**Rocket launch parameters**

Does the SRB behave differently then other engines? (No vac/sea level listed).

What engine and rocket specs are used in the equations and what are superfluous to our calculations?

Calculating K

What angle is the rocket launched at? If purely vertical, how do horizontal variables come into play?

Difference between vertA effective and vertA? Which is used in vertA\_avg

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Thrust in vacuum (**Tvac**); at sea level (**Tsl**); at altitude (**Talt**); Specific Impulse (**ISP**)

Space Shuttle Main Engine Thrust (**TSS**); in vacuum (**TSSvac**); at b level (**TSSsl**); at altitude (**TSSalt**)

RD-171 Engine Thrust (**TRD**); in vacuum (**TRDvac**); at sea level (**TRDsl**); at altitude (**TRDalt**)

RS-68A Engine Thrust (**TRS**); in vacuum (**TRSvac**); at sea level (**TRSsl**); at altitude (**TRSalt**)

Solid Rocket Booster Thrust (**TSRB**)

Thrust is given in units of pounds of force (lbf).

Weight is given in units of pounds mass (lbm)

Percent of Vacuum (PctVac); atmospheric pressure (PATM)

**Talt** = **Tsl** + [PctVac \* (T**vac** - T**sl**)] *(generic equation)*

Number of RD-171 Engines **(nrd);** Number of RS-68A Engines **(nrs);** Number of Space Shuttle Main Engines **(nss);**

**TSRBalt** = **nsrm** \* 3,600,000Lbfat liftoff (0.0 seconds) until 24.0 seconds

**nsrm** \* **throt** \* {**TSRMsl** + [PctVac \* (**TRDvac** - **TRDsl**)] }

**SRM** fuel burn rate = assigned thrust divided by specific impulse at altitude

Specific Impulse at altitude (**ISPalt**) = **ISPsl** + [PctVac \* (**ISPvac** - **ISPsl**)]

Solid Rocket Booster Thrust (**TSRB**) = assigned until 99.0 seconds after liftoff;

At **24.00** sec. decrease thrust @ - 20,000 **Lbf/** sec.**/srm** to 3,180,000 **Lbf/srm** by **45.00** sec.)

At **45.00** sec. hold thrust @3,180,000 **Lbf/srm** until **99.00** sec.)

At **99.00** sec. reduce thrust both **srm** until depletedby **114.00** sec.; where **srm** cutoff time (**114.00**) is assigned:

remaining solid fuel weight divided by number of seconds remaining (**114.00** sec. minus **99.00** sec. ) =

average fuel burn rate per second )

**→** **W**T = total vehicle weight minus (accumulated fuel used plus (fuel burn rate per engine times **T**i ))

Maintain a progressive tally of all fuel burned by all engines types. Vehicle weight at any given time is

equal to the initial weight minus this fuel burned weight tally.

true air speed (**VAS**); Aerodynamic Drag Compensation (**ADC**)

**VAS**  = ((**Vv** \*\*2)**+**(**Vh**\*\*2))\*\*0.5 the square root of (Vertical velocity squared plus Horizontal velocity squared)

**ADC** = ((**VAS** / 1,000)\*\*2)\*PATM\* **K** with resultant **ADC** in "**g**" units

Where: **VAS**is Air Speed In MPH & **K** is Drag Coefficient (Assigned)

**ADC "K"**=1.000for 3,500 sq. ft. cross sectional area

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acceleration (**A**); total acceleration (**A**Tot); weight (**W**T)

**A**Tot = **T**Tot **/ W**T

**A** = **A**Tot - **ADC**

**A**\*\*2= (**Av**\*\*2 + **Ah**\*\*2)

**A** = ((**Av**\*\*2 + **Ah**\*\*2))\*\*0.5

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