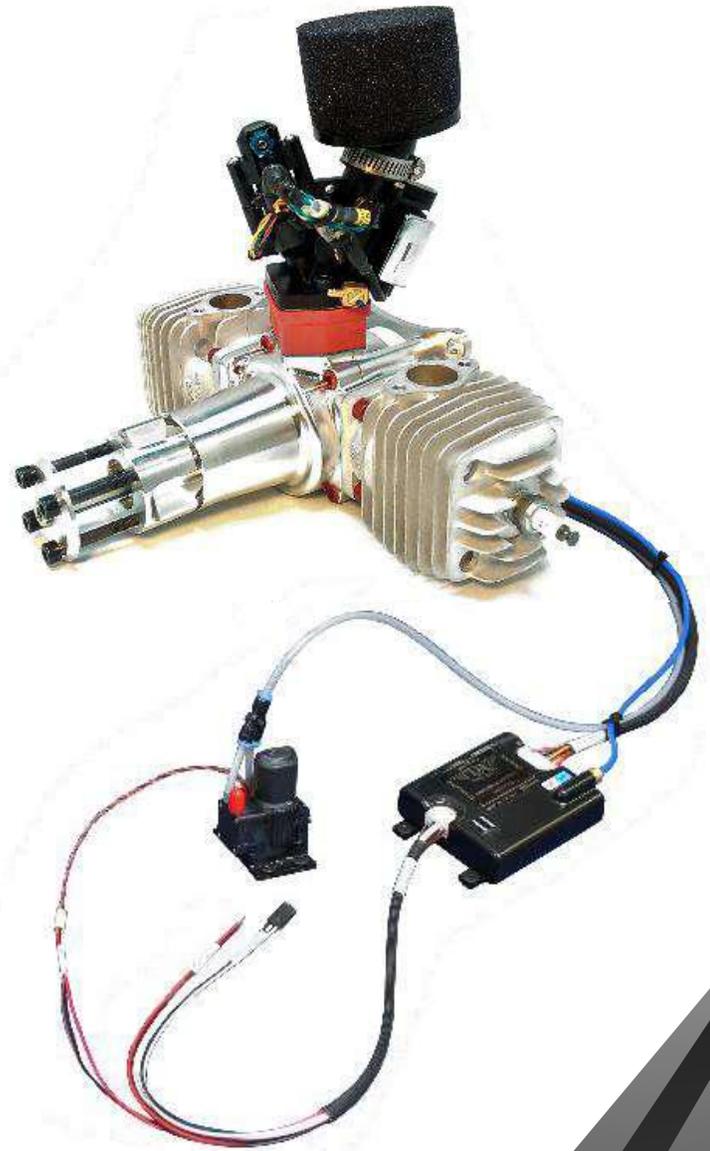




DA70 EFI Data Sheet

HFEDCN0819 Rev B



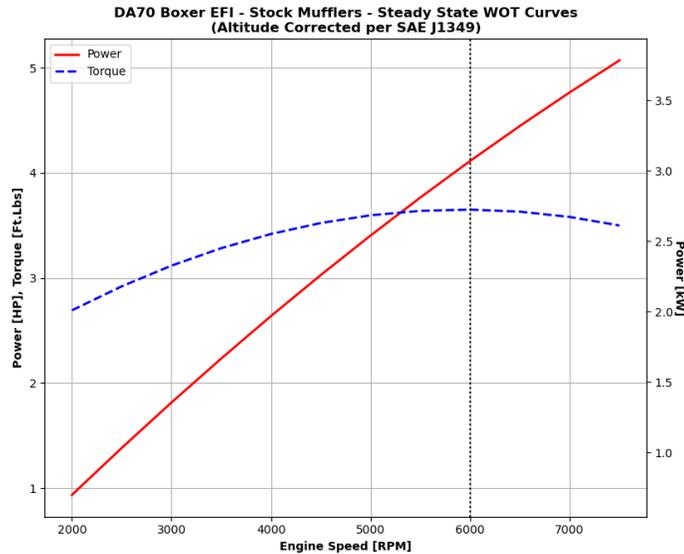


Figure 1: Power curve generated from steady state wide open throttle condition from 2000 RPM to 7500 RPM in 500 RPM increments. Measured torque was averaged over 30 seconds at each RPM, accounting for all high/low torque spikes that are present in normal operating conditions. Note that the dotted black line denotes continuous power & torque.

	METRIC	IMPERIAL
DISPLACEMENT	70 cc	4.3 ci
MAX POWER (7500 RPM)*	3.8 kW	5.1 HP
MAX TORQUE (5000 RPM)*	5.2 Nm	3.8 ftlb
CONTINUOUS POWER (6000 RPM)*	3.0 kW	4.1 HP
CONTINUOUS TORQUE (6000 RPM)*	4.9 Nm	3.6 ftlb
OPERATING RPM RANGE	2000 RPM to 7500 RPM	
AVERAGE BSFC	700 g/kWh	1.15 lb/HPH
WEIGHT (ENGINE WITH THROTTLE BODY)	2.25 kg	4.95 lb
WEIGHT (ECM)	85 g	2.9 oz
WEIGHT (FUEL PUMP)	90 g	3.2 oz
WEIGHT (IGNITION)	150 g	5.3 oz
WEIGHT (WIRE HARNESS/ FUEL LINES)	170 g	6.0 oz
WEIGHT (ROTOR, STATOR, & HARNESS)	700 g	1.5 lb
WEIGHT (TOTAL W/O GENERATOR)	2.75 kg	6.05 lb
FUEL**	Any Grade Pump Gasoline	
TWO STROKE OIL	Red Line, 40:1 Mixture	
AMBIENT TEMPERATURE RANGE	-12° to 49° C	10° to 120° F

*Stock Muffler **No heavy fuel option at this time

Propeller Recommendations						
2-Blade	Max RPM ± 200	Estimated Max Thrust (lbs) ±10%	3-Blade Mejzlik	Max RPM ± 200	Estimated Max Thrust (lbs) ±10%	
	24x9	6900**	41.8**	20x10	6200*	36.1**
	24x10	6700**	37.9**	22x10	6100*	40.5**
	26x8	4500**	50.6**	22x12	5475**	30.0**

*Recorded from static test stand **Estimated via simulation

Part-Throttle Power and Torque

Part throttle curves were generated by operating the engine at steady state using a Magtrol eddy current dynamometer. Torque and speed data was captured for 30 seconds at each throttle position and speed point. Low throttle cut off points were determined by the engines ability to produce torque at a given speed; as speed increased higher starting throttle positions were required. Each trace represents constant throttle position, starting at 20% throttle (bottom trace) to 100% throttle (top trace). All data points are $\pm 10\%$ to account for measurement error and engine to engine variation. Test details are available upon request.

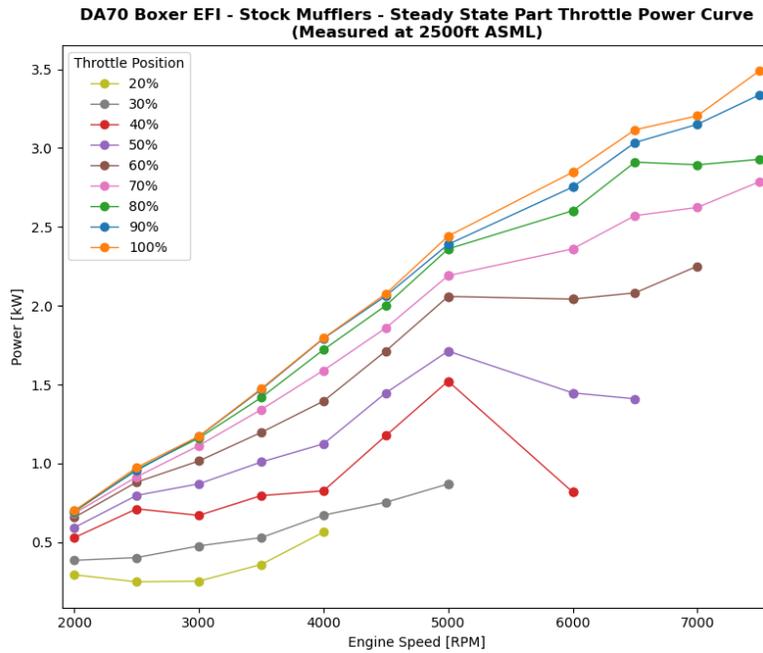


Figure 2. Part throttle power curves

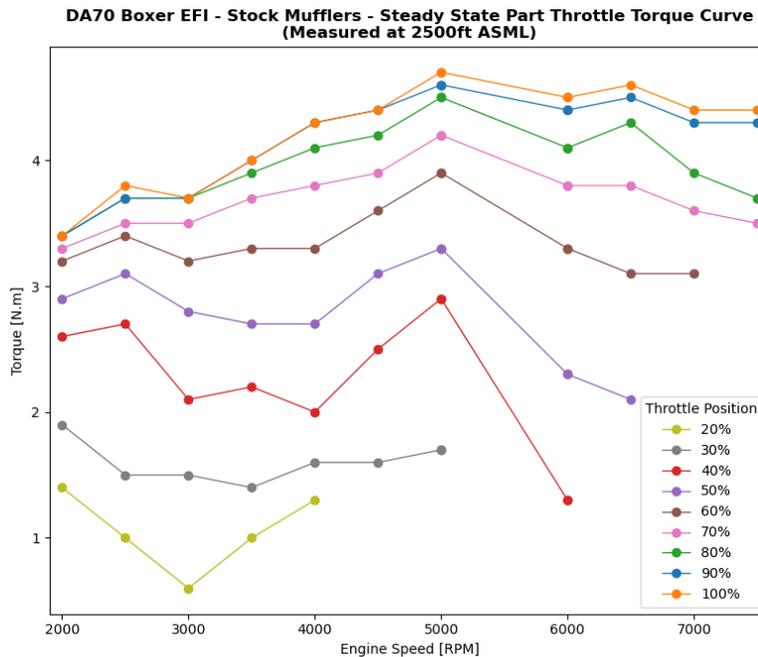


Figure 3. Part throttle torque curves

Brake Specific Fuel Consumption (BSFC)

Fuel consumption was measured (5Hz sample rate) via gravimetric analysis at a steady state for 30 seconds simultaneously with torque measurements. The relationship between BSFC and engine speed at wide open throttle (WOT) is shown (Figure 6). A BSFC contour plot is shown (Figure 7) in relation to torque and speed; this is useful for estimating regions of torque and speed having a near constant BSFC. Additional BSFC vs. speed plots at a given throttle position are available upon request.

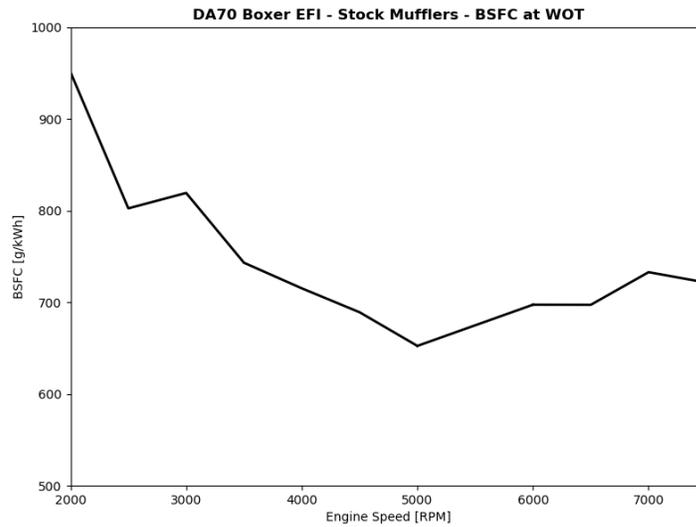


Figure 4. BSFC as a function of RPM

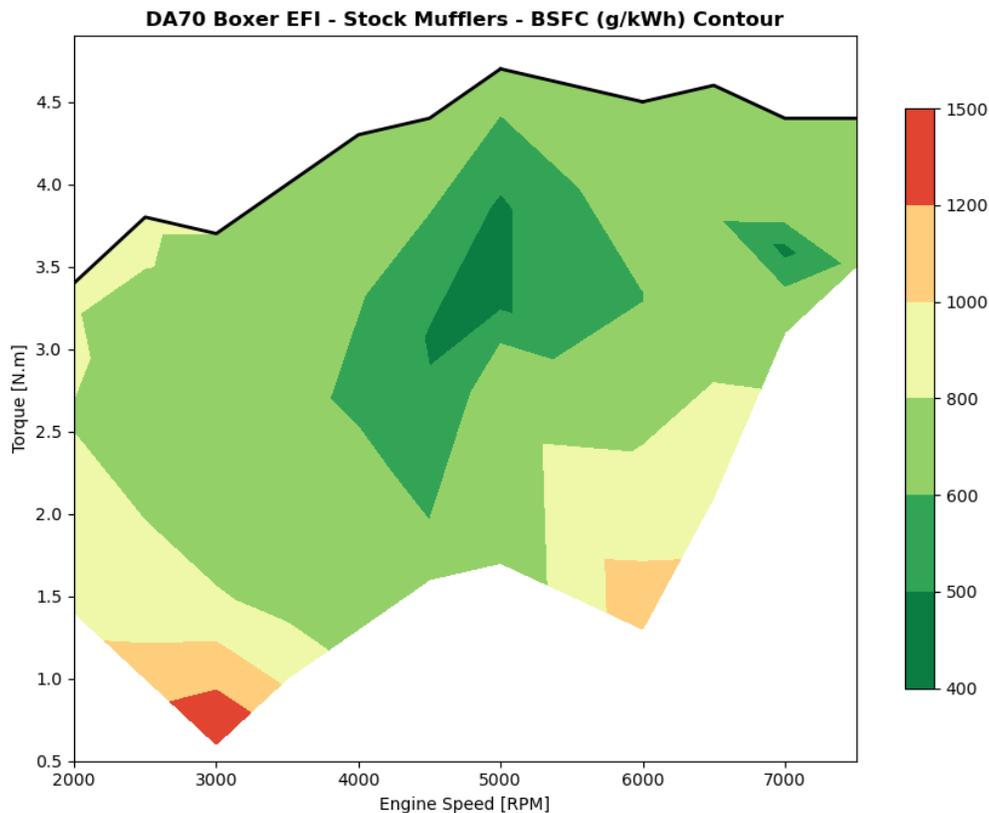


Figure 5. BSFC contour within regions of engine torque and speed

Stock Muffler Acoustic Analysis

Acoustic data was measured using a thirty-two-microphone array, positioned ~0.9 meters from the engine exhaust tip. A-weighted sound pressure from each microphone was averaged at a given frequency, then the equivalent sound pressure was calculated across a frequency range of 100Hz to 10kHz, to produce a single decibel level of the exhaust at a specific engine speed and throttle position. Figure 8 shows the results of this analysis at five throttle positions across the engine’s speed range (2000 to 9000 RPM) where applicable.

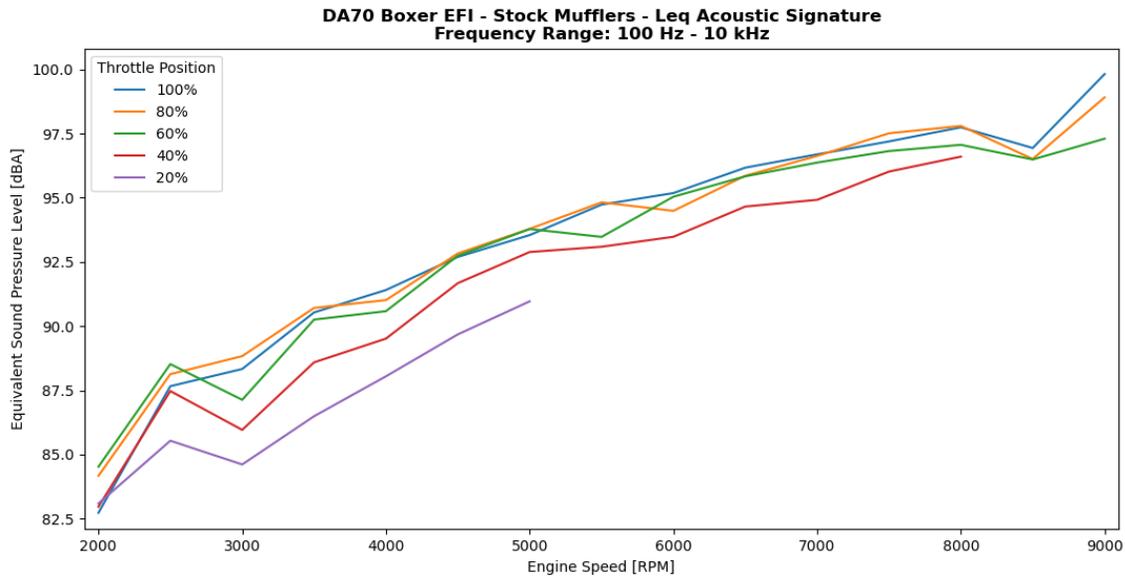


Figure 6. A-weighted equivalent sound level at five throttle positions, observer ~0.9 meters from engine.

Altitude attenuation is used to approximate the engine exhaust dBA over an increasing altitude gradient assuming that the observer is directly underneath the aircraft. Isohumidic plots of sound level vs. altitude are shown for various throttle positions across a range of engine speeds. Note that an ambient relative humidity of 50% is assumed, and a higher relative humidity would lead to slightly more acoustic attenuation & vice versa for a lower relative humidity.

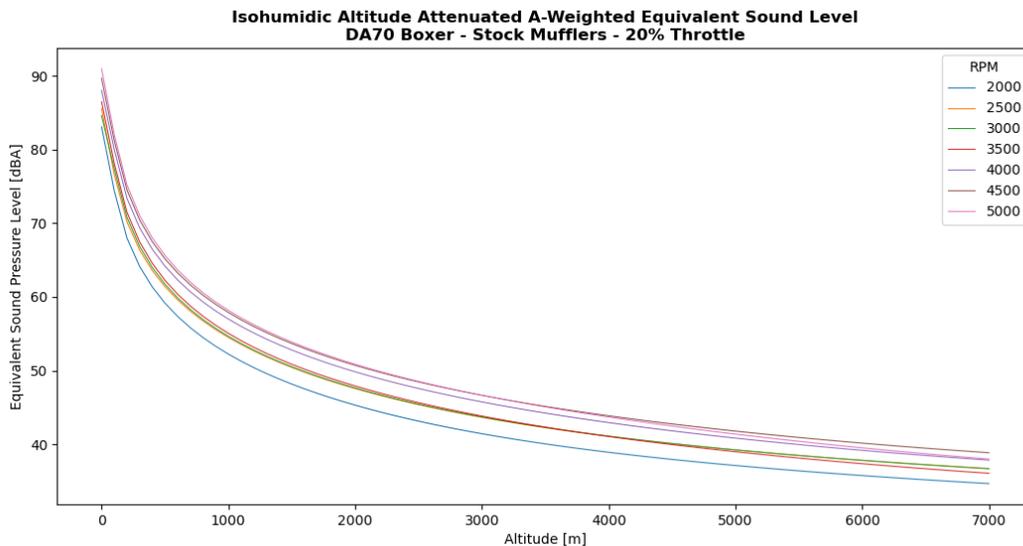


Figure 7. IsoHumidic plot for engine at 20% throttle and varying speeds.

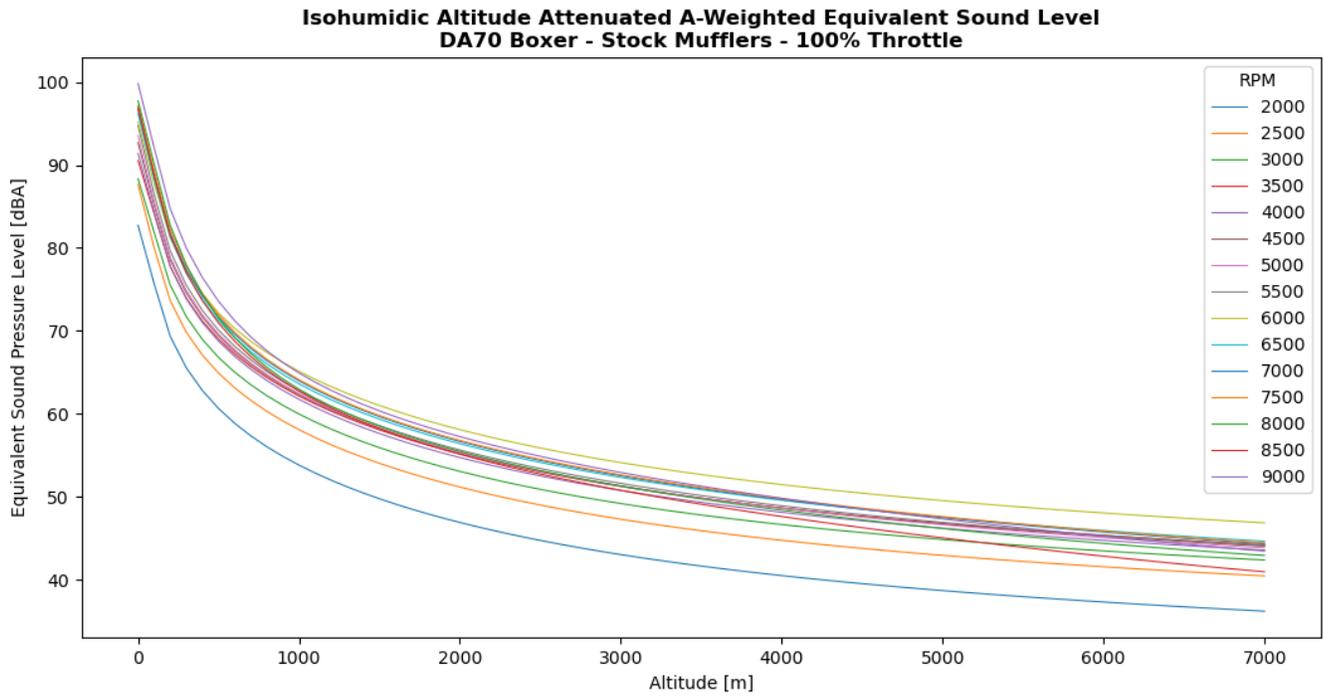


Figure 8. IsoHumidic plot for engine at 100% throttle and varying speeds.

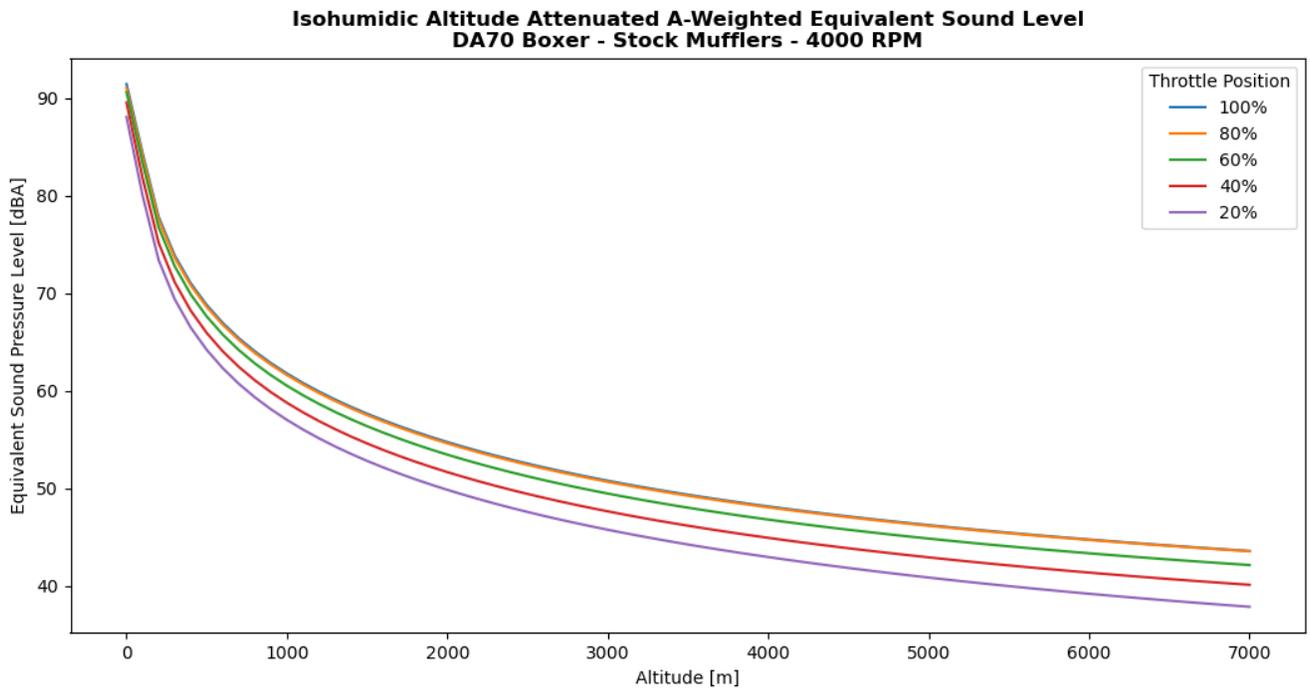


Figure 9. IsoHumidic plot for engine at 4000 RPM and varying throttle positions.

Additional altitude attenuation plots and frequency plots are available upon request.

DA70 Core Engine Dimensions

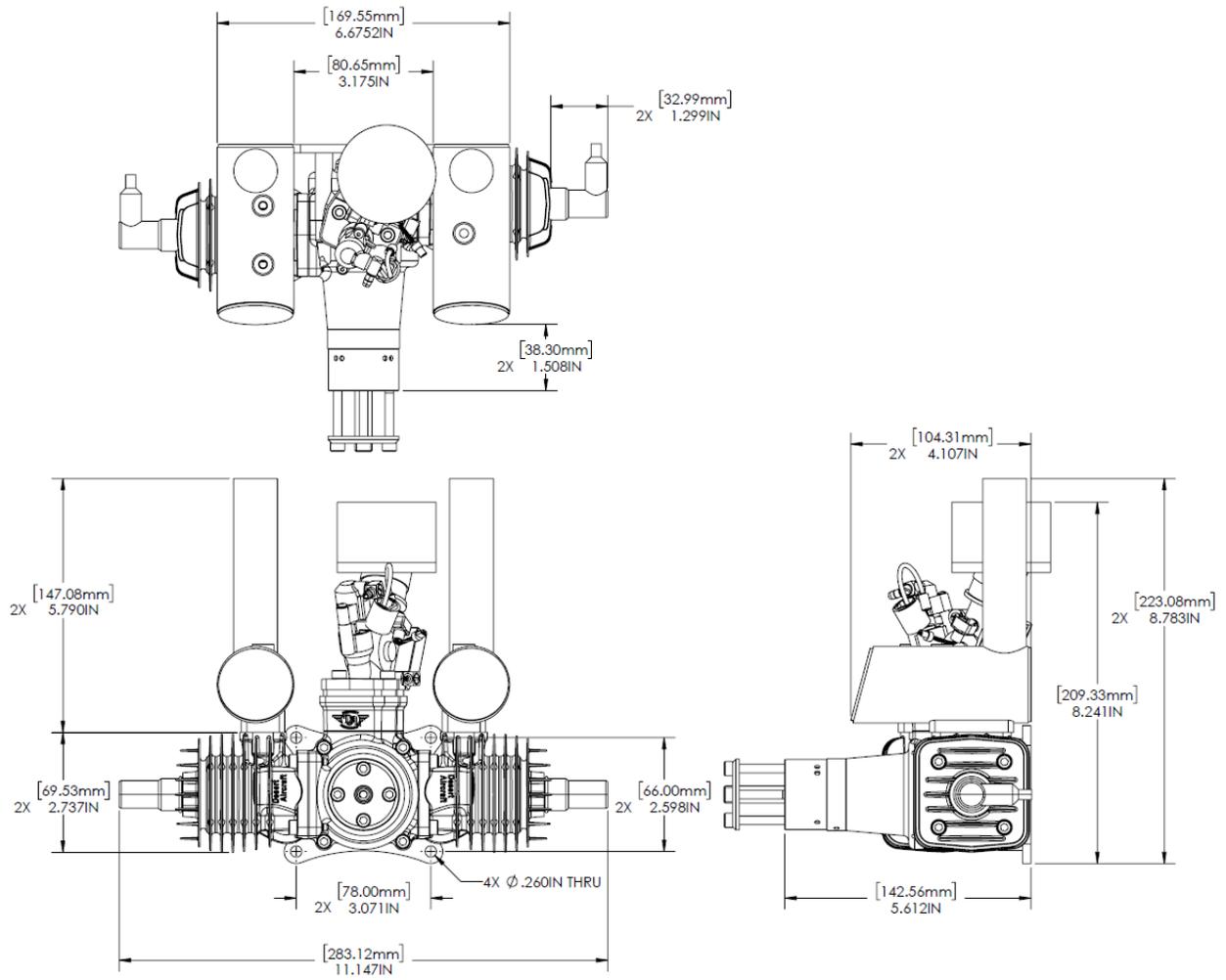


Figure 10. Various DA70 dimensions.

Maximum Power and Maximum Rated RPM Disclaimer

HFE provides the data in this sheet with the following exceptions:

- Maximum RPM can change between propeller manufacturers even if it is the same pitch and diameter. Propeller mass, balance, surface condition, chord shape, and tip shape, vary between manufacturers.
- Surface condition and defects in the propeller can change maximum RPM.
- Rigid vs. soft mounting the engine will change maximum RPM values.
- Engine to engine tolerance stack up for piston and bore clearance, casting variations and bearing fit can result in a +/- 3% variance in maximum RPM from engine to engine. HFE does not claim or warrant that all engines delivered will have the same maximum power. Engineers should design for the +/- 3% of the rated RPM in this data sheet.
- Generator loads can reduce maximum RPM by levels much higher than the power curve may state because there are other losses in the generator and PMU system that should be considered.
- It is common knowledge that two strokes can reduce RPM after being held at full throttle for several seconds. Initial full throttle RPM reduces because the piston expands with heat and becomes tighter in the bore, increasing friction. The expected drop from the instant high RPM, is approximately 200 RPM and varies depending on the propeller load.
- Increases in altitude will reduce air density in the engine resulting in lower power, however the work required to turn the propeller will also reduce. This relationship will vary depending on the propeller design. In some cases, the RPM will increase with higher altitude, and in some cases the RPM could decrease with higher altitude.
- Changes in intake air temperature and cylinder head temperature can affect maximum RPM.
- If the customer changes the location of the engine crank position sensor, maximum RPM can change and possibly damage the engine.
- Engine break in can cause RPM to increase slightly over time.
- Changing the muffler will change engine performance. Any change in the muffler should be coordinated with HFE otherwise the warranty is void.
- Changes in fuel, oil type and oil to fuel ratio can affect maximum RPM