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Description of the AMT Netherlands Olympus HP gas turbine.

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The original Olympus design was redesigned in 2004 to the HP version, in 2010 the engine is converted to a direct kerosene starting system.

The engine is highly used in the "model jet scene" but also professionals are using the Olympus HP. A spinoff of the Olympus HP is being certified by EASA for the use as a "bringing home device" for a full size glider.

For universities a "special" layout is available with measuring points.

Pricing : http://www.amtjets.com/form_pricelist.php

Specifications

All data at STP +/- 2%

Engine diameter	130 mm	/	5.1 Inch
Engine length	374 mm	/	14.7 Inch
Engine weight	2900 gram	/	6.4 Lbs
System airborne weight *	3845 gram	/	8,5 Lbs
Thrust at S.T.P. **	230 N	/	51.7 Lbf
Maximum RPM	108.500	/	108.500
Thrust at Idle RPM	13 N	/	2.9 Lbf
Pressure ratio	3.5:1	/	3.5:1
Mass flow	450 Gr/sec	/	0.99 Lb/Sec
Max continues EGT	750 Deg C	/	1380 Deg F
Fuel consumption	640 Gr/min	/	22,5 oz/min
Specific fuel consumption	46,4 gr/(Kn*sec)	/	1,64 lb/(lbf*hr)
Starting method	Direct kerosene starting gas turbine, on request propane start.		

* Total weight of; Engine,ECU,pump,battery,thermosensor, valves, mounting straps.

** On request the RPM can be raised to 110.000 RPM giving 10 Newton additional thrust.

Operating conditions

Min operation temperature *	- 35 Deg. Celsius	/	-31 Deg F
Maximum operating temperature	+ 50 Deg. Celsius	/	+122 Deg F
Maximum operating altitude	8000 Meter	/	26250 feet
Maximum operating speed	1000 Km / hour	/	620 Mile / hour

* With the use of LiPo batteries the minimum operation temperature is limited to -10 Deg Celsius.

Engine control possibilities

1 x RS232	Throttle and switch settings including special functions *		
2 x PWM between 1-2 milliseconds **	Throttle and switch settings.	(special functions * with push button)	
2 x Analog inputs 0-5 volt DC **	Throttle and switch settings.	(special functions * with push button)	

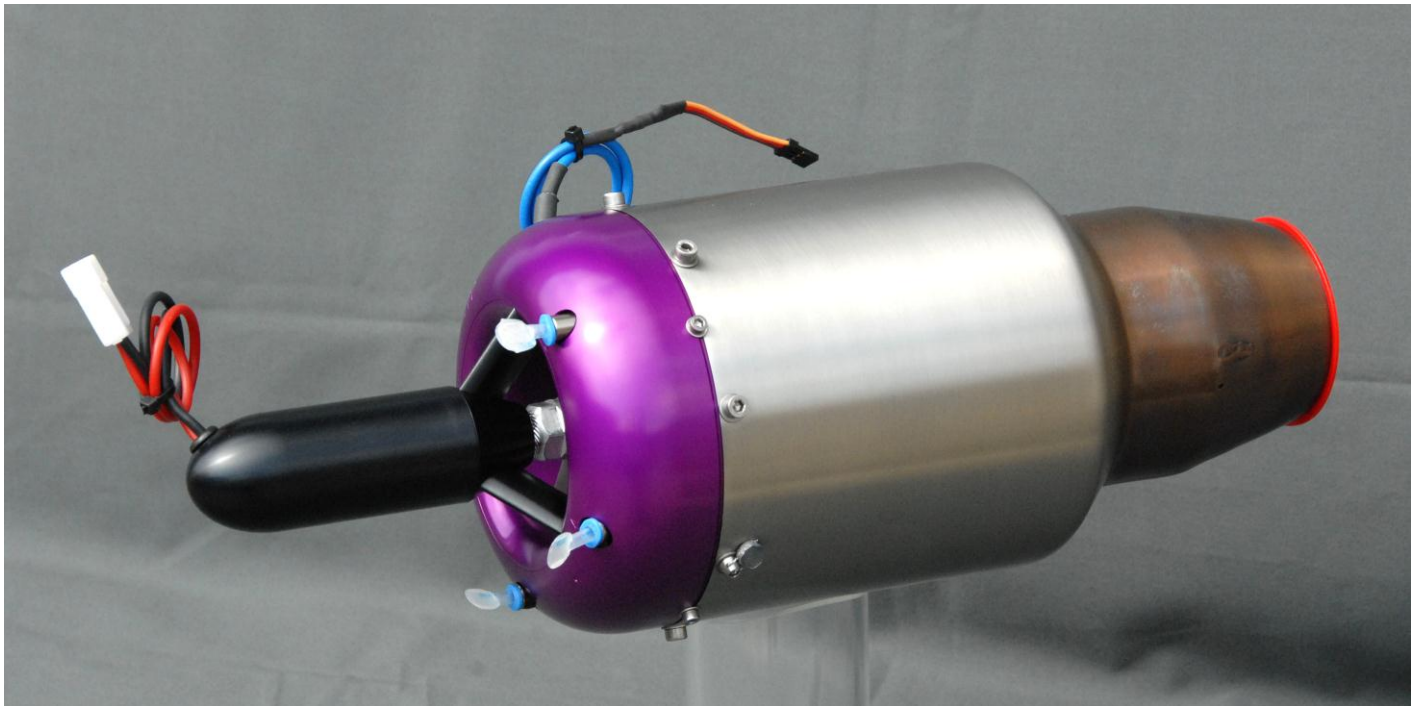
* Activation of prime function, igniter function, starter function, speed cool.

** Specify ECU at ordering with PWM inputs or Analog inputs.

All specifications are subject to change without notice.

S.T.P. : 15 Degrees Celsius / 59 Degrees Fahrenheit, Pressure : 1013 Mbar / 29.91 in

Picture of a standard Olympus HP E-start.



Picture of a Olympus HP E-start with additional measuring points.

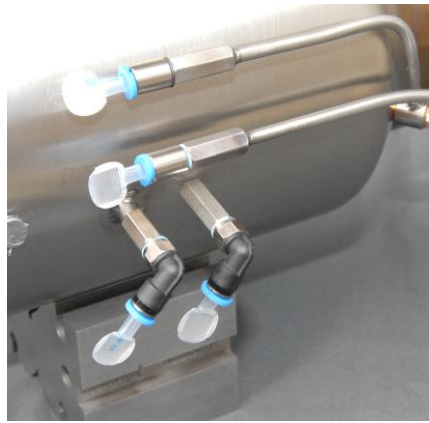


Additional measuring points on engines are build on request and are not standard.

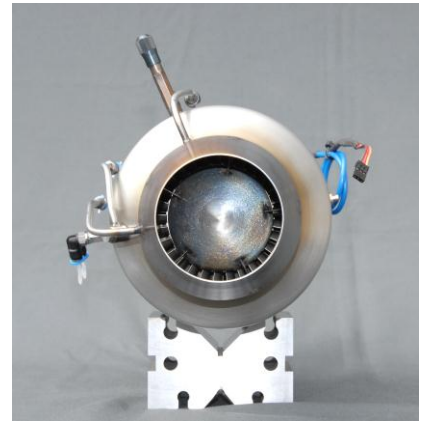
Front engine view



Side view



Rear engine view



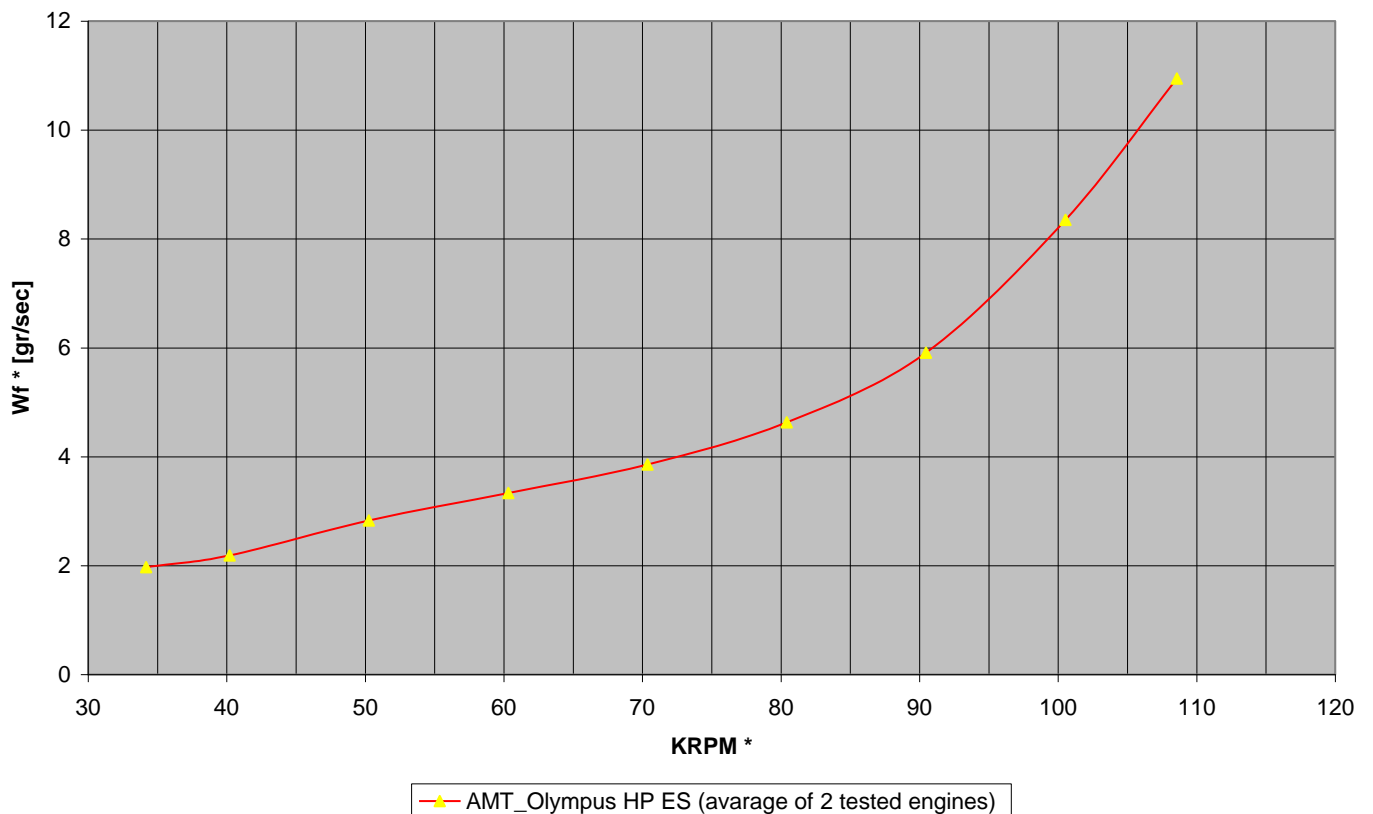
The Olympus HP E-start on a full size glider as a “bringing home” device. (ASW 20)



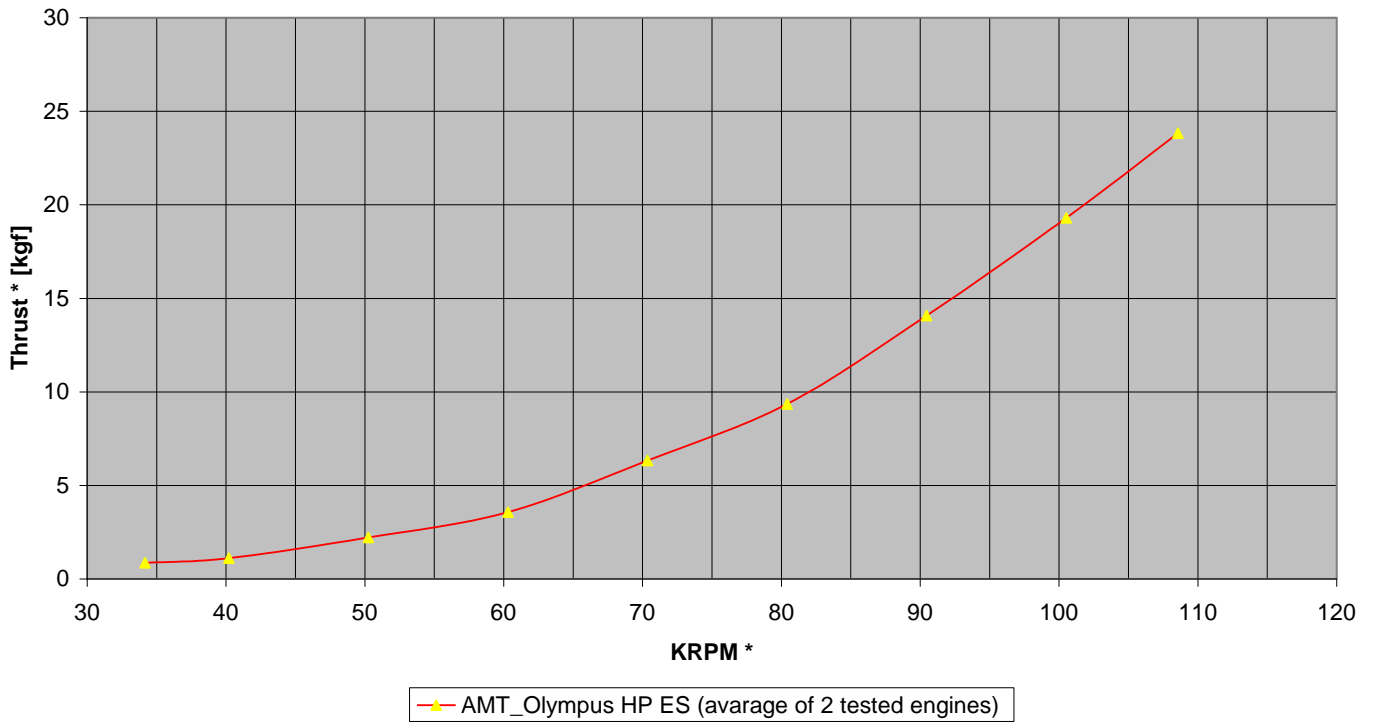
Picture Klaus Meitzner

Olympus HP E-start data as graphical information.

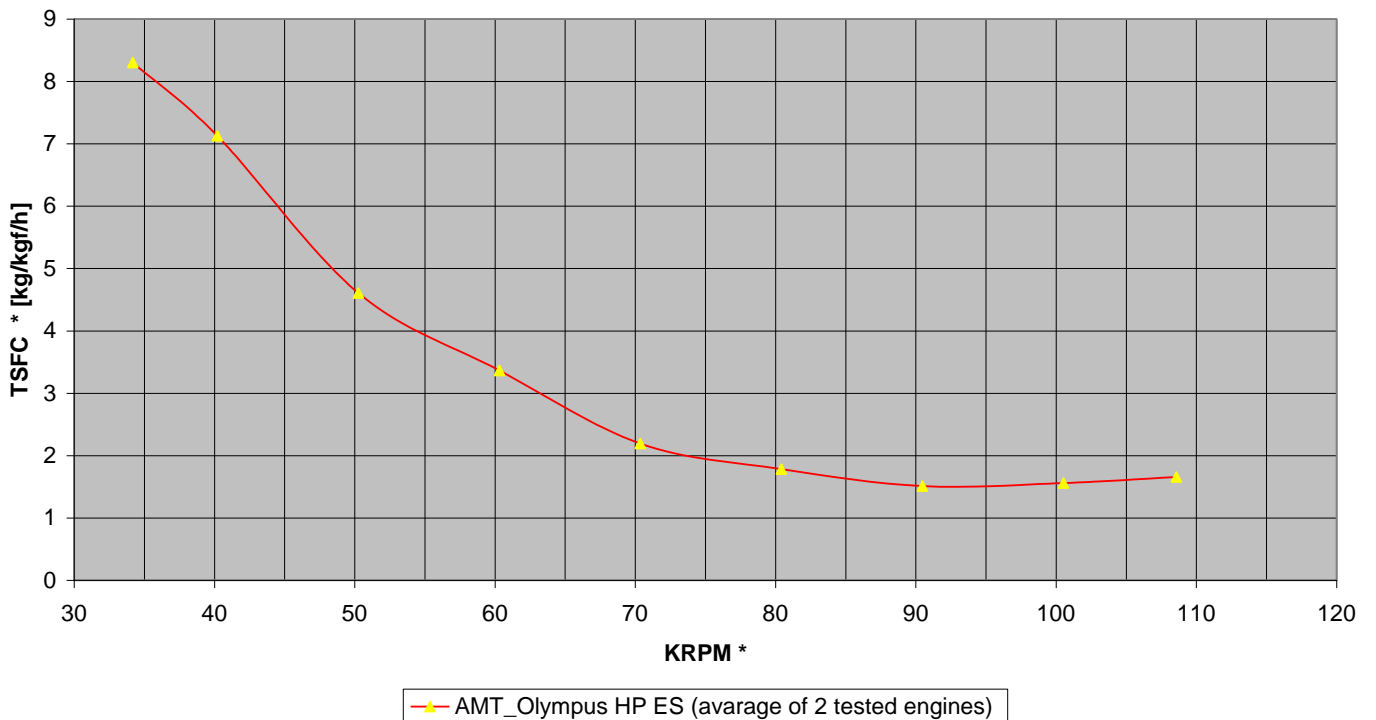
**Fuel Flow VS. RPM (Corrected)
AMT Olympus HP ES**



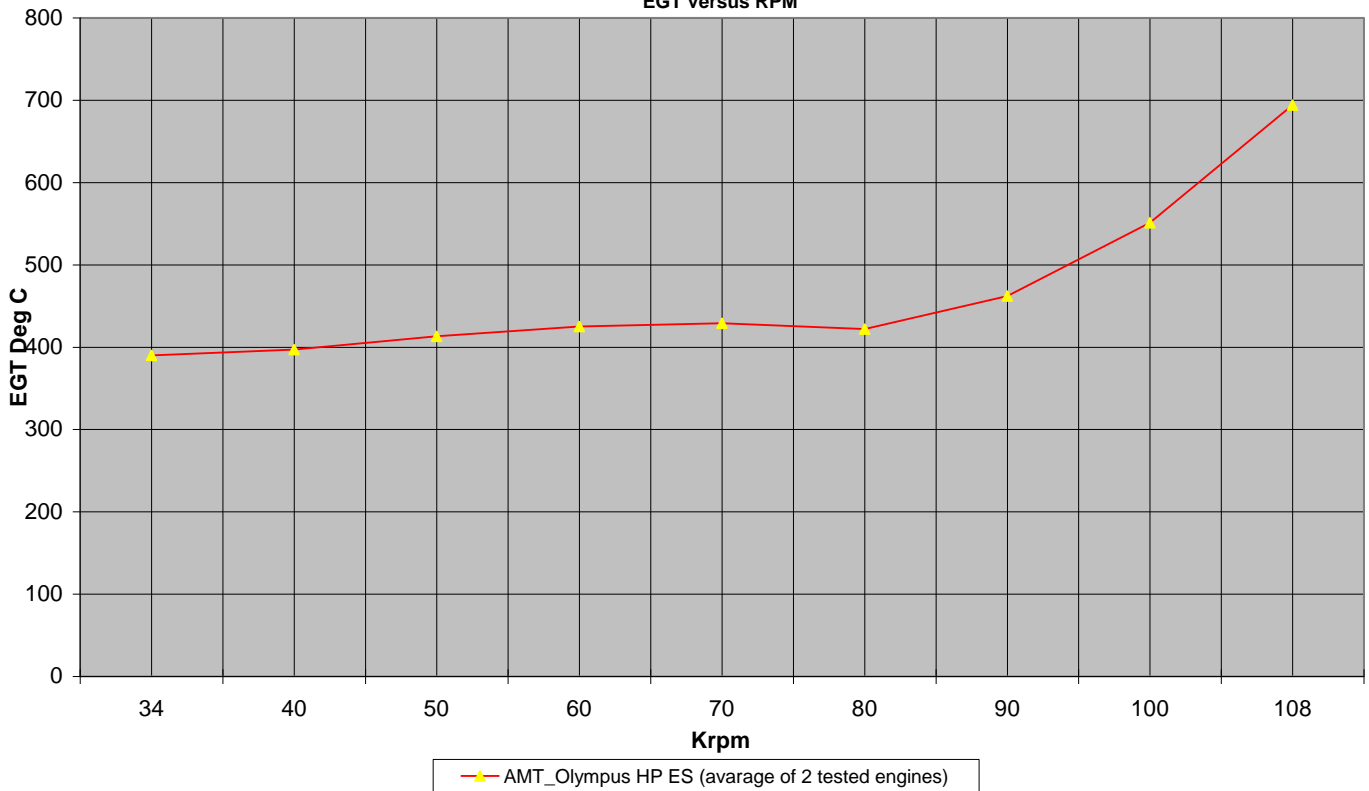
Thrust VS. RPM (Corrected) AMT Olympus HP ES



SFC VS. RPM (Corrected) AMT Olympus HP ES



AMT_Olympus HP ES
EGT versus RPM



Electronic Control Unit

AMT Netherlands developed in house a fully automatic ECU to control the turbine, main reason for this development was that there was a need for fully automatic starting turbines.

The latest update was to make it possible to start directly on kerosene with the use lithium polymer (LiPo) batteries. The lithium polymer batteries are available for all our engine types.

ECU Features.

- * One or Two channel operation.
- * ECU works on 4 cell LiPo.
- * Output for fuel solenoid valve.
- * Output for igniter solenoid valve.
- * Output for igniter.
- * Output for E-starter.
- * Programmable failsafe timer, standard set to 1 second delay before full stop.
- * Log file of last 22 min, of run @ 1 seconds interval.
- * Serial 2400 Baud, rs232 level output.
- * Weight 160 gram / 5,4 oz.
- * Fuzzy logic software, for fast throttle response.
- * No adjustments needed.
- * Ridged small ECU housing.
- * All high quality cables with gold plated connectors.
- * Standard "K type" EGT probe connector.



Note:

Latest software version (V33F and up) can control the ECU with a RS232 protocol. (For data see AMT website)

Telemetry software

Settings Tab

The screenshot shows the 'Settings' tab in the AMT Netherlands ECU ToolKit V2 software. The main window displays a table of ECU parameters. Below the table are several control panels for programming and settings.

Addr.	Internal	Description	Value	Unit	Compare
50	217	Maximum RPM; Actual Setting.	108500	RPM	0
51	180	Maximum RPM; Minimum allowed value.	90000	RPM	0
52	220	Maximum RPM; Maximum allowed value.	110000	RPM	0
53	217	Maximum RPM; Basic Factory Setting.	108500	RPM	0
60	224	Over RPM; Actual Setting.	112000	RPM	0
61	200	Over RPM; Minimum allowed value.	100000	RPM	0
62	228	Over RPM; Maximum allowed value.	114000	RPM	0
63	224	Over RPM; Basic Factory Setting.	112000	RPM	0
64	10	Over RPM time allowed (before getting error).	0,55	s	0
87	6	Corrects Vout every time going to maximum RPM. (decrease Vout)	0,05	Volt	0
133	1	Spin timer for correcting pump @ MaxRPM. (less = quicker response)	1	s	0
134	1	Spin timer for correcting pump the first time in MaxRPM range. (less = quicker resp)	1	s	0
135	4	Spin timer for spinning @ over RPM.	0,8	s	0

Below the table, the software interface includes several control panels:

- Category:** A list of categories including Spin timers, EGT, Hardware / Software, RPM settings @ idle side, RPM settings @ max side (highlighted), and Throttle response. An 'Edit' button is present.
- Programming:** Contains buttons for Handshake, Erase Log, Erase LRI, Download All Settings, and Program Changed Settings.
- Register Settings:** Contains buttons for Load ARS / SRS, Save ARS, Save Simple SRS, and Swap Value and Compare fields.
- ScreenControl:** Includes checkboxes for DebugInfo, Simple Settings, and Expert (checked).
- Compare Settings:** Includes a checkbox for Show Differences.

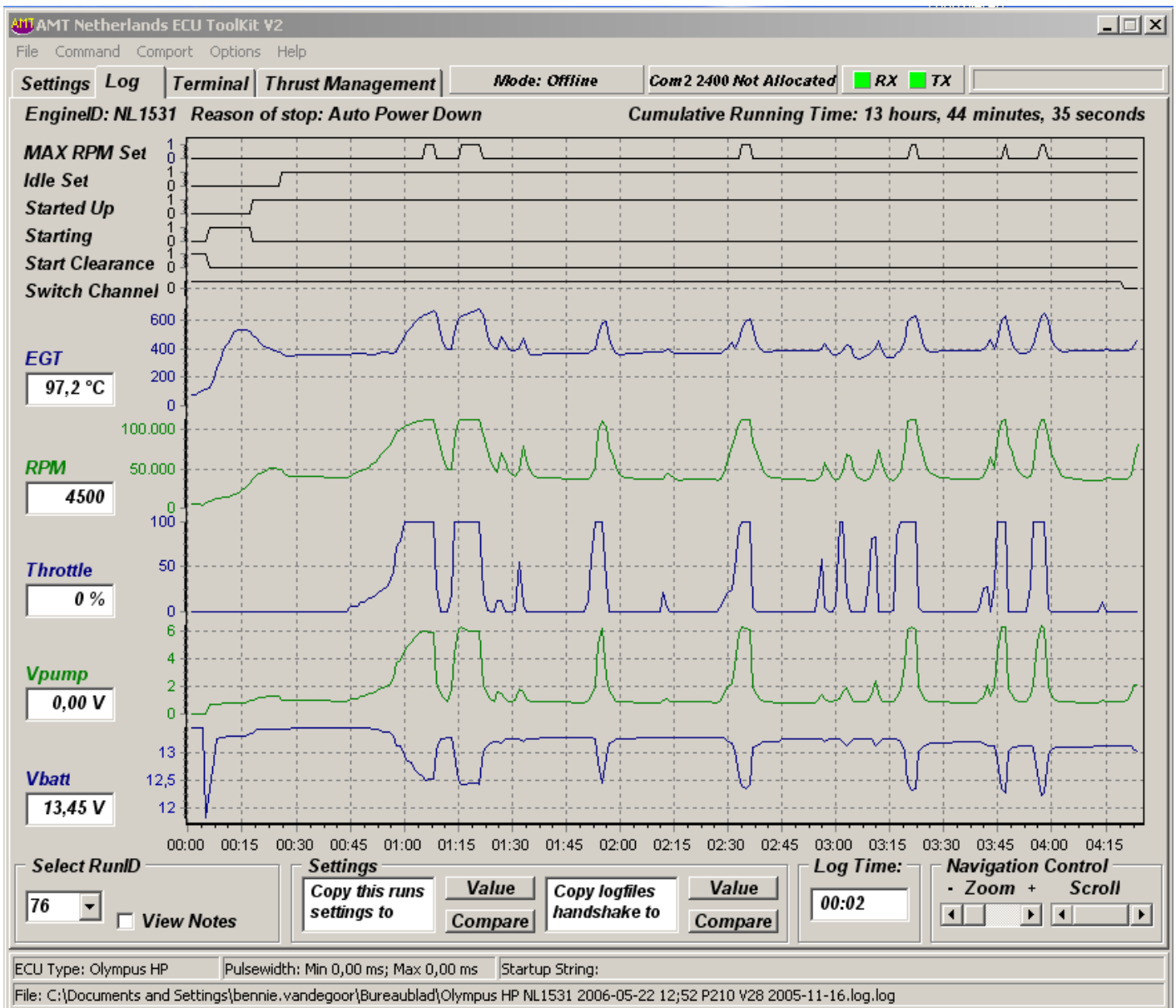
The status bar at the bottom shows: ECU Type: Olympus HP, Pulsewidth: Min 0,00 ms; Max 0,00 ms, Startup String: File: C:\Program Files\ECU Software\V2 Settings\Olympus HP\213\Olympus HP P213 V29 2007-03-16 2007-06-28 NL1673.set

The telemetry PC software is written for use with the Window XP operating system, this software will be shipped with every turbine.

With the "Settings" Tab in the PC program the user can change several parameters in the ECU software. Normally this is not needed, all ECU,s are pre-programmed and tested with the actual engine and fuel pump.

AMT Netherlands keeps record of all information during building of the engine including all data during testing.

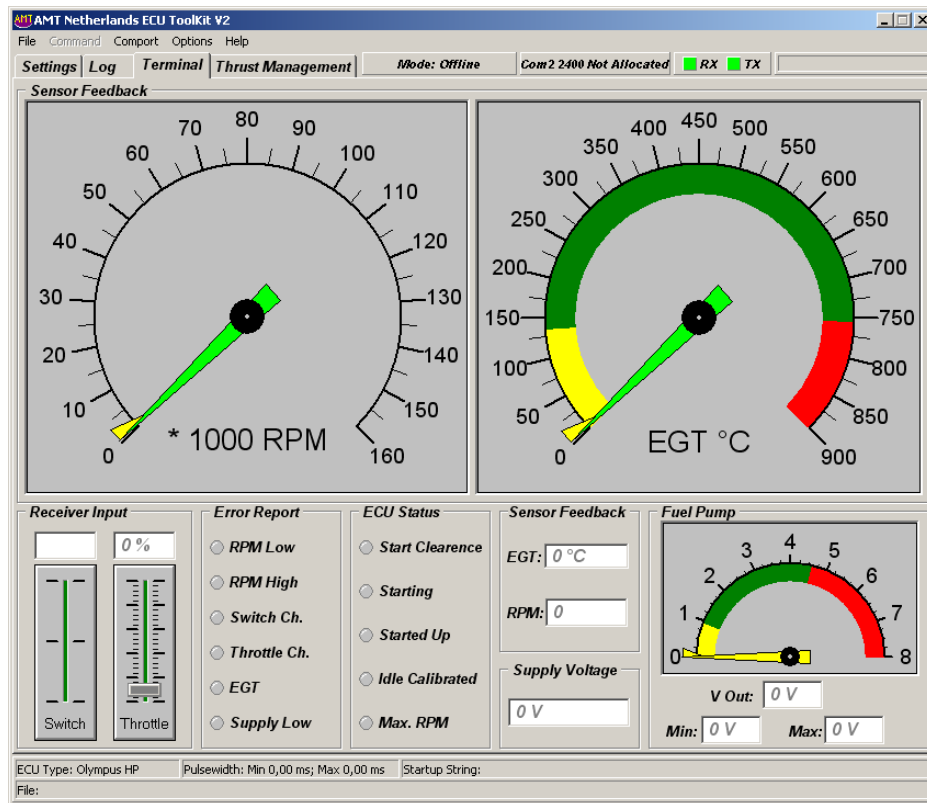
Log Tab



At a running engine the following information is logged.

- > RPM of shaft. (500 RPM resolution)
- > Exhaust Gas Temperature. (4 Degree Celsius resolution)
- > Throttle channel. (1 % resolution)
- > Switch channel, or throttle trim @ single channel operation.
- > Fail save condition if occurred.
- > Number of fail safes during last engine run.
- > Supply voltage of ECU.
- > Pump voltage.
- > Status of ECU (e.g. started up, max RPM set, error messages)
- > Reason of last stop.
- > For each engine run, all engine settings are stored.
- > Each run has its own unique engine number and time.
- > Total running time and run time of last run.

When using the actual program and you move your cursor over the graph, the cursor feedback will give you more detailed information in high resolution. All data from cursor position is displayed on the left of the screen.



Terminal Tab

At the “Terminal” Tab the operator can observe real time data coming from the ECU.

ECU status, control inputs, fuel pump voltage battery voltage and all error messages are visible on the screen.

Since the 2010 this engine is equipped with a direct kerosene start system, each set contains the following parts:

- 1 x Fully tested Olympus HP E-start gas turbine with kerosene start system.
- 1 x Version 2.0 b Electronic Control Unit.
- 1 x High flow main solenoid valve for kerosene.
- 1 x High flow fuel solenoid valve for igniter.
- 1 x Olympus HP fuel pump.
- 1 x Rear engine mount.
- 1 x Front engine mount + EGT sensor mount.
- 1 x 4 cell 2500Mah Lithium Polymer battery pack.
- 1 x Battery pack charge cable.
- 1 x Safety clip for RPM sensor.
- 1 x Thermo sensor (K-type).
- 1 x Manual Olympus HP E-start (kerosene).
- 1 x 3 meter Festo PP3 tube.
- 1 x 2 meter Festo PP4 tube.
- 1 x Fuel filter.
- 1 x Festo T piece for igniter feed.
- 1 x Engine Data Terminal.
- 1 x EDT charge cable.

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For latest information see **AMT Netherlands** website at [Http://www.amtjets.com](http://www.amtjets.com)