Apollo Lunar Launches - MAYBE NOT Too Fast

Note A17 - full launch video:
https://www.nasa.gov/wp-content/uploads/static/history/alsj/a17/a17v_1880127.mpg

Note the absence of light emission from the interior of nozzle.
Lumens should be 20-40x equiv of 100W incandescent flood light.

More, Testing of the Ascent Flush Setup:
https://ntrs.nasa.gov/api/citations/20100032986/downloads/20100032986.pdf
"The Apollo 5 mission was the first to test the LM Descent and Ascent Stage operation. "
(Jan 22, 1968) – "Fire in the Hole"

I have completed the Lunar Launch Speed analysis, and that was a long road to a personal conclusion that this MLH theory is possibly debunkable, based upon the inclusion of "Static Pressure Thrust", which may be exceptionally high for the Ascent Launch with a platform directly beneath it. If so, then NASA may have modeled the acceleration reasonably well when they pulled it up by the cable.

This argument DOES NOT support the MLH theory, unless someone with deeper understanding of Rocket Engines can indicate that this setup of "high static pressure" wouldn't be extraordinarily dangerous, or grossly interfere with the other forms of thrust (Momentum Thrust) as it reached the 0.5 meter point. This analysis is above my pay grade, so I will not be attempting any such analysis.

My initial analysis omitted the concept of Static Pressure Thrust, which could be HIGH at take-off. A re-analysis of 20 Frames of Apollo 16, with a thorough spreadsheet of intermediate results has revealed that it could be possible to explain the acceleration rate with the inclusion of Static Pressure Thrust, while also assuming that the rest of this rocket's thrust is not reduced by too much.

In short, from the vantage point of a non-rocket-scientist, Static Pressure Thrust could potentially account for enough added boost during the first 0.5 seconds in order to give it the velocity to carry it through to the 1.8 meters high at 1.0 seconds into the flight.

Although personally, I still firmly believe the Human Moon Landings were faked, this particular analysis appears to hold little-to-no weight to this end. From what I can

see, the actual Ascent Module specs/setup, could feasibly produce the acceleration curves witnessed in all 3 Lunar Launches - 15, 16, and 17.

This revised conclusion can be seen in the spreadsheet - Tab #1

Lunar-Launch-Too-Fast - SPREADSHEET - Proves Debunk

NOTE!! NASA Modeled this Correctly.

AM Height	**2.82**	**245**	**pixels**	**Expected**	**1.39**
Pixel Scale	**0.011510:**	**meters**			

Accel Fuc 1 (to compensate for 0.1 sample i

						start	VALIDATE		DURING					Y-PIXEL - IMAGE LOCATION				
	(ms)			Alt (mm)		m/s	Altitude(mm)		Time	dTime	v0*	(m/s^2		Pixels				
sk	Time		Incr	Incr	Total	Speed	Alt(mm)	Expected	Incr(s)	Squared	dT	Accel	YPix	Fudge	TopCtr	TopRt	Right	SideHt
	0	0	33	0.0	0	0.0000	0.00	0.00	0.033	0.00116	0	2.000	646.67	0.00	619	619	702	83
	33	33	34	1.2	1.2	0.0660	1.16	1.16	0.034	0.00116	0.002	7.000	646.57	0.10	619	619	702	83
	67	67	33	6.3	7.4	0.3040	7.45	7.45	0.033	0.00109	0.010	6.000	646.02	0.31	619	618	702	84
	100	100	33	13.3	20.7	0.5020	20.75	20.75	0.033	0.00109	0.017	5.000	644.86	-0.53	617	617	699	82
	133	133	34	19.3	40.0	0.6670	40.0	40.0	0.034	0.00116	0.023	5.000	643.19	-0.19	616	615	698	83
	167	167	28	25.6	65.6	0.8370	65.6	65.6	0.028	0.00078	0.023	5.000	640.97	0.03	613	613	697	84
-5	200	195	38	25.4	91.0	0.9770	91.0	91.0	0.038	0.00144	0.037	4.000	638.76	0.57	611	611	696	85
5	233	233	34	40.0	131.0	1.1290	131.0	131.0	0.034	0.00116	0.038	3.800	635.28	0.05	606	607	693	86
	267	267	33	40.6	171.6	1.2582	171.6	171.6	0.033	0.00109	0.042	3.200	631.76	0.24	603	603	690	87
	300	300	33	43.3	214.9	1.3638	214.9	214.9	0.033	0.00109	0.045	3.100	628.00	0.33	598	600	687	87
	333	333	42	46.7	261.6	1.4661	261.6	261.6	0.042	0.00176	0.062	2.700	623.94	0.06	594	596	682	86
8	367	375	25	64.0	325.5	1.5795	325.5	325.5	0.025	0.00063	0.039	2.430	618.39	-0.72	588	590	675	85
-8	400	400	36	40.2	365.8	1.6402	365.8	365.8	0.036	0.00130	0.059	2.350	614.89	0.44	585	588	673	85
3	433	436	31	60.6	426.3	1.725	426.3	426.3	0.031	0.00096	0.053	2.200	609.63	-0.63	579	580	668	88
-3	467	467	33	54.5	480.9	1.793	480.9	480.9	0.033	0.00109	0.059	2.120	604.89	0.44	575	578	663	85
	500	500	105	60.3	541.2	1.863	541.2	541.2	0.105	0.01103	0.196	2.050	599.65	0.68	570	573	658	85
5	600	605	107	207	748.1	2.078	748.1	748.1	0.107	0.01145	0.222	1.870	581.67	-0.34	549	553	642	89
7	700	712	104	233	981.2	2.278	981.2	981.2	0.104	0.01082	0.237	1.760	561.42	-0.76	527	534	621	87
4	800	816	97	246	1227.6	2.461	1227.6	1227.6	0.097	0.00941	0.239	1.680	540.01	-0.34	507	513	599	86
-3	900	913	107	247	1474.3	2.624	1474.3	1474.3	0.107	0.01145	0.281	1.640	518.58	0.42	485	493	579	86
7	1000	1020	205	290	1764.5	2.800	1764.5	1764.5	0.205	0.04203	0.574	1.600	493.37	-0.70	456	468	554	86
5	1200	1225	300	608	2372.1	3.128	2372.1	2372.1	0.300	0.09000	0.938	1.550	440.58	-0.25	404	415	502	87
	1500	1525	312	1008	3380.2	3.593	3380.2	3380.2	0.312	0.09734	1.121	1.51	353.00	-0.33	318	329	411	82
12	1800	1837	-1800	1194	4574.6	4.064	4574.6	4574.6	0.200	0.04000	0.813	0.00	249.23	-0.9	212	227	306	79

Column A - is msec time skew correction.

ORIGINAL (WRONG) CONCLUSION - not accounting for Static Pressure Thrust

This article demonstrates that **Apollo's Ascent Modules seemingly broke physics** during Lunar Ascents for Apollo 15, 16, and 17. The math involved is the simple high school physics equation for distance traveled with constant acceleration, and some algebra.

In all 3 cases, the distance traveled by the Ascent Module (AM) was significantly further than what would be possible given the specs of this AM thrust engine, at 15,700 Newtons, and the calculated mass of the AM at launch, in lunar gravity.

NOTE: This doesn't account for "Static Pressure Thrust" which is significant up to 0.3 meters above lift-off. Under construction… adding it now.

Given that even the mighty **Apollo is not allowed to "break physics"**, the results presented in this article may indicate that these launches were not real, but rather were faked/simulated.

Summary of results, for the 1 second test:

A15: 2.86x factor, too fast

A16: 2.57x factor, too fast

A17: 2.58x factor, too fast

(NOTE – Need to factor in Static Pressure Thrust)

Here are the time-stamped links to the NASA footage for each Lunar Ascent:

A15 Footage: https://youtu.be/BMBcLg0DkLA?t=50 (15 FPS)
A16 Footage: https://youtu.be/VV0LYUTffTI?t=12 (30 FPS)
A17 Footage: https://www.youtube.com/watch?v=9HQfauGJaTs (30 FPS)

LINKS:

One Drive Source Folder:

Lunar Launches - Too Fast - SOURCE FOLDER

Spreadsheet of the MATH:

Lunar Launches Too Fast - THE MATH

FRAME CAPTURE RESULTS - Folder:

BIG - Lunar Launches Too Fast - FRAME CAPS

How work was done - shown here:

Lunar Launches Too Fast - README

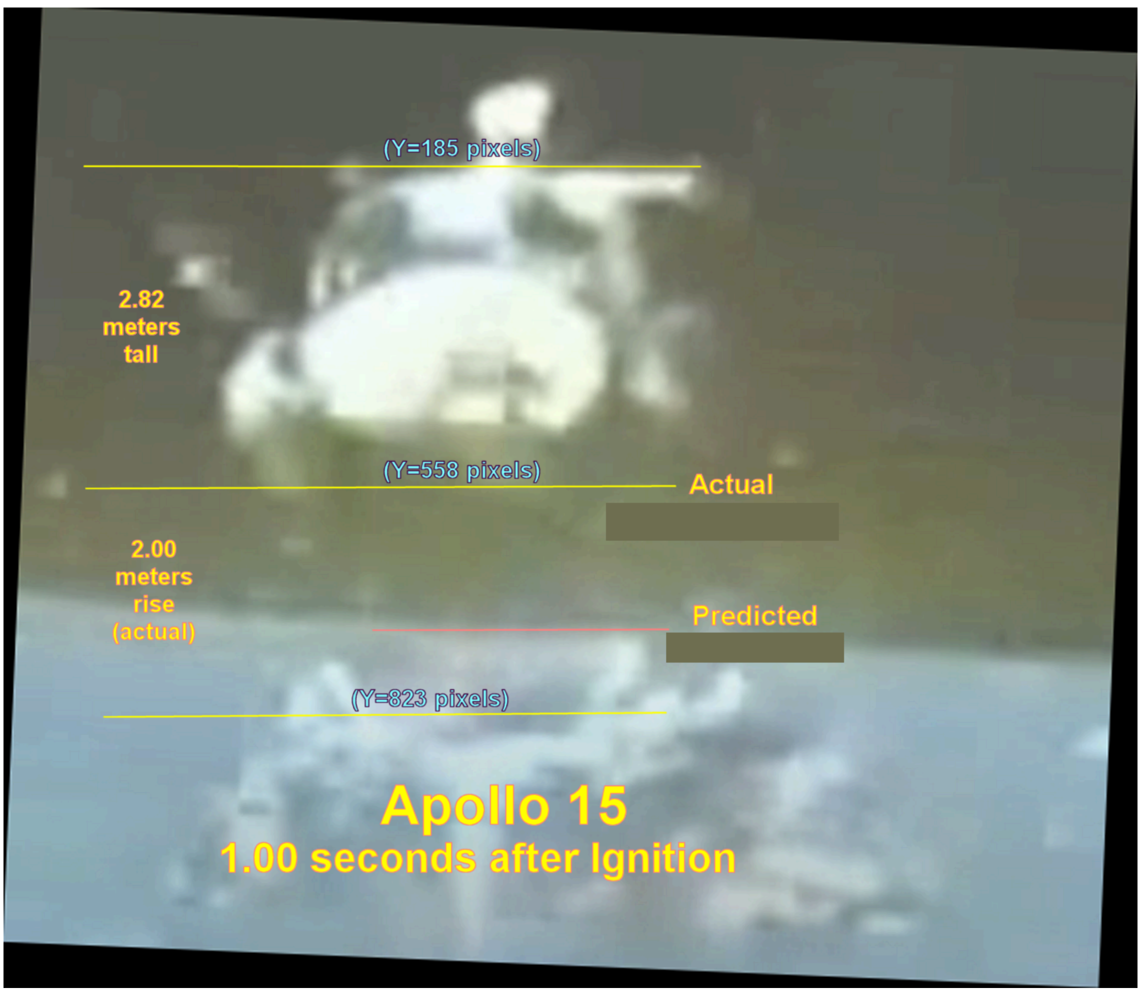
Apollo 15 Launch, 2.82X Too Fast!

Acceleration/Mass/Gravity Math:

Mass of LM Ascent stage = 5154 kg
Expected Acceleration: 1.40 m/sec^2

Actual Acceleration: 4.00 m/sec^2

Apollo 15 - 1 Seconds After Launch

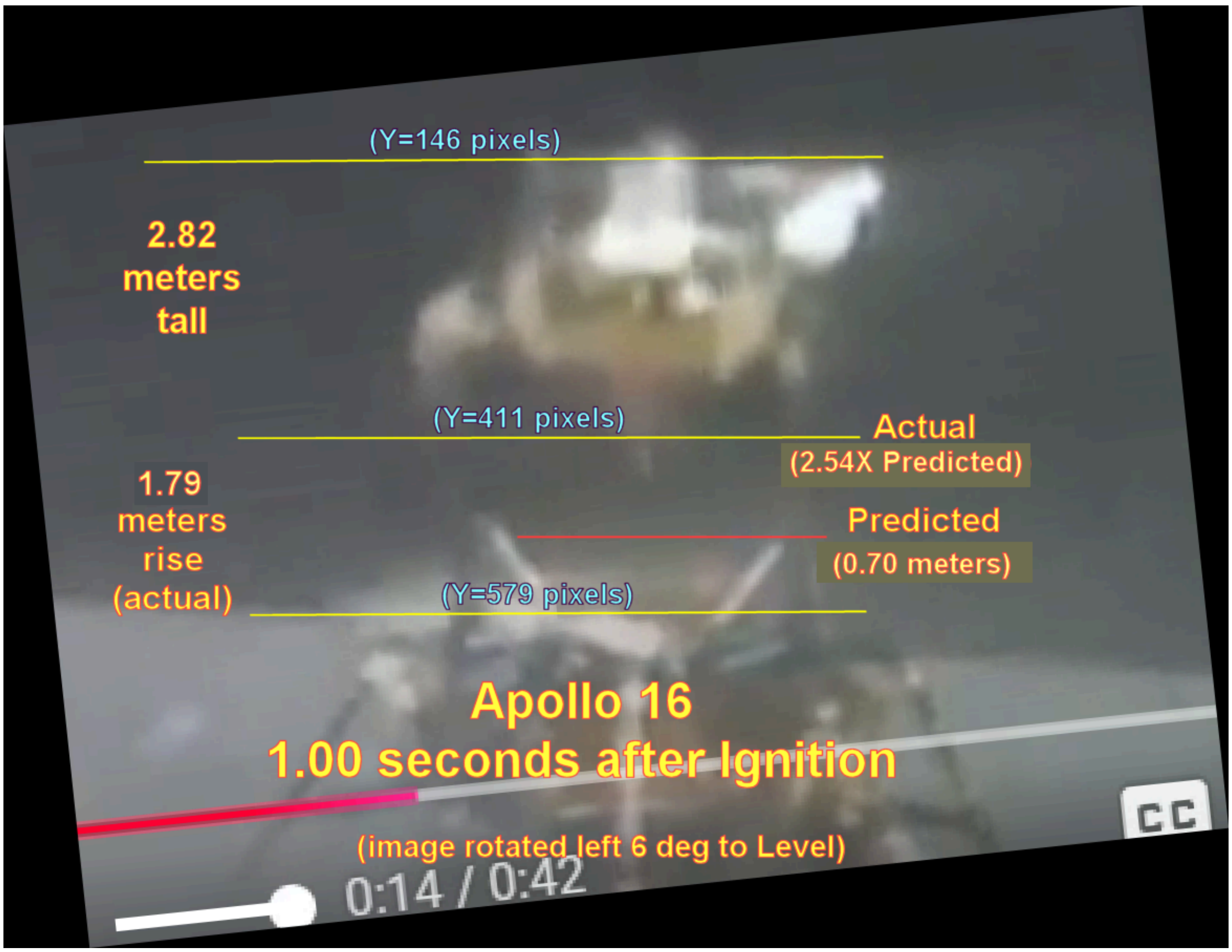


Apollo 16 Launch, 2.58X Too Fast!

Acceleration/Mass/Gravity Math:

Mass of LM Ascent stage = 5175 kg
Expected Acceleration: 1.39 m/sec^2
Actual Acceleration: 3.58 m/sec^2

Apollo 16 - 1 Seconds After Launch



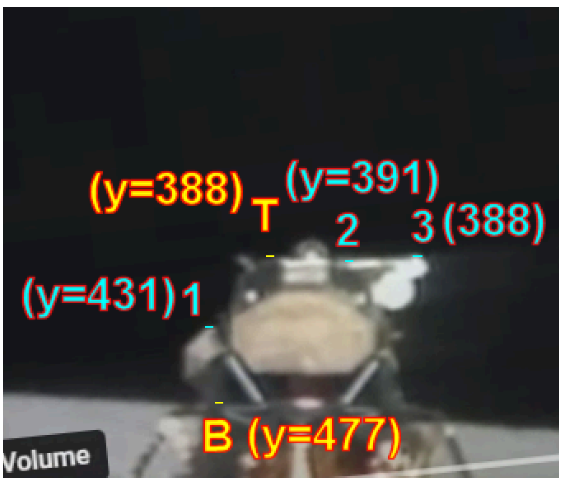
Apollo 16 Launch, 2.57X Too Fast!

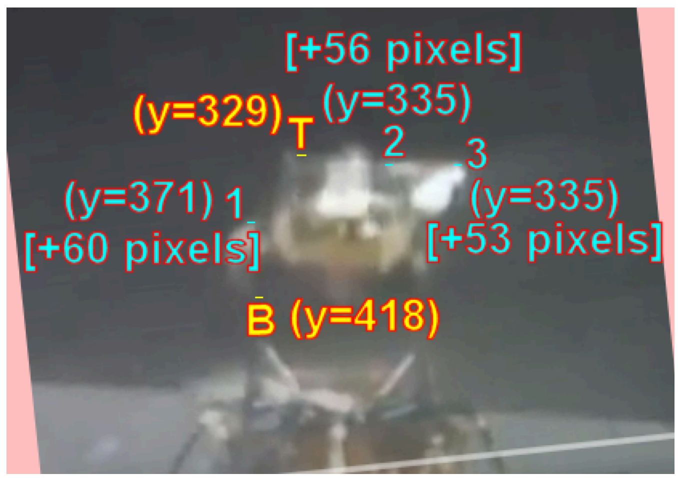
RE-ANALYZED USING MORE PRECISE IMAGE ANALYSIS METHODS.

Actual Acceleration: 3.57 m/sec^2

Work/Methods shown in this folder:
https://drive.google.com/drive/folders/1EyQ1deiKOqD6Ti-XxvCEGhp9SEXd_bYH?usp=drive_link

Apollo 16 - At Ignition, and then 1.00 Seconds After Launch



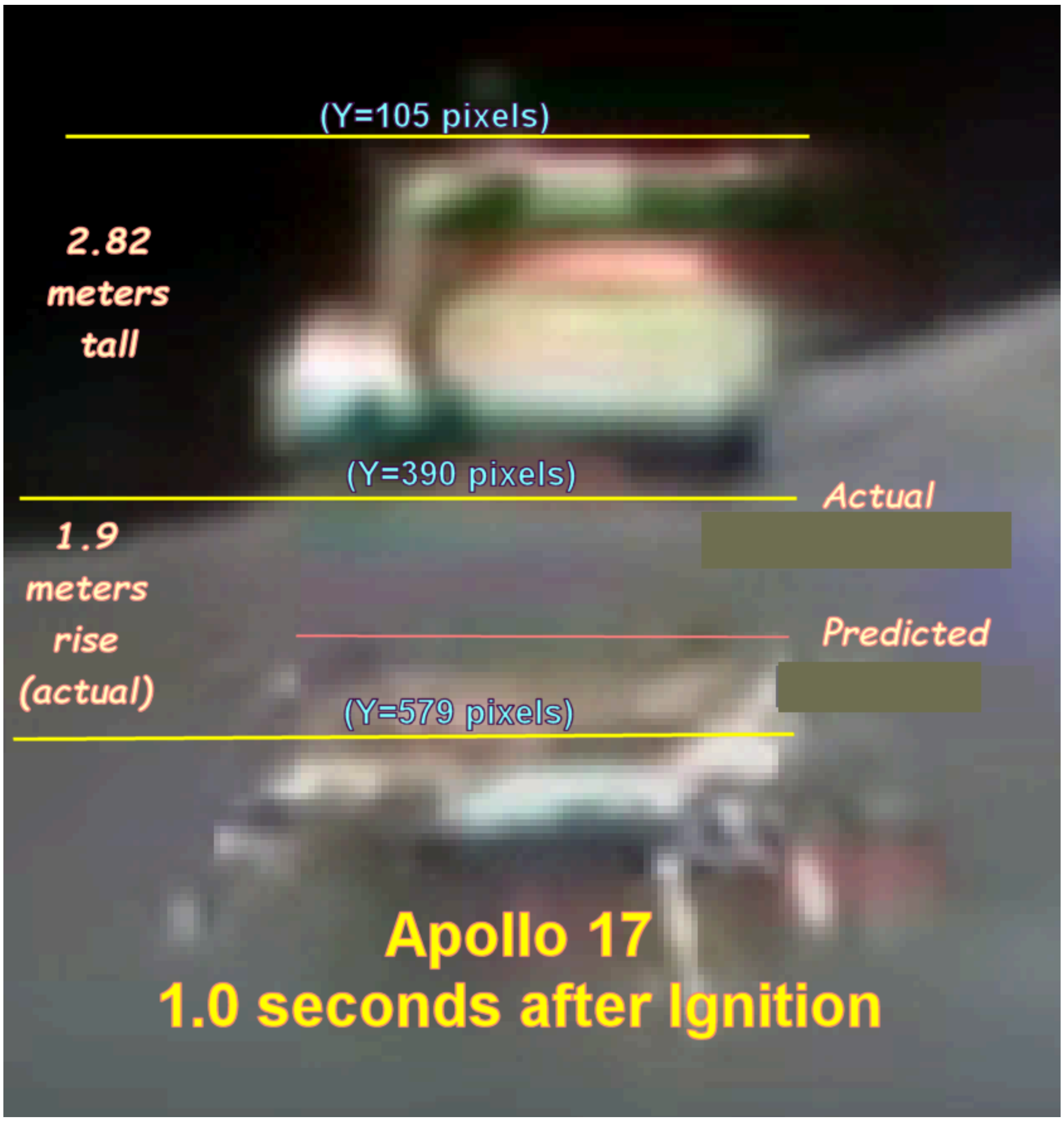


Apollo 17 Launch, 2.55X Too Fast!

Acceleration/Mass/Gravity Math:

Mass of LM Ascent stage = 5074 kg
Expected Acceleration: 1.45 m/sec^2
Actual Acceleration: 3.74 m/sec^2 (2.55X)

Apollo 17 - 1 Seconds After Launch



Prior Frames - To Justify Vertical Starting Point for Launch Acceleration.

Apollo 15:

Apollo 16:

Apollo 17:

REBUTTAL #1:

A16 - Launch Too Fast - Was there Impulse?

Was there an Initial Impulse from Exhaust Compression?

Conclusion: NO. Rebuttal fails. (see below and linked spreadsheet)

However this analysis beyond 1 second showed another, perhaps **another mistake** in NASA's simulation.

Time: 0 to 1 second - shows near constants acceleration of 3.6 m/s^2 (2.5X expected).
Time: 1 to 1.5 seconds - Acceleration drops well below HALF of the expected 1.39 m/s^2

Folder showing Image Capture Analysis:
A16-LaunchTooFast - 10 FPS Breakdown folder

Spreadsheet of THE MATH: (2nd Worksheete - "A17-10FPS-2sec")

A16-LaunchTooFast - THE MATH <= link

(x0.01s)	Pixel Y-Offset		m/s	Acceleration (m/s^2)				Altitude (m)		
Time	Incr	Total	Speed	Instant	Expected	0.5 sec	RATIO	Actual	Expected	RATIO
0	0	0	0	0	0	0	0.00	0	0	
10	0.65	0.65	0.206	2.060	1.390		1.48	0.021	0.007	2.96
20	1.75	2.4	0.554	3.485	1.390		2.51	0.076	0.028	2.74
30	2.85	5.25	0.903	3.485	1.390		2.51	0.166	0.063	2.66
40	3.95	9.2	1.252	3.485	1.390		2.51	0.292	0.111	2.62
50	5.05	14.25	1.600	3.485	1.390	3.200	2.51	0.452	0.174	2.60
60	6.15	20.4	1.949	3.485	1.390	3.485	2.51	0.646	0.250	2.58
70	7.25	27.65	2.297	3.485	1.390	3.485	2.51	0.876	0.341	2.57
80	8.35	36	2.646	3.485	1.390	3.485	2.51	1.141	0.445	2.56
90	9.45	45.45	2.994	3.485	1.390	3.485	2.51	1.440	0.563	2.56
100	10.55	56	3.343	3.485	1.390	3.485	2.51	1.774	0.695	2.55
120	21	77	3.327	-0.079	1.390	2.060	-0.06	2.440	1.001	2.44
150	33	110	3.485	0.528	1.390	0.285	0.38	3.485	1.564	2.23
180	36	146	3.802	1.056	1.390	0.634	0.76	4.626	2.252	2.05

Rebuttal #2: You can’t count on the timing.

Response: Yes you can, reference the Flight Journal:
https://youtu.be/x34CzbUdHBA

The journal matches the Film timing verbatim. Film Timing was correct.

Also timing from these cameras is consistent for all other hours of footage vs. audio, where alignments can be made. And the timing for all 3 launches shows the same 2.5x+ acceleration, which is further proof that “timing error” is negligible.

188:01:39 Schmitt: Ignition.

[Schmitt - "As I recall, at the moment of ignition, all we had was static - loud static. And I was looking to see what happened, to see if I'd lost lock."]

[Cernan - "Jack spent half of the lift-off trying to get comm back."]

[Schmitt - "And I remember somebody telling me that what had happened was that they had a site handover scheduled right at lift-off! And nobody caught it."]

[Jack's memory is not quite accurate, although the problem was, in part, due to procedures on the ground. The following has been extracted from the Apollo 17 Mission 5-Day Report: "On lunar module ascent, two-way lock with the lunar module transponder was lost. This resulted in a 4-minute loss of uplink voice, and tracking data during ascent. It was necessary to have the Command Module Pilot pass comments from the ground to the lunar module crew during this period. The initial loss of lock was attributed to attenuation by the lunar module (engine) plume. Communications should have been re-established in less time (than 4 minutes). A review of data indicates that a normal re-acquisition by Goldstone should have been attempted earlier. Approximately 4 minutes after lunar module lift-off, a normal re-acquisition was accomplished."]

[According to Apollo 7 astronaut Walter Cunningham in his 1977 book "The All-American Boys" (p 241) and, more importantly, according to Gene in his 1999 book "Last Man on the Moon" (p338), Gene's last words on the Moon were "Let's get this mother out of here." During the mission review in Santa Fe, Gene was surprised not to hear those words but what seems likely is that what he was remembering was his "Now, let's get off." at 188:01:25; and that, in later tellings, the wording changed to the more colorful version. I have discussed this matter with Andrew Chaikin, another aficionado of the audio tapes, and we agree on the interpretation given here. My thanks to William Bianco for reminding me about this issue and to Hamish Lindsay for pointing me to the telling in Gene's book.]

188:01:40 Cernan: We're on our way, Houston!

188:01:43 Schmitt: Rates are good. AGS saw it (that is, the ignition). (Pause)

188:01:48 LM Crew: Pitchover!

188:01:51 Fullerton: Roger. You have good thrust. (Pause)

Old Rebuttal Removed, by 2016:
https://web.archive.org/web/20140715030721/www.braeunig.us/apollo/LM-ascent.htm

ALSO - Validated Timing via published FPS and YouTube Timer:

1. Source Frame Rates are published for all 3 (15, 30, and 30 FPS).
2. In All 3 cases, the Published FPS exactly matched the YouTube Timer.
   (e.g. if the 6th frame was the first time we see “14 seconds” on YouTube time, then the 36th frame was the first time we see “15 seconds” on YT timer.)
   For all 3 the published FPS and YT Timers were exactly matched.

NOTE: In order to align Video with Audio, they had to be good at keeping “good timing”. The A17 example of Audio, Video, and Transcript – all align for a full 15 seconds confirmed - with no skew.

Rebuttal #3 "Ignition Transients gave extra Boost at Launch"

Robert A. Braeunig quote used by PNA's:
Article cited - last seen in 2017, **gone by 2018**:
https://web.archive.org/web/20170904033346/http://www.braeunig.us/apollo/LM-ascent.htm

...there is a brief period, called the ignition transient, during which extreme conditions can occur, such as high pressure... For the LM's ascent engine, the ignition transient lasted for about **350 milliseconds**, during which stronger than normal thrust was produced.

Notice that the exit of the ascent engine nozzle sat tight against the upper deck of the descent stage. On start-up, the **gas pressure at the nozzle exit rose to higher than normal values due to the constricted flow** of exhaust gas. This produced a high degree of transient pressure thrust just at the moment of liftoff….

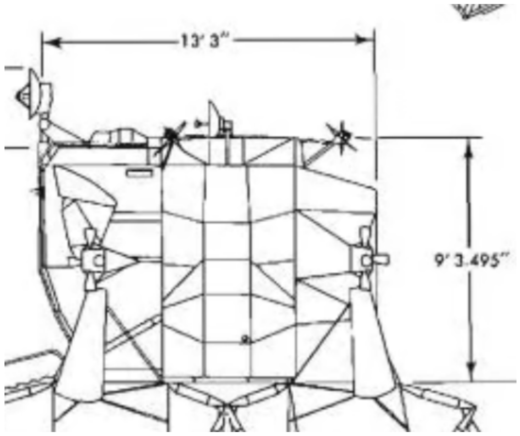
…this was only a transitory condition, **after which the LM's acceleration was consistent** with the steady-state operation of its ascent engine.

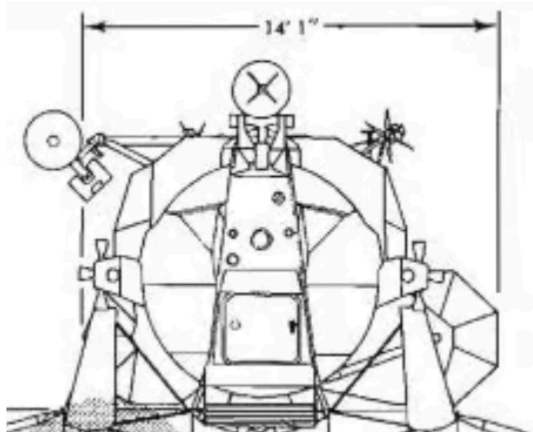
Braeunig is "an average guy" - that's it:
https://www.scss.tcd.ie/Stephen.Farrell/ipn/background/Braeunig/about.htm#:~:text=My%20name%20is%20Robert%20A,perhaps%20a%20model%20rocketry%20enthusiast.
"you may come to the conclusion that I may be some sort of 'rocket scientist' or perhaps a model rocketry enthusiast. Both of these assumption would be incorrect. My education is in the field of civil engineering and I currently work for a construction company in Dayton, Ohio. I have never designed, built or launched a rocket of any kind. **I am simply an average guy** who is fascinated by rocketry and space flight."

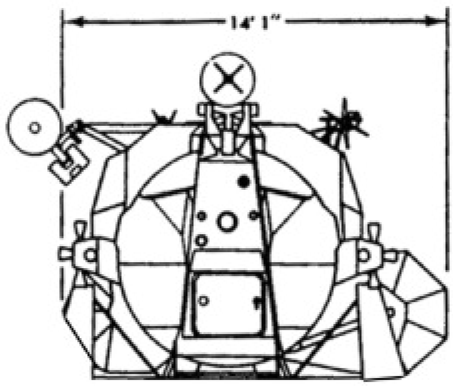
Critical Issues:

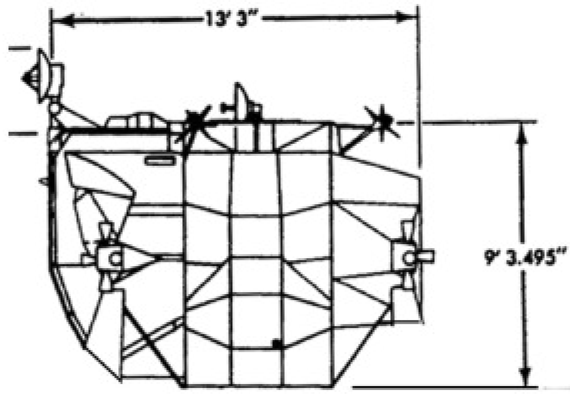
1. Not Expert - Braeunig is nowhere close to an "expert source".
2. Retracted 2018 - Statement retracted in 2018.
3. Vague/Unsupported - Statement was vague, unsupported
4. Contrary - contradicts all other legit articles we can find.
5. Inaccurate - as 2.5x acceleration lasted 1000 msec, vs. 350 msec.
6. Inaccurate - 2nd second was also NOT CONSISTENT (acceleration dropped below 0).

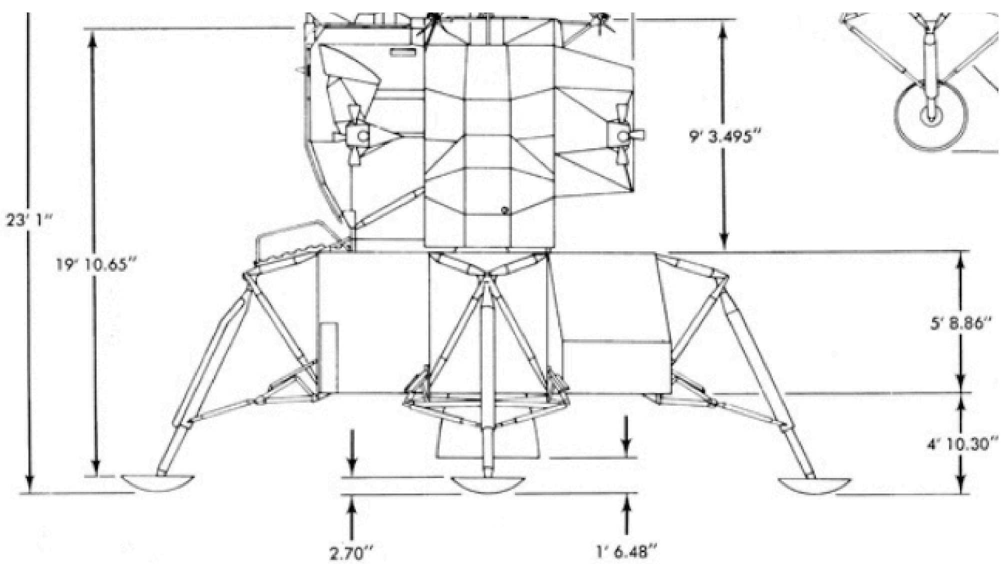
Blueprints of the LEM and AM to derive 9’3” Tall Ascent Module:

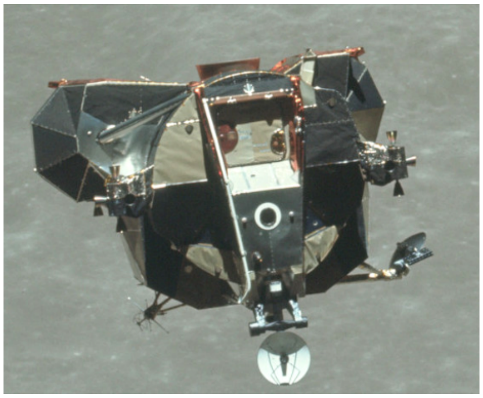


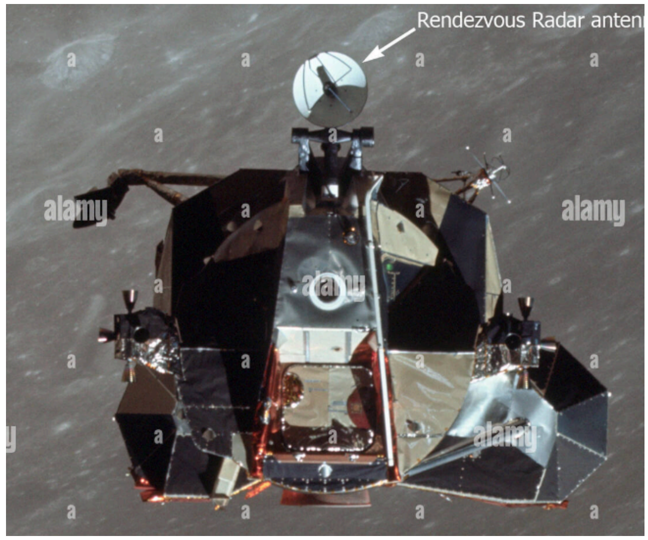











Rendezvous Radar anten


olume
0:13 / 0:42
CC

Method of Image Analysis:

We are using the known height of the AM (2.82 meters) as your “measuring stick” to determine all other distances.   In short if the AM is 100 pixels high, then an upward movement of 50 pixels translates to 1.41 meters (of motion).

Corrections:

For Apollo 16, Young parked the Rover 300 feet east of the LM 300 feet is 91.4 metres

For Apollo 17, Eugene Cernan parked the Rover about 518 feet from the LM. This is 158m and the closest to your assumptions, but its still wrong with a 6% error. It was also parked on uneven ground.

Setup:

1. Camera is positioned 91/158 meters away, at 1.5 meters above ground.
2. Assumed that ground level is between -5 meters to +10 meters of the Lander.
3. AM bottom starts at 3 meters above ground. (top of the base)
4. AM is about 3 meters tall. (Vertical Center is 4.5 meters above ground)
5. AM bottom/top, therefore are 2 and 5 meters above the camera.
6. AM rises about 2 meters in the first 1 second.
7. The Camera View angle starts out at: 0.8 deg (bottom) & 1.9 deg (top).
8. After 1 second, Camera view angle is: 1.5 deg (bottom) & 2.7 deg (top)
9. **The Arc Angle of AM Top motion is 0.8 deg.**

Error Analysis SUMMARY:

The following potential sources of error were analyzed:

1. Pixel Measurement Error **- TODO**
2. Frame Time Error **- TODO**
3. Camera View Angle Skew: Negligible - would favor MLH
4. Non-Level Launch: Negligible - would favor MLH
5. Camera Aspect Ratio Skew - Zero impact.
6. Camera Barrel Distortion - < 2% impact, would favor MLH

Error Analysis #1: Pixel Measurement Error?

RESULT: ?

We will calculate the error for the extremes, to see if it’s negligible or not.

Error Analysis #2: Frame Time Error?

RESULT: ?

We will calculate the error for the extremes, to see if it’s negligible or not.

Error Analysis #3: Impact of Camera View Angle Slant?

We will calculate the error for the extremes, to see if it's negligible or not.
RESULT: NEGLIGIBLE (0.22% max)- Including would FAVOR MLH.

Case #0: Perfect side case
Rover is 4 meters higher than the lander, thus perfectly to the side at the midpoint.
View Angle of AM Center:
Launch: (4.5) - (4 + 1.5) = -1.0 meter / 91 meters => invTan => -0.63 deg => Cos => 0.99994
1-sec: (4.5 + 2) - (4 + 1.5) = 1 meter / 91 meters => invTan => 0.63 deg => Cos => 0.99994
Error: 0.0000

Case #1: Rover Lowest (-5 meters)
Rover is 5 meters LOWER than the lander
View Angle of AM Center:
Launch: (4.5) - (1.5 - 5) = 8 meters / 91 meters => invTan => -5.02 deg => Cos => 0.99615
1-sec: (4.5 + 2) - (1.5 - 5) = 10 meter / 91 meters => invTan => 6.27 deg => Cos => 0.9940
Error: 0.00215 = > 0.22%...

Case #2: Rover Highest (+10 meters)
Rover is 10 meters HIGHER than the lander.
View Angle of AM Center:
Launch: (4.5) - (1.5 + 10) = -7 meters / 91 meters => invTan => -4.40 deg => Cos => 0.9971
1-sec: (4.5 + 2) - (1.5 + 10) = -5 meter / 91 meters => invTan => -3.14 deg => Cos => 0.9985
Error: 0.0014 => 0.14%.

Conclusion: NEGLIGIBLE. (0.22% max) IGNORED for simplicity.

NOTE: If we accounted for this error, it would make the MLH case up to 0.22% STRONGER than it is now (as our Rise Distance would be underestimated by up to 0.22%).

LEGACY ANALYSIS:
OLD Invalid Analysis - not accounting for "both readings being impacted by same skew"
A17:
cos(1.9) / cos(2.7) = 0.99945 / 0.9989 = 1.0006, or well under 0.06% of error max.

Error Analysis #4a: Non-Level Launch (TOWARDS Camera)?

Result: NEGLIGIBLE (0.21% max) - Including favors MLH

If we assume 5 degrees of skew TOWARDS the camera, then after 2 meters of motion, this would equate to the AM moving under 0.2 meters towards or away from the camera, which is already 91 meters away.   The difference in arc-angle of the 2.8 meter tall LM between 149.8 meters away vs 150 meters away:

At 91 meters away is ratio 0.03099 => InvTan => 1.775 deg tall (arc-angle)
At 90.8 meters away is ratio 0.03106 => InvTan =>1.7789 deg tall (arc-angle)
Ratio of Ratios = 0.03106 / 0.03099 => 1.00185 => 0.185% size change

The impact of this on our measurements would be 0.19 pixel per 100 pixels in Favor of the Apollogy (as our height of top could be 0.19% higher).

HOWEVER, this introduces a new form of error in that the AM's height would actually be 0.4% greater than measured. (cos(5 deg))

Combined impact is 0.21% in FAVOR of MLH

Error Analysis #4b: Non-Level Launch (AWAY FROM Camera)?

Result: NEGLIGIBLE (0.62% max) - Including favors MLH

If we assume 5 degrees of skew AWAY FROM the camera, then after 2 meters of motion, this would equate to the AM moving under 0.2 meters towards or away from the camera, which is already 91 meters away. The difference in arc-angle of the 2.8 meter tall LM between 149.8 meters away vs 150 meters away:

At 91 meters away is ratio 0.03099 => InvTan => 1.775 deg tall (arc-angle)
At 91.2 meters away is ratio 0.030921 => InvTan =>1.7711 deg tall (arc-angle)
Ratio of Ratios = 0.030921 / 0.03099 => 0.9978 => 0.223% size change

The impact of this on our measurements would be 0.22 pixels per 100 pixels in Favor of MLH (as our height of top could be 0.22 pixels lower).

HOWEVER, this introduces a new form of error in that the AM's diagonal ascent would actually be 0.4% greater than measured. (cos(5 deg))

Combined impact is 0.62% in FAVOR of MLH

Error Analysis #5: Camera Aspect Ratio Skew?

Result: NEGLIGIBLE (0.000% max)

This makes ZERO impact, because all measurements are relative. So if the height of the AM is skewed up by 10%, then the amount of Rise will be skewed up by 10% as well. So they cancel out entirely.

Error Analysis #6: Camera Barrel Distortion?

Result: NEGLIGIBLE (< 2% max) - Including favors MLH

Barrel Distortion decreases the size/scale of objects towards the edge. Therefore, if this distortion were a factor for these videos, it would only mean that the AM actually rose HIGHER than the pixel count is indicating. This would favor the MLH case.

We could detect this by measuring the relative height of the AM at Launch, vs. 1 second. If Barrel Distortion is a factor, then the Pixel-height of the AM would shrink (get shorter). The measurements taken do not indicate any detectable distortion.

NOTE: If there is distortion, then that would make the MLH case stronger, because the current "1 second altitude measurements" would need to be adjusted HIGHER, thus increasing the already problematic Acceleration ratios.

Similar Proof: Lawrence Howlins

https://www.youtube.com/@lawrencehowlins9887
https://www.youtube.com/watch?v=ziyE5NbPe9M
https://www.youtube.com/watch?v=x34CzbUdHBA

Covers the Trajectory itself - not on mark for a lunar Rendezvous:

https://www.aulis.com/apollo17_ascent.htm?fbclid=IwY2xjawGtyd5leHRuA2FlbQIxMAABHY7s9CgdITT6nZvy-Osx4hVJLUwKn74zAXGdGK7KYIKPA_AHYmzgS8sb2w_aem_Ar3iYaIJoitYoJGwqvXFbw

Articles about Ignition Transients - Liquid-Fuel Rockets:

General behavior of Liquid-Fuel Rockets is that thrust starts low at ignition and builds up to peak, but never goes ABOVE peak (unless maybe a small blip).

https://ntrs.nasa.gov/api/citations/19710014805/downloads/19710014805.pdf

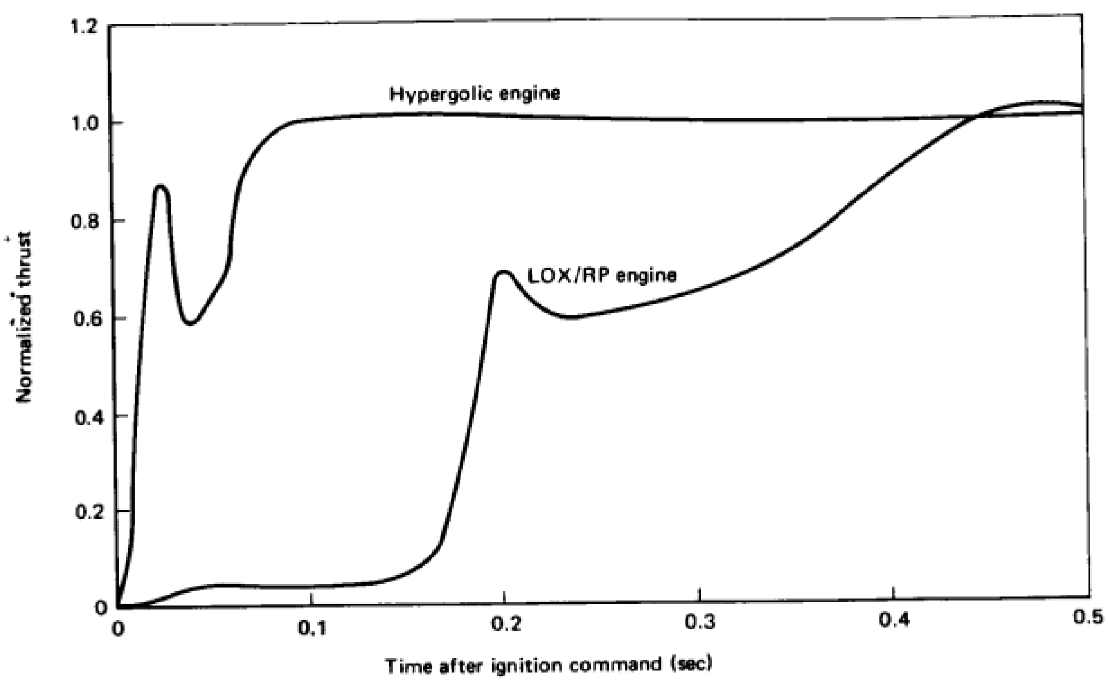
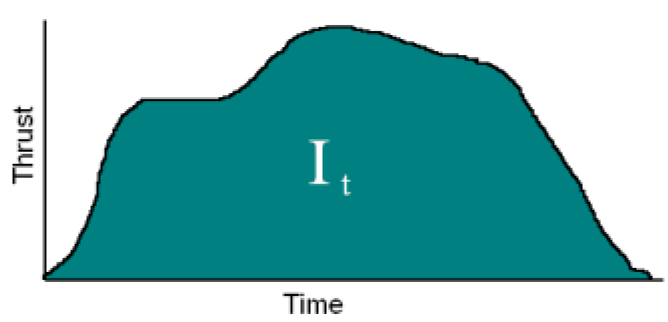


Figure 1

https://ntrs.nasa.gov/api/citations/20140002716/downloads/20140002716.pdf



Solid Rocket - not directly applicable - but has same behavior:

https://ntrs.nasa.gov/citations/19920006646
https://ntrs.nasa.gov/api/citations/19920006646/downloads/19920006646.pdf

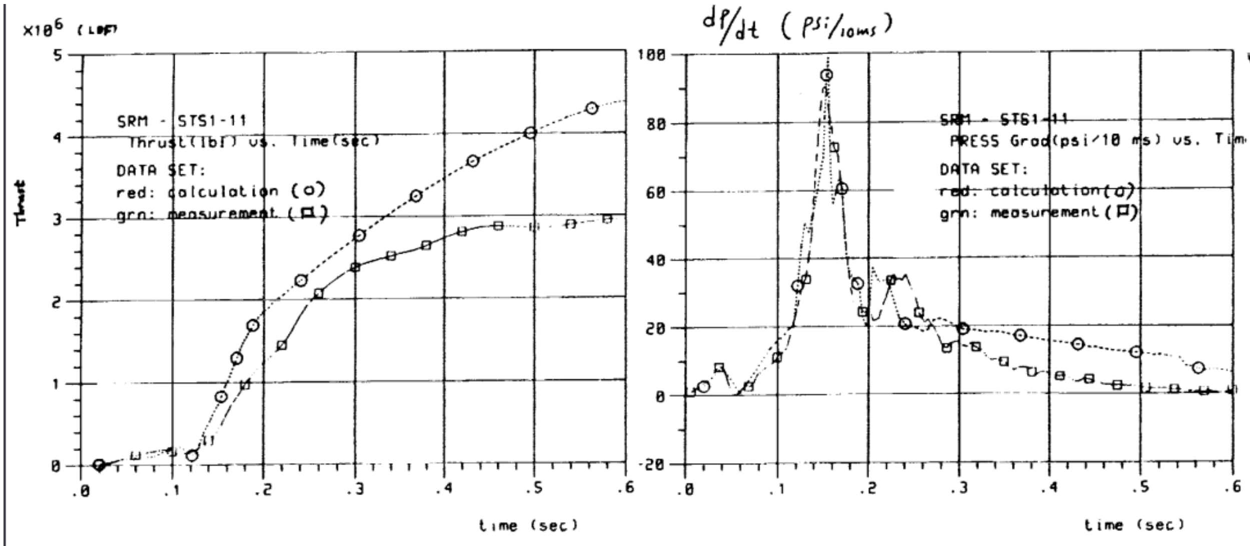


Fig. 1

Educational Sites and Terms/Concepts:

Momentum Thrust = Conservation of Momentum.
Pressure Thrust = 3rd Law, Equal-Opposite forces
Ideally Expanding Nozzle - minimizes Pressure Thrust (the ideal)
Specific Impulse = SI = v/g

Tutorial:
https://youtu.be/7Kd72HBMIT4

Equation and Basics:
https://www.grc.nasa.gov/www/k-12/airplane/rockth.html

More:
Aspect Ratio analysis.

Front/Back In-Flight Antennas. SNR/specs? Mentions of them?
What does Low-Bit-Rate imply?

And:
https://apollohoax.net/forum/index.php?topic=1893.msg56499#msg56499

https://apollohoax.net/forum/index.php?topic=1563.msg48922#msg48922

Attempted debunks:

Attempt #1:

Windley: It doesn't directly address thrust, but it does address the proxy value of chamber pressure. "The maximum allowable combustion chamber pressure during start transients was 177 percent of the nominal combustion-chamber pressure." C.E. Humphries, R.E. Taylor. Apollo Experience Report - Ascent Propulsion System, NASA Technical Note TN D-7082 (Houston, TX: 1973), p. 2.

Rebuttal: This quote simply tells the "breaking point" of the chamber/hardware, that should NEVER be exceeded.   The rated Chamber pressure is 120 psia, but should never exceed 130 psia, because of reverberation risks. The fuel intake pressure is 170 psi - and is dependent upon a lower chamber pressure in order to enable this fuel to flow.   If it psia goes too high - it slows (or even stops) the fuel flow - which then results in the chamber pressure dropping to VERY LOW – which then causes more fuel to surge - when then results in VERY HIGH pressure again, and the cycle of reverberation begins, and is dangerous.   They seek to avoid this, so that no one dies.

Attempt #2:

You maintain that thrust is uniformly lower during ignition transients. But from your own sources: "Single engines or different engines of the same design also exhibit variations of thrust input, and consequently have significant differences in thrust-buildup curves. As discussed in Section 2.1.4, the usual procedure is to conduct many static firings to establish the statistical nature of the ignition thrust input." *Transient Loads from Thrust Excitation*. NASA Space Vehicle Design Criteria, NASA SP-8030, p. 2. The reference says, "Data for obtaining dynamic input curves of thrust buildup and thrust decay should be obtained directly from static firings of the actual engines, with care taken to correct the data for test-stand motion." (internal references omitted) *Id.* p. 15. There's no one-size-fits-all concept of ignition transient.

Rebuttal: Sure there is variation. But show us JUST ONE case where the tested result showed MORE THRUST during this transient Ignition state? They bring it up steadily to avoid "oscillation/reverberation" – spiking it, is bad bad bad – and may result in critical failure overall. So we should expect LESS Thrust during ignition, not more.

Attempt #3 - SmartCooky:

My understanding of mathematical tolerances is just fine. I do this sort of stuff for a living, and I have been correct in all of my assessments of your shoddy work.

Trying to measure timings with an uncertainty of one second over a maximum measurable reference time of three seconds introduces error bars of about ±30%. This is because you have not allowed for digital uncertainty.

When a digital clock reads 10 seconds, the actual value could be as low as 9.5s or as high as 10.4s... a possible error of 0.9 seconds.
When a digital clock reads 13 seconds, the actual value could be as low as 12.5s or as high as 13.4s... a possible error of 0.9 seconds.

therefore, the actual elapsed time could be anywhere between 2.1 seconds (12.5-10.4), and 3.9 seconds (13.4-9.5)
2.1s over a 3 second measurable reference time is 21/3x100 = 70% (-30%)
3.9s over a 3 second measurable reference time is 3.9/3x100 = 130% (+30%)
Therefore, your error bars are at ± 30%
Q.E.D.

This makes the basis on which you have taken you measurements is flawed. When the basis is flawed, any measurements you take are meaningless, and any results you draw from them are therefore also meaningless. The rest of your errors do not really matter. Nonetheless, I will address them.

Rebuttal: For A16 and 17, this high fidelity camera produces a reliable ~30 FPS. The secondary Audio Source, aligns, to confirm that our video feed time scale is not notably skewed. Given 30 FPS, the resolution of timing here is 0.0333 seconds. And since we are not measuring "absolute time" but rather "relative time" - this eliminates even more uncertainty.

For example, if you had a timer that ticks every 1.0 seconds reliably - then with each "tick" it would ADVANCE 1.0 seconds. So tick-to-tick, the consistency is fairly high fidelity. For our 1 second duration, we can reliably estimate 0.067 seconds of error maximum… either way.

But we have 3 consistent examples of a launch - ALL with the same acceleration nuance… along with A17's "continuous audio feed" demonstrating that the audio time matches the video (from Ignition to "pitch over" 9 seconds later).

Attempt #4 - SmartCooky - View Angle Skew

Quote from: najak on December 03, 2024, 03:33:08 PM

> The 500' vs 300' range changes the "angular error" from this "ignored factor" from 0.14 pixels to 0.3 pixels max. This makes very little impact on overall analysis. It remains "mostly negligible" and I excluded it for simplicity, not because I cannot "do the math and correct for it".
>
> The height of the Rover/camera -- also plays a small role here, so we can be off by a considerable amount on estimates, and still have almost no impact on the final analysis results (because if there is angular skew here, then it impacts BOTH the AM Height calculation and the Rise calculation by nearly the same amount!). This has LESS impact than does my wrong estimation for Apollo 16 camera distance, which was also negligible.

Cooky:
1. You don't know what the scan frame error rate is for that camera. Its frame rate was 30fps over approximately 200 lines. I'll let you do the math - if you're as intelligent as you claim, you will have no trouble... Hint: the frames were interlaced, and the raster frequency was 15750Hz... I think. (Dwight would have a better idea about this than me... he literally wrote the book Apollo TV technology)

SPECS: DAC specs - 525 lines per frame, at 30 FPS is 15750 Lines/sec.
https://www.lpi.usra.edu/lunar/missions/apollo/apollo_15/photography/

2. You don't know if the LRV was positioned above or below level of the descent stage landing pads, and I have not found any information about that. It could be five or more metres above or five or more metres below. At a distance of 90 to 158 metres. That is significant and would be extremely difficult to see from the LRV camera

If you are right about the camera being 1m above the ground

LRV is 5m below at 90m, the elevation angle to the top of the Descent stage is +4.6°
LRV is 5m aboveat 90m, the elevation angle to the top of the Descent stage is -1.8°
LRV is 5m below at 158m, the elevation angle to the top of the Descent stage is +2.7°

LRV is 5m below at 158, the elevation angle to the top of the Descent stage is -1.0°

You are trying to measure fractions of a pixel over the vertical height of a video that is barely 200 lines, without taking into account scan frame errors, and without being sure about the height of the camera. These disparities will render your measurements useless.

RESPONSE: Apollo 16/17 has 550 Scan lines, not 200.

The Uncanny Corrections of Jay Windley:

Windley wrote: In vacuum, pressure thrust occurs and is much more pronounced. It provides a significant amount of the thrust in a vacuum, where a properly expanded plume (and therefore optimum momentum thrust) is practically impossible. Because the plume spreads in a vacuum, it's not always the case that an advantage in momentum thrust due to to unimpeded flow outpaces the loss of momentum thrust from incoherent flow. It depends on the precise design of the engine. Just because your sources ignore this for the sake of simplicity doesn't mean they don't occur.

Response: I'm only saying that "if some surge in acceleration occurs" it's very short-lived, and has only a nominal outcome on the acceleration curve for the first 1 second. Whatever gains you achieve in Pressure-related Thrust is usually erased by the Losses in Momentum Thrust. And definitely NOT going to result in a "Steady 1-full-second of 72% increase in Thrust".

Windley: It doesn't directly address thrust, but it does address the proxy value of chamber pressure. "The maximum allowable combustion chamber pressure during start transients was 177 percent of the nominal combustion-chamber pressure." C.E. Humphries, R.E. Taylor. Apollo Experience Report - Ascent Propulsion System, NASA Technical Note TN D-7082 (Houston, TX: 1973), p. 2.

Response: This is simply a spec to consider to help keep you from breaking the rocket entirely. Not a spec of how much pressure is expected. YOU PRESENT THIS AS THOUGH IT IS A SPEC FOR HOW MUCH THRUST IS EXPECTED. It's nothing of the sort.

Windley: You maintain that thrust is uniformly lower during ignition transients. But from your own sources: "Single engines or different engines of the same design also exhibit variations of thrust input, and consequently have significant differences in thrust-buildup curves.

Response: All ignition thrust curves I've seen start LOWER. Only one had a very brief blip, where a transient impulse exceeded the thrust rating by about 5%, before it rebounded and went lower than rating… The overall net thrust of that Ignition period was LESS than the steady state rated thrust.

As discussed in Section 2.1.4, the usual procedure is to conduct many static firings to establish the statistical nature of the ignition thrust input." Transient Loads from Thrust Excitation. NASA Space Vehicle Design Criteria, NASA SP-8030, p. 2. The reference says, "Data for obtaining dynamic input curves of thrust buildup and thrust decay should be obtained directly from static firings of the actual engines, with care taken to correct the data for test-stand motion." (internal references omitted) Id. p. 15.

Response: This is just telling you "how to run tests, in order to establish the "average curve" along with variance. Of course, these curves are "test results" - all of which, that I've seen, exhibit LESS THRUST at ignition.

Bad Logic by Mag40 - recorded only because he thinks it's a good idea to rub people's noses in misjudgements after they've been corrected.

"OK. Let me "dazzle" you. Your top-level math multiplied two different values for nominal and your claim of observed but.... not by the same duration. Should you wish to compare the two you should multiply the second value by the same duration.

15600 * 0.7 = 10,920
26800 * 0.7 = 18,760
"

Response: Energy(or work) is "F x Distance" NOT "F x Time".

Stack-Exchange query:
https://space.stackexchange.com/questions/67541/apollo-ascent-module-launch-potential-contributors-to-acceleration

Dark Platform beneath A16 - while 6’ away: