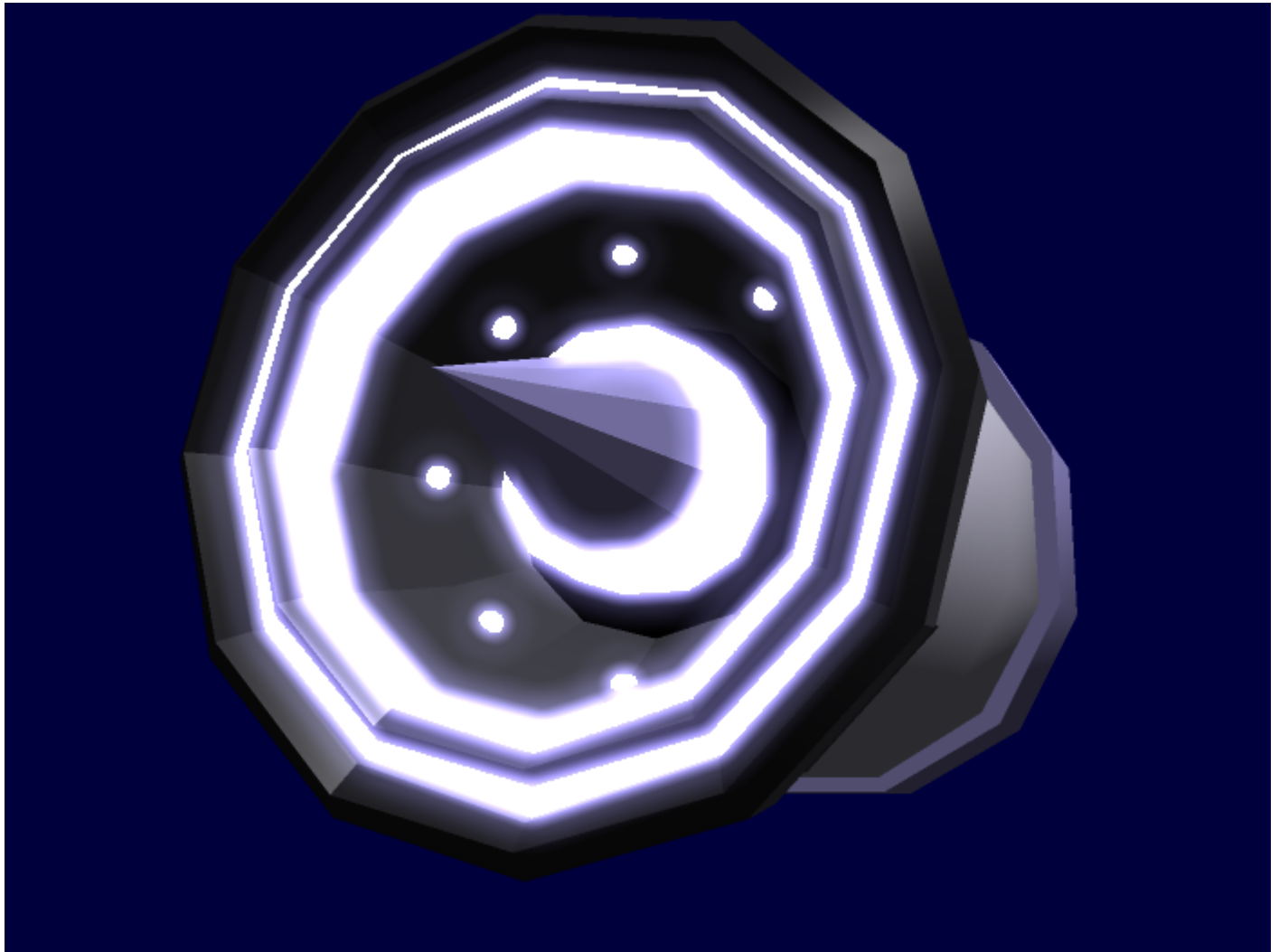


Two Stage Laser Engine



Pictured: Ke-M12-P3202 Two Stage Laser Engine

History and Background

Developed in [YE 33](#) by Chusa [Kage Yaichiro](#), the Two Stage Laser Engine is a [Project THOUGHT](#) concept which combines the specifications of the two main STL propulsion systems of the [Tsubame Prototype Fighter](#) into one hybrid system. The system is able to function in atmosphere, underwater, and in space, and can be considered a sibling to the [Dual Stage Aether Drive](#) developed for the same niche.

About the Two Stage Laser Engine

The Two Stage Laser Engine is a hybrid engine which is capable of delivering two forms of propulsion. Unlike its sibling Dual Stage Aether Drive, the drive is somewhat more expensive, though there are no

laws regulating its civilian use. Due to this, Thought Armor models that predate [Ketsurui Fleet Yards](#) production utilize this design rather than the turbo Aether Plasma-based system to avoid legal issues.

Also of note is that it is far stealthier in its space configuration than its counterpart due to the nature of the [Aether-assisted Laser Engine](#) used in its second mode of operation. The first mode is not stealthy, but can be used for assisted jumps by Thought and Power Armor without activating the Aether Generator, allowing it to work with a Thought Armor's Low Power Mode. Like the [Dual Stage Aether Drive](#), it is designed to be placed into many chassis, and even has potential for use in units with thrust vectoring capabilities.

Modes of Operation

Stage 1/Laser-heated Jet

Stage 1 uses lasers to heat the air or water at a specific point to combust or vaporize, to serve as a means of fuel-less propulsion. This is the main use for the system in atmosphere and in water. Like the [Dual Stage Aether Drive](#), rotating and specially shaped forcefields near the intake are typically utilized when at low speeds, which change angle of attack or are even deactivated when the speed of the air or water coming in high enough.

It should be noted that in this mode, a defocusing ring works in conjunction with additional emitters to diffuse the laser beam before it leaves the thruster, but after it has done its work. Volumetric systems built into the defocusing ring help lower the light output of the engine to the point where it is not overtly harmful, though it is not removed entirely. Due to this light output as part of the exhaust of the engine, it is not particularly stealthy in atmosphere.

The maximum attainable speed without burning atmosphere in a harmful way is an estimated 3,581 kph/2,225 mph (roughly Mach 3 at sea level), and a speed limit of 400 kph/249 mph is recommended on populated planets so as not to discomfort the eyes of inhabitants with the light output. Frame limitations may require that the engines be locked at a lower top speed than this, however. Lower wavelengths of light containing less energy are typically used within atmosphere as well.

Stage 2/Aether-assisted Laser Engine

Stage 2 makes the engine act as a standard [Aether-assisted Laser Engine](#), with all of the benefits and specifications thereof. The high output laser requires an Aether Generator to operate with any acceptable acceleration, otherwise it will take months or years to get up to an acceptable STL speed.

Unless the laser is directly pointed at the sensors scanning for it, the system is very hard to detect in space as long as the Aether Generator is not detected. This is especially true as the light from the laser travels no faster than the speed of light. Care should still be taken when in extremely close proximity to an enemy craft that the Aether Generator not show up on their sensors. The laser in this form, however, has the power to melt and cause a fair amount of damage if not diffused by the secondary emitter and

defocusing ring. Often, the secondary emitters and defocusing ring are still enabled in space when traveling through friendly territory. It is also good practice to adjust to a weaker wavelength and output, as it is adjustable.

The speed range of the device is actually anything below $1c$, but the acceleration notably drops off well before that even in an ideal system. Due to that, the *effective* top speed is estimated to be $0.375c$ (112,422 km per second), with some variance depending on the model used and what it is propelling. This is considered a fast engine and in the Very Advanced Technology class.

Benefits and Detriments

Civilian Legality

Unlike the Dual Stage Aether Drive, the Two Stage laser Engine is legal for civilian use and testing as of the time of its invention. Therefore, it is a preferred propulsion system for prototype Project THOUGHT models not yet submitted to [Ketsurui Fleet Yards](#).

Cost

The system is not the cheapest of the various STL systems to construct, but it does achieve propulsion in most environments without an exhaustible fuel source or notable environmental damage. Due to this, it has a very low operating cost once installed.

Generators and parts from the Dual Stage Aether Drive are used where possible, to keep costs down with uniform production lines.

Joints

While it can be mounted to normal engine mounts, the engine can also be used with the jointed developed by Project THOUGHT, such as the [Project THOUGHT Frictionless Hybrid Joint](#) and the [Project THOUGHT Simplified Joint](#). Due to this, it is not uncommon for these joints to be used for thrust vectoring capabilities. This is only if the frame of the equipped craft can handle the stresses of thrust vectoring, and the range of motion may also be limited by what the frame can handle.

Multirole

While not the stealthiest system in terrestrial operation, this type is capable of most kinds of space and terrestrial STL. While other types of propulsion may be better for specific mission profiles, it is a good all around STL engine design – and stealthier than the Dual Stage Aether Drive or Turbo Aether Plasma Drive when used in space. However, it has a lower top speed in atmosphere, assuming the frames on which they are installed to be able to take the speed.

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