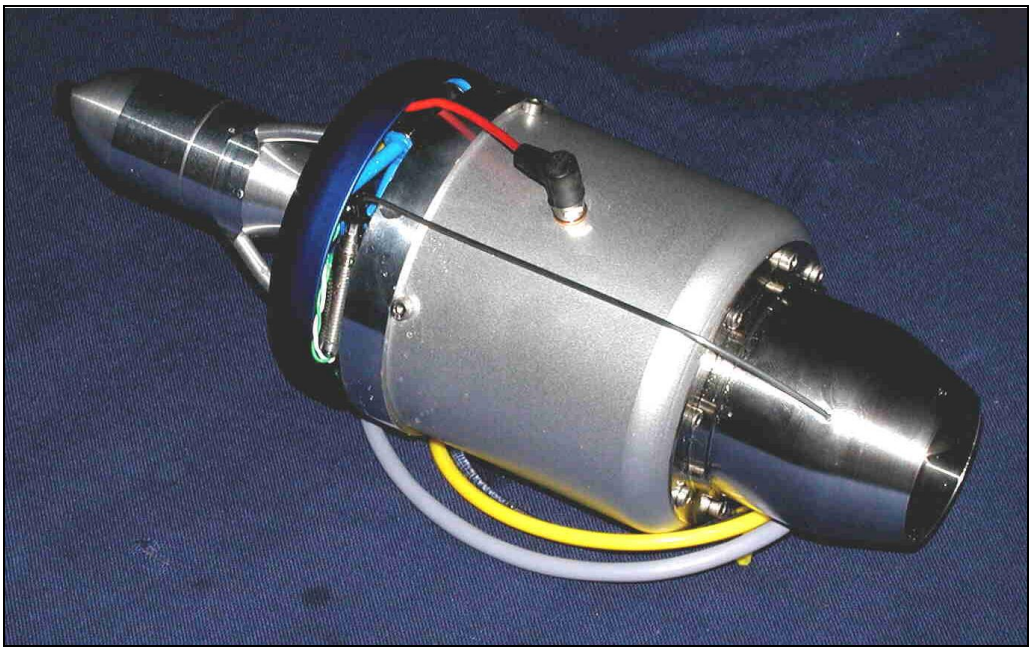
SimJet Miniature Turbojet Engine



Owner's Manual

SimJet – In Thrust We Believe!

INTERNAL DOC. NO. 9016-010-0002 REV. CODE 1.20

Dear SimJet owner,

Congratulations on the purchase of your new SimJet miniature turbojet engine system!

We strive to supply a thoroughly tested product - all SimJet miniature turbojet engines will therefore have a bluish tinge on the exhaust cone; This is your reassurance that it has been tested prior to shipment.

Please take the time to carefully read this manual. It contains all you need to know to ensure many safe and trouble free hours of operation of your SimJet miniature turbojet. It is important that you FULLY understand the operation of your Turbojet engine before running it for the first time.

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Rev 1.20	Manual extensively revised and adapted to A size format Special thanks to Kevin M^{c}Leod and Kerry Sterner for their contributions
Rev 1.11	New Fadec 2000 AES System Added
Rev 1.10	Drawings corrected.
Rev 1.09	Drawings corrected.
Rev 1.08	Customs information added.
Rev 1.07	Specifications 1910 added.
Rev 1.06	Errors corrected.

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Turbojet Specifications

Generic Specifications for:	**1700/2300/3000 AES**	**1200 AES**
Length	12" (305 mm)	10.25" (260mm)
Diameter	4.25" (108 mm)	3.5" (89mm)
Weight	2.6lbs (1200 g)	2.2lbs (1000g)

Residual thrust (at idle)	0.8 – 1.3 lbs
Nominal EGT	1000 – 1100 ºF (540 – 590 ºC) at max. thrust
Emergency shutdown temp.	1472 ºF (800 ºC)

Fuel	Jet A1/kerosene + 4% lubricant mix (1 quart of oil to 6.2 U.S. gal of fuel)
Lubricant	Exxon 2380 / Aero shell 500 or 560
Start gas	Propane or Powermax™

ECU power supply 9,6 V = 8 cells. Min. 1300 mAh

Type 3000 Specifications

Max. Thrust	30lbs	
Fuel consumption	12oz/min	@ max. Thrust

Type 2300 Specifications

Max. Thrust	23lbs	
Fuel consumption	10.5 oz/min	@ max. Thrust

Type 1700 Specifications

Max. Thrust	17.5lbs	
Fuel consumption	8.5 oz/min	@ max. Thrust

Type 1700 SP Specifications

Max. Thrust	20lbs	
Fuel consumption	8.5 oz/min	@ max. Thrust

Type 1200 Specifications

Max. Thrust	12lbs	
Fuel consumption	6.7 oz/min	@ max. Thrust

Type Sonic 8000 Specifications

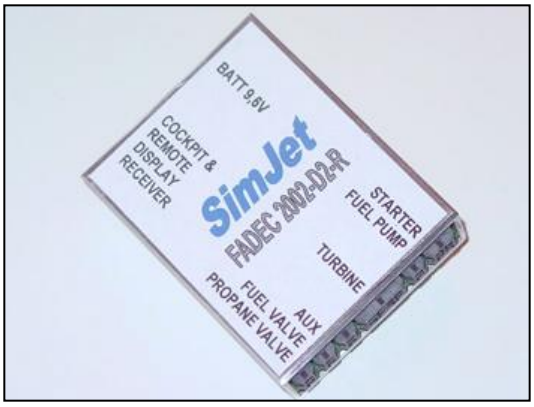
Max. Thrust	17.5lbs	
Fuel consumption	8.5 oz/min	@ max. Thrust

Type Sonic S120 Specifications

Max. Thrust	24.5lbs	
Fuel consumption	10.8 oz/min	@ max. Thrust

ECU Description

The SimJet Engine Control Unit, referred to hereafter as the ECU, is a highly advanced electronic control system for running and monitoring your SimJet engine. State of the art electronic hardware collects data from your engine and receiver, and directs the necessary power to the solenoids, starter, glow plug, and fuel pump. Timing for all these functions and fuel pump drive levels are controlled by a modern software algorithm stored in the memory of your ECU. The software is also responsible for keeping your engine running at peak performance; Should it determine that a failure has occurred it will immediately shut your engine down to prevent any further damage. While all SimJet ECUs look alike, the installed software is unique to your turbine type**. YOU MUST NEVER USE YOUR ECU WITH A DIFFERENT THRUST RATED TURBINE!**

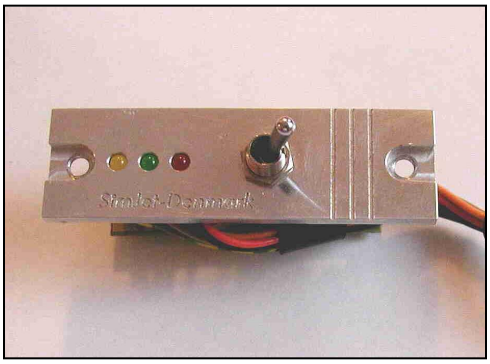


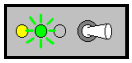
The SimJet ECU performs the following functions:

- Automated start-up sequence – The ECU determines when to apply starter power, glow drive, propane and fuel to the system.
- Throttle control. The ECU translates the throttle signal directly to compressor RPM for more linear thrust response characteristics. The throttle signal from the receiver is read using an opto-coupler interface to resist EMC noise transmission problems.
- Idle stabilization with indicator (yellow LED)
- Automatic glow plug drive and fault detection circuitry.
- Compressor RPM monitor – Engine speed is continually monitored and is not permitted to exceed the maximum rpm value programmed in the ECU.
- Auto Shut Down (ASD)- In case of overspeed, overtemp, or loss of throttle signal the ECU will immediately stop fuel flow to the engine.
- Controls max. Spool-up time is <2 sec.
- Controls max. Spool-down time is <4 sec.
- Provides status information to the Cockpit Display Panel.

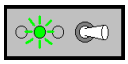
Cockpit Panel Description

The Cockpit Display Panel is a simple remote power control and display unit for monitoring the status of your SimJet engine. Its flash/ colour codes give you an instant indication of what your engine is doing, and its small size allows for convenient installation where the larger ECU would be difficult to see. A breakdown of the flash/colour codes during normal operation are shown below:

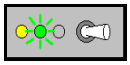




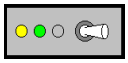
Legend – Diagram indicates solid Yellow and flashing Green LED



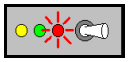
Initial ECU power up, built in test OK



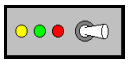
Ready to begin auto start sequence



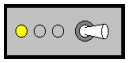
Startup sequence initiated



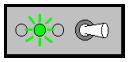
Propane ignition sequence



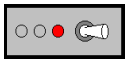
Combustion chamber has reached 250°F, ECU will engage primary fuel supply



Autostart sequence complete, engine at Start/idle position

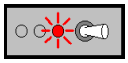


Engine running at full RPM

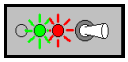


Engine shut down due to user command or fuel system malfunction

Engine fault codes:



Engine shut down due to ASD (see section on ASD)



Combustion chamber too hot to start, ECU will initiate cool-down

Glow plug failure. (Indicated during propane ignition sequence so Red and Green LED's will also be illuminated, but not shown here for clarity)

Also found on the CDP is a toggle switch. This is the main power switch for the ECU. When the switch is toggled away from the LEDs (as shown in the above diagrams) the ECU will be turned on.

Transmitter Setup

Start/idle and shutdown positions:

Power on transmitter.
Power on receiver and ECU.
Set both the throttle stick and trim to minimum, the yellow LED should not be on. **This is the shutdown position.**
Move throttle trim forward. The yellow LED should light up.
Continue to move the idle trim forward. The yellow LED will go out.
Move transmitter trim back a little until the yellow LED is once again lit. **This is your start/idle position.**
Your transmitter is now properly configured for the ECU.

Note- When going from idle to shut down, there is a two second delay between commanding shut down and the yellow LED going out. For this reason you must follow the above procedure to correctly set up your Tx.

If you cannot achieve the idle and shutdown positions as described above, you may need to electronically adjust the low end point of your throttle channel. (Please refer to your transmitter's instruction manual for assistance on how to do this.)

Full throttle position:

The first time you run your SimJet, advance the throttle slowly while observing the green LED. The green LED will begin to flash when you have achieved maximum turbine RPM. This should occur near the full throttle position on your Tx. If this is not the case you may need to adjust the high end point of your throttle channel. *If you are trying to perform an electric autostart sequence and cannot get the sequence to initiate, you may need to increase the high end point on your throttle channel.* (Please refer to your transmitter's instruction manual for assistance on how to do this.)

Propane Regulator Setup

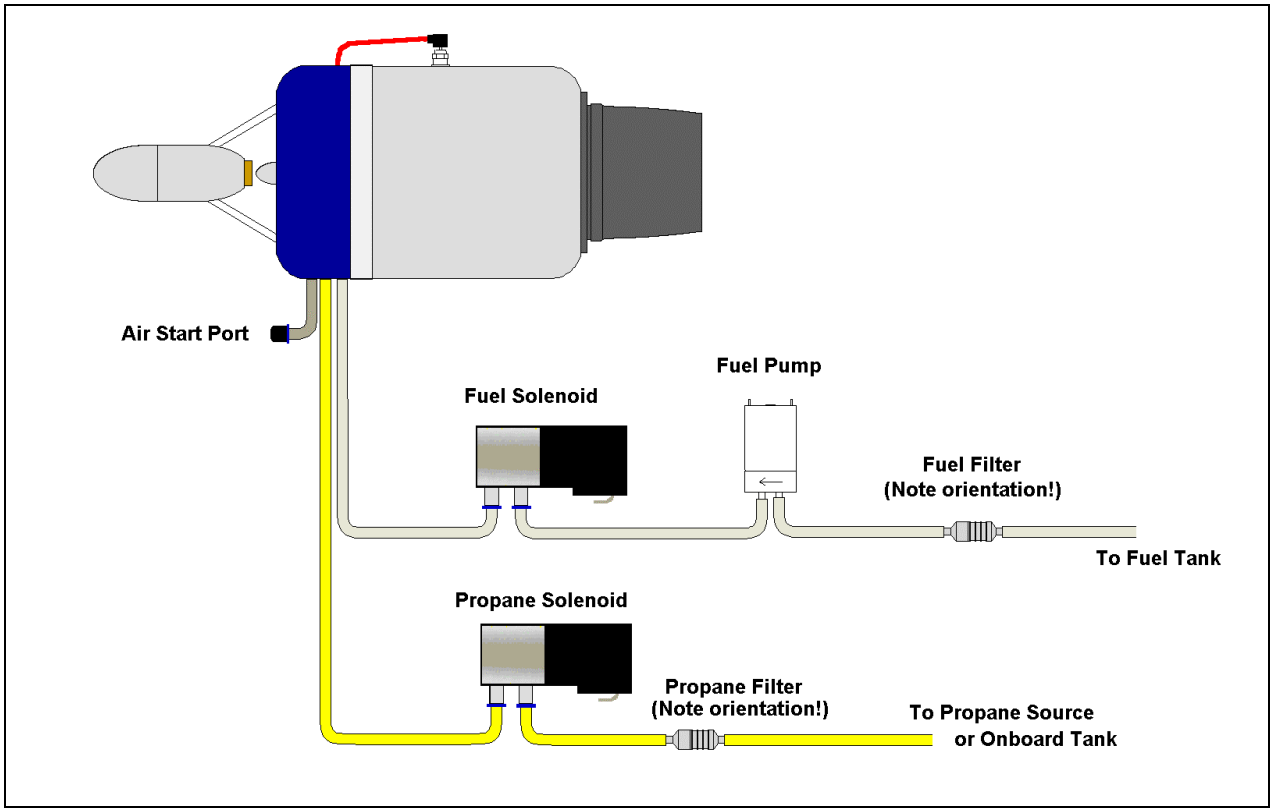
If you are going to use propane to start your SimJet, you must also obtain a regulator to reduce the pressure. We recommend you use the following procedure to find the right regulator setting for your SimJet on your first start. You may also use this procedure if you are having difficulties getting the propane to ignite on subsequent starts. Once you have established the correct setting you may set your regulator directly to this setting as a part of the pre-start checklist.

During the start sequence keep the propane regulator closed until the starter motor disengages and the red LED begins flashing. Slowly open the propane valve until you hear the "puff" of the propane igniting. The engine should ramp up through the rest of the start sequence. Remember where your propane valve is set, this is your propane start setting. **In 90% of cases with no ignition of the propane it is because there is too much propane.** If the propane ignites but the engine will not ramp up, slowly open the valve a little more until the engine has enough speed to engage the main fuel supply. Note this new setting as your propane start setting.

** Remember to always have your model facing into the wind when performing the start or shutdown sequence.

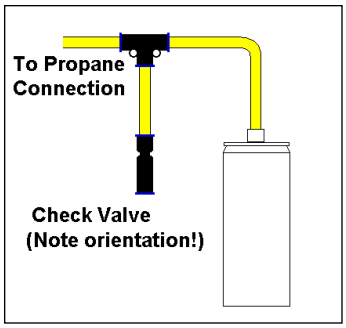
Fuel/Start Gas/Air connections

Please use the following diagram for connecting the fuel and start gas equipment to your turbine. Take careful note of the order in which the various components are placed. (First the filter, then pump, then the solenoid valve.) Also please pay attention to the input and output ports on the solenoid valves as the they will not shut off if they are connected backwards.



Onboard Start Gas Tank Installation

All SimJet AES engines are capable of being started with an onboard start gas reservoir. If you choose to use the onboard reservoir be sure to fill the tank with a propane/butane blend (ie Powermax™). **The onboard start tank will not work with pure propane!** It is also very important that the tank be mounted as close to vertical as possible (with the fuel line out the top) so that only gaseous propane/butane will reach the turbine. During installation the distance from the onboard propane tank to the turbine should also be kept as short as possible.



Priming the System

Your SimJet has been designed so that for most installations the user will not have to initiate any form of pump priming sequence, even on the very first run-up. In some installations however, where there is a long distance (>3 feet, except SimJet 1200, where we recommend following procedure each time the fuel lines are empty) between the hopper tank and the turbine, you may have some difficulty with your first start.

Upon initiating your first start, if the fuel pump runs for longer than 10 seconds but fuel has not yet entered the turbine, it is recommended that you abort the start by cycling the ECU power switch and reinitiate the start sequence. This will ensure that the fuel is delivered to the turbine in a timely manner during the next start sequence.

For SimJet 1200 please proceed with normal startup procedure until first fuel is accessing the turbojet. Then stop ECU with the ECU power switch and turn on again after turbine has come to a stillstand. Wait for cooling sequence and begin normal startup procedure again.

Pre-start Checklist

CHECK	- Preflight check of aircraft completed
SPACE	- Free space behind turbojet - min. 25 feet. And ensure your model is facing into the wind.
SPECTATORS	- Ensure that all persons not associated with the start procedure are kept away at a safe distance.
SPIN	- Check that the turbojet spins freely.
FIRE	- Have a manned fire extinguisher ready
FUEL	- Ensure your fuel tanks filled to capacity.
FOD	- Ensure there are no loose object around your model that could be ingested by your SimJet. (This also includes long hair or any items you may have in your shirt pocket!)
POWER	- Switch on transmitter
	- Switch on the receiver.
	- Switch on the ECU *(green LED flashing).*
	- Throttle to the start/idle position (*yellow LED on*) for start.
PROPANE	- Connect the propane and open the regulator to the start setting.

If you have a manual shut-off valve in the fuel system ensure it is open.

You may now initiate the start sequence

Running Your SimJet

Initiating the Auto Electric Start Sequence

ALWAYS COMPLETE THE PRE-START CHECKLIST BEFORE STARTING YOUR SIMJET ENGINE

Move the throttle stick from start/idle to full throttle, and let throttle stay in this position for approx 2 seconds.
Yellow LED will go on after 2 seconds, indicating accept of start command.
Go to idle setting with throttle stick.
After a 3 second delay, the ECU will begin the auto start sequence, as described below:

- Starter motor will engage.
- The green LED will go from flashing to solid, indicating that the auto start sequence is beginning and that greater than 2000 RPM has been detected.
- At 10000 RPM the starter will release and begin to pulse on and off to maintain the necessary compressor RPM.
- Propane valve will open, and glow plug will light. *(Red LED will begin flashing)*
- The propane will ignite*
- (*When combustion chamber has reached the right temp the red LED will go from flashing to steady)*
- Starter will engage and increase the compressor speed to 12000 rpm.
- Fuel valve will open, and the turbine will spool up. (If the fuel line is empty this can take up to 10 sec. For Simjet 1200 please read chapter "Priming the fuel system")
- At 16000 rpm the propane valve will close.
- At 20000 rpm the starter will disengage.
- Idle will stabilise at 35000 rpm. (55000 for the SimJet 1200)
- The green light will extinguish. (*Green LED may light now and then indicating idle adjustment.*)

The SimJet is now ready for your command.
Close the propane regulator and disconnect the propane source from the turbine.
Advance the throttle to full and observe the LEDs on the CDP. Ensure the green LED is flashing quickly.
Go fly!

DO NOT SHUT OFF PROPANE SOURCE UNTIL AUTOSTART SEQUENCE IS COMPLETE!

*If the propane for some reason does not ignite after 3 intervals, the ECU will go into start-fail mode. All LED's will illuminate and the starter motor will continue to spin at full speed (This will purge the turbine of any raw fuel that may have built up during the start attempt.) Even though the starter motor is engaged, no further start attempts will be made by the ECU. Switch off the ECU and wait until the compressor stops spinning, then reapply power to the ECU for a new start attempt. Check for adequate pressure from the propane source, but be careful not to supply too much propane to the turbine as this is the cause of most failed starts.

Initiating Air Start Sequence

Although your SimJet is designed to be operated as a full auto electric start turbine, it still retains the capability of being air started if desired. Your air source must be capable of supplying at least 80 PSI to the air start port of the SimJet. To perform an air start use the following sequence:

ALWAYS COMPLETE THE PRE-START CHECKLIST BEFORE STARTING YOUR SIMJET ENGINE

Apply air to the air start port. *(The green LED will go from flashing to solid)*
At 10000 rpm the ECU will open the propane valve and apply power to the glow plug. *(Red LED will begin flashing)*
When you see the red LED begin to flash, stop applying air to allow the propane to ignite.
When the propane catches, the red LED will go from flashing to steady.
Reapply the air until the red LED goes out. (If compressor RPM begins to fall, reapply air for an additional 10 seconds)
Close propane regulator and disconnect the propane line from the turbine.
Disconnect the air line from the turbine.
Advance the throttle to full and observe the LEDs on the CDP. Ensure the green LED is flashing quickly.

Go fly!

If Start Up Fails

Power off ECU. **(In any case of failure the first step is always to switch off the ECU. This automatically closes propane and fuel valves)**
Wait until zero rpm on turbine.
Power on ECU.
Begin with start up sequence again.
Please note: If temperature is too high in the combustion chamber the red and green LEDs will flash on power up and the electric starter motor will perform a cool down sequence. This cool down sequence starts after a time delay of approximately 3 seconds. You will not be able to get Yellow LED (start up position) before combustion temperature is below 110C and the compressor has spun down to a sufficiently low RPM.

Manual Shut Down

Move throttle stick to idle.
Move throttle trim/throttle cut to the shut down position and hold for two seconds. (*Yellow LED off after two seconds*)
The fuel will be cut off and the turbine will spool down. (*Red LED will illuminate*)
Move throttle trim (or throttle cut) back to idle position.
Electric start motor will now perform cool down sequence. The cooling time depends on turbine temperature, but starter will engage min. 3 times. (If the throttle is left in the shut down position, this will not be executed.)
When the cooling sequence stops power off the ECU, Rx, then Tx.

Auto shut down - ASD system

The ASD function ensures that the turbojet is operational only when a valid signal is being continuously read from the receiver. If receiver power is lost or the receiver experiences interference on the throttle channel, the ASD function will detect this and shutdown your SimJet immediately.

Any of the following four conditions will allow you to test the ASD function:
1.) Switch-off the transmitter when turbojet is running. (We recommend you do this only at idle.)
2.) Disconnect the connection between receiver and ECU.
3.) Switch-off the transmitter.
4.) Switch-on a second transmitter on the same channel.

Understanding the effect of failsafe on ASD

In case of radio interference some radio systems will enter a fail-safe mode. It is important that the SimJet owner understands the effects of radio-based fail-safe modes and how they defeat the ASD on SimJet turbines.

When a receiver enters fail-safe mode, depending on how the fail-safe mode is configured, a given channel will either be set to a *pre-selected* position, or *hold* the channel at its last received good position. If the fail-safe mode is set to *hold* on the throttle channel it will prevent the ASD from detecting a radio interference problem. In this situation, your turbine will still be running when your aircraft hits the ground, which greatly increases the risk of a post crash fire. SimJet urges its customers who fly with radios that have a failsafe on the throttle channel to *PRESET* IT TO KILL THE TURBINE IN THE EVENT OF SIGNAL LOSS.

Understanding Density Altitude

All turbojet engines derive their thrust as a function of compressor RPM and the density of the air mass they are running in. For a certain RPM then, running in less dense air will result in less thrust. Loosely defined, density altitude is a way to measure the density of the air mass around you. It is affected not only by your actual elevation above MSL, but also the temperature, humidity and ambient pressure of the air around you.

Why do you need to know about density altitude? If you travel to different locations to fly, you may notice that your turbine performs better at lower elevations. You may also notice that your turbine seems to perform better in cooler temperatures. This is normal, and will affect all turbines in the same way. These phenomena are effects of changing density altitude. The lower the density altitude, the better your turbine will perform.

All model turbojet engines (SimJet and others) are thrust rated based on a standard density altitude. (In the case of SimJet, the following figures are used as standard conditions: 0ft MSL, 29.92"Hg, 64˚F, dry air.) When running your turbine at a higher density altitude than standard conditions, you should expect a marginal loss in thrust.

If you wish to fly in a higher density altitude please accept a power loss, which can be calculated with following formula:

L_F= (QNH/29.92)	Pressure in hg at your field. If unknown, simply fill in 29.92 the expected error Is<1.5%.
T_F= (286/ (273+T)	Standard temperature divided by temperature at your field in °C
H_F= (1-(H/36000))	Altitude correction H= Field altitude in feet

Humidity will not be corrected, error to small.

$N_{tat} = N_{nom} * L_F * T_F * H_F$ Real thrust = Rated thrust multiplied by factors

eg:
You will fly on a hot summer day T=35°C in an altitude of 1500 feet and an QNH of 29.54. What is the real power of your SimJet 1700 with a rated power of 17.5 lbs.

L_F= 29.54/29.92= 0.99
T_F= 286/(273+35)= 0.93
H_F= (1-(1500/36000)= 0.96

N_{tat}= 17.5 lbs*0.99*0.93*0.96= **15.5 lbs**

2 lbs thrust or 11.6% are lost!

Maintaining your Turbojet

Like most technically complex equipment your SimJet requires periodic maintenance. It is highly recommended that you keep a log of all your runs, and schedule regular maintenance based on those runs. Some things will need to be checked frequently to ensure optimal performance, while others will only need periodic monitoring. It is also very important to learn what is "normal operation" for your SimJet; If you begin to notice an unusual behavior when starting, running or shutting down your SimJet, it may be an indication that something needs attention.

Every 10-15 Starts

- Check starter O-ring for wear. If you have a knurled compressor nut, you must visually inspect for wear on the starter O-ring. Wear will also be indicated by prolonged switchover times from start gas to main fuel during start up. **Warning!** Allowing your O-ring to become excessively worn can result in damage your compressor nut.
- Oil the propane valve. This will prevent the valve from sticking during start up.

Once per season

- Service your fuel pump. This can be done by completely immersing the pump unit in a glass of water and driving it with 1.5V to 2V across the motor terminals for about 10 minutes. The water will clean and re-hone the motor brushes, allowing the pump to run more smoothly. (It is normal for the water to get dirty as sediment is flushed out from inside the motor casing.) When this is done shake out as much water as you can, then dry off with a clean cloth. Sparingly apply a drop of 3 in 1 oil to the rear bushing of the pump. Finally, circulate some 3 in 1 oil through the pump to flush out any water from inside the pump mechanism. (Do not immerse the pump in oil!) Never run the pump dry.
- Clean out all filters. Over time, the fuel filter will accumulate particles that will eventually restrict fuel flow to the engine. Replace the fuel filter basket or back flush with clean fuel. If you have a filter in the propane line, it can be back-flushed with clean fuel or low pressure compressed air. Be sure to reinstall the filters with the correct orientation!

As Required

- Service the starter motor/bendix. The your starter motor seems weak it can be re-conditioned by following the same procedure as above for the fuel pump- fully immersing the starter in a glass of water and run for 10 minutes at a reduced voltage (1.5V to 2V). When complete, shake out as much water as you can then dry off with a clean cloth. Apply a drop of oil to the rear motor bushing and in the gap between the motor and bendix. Work the oil in by spinning the motor over by hand. If the bendix mechanism does not retract smoothly when pulled out, apply a little oil to the helical track in the bendix mechanism. Make sure you do not get any oil on the O-ring!

For major overhauls such as bearing changes, contact your dealer for instructions on obtaining factory level repair.

Troubleshooting Guide for the AES system

Fault 1 No RPM on start attempt

Possible cause

1) Starter motor does not engage
   a) Cockpit Display Panel switch not turned on
   b) Insufficient charge on ECU battery
   c) Starter motor failure
   d) Wiring failure
   e) ECU fault or motor plugged into wrong jack on ECU
   f) Starter motor Bendix seized
   g) Radio not programmed properly
   h) Excessively worn O-ring or O-ring missing
   i) Starter motor installed to incorrect depth in housing

2) Seized Rotor
   a) Foreign object damage (FOD) to the rotor
   b) Seized bearings

Actions to correct problem:

1)
   a) Turn on CDP switch
   b) Charge ECU battery. If insufficient voltage exists after charge battery may need to be replaced
   c) Service start motor
   d) Ensure wiring between start motor and ECU is not broken
   e) Ensure start motor wiring is correctly inserted into the ECU
   f) Service Bendix (Lubricate barrel and pins with lightweight grease or oil.)
   g) Ensure that the throttle channel does not need to be reversed. Increase full throttle by setting ATV to >100%
   h) Inspect O-ring and replace as required
   i) Adjust starter motor depth so that 1/16" (1700/2300/3000) or 3/16" (1200) of Bendix protrudes from the end of the starter motor housing.

2)
   a) Return turbine to service centre for repair
   b) Return turbine to service centre for repair

Fault 2 Starter motor does not release on start attempt

Possible cause

1) ECU Battery voltage insufficient for start. (Compressor must reach 10000 RPM before release)
2) Starter motor bullet out of alignment with turbine shaft
3) Starter motor installed to incorrect depth in housing
4) Faulty RPM sensor (Green LED not going solid during start up is an indication of this.)
5) Turbine not connected to ECU

Actions to correct problem

1) Test ECU battery, recharge or replace as required
2) Re-align or replace starter motor housing
3) Adjust starter motor so that 1/16" of Bendix protrudes from the end of the starter motor housing
4) Return turbine to service centre for repair
5) Ensure turbine is properly connected to ECU

Fault 3 Propane won't ignite during start sequence

Possible cause

1) Propane valve is stuck closed
2) Incorrect quantity of propane is being applied to turbine
3) Propane source empty
4) Glow plug blown. (Indicated by flashing yellow LED)

Actions to correct problem

1) Service propane solenoid with 3-in-1 oil. Test by disconnecting propane line between the solenoid and the turbojet. Next, apply power to the ECU. You will hear a short burst of propane escaping from the valve as it is cycled when the ECU first comes on line.
2) See section on determining the proper propane regulator setting.
3) Replace propane canister
4) Replace glow plug. Be sure to pull out 3 coils before installing replacement into your SimJet.

Fault 4 Can't get solid red LED during startup

Possible cause

1) Insufficient propane pressure
2) Thermocouple coated with carbon

Actions to correct problem

1) Increase the propane flow setting slightly and re-initiate start sequence.
2) Service T/C by carefully cleaning tip with fine steel wool or replace T/C. Carbon buildup is generally due to running turbine on greater than 4% oil mix. Inverting the propane bottle **briefly** will also temporarily help this.

Fault 5 Turbine won't ramp up after propane ignites

Possible cause

1) Incorrect quantity of propane being applied to turbine or low propane supply.
2) Restricted fuel line.
3) Sticky fuel solenoid
4) Fuel pump in need of service
5) Rotor rubbing – high bearing friction.
6) Starter O-ring is worn out or wet with oil or propane.
7) Starter motor installed to incorrect depth in housing or is worn out.

Actions to correct problem

1) Adjust propane valve until turbine ramps up smoothly. This can be due to either not enough or too much propane. Replace propane canister if necessary. Check for restrictions or kinks in the propane line as they can also be responsible for this.
2) Inspect fuel delivery tubing and back flush fuel filters. (Ensure they are reinserted in the same direction!)
3) Service fuel solenoid
4) Service fuel pump. (See section on maintenance) Replace as required.
5) Return turbine to service centre for repair
6) Clean or replace O-ring as required
7) Ensure starter motor is set so that 1/16" of Bendix protrudes from the end of the starter motor housing. If you have more than 150 - 200 starts on your starter motor it may need to be replaced.

Fault 6 No or slow acceleration from idle to full power

Possible cause

1) Throttle channel on radio improperly programmed
2) Restricted fuel flow
3) Restricted fuel nozzle
4) Rotor rubbing or high bearing friction
5) Worn or dirty fuel pump
6) Air in fuel delivery system
7) Vacuum in fuel system

Actions to correct problem

1) Ensure throttle channel is programmed correctly. Call your dealer for assistance if necessary.
2) Inspect fuel delivery tubing and back flush fuel filters. (Ensure they are reinserted in the same direction!) Larger diameter fuel tubing may also be required- this can be tested for by supplying the fuel pump from a different fuel tank with a very short large diameter supply line.
3) Return turbine to service centre for repair
4) Return turbine to service centre for repair
5) Service fuel pump. (See section on maintenance) Replace if necessary
6) Check all fittings and tubing for air bubbles while turbine is running. Replace tubing and/or fittings as required.
7) Check fuel system for proper venting and/or collapsed pick up tubing.

Fault 7 Turbine quits while decelerating from full power to idle

Possible cause

1) Idle position set too low on Tx.
2) Vacuum in fuel system.

Actions to correct problem

1) Ensure idle is set according to set up procedure in manual. Adjust idle trim 2-3 clicks higher.
2) Check fuel system for proper venting and/or collapsed pick up tubing.

Fault 8 Turbine continually performs cool down sequence on start up

Possible cause

1) Turbine is not properly connected to ECU
2) Damaged thermocouple

Actions to correct problem

1) Ensure the cable between the turbine and the ECU is connected correctly and the connectors are fully inserted.
2) Return turbine to service centre for repair

Fault 9 Turbine quits during steady state running

Possible cause

1) Rotor rubbing
2) High bearing friction
3) Internal fuel leak
4) Damaged thermocouple

Actions to correct problem

In all the above cases, return the turbine to service centre for repair

CDP LED quick reference guide

Green LED flashing slowly	ECU power on
Green LED steady on	Autostart mode initiated
Green LED flashing quickly	Turbine is at max RPM
Yellow LED steady on	Start/Idle mode
Yellow LED flashing	Glow plug failure
Red LED flashing during start	ECU attempting to ignite propane
Red LED steady on during start	Combustion chamber warm enough for main fuel ramp up
Red LED flashing after shutdown	Shutdown due to ASD
Red LED steady after shutdown	Shutdown due to operator command or fuel system malfunction

Do's and Don'ts

- During turbine installation, pay careful attention to route the Rx antenna as far as possible from the turbine electronics and fuel pump to minimize range loss due to EMI.
- Always keep your plane extremely tidy - remember that even the smallest piece of scrap tube or wood will destroy your turbojet if ingested while running. (FOD)
- In case of suspicion about faults in plane or turbojet - don't fly. Check and correct any faults.
- Before any start-up of the turbojet check that there isn't any fuel in the turbojet to avoid hot starts. Hold the plane upright so that any pooled fuel will drip out.
- Always face the Turbojet/ model into wind during startup and shutdown procedures.
- Never stand behind or in line with the turbine blades during operation.
- If the turbojet begins to squeal it is an indication that it is severely out of balance. Stop the turbojet immediately and contact the supplier. During operation you must not be able to feel any vibrations in the plane.
- If you notice hot spots on the turbojet exhaust cone during operation contact your supplier.
- Do **not** attempt to repair or alter the turbojet or ECU yourself.
- Always empty the fuel system after a day flying or run-ups.
- Never run the turbine without a filter.
- NEVER use your ECU with a SimJet engine of different thrust rating.
- In case of a gear-up or off field landing: shutdown the turbine before the plane lands to avoid dirt etc. being ingested by the turbojet. After recovery the plane should be thoroughly cleaned and the turbine inspected for FOD damage.
- If you have any questions about the operation of your SimJet or wish clarification of any of the material presented here *please* contact your supplier and ask!

Per AMA and MAAC regulations, you must always have a manned fire extinguisher when running your SimJet.

Service and Repair

Please note: ***If you have to return your turbine to SimJet Denmark or Great Northern Models for service or repairs, please state in the documents that it is being returned for repairs. This will expedite handling through customs considerably.***

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Glossary of Terms

ECU: Electronic-Control-Unit

AES: Auto-Electric-Start

ASD: Auto-Shut-Down

CDP: Cockpit Display Panel

MSL: Mean Sea Level

Hg: Inches of Mercury

LED: Light Emitting Diode

EGT: Exhaust Gas Temperature

FOD: Foreign Object Damage

EMI: Electromagnetic Interference