E RETENTION & ZOOM TESTING

PLANE: *P-51D-20NA*

TEST CONFIGURATION

- MAP: Crimea
- WEATHER: Clear
- WING & TURBULENCE: Off
- TIME: 12:00PM
- FUEL: 100%
- WEAPONS LOADOUT: DEFAULT
- RADIATOR SETTING: DEFAULT

TEST METHOD

- START @ 10kft @230mph IAS
- Apply Full Throttle & WEP (if aval)
- Dive @ -35° pitch
- Wait until you pass through 5,000ft
- Perform Pull out @ 5g (overload)
- Climb @ 30° pitch
- Wait until IAS = 110mph
- END

DISCLAIMER

All graphs contain raw DeviceLink data unless otherwise noted as calculated. For example the TAS value is calculated from the DeviceLink IAS and Altitude values.

This analysis consists of two parts:

1. Energy Analysis
2. XY Flight Path Analysis

The Energy graphs assume an aircraft mass of 1kg, in that the actual mass of the airplane used in IL2 is not known. Therefore you would have to multiply the value listed in the graph to obtain the true Energy value in Joules.

The XY Flight Path graph uses the actual DeviceLink altitude value for the Y axis and the calculated X distance. The X distance is derived from the calculated TAS value and the calculated Velocity Vector Angle and time

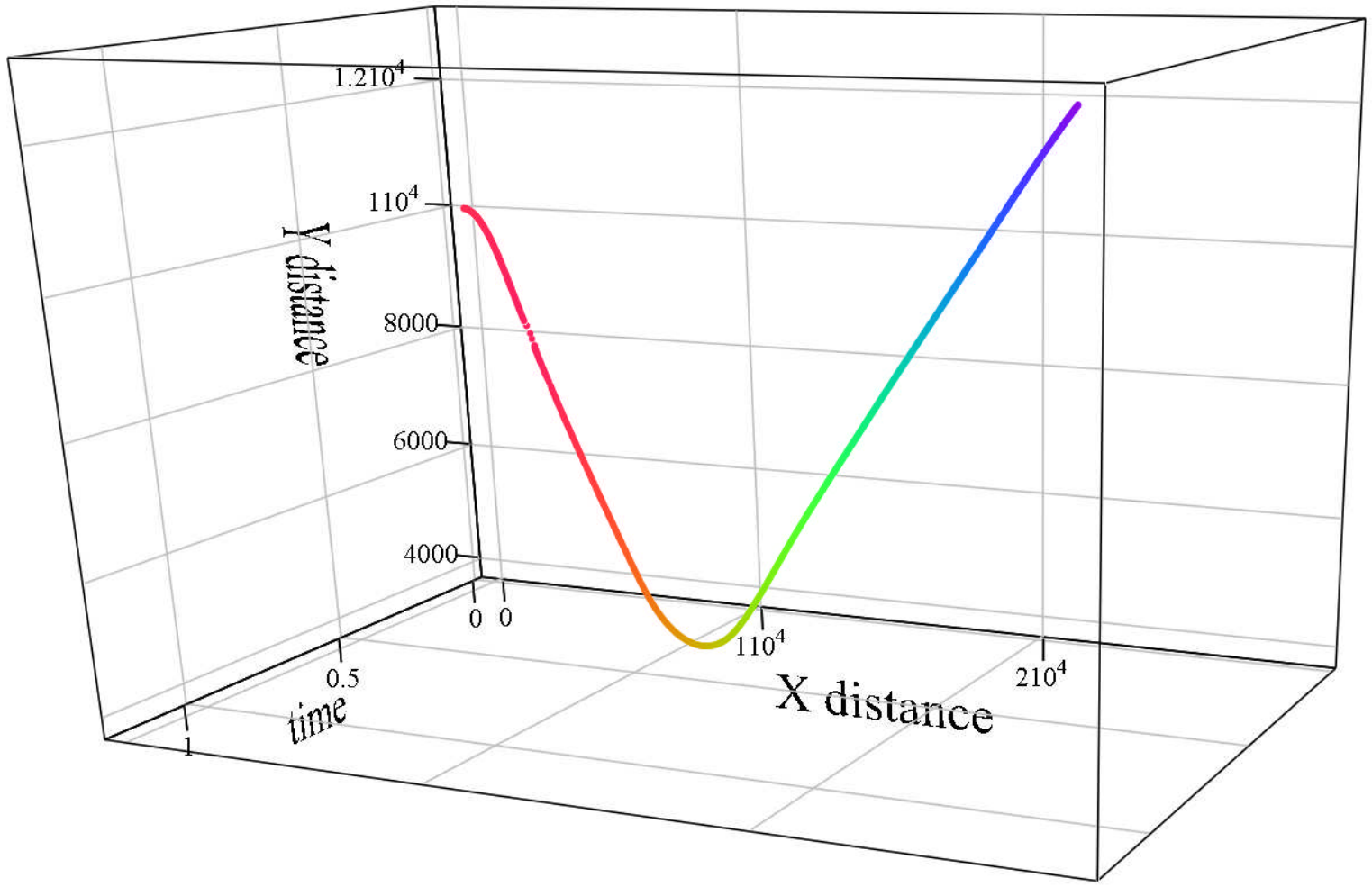
$$X = TAS \times \cos(\theta_{vel\ vector}) \times time$$

I have come up with a good approximation of the $\theta_{vel\ vector}$ and validate it by calculating the Y distance and comparing it to the know Y distance (aka Altitude)

$$Y = TAS \times \sin(\theta_{vel\ vector}) \times time$$

By Grant Senn aka Tagert

Calculated XY Flight Path vs. time



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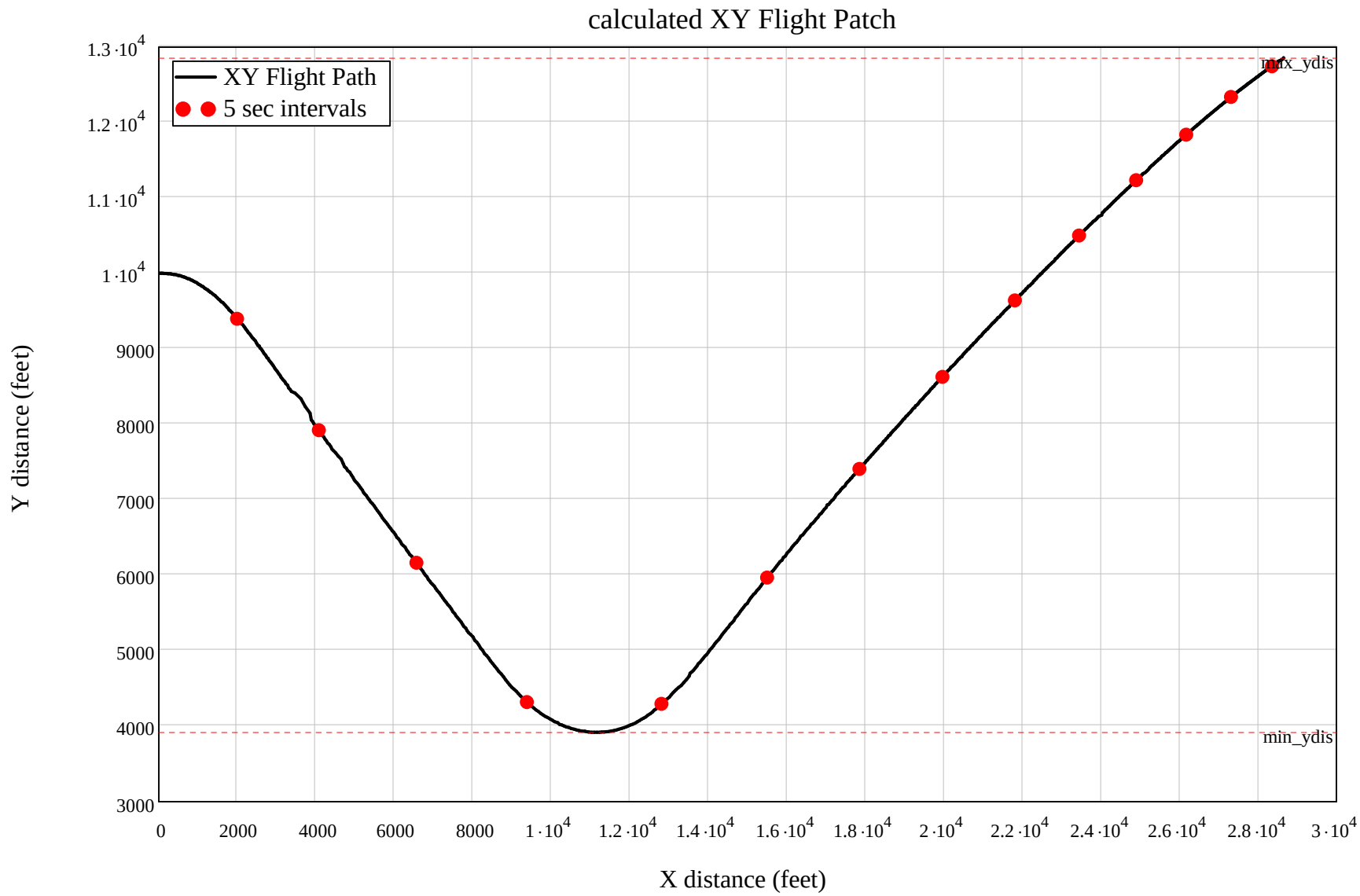
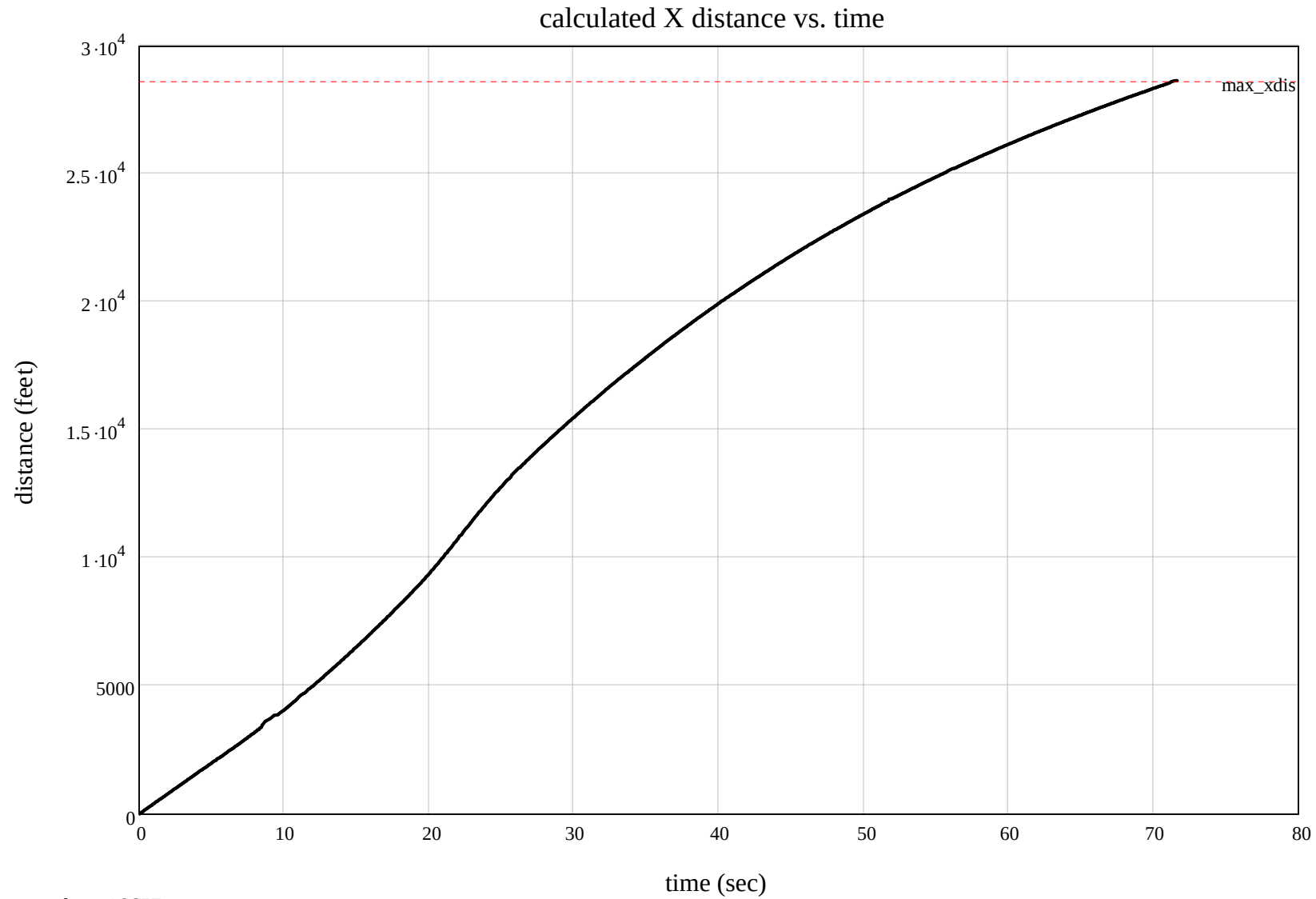
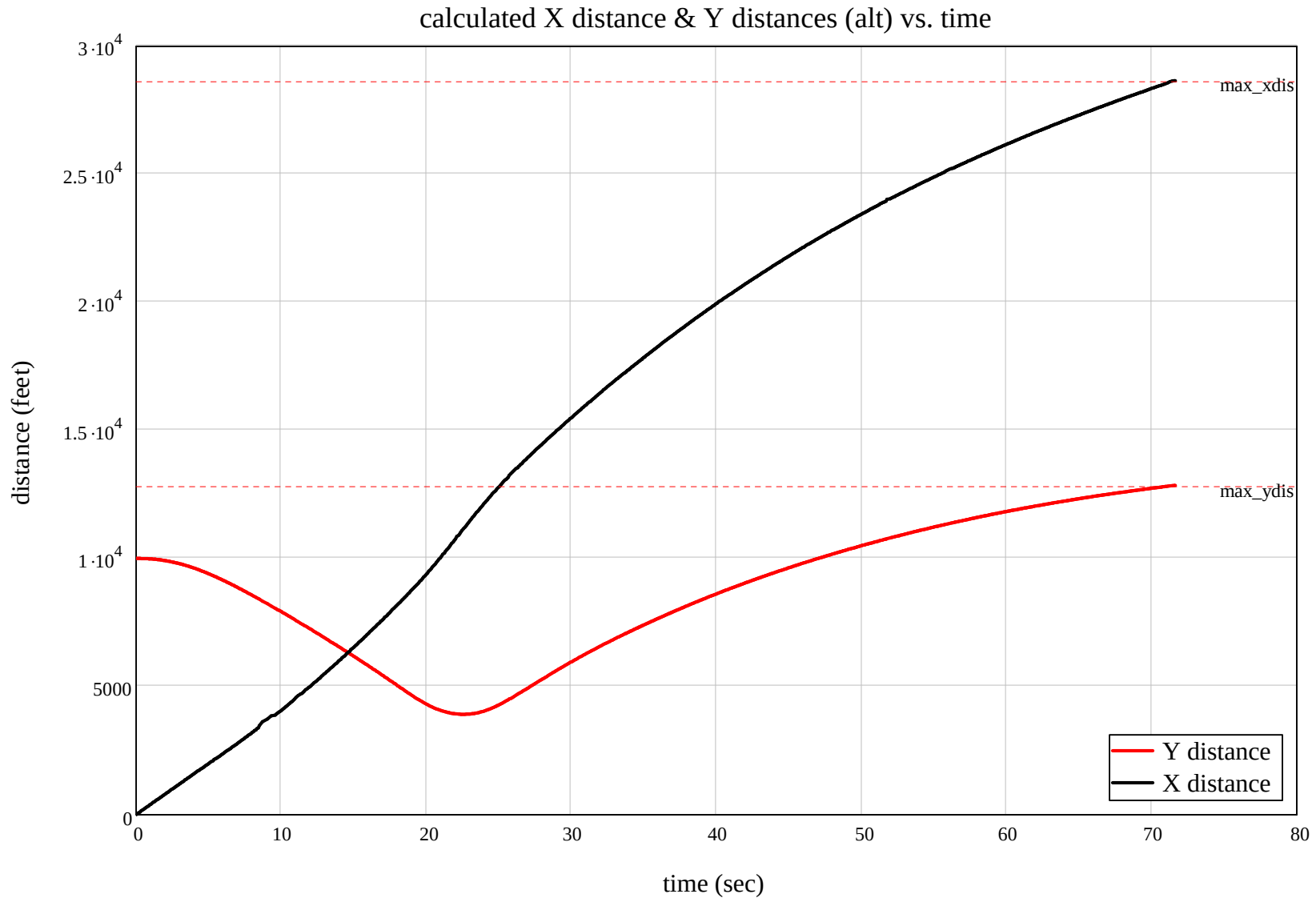


min_ydis = 3917 max_ydis = 12859

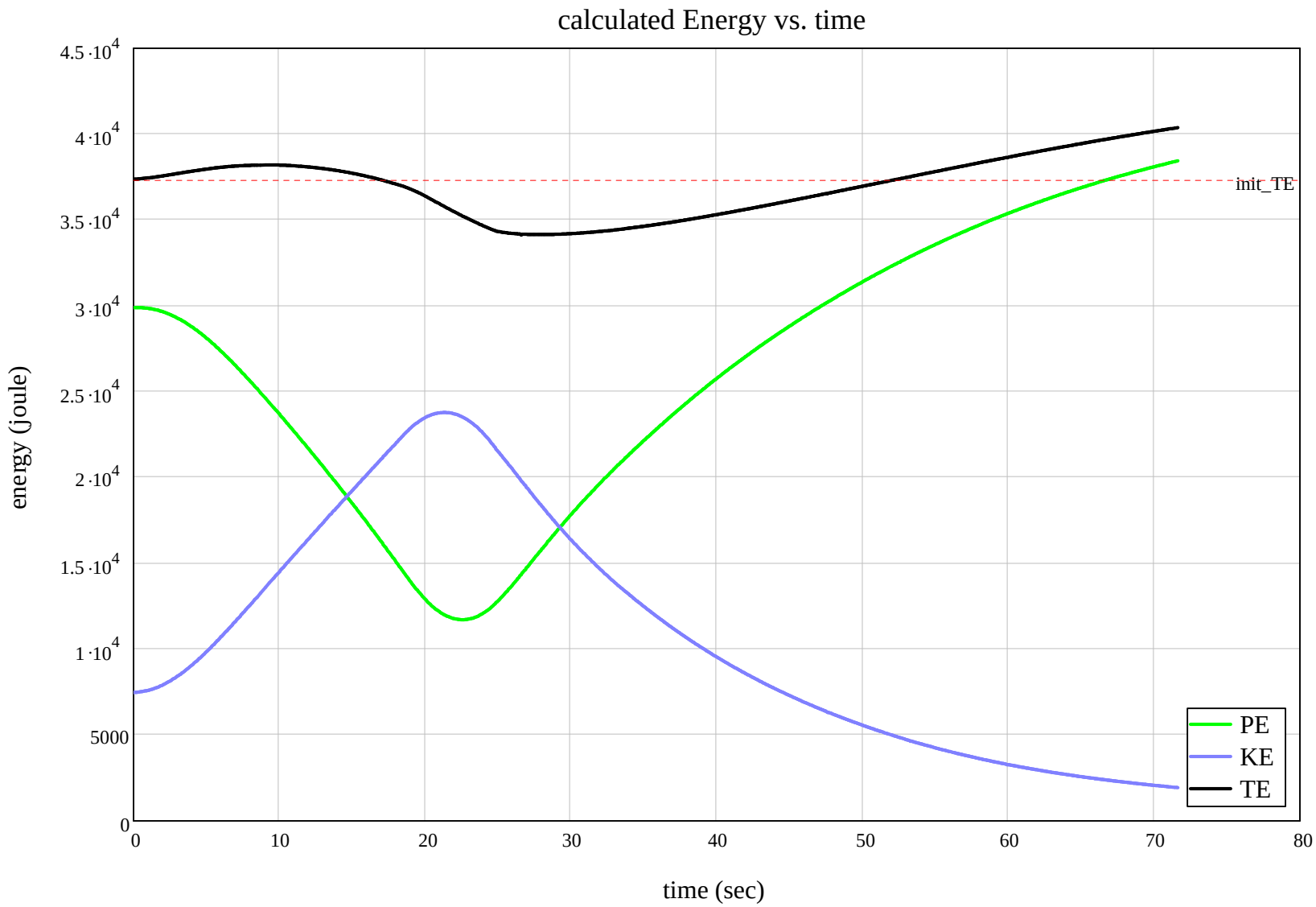


max_xdis = 28657


N A C A


calculated X distance & Y distances (alt) vs. time
distance (feet)
time (sec)
3·10^4
2.5·10^4
2·10^4
1.5·10^4
1·10^4
5000
0
0
10
20
30
40
50
60
70
80
max_xdis
max_ydis
Y distance
X distance


N A C A


calculated Energy vs. time
energy (joule)
time (sec)
init_TE
PE
KE
TE
4.5·10^4
4·10^4
3.5·10^4
3·10^4
2.5·10^4
2·10^4
1.5·10^4
1·10^4
5000
0
0
10
20
30
40
50
60
70
80

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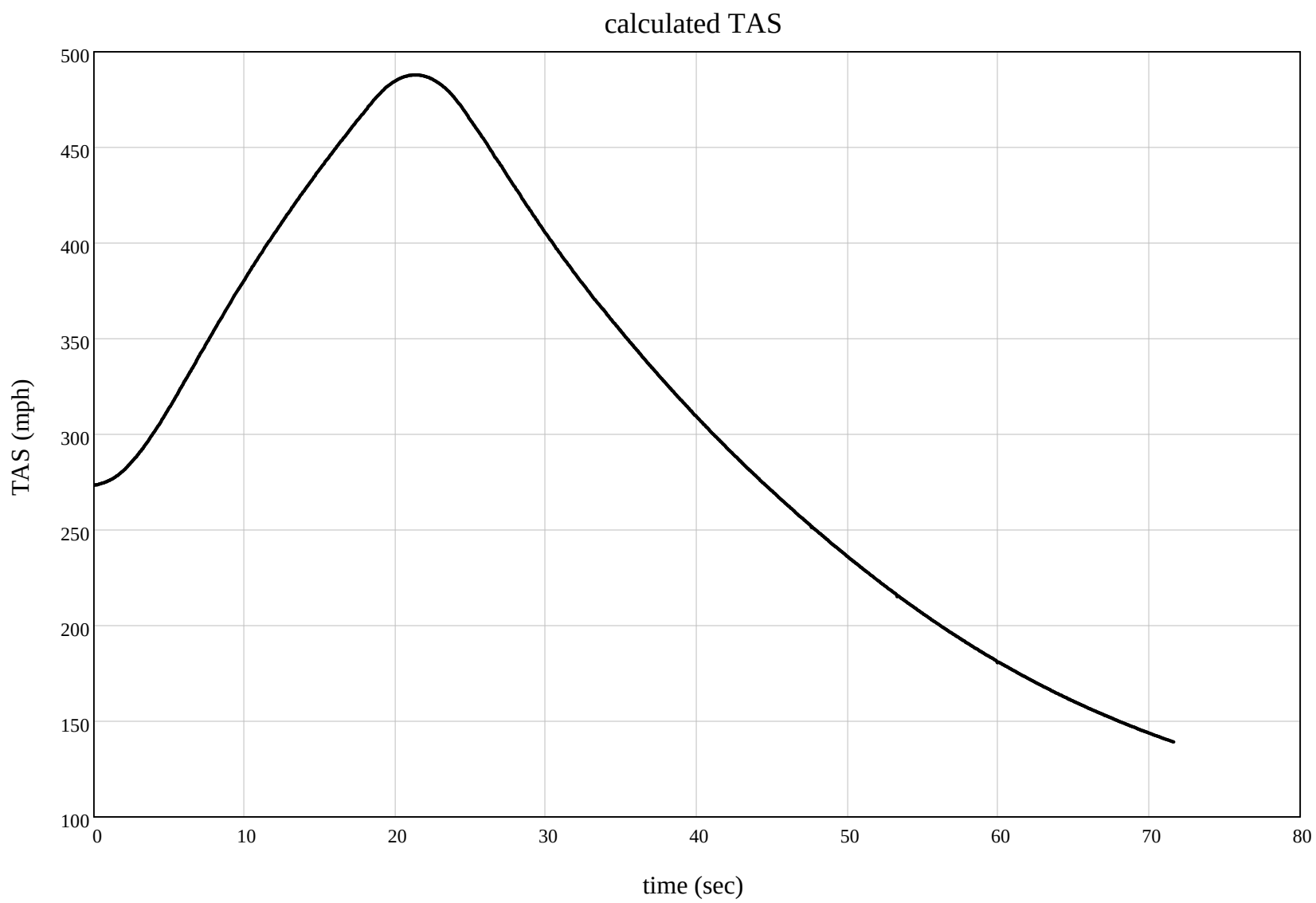

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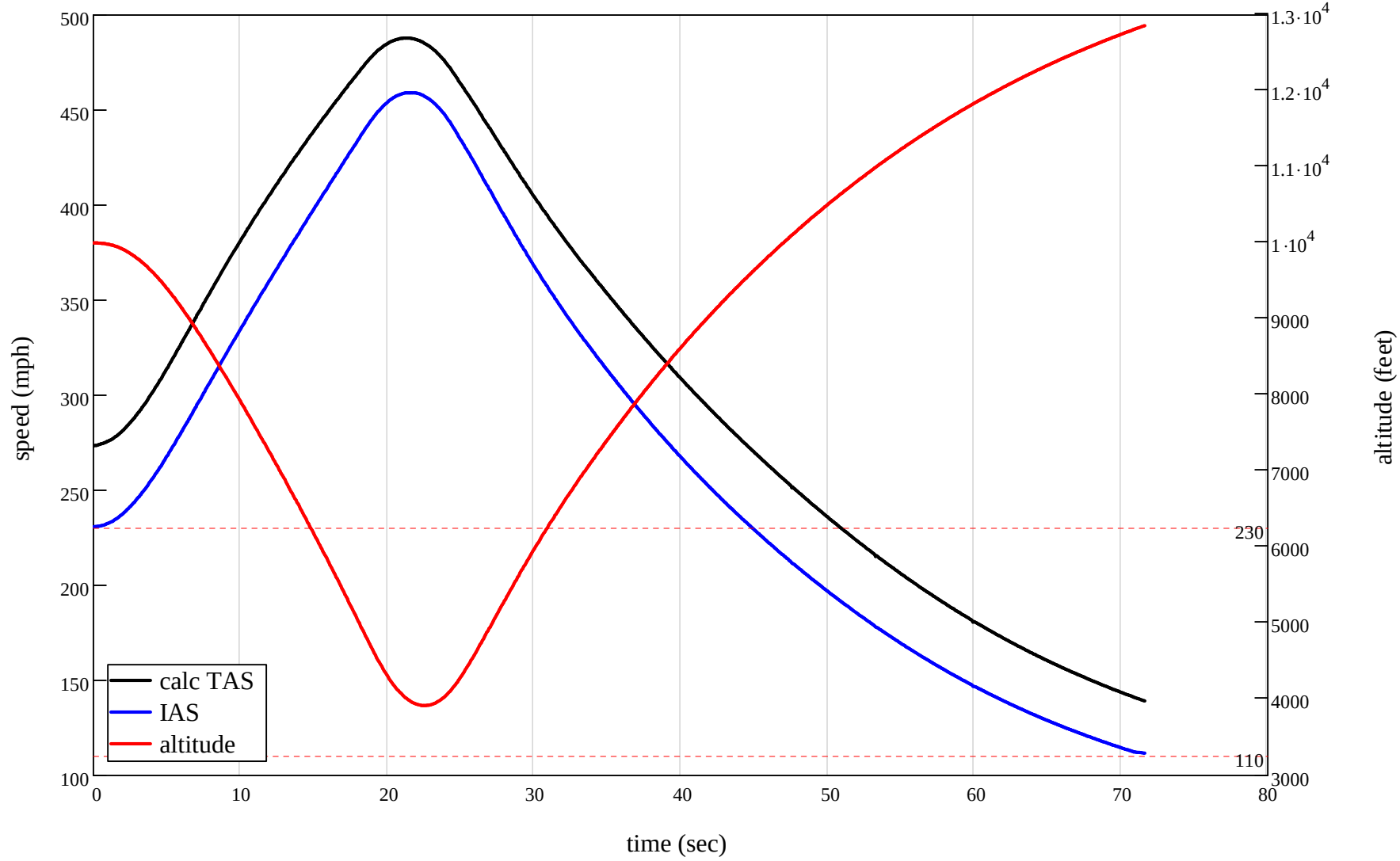
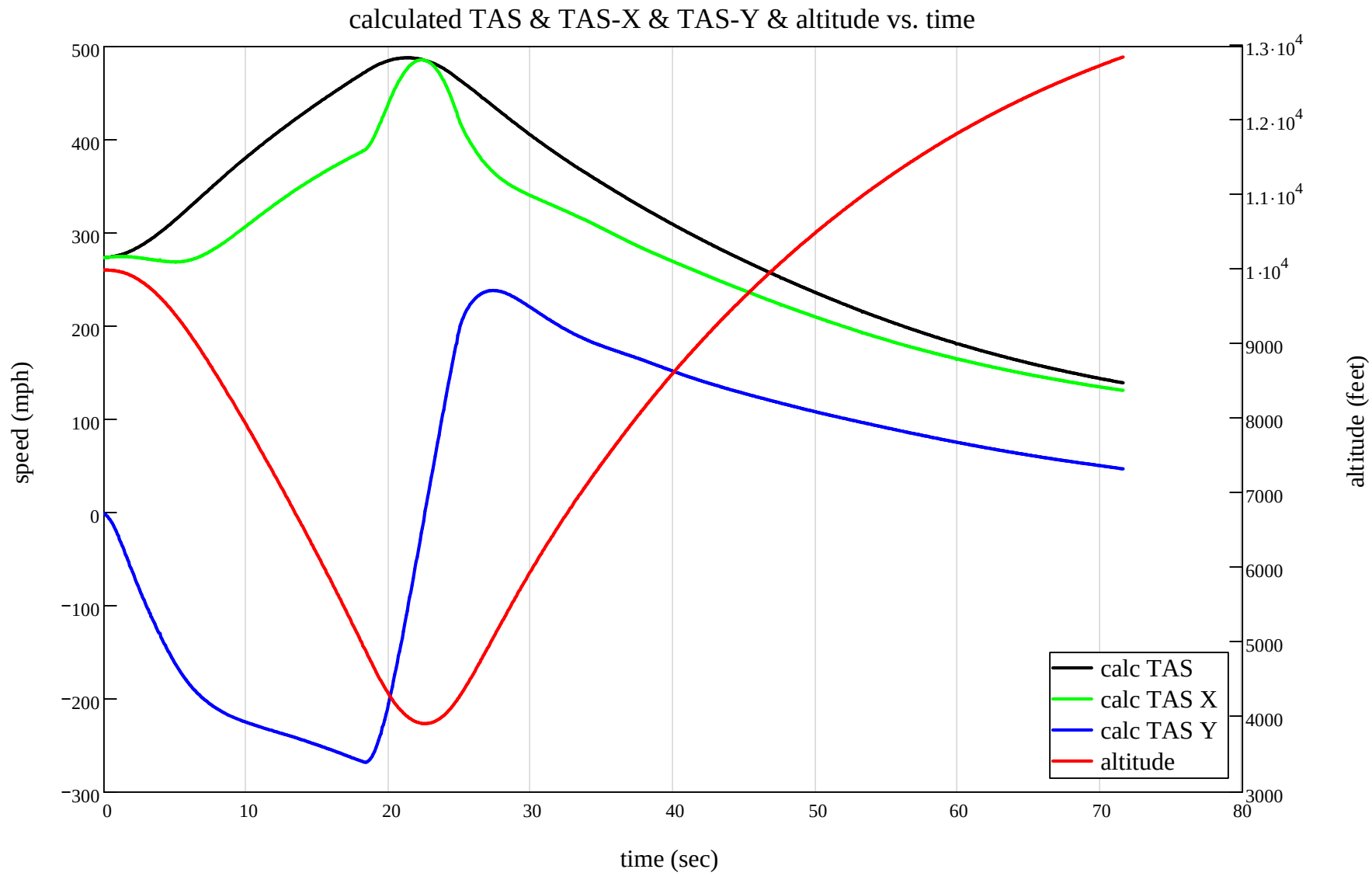
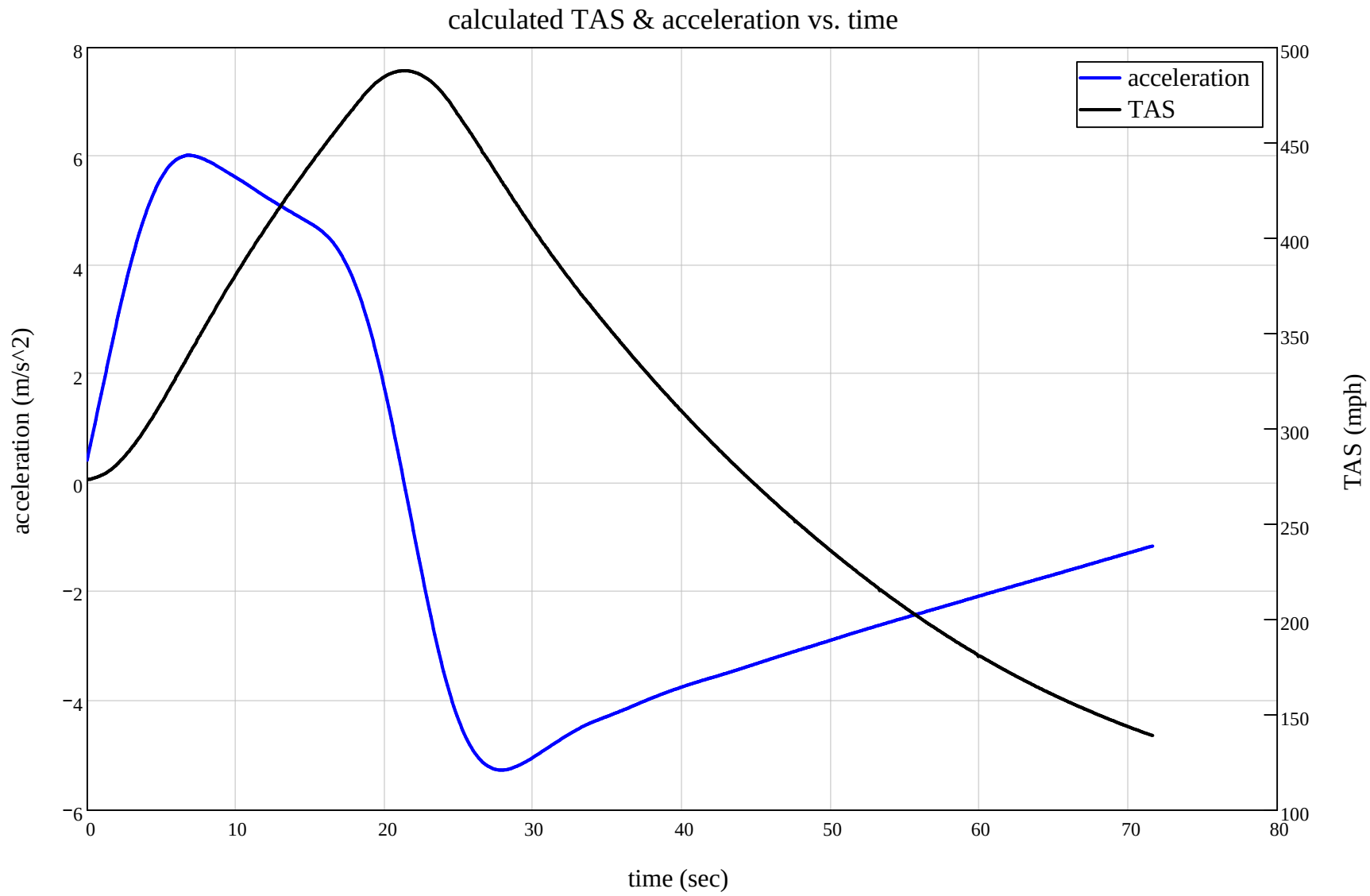


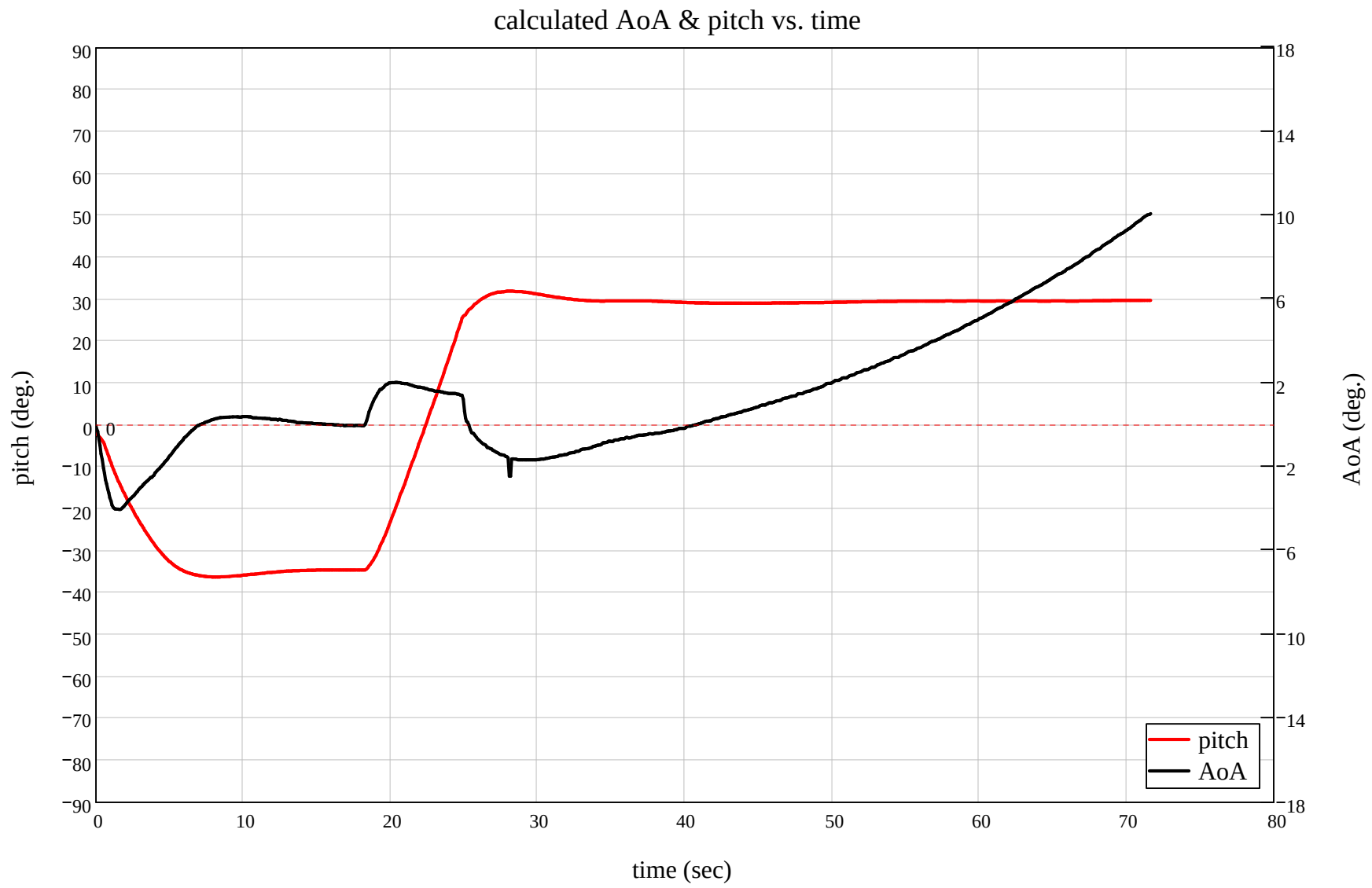

N A C A


calculated TAS & TAS-X & TAS-Y & altitude vs. time
speed (mph)
altitude (feet)
time (sec)
500
400
300
200
100
0
−100
−200
−300
1.3·10^4
1.2·10^4
1.1·10^4
1·10^4
9000
8000
7000
6000
5000
4000
3000
0
10
20
30
40
50
60
70
80
calc TAS
calc TAS X
calc TAS Y
altitude

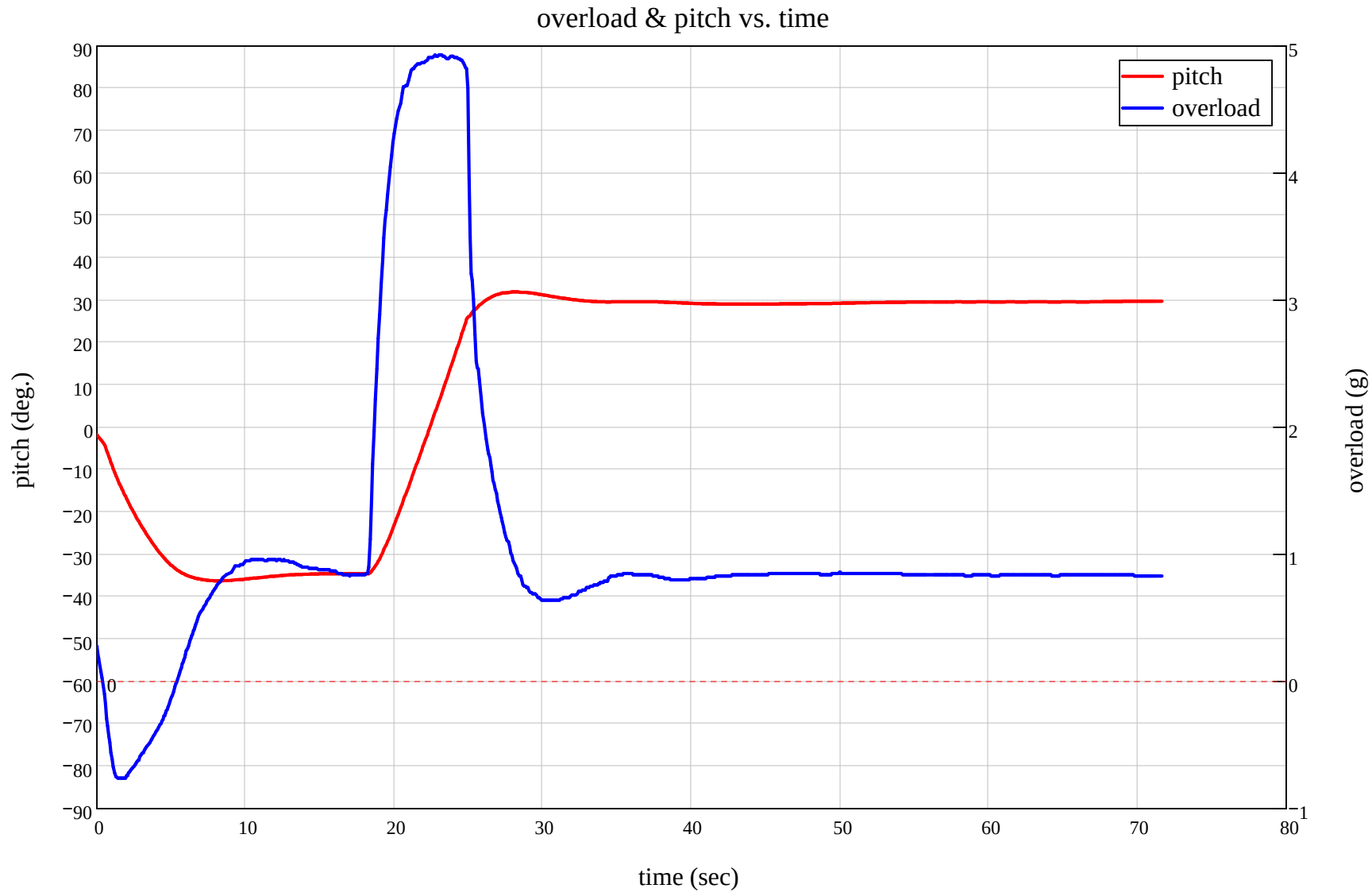

N A C A


calculated TAS & acceleration vs. time
acceleration
TAS
acceleration (m/s^2)
TAS (mph)
time (sec)
8
6
4
2
0
−2
−4
−6
500
450
400
350
300
250
200
150
100
0
10
20
30
40
50
60
70
80


N A C A


calculated AoA & pitch vs. time
pitch (deg.)
AoA (deg.)
time (sec)
90
80
70
60
50
40
30
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
18
14
10
6
2
-2
-6
-10
-14
-18
0
10
20
30
40
50
60
70
80
pitch
AoA


N A C A


overload & pitch vs. time
pitch
overload
pitch (deg.)
overload (g)
time (sec)
90
80
70
60
50
40
30
20
10
0
−10
−20
−30
−40
−50
−60
−70
−80
−90
5
4
3
2
1
0
−1
0
10
20
30
40
50
60
70
80

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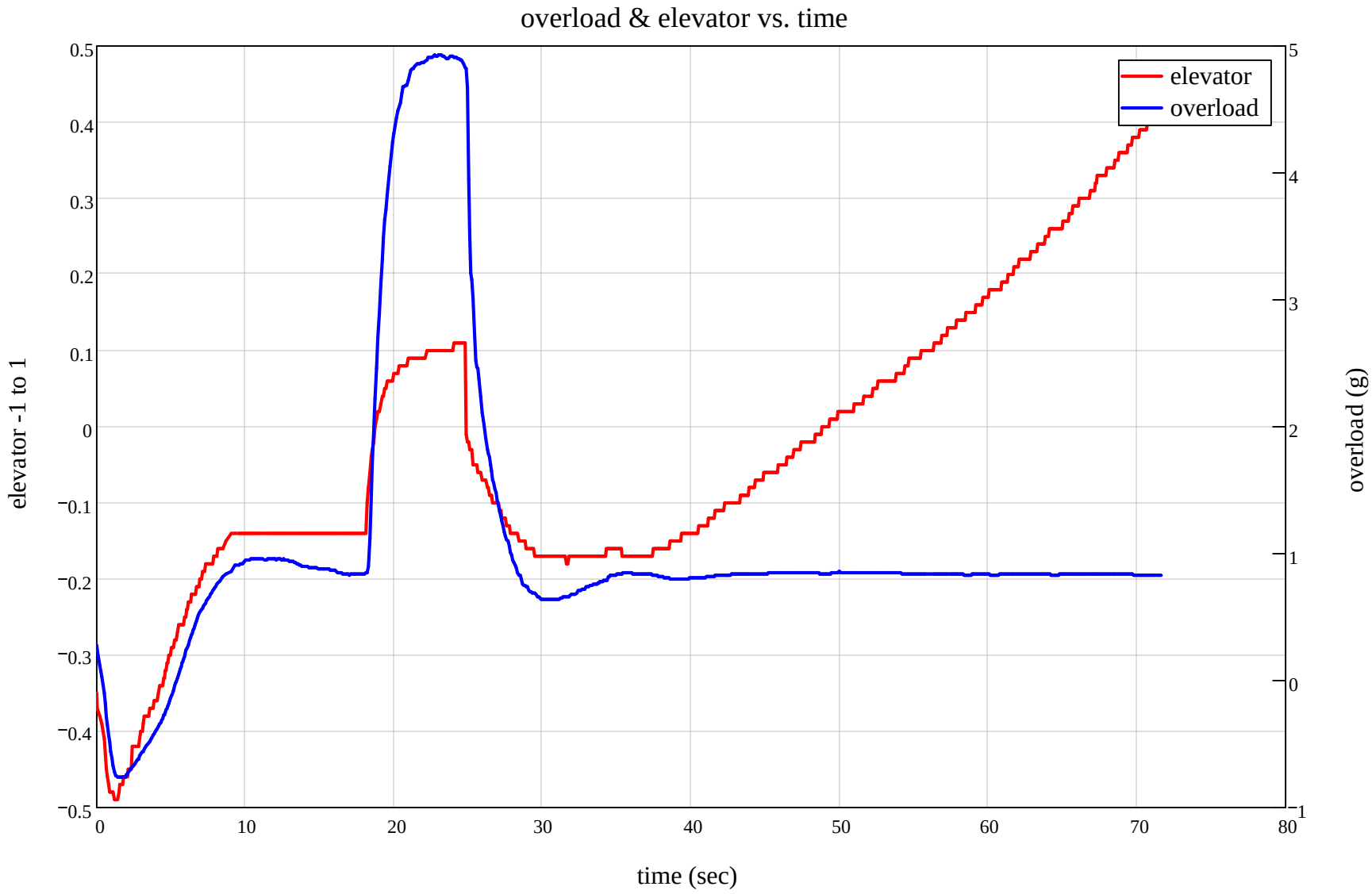
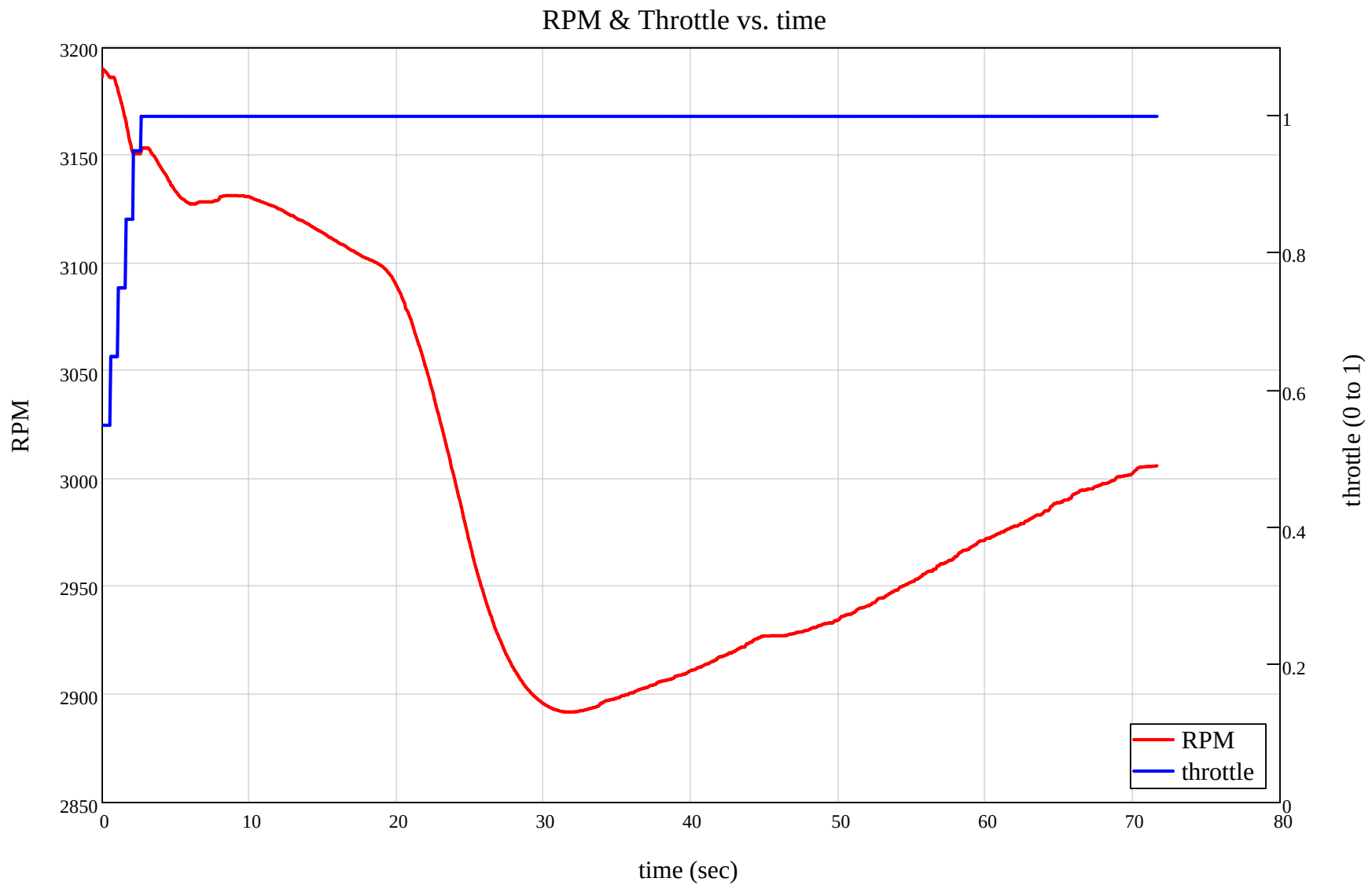
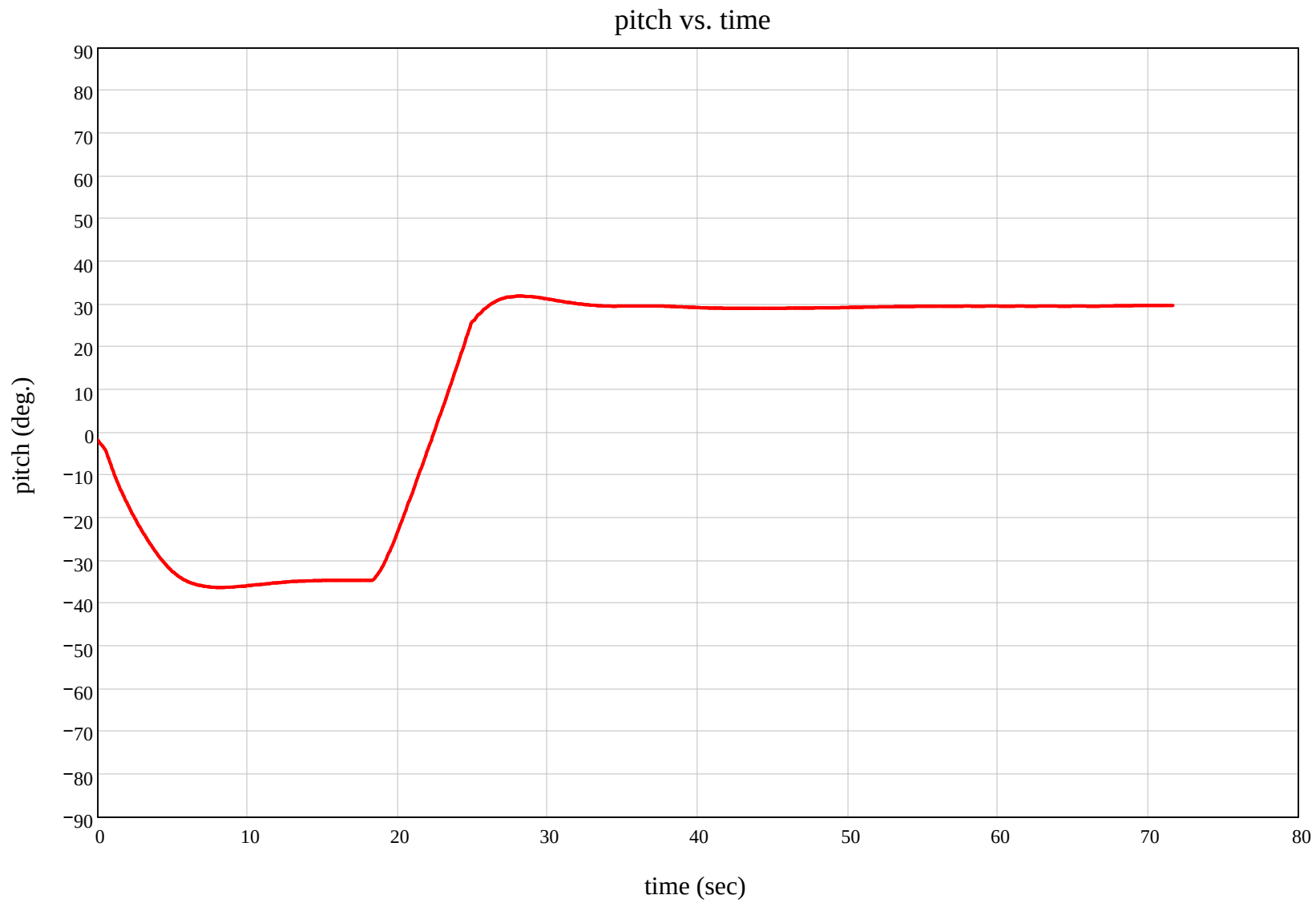


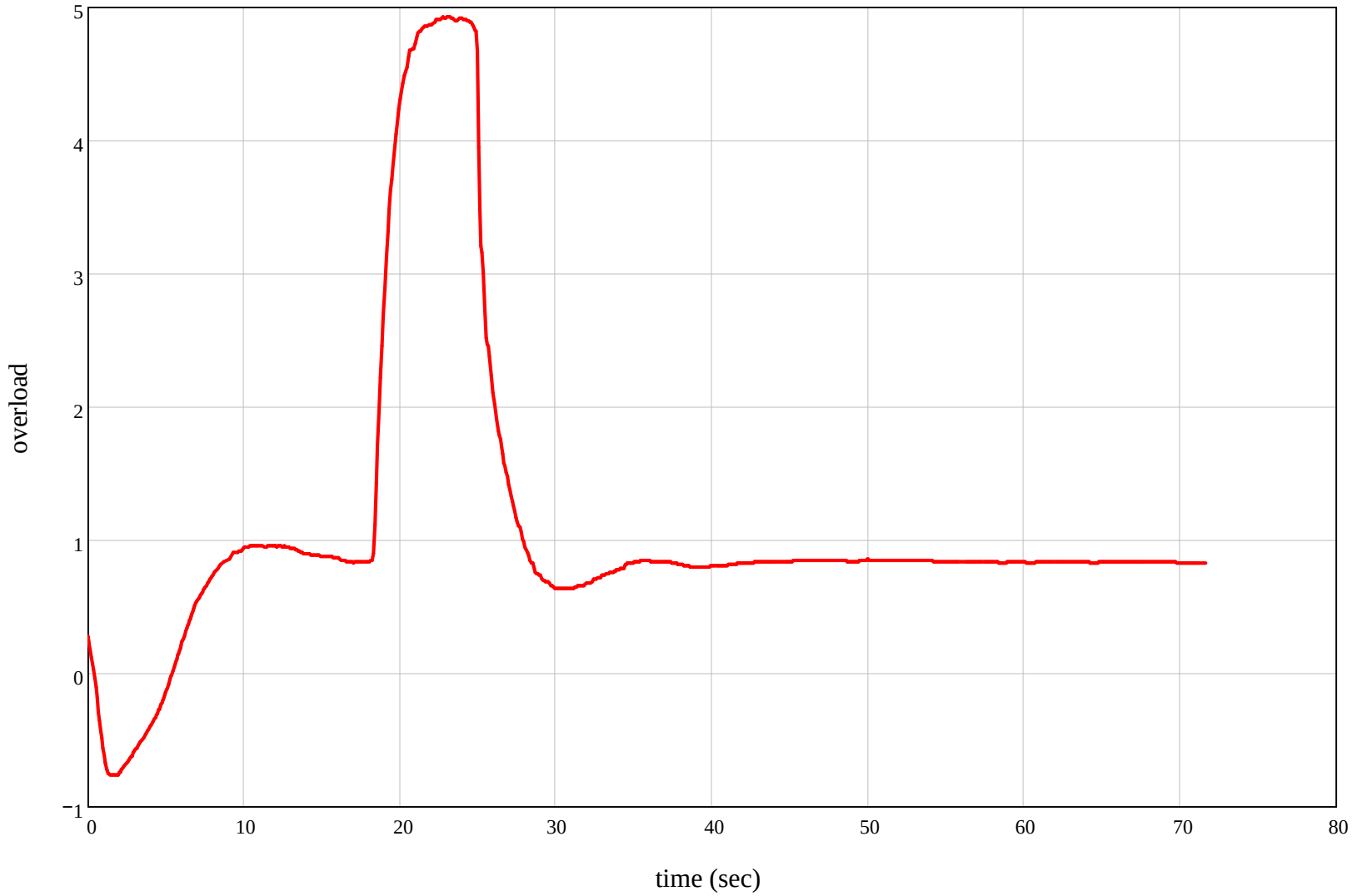

N A C A


RPM & Throttle vs. time
RPM
throttle (0 to 1)
time (sec)
3200
3150
3100
3050
3000
2950
2900
2850
1
0.8
0.6
0.4
0.2
0
0
10
20
30
40
50
60
70
80
RPM
throttle

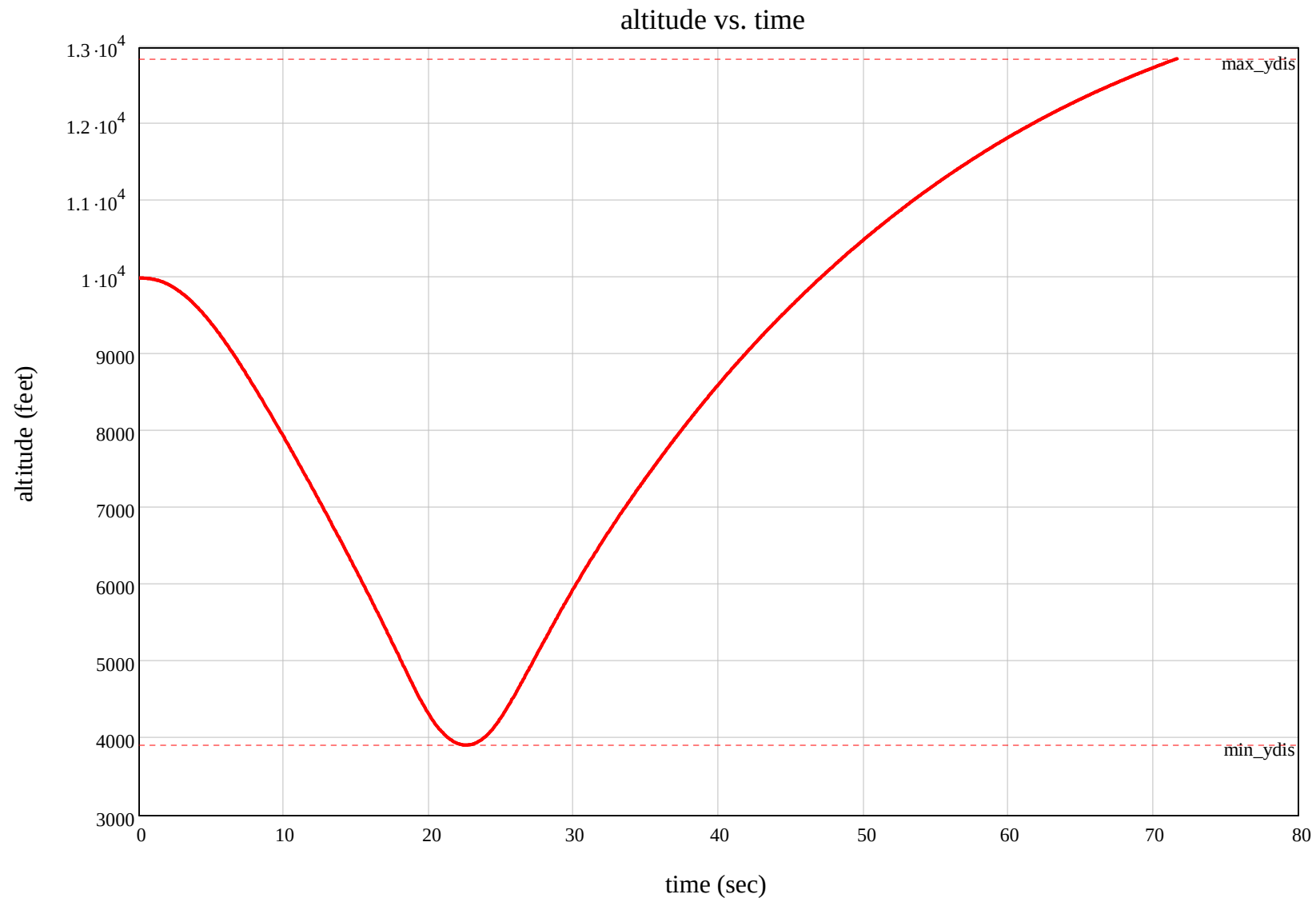

N A C A


pitch vs. time
pitch (deg.)
90
80
70
60
50
40
30
20
10
0
−10
−20
−30
−40
−50
−60
−70
−80
−90
0
10
20
30
40
50
60
70
80
time (sec)


N A C A

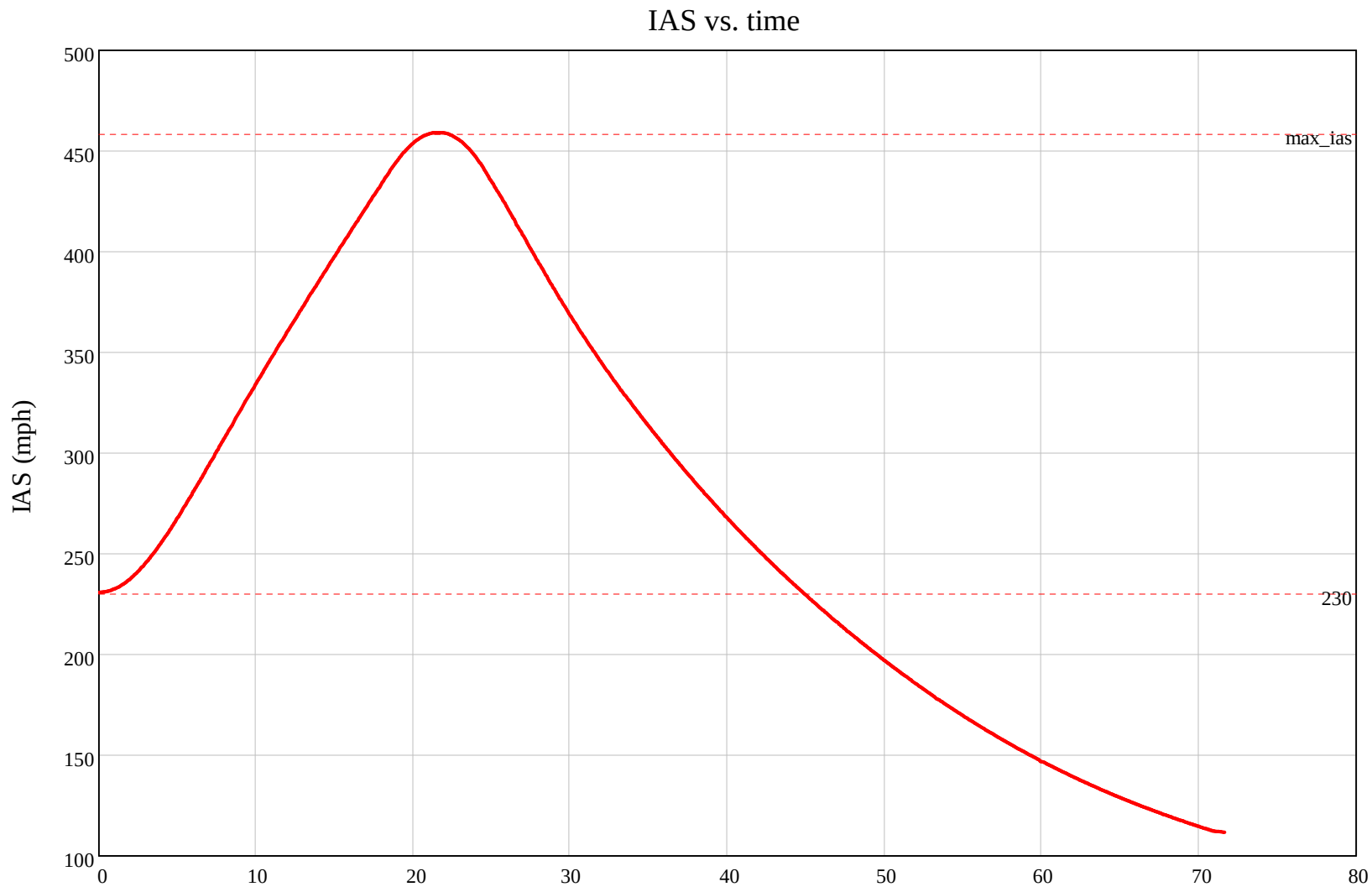

overload vs. time
overload
time (sec)
5
4
3
2
1
0
−1
0
10
20
30
40
50
60
70
80

By Grant Senn aka Tagert



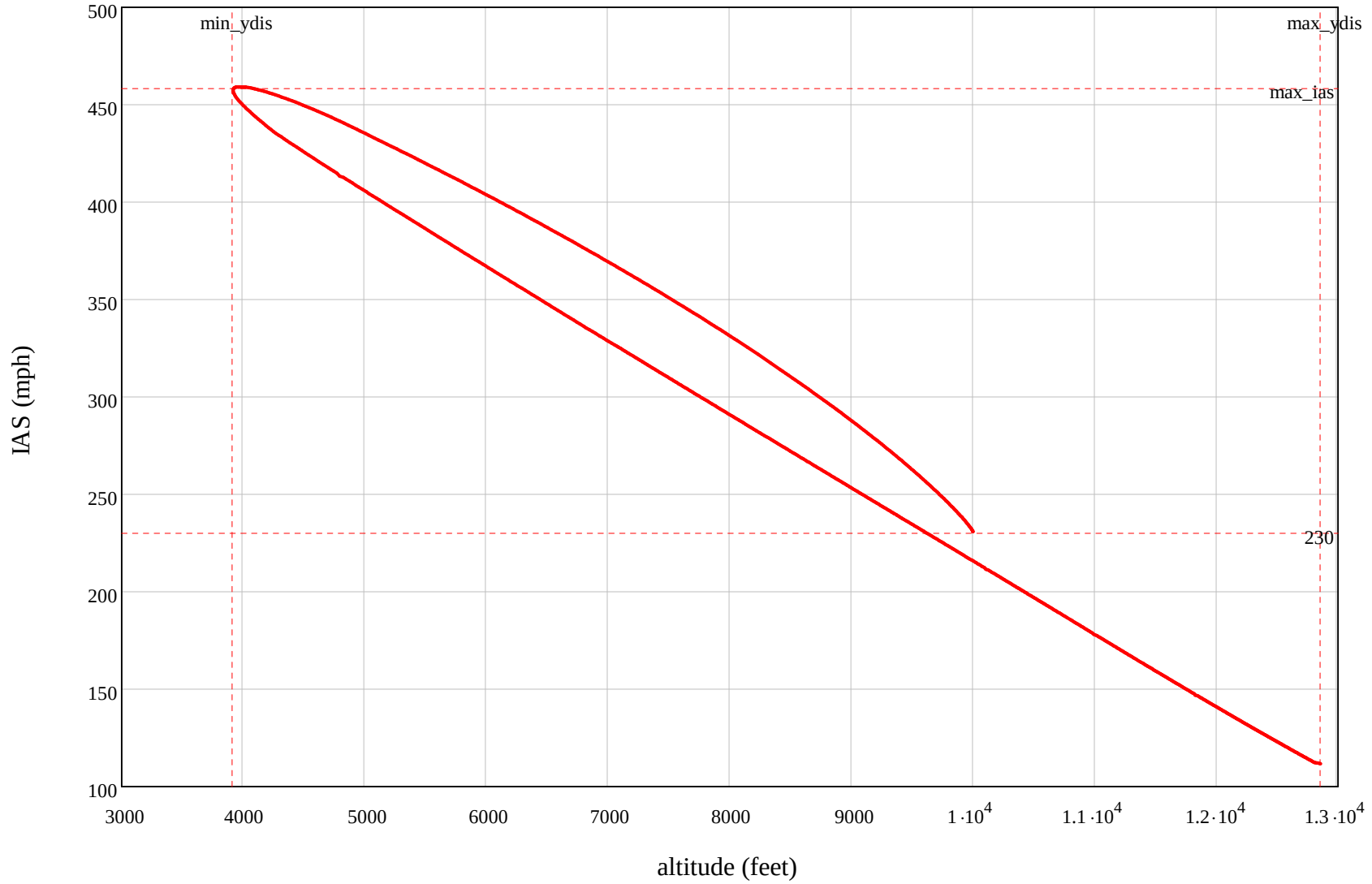
min_ydis = 3917 max_ydis = 12859


N A C A


IAS vs. time
IAS (mph)
500
450
400
350
300
250
200
150
100
0
10
20
30
40
50
60
70
80
max_ias
230
time (sec)

max_ias = 459


N A C A


IAS vs. altitude
min_ydis
max_ydis
max_ias
230
IAS (mph)
500
450
400
350
300
250
200
150
100
3000
4000
5000
6000
7000
8000
9000
1·10^4
1.1·10^4
1.2·10^4
1.3·10^4
altitude (feet)