

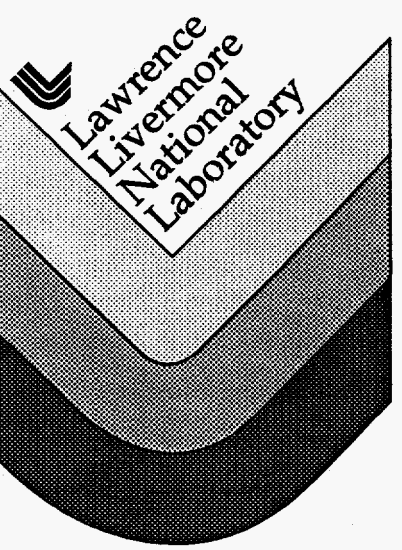
Reactor Thrust During Boost in a Low Altitude Trajectory

J. H. Moyer

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December 14, 1962



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Naval Applications Memo No. 15.

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FROM: J. H. Moyer

SUBJECT: Reactor Thrust During Boost in a Low Altitude Trajectory.

December 14, 1962.

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This memorandum forms a sequel to NAM No. 12. The same calculations reported there have been done for a typical low altitude trajectory, shown in Figure 1. The reader is referred to NAM No. 12 for a discussion of the method. However, a few ground rules are worth repeating to aid interpretation.

1. The assumption is made that the flow rate through the inlet exactly matches that demanded by the reactor and nozzle at all times.
2. The fuel element maximum wall temperature is assumed constant at 2500^oF from time zero. This means that the values plotted in Figure 2 at any given time are true only if design temperature has been achieved by that time.
3. Values of F_{jnet} and C_{fnet} in Figure 2 are 7.3% less than the machine-computed values, to allow for losses not included in the code. They may be compared directly with the corresponding numbers in Tory II-C Memo No. 407.
4. Thrust and thrust coefficient in Figure 2 are true for an unobstructed nozzle. If the nozzle exhaust is deflected to pass the nose of a tandem booster the values plotted must be reduced.

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These are those of a random poster the values plotted what be

unoperated poster. If the poster expires is reflected to

1. The first and final coefficients in Figure 3 are fine for an

impulse in JOLY II-C Memo No. 401.

the code. They may be compared directly with the corresponding

numeric-computed values to allow for losses not included in

2. Values of β and γ in Figure 3 are $\lambda \approx 1$ less than the

has been calculated by that time.

in Figure 3 at any given time are fine only if design temperature

is 2000 F from the zero. This means that the values plotted

3. The first element maximum with temperature is assumed constant

values.

directly measure that demanded by the reactor and poster at all

4. The assumption is made that the flow rate through the tubes

however, a few errors may be noted regarding to its interpretation.

Figure 1. The reason is referred to NAW No. 12 for a discussion of the method.

reported there have been done for a typical low altitude trajectory shown in

this memorandum forms a subject to NAW No. 12. The same calculations

SUBJECT: Reactor thermal output post is a low altitude trajectory.

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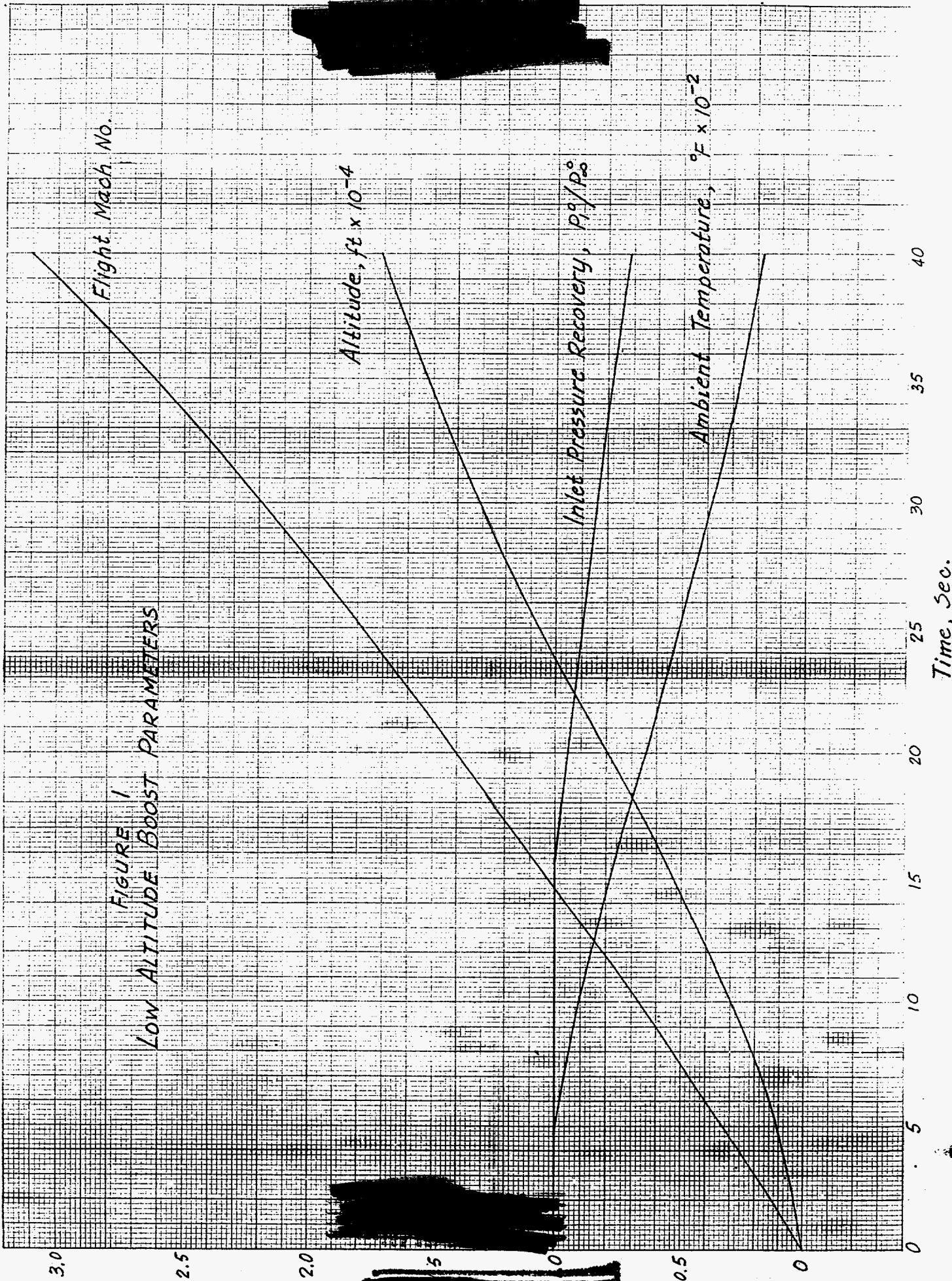


FIGURE 1
LOW ALTITUDE BOOST PARAMETERS

Flight Mach No.

Altitude, ft x 10⁻⁴

Inlet Pressure Recovery, P₀/P₀₀

Ambient Temperature, °F x 10⁻²

Time, Sec.

FIGURE 2

BOOST PHASE REACTOR PERFORMANCE

Reactor: Tory II C

Nozzle Throat Area: 780 in²

T_{wmax} = 2500 °F (constant)

P₂^o, T₂^o: Reactor exit plenum conditions

w_r: Flow rate demanded by reactor-nozzle system

F_{jet}: Net jet thrust

C_{fnet}: Net jet thrust coefficient (ref. area = 17.75 ft²)

