



# Turbine Power Technologies, Inc.

## Starting the Walter M601 B, D & E Turbine - Limiter

*This is only to be used as a guide and not to be used as the check list.*

### AUTO START with (Limiter)

1. Power on.
2. Inverter on if necessary.
3. Fuel on.
4. Fuel pump/pumps on.
5. Condition lever forward to detent.
6. Propeller in feather position.
7. Throttle in idle position.
8. Press start. It is best to keep a hand on the condition lever in case of over temp.
9. Carefully monitor the ITT for increasing temp, do not exceed 710 degrees. Rate of increase is important. If over temp occurs, pull the condition lever to the shut-off position.
10. Make sure N1 (Compressor rpm) increases to at least 60%. If not, forward throttle slightly and monitor ITT.
11. After N1 and ITT stabilize, switch on generator.
12. Check oil and fuel pressure.
13. Advance the prop to full-fine pitch.

**Recommended Practices:** It is good practice to start the turbine with headsets off. A possible over temp can be heard quicker than the ITT gauge can display it.

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United States  
386-216-8180



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**CAUTION:** Keep one hand on the Condition Lever and be ready to cut as the button will not prevent an over temp if the throttle is partly open, the batteries are low, or there is high outside temperature and / or elevation. If there is a high turbine temperature (over 150°C) before starting, a wind from the rear, a blockage of the air intakes, or the ISOL valve is in the ISOL mode, these may also cause an over temp.

**Important Notice:** If the ITT exceeds 735°C and no more than 800°C, the turbine must be inspected for damage (Borescope). If ITT exceeds 800°C, the turbine must be dismantled for inspection and a possible change of all compressor turbine blades. To continue operation after an over temp could cause a catastrophic failure!

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## **Cold Cycle Start (motor):**

1. Master switch on
2. Fuel on
3. Fuel pump ON
4. Throttle to idle
5. Prop to Feather
6. Condition lever in shut off position
7. Turn the Motor switch on and carefully monitor the 20-second Motor sequence.

**NOTE:** If aircraft batteries are used during the Cold Cycle without a GPU, it is possible to worsen the problem by depleting the batteries. It is possible to cold cycle the turbine for five to eight seconds and abort by switching the Master off. This will save the battery power and should reduce the turbine temperature enough for a successful start.

## **IF THE TURBINE TENDS TO OVER TEMP DURING START, THE PROBLEMS COULD BE:**

- The Batteries have insufficient power.
- The limiter is not working (electrical).
- Throttle linkage adjustment is incorrect - FCU lever must be on "0" degrees.
- An adjustment is needed on the FCU.
- High elevation.
- High outside temp.
- Strong wind from rear of aircraft. Turn into wind.
- If ITT is 150°C and over, cold cycle (Motor) the turbine to cool it off before attempting a start.

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## Manual Start:

1. Power on.
2. Inverter on if necessary.
3. Fuel on.
4. Fuel pump / pumps on.
5. Condition lever in shut-off position.
6. Prop in feather position.
7. Throttle in idle position.
8. ISOL valve on (emergency throttle system).
9. Press start.
10. Monitor N1 (compressor rpm). When N1 reaches 16 / 18%, feed fuel in by forwarding condition lever, it could be necessary to forward almost to indent position to light. Once turbine has lit, reduce fuel by pulling condition lever towards shut off position not to exceed 620 / 680. Keep adding fuel by forwarding condition lever until such time as the N1 reaches 60 / 63 %.
11. At 60 / 63 % N1 make sure throttle is in idle position and switch ISOL off (normal position).
12. Monitor oil pressure, fuel pressure, ITT, N1 and torque.
13. Generator on.
14. Forward prop lever to full-fine pitch.

**Note:** If the starter generator is equipped with the standard timer LUN 2601-01, it will engage for a duration of 20 seconds. It is crucial to aim for an N1 speed of 60-63% before the starter disengages to minimize the risk of over-temperature. In case there is a potential for over-temperature at any point, promptly move the condition lever to the shut-off position.



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Additionally, it is important to achieve an N1 speed of 60-63% before turning off the ISOL valve. A minor bump or burp (compressor stall) may be audible, and this is considered normal. A more seamless transition from ISOL to normal mode is achieved when N1 is closer to the range of 60-63%.

**TAXIING:** Taxiing can be done in beta range or feather. When taxiing in feather with low clearance propellers, the propeller blades tend to sweep the taxiway lifting dirt and stones into the air intake.

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**TAKE OFF:** Make sure the prop has come out of beta range and stabilized before adding power. (Adding power whilst the transition is taking place from beta to normal mode will result in an over speed of the prop stretching the blades on the power turbine wheel leading to possible failure.)

Add power gently to achieve the necessary take off power. Monitor the ITT, N1, N2 and torque.

Max ITT take off on calibrated Czech gauges 8 OHM 710C. It has been found that some American gauges read low by as much as 50 °C.

## **MAX Take-off power 1 minute:**

- ITT: 710Max
- Max N2/Np: 2080 rpm
- Max torque: 105% +/- 132 PSI if using oil pressure gauge

## **MAX Continuous:**

- ITT 690
- N1/Ng 98.2%
- N2/Np 1850 - 2080 rpm
- Torque 100% +/- 128 PSI

## **TYPICAL CRUISE Power Setting:**

- ITT 660
- N1/Ng 97.5
- N2/Np 1700 - 1850 rpm
- Torque 90%

## **MAX REVERSE Thrust:**

**NEVER use reverse thrust in flight!**

- ITT 710
- N1/Ng 99%
- N2/Np 2000 rpm

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# **Turbine Power Technologies, Inc.**

## **SHUT DOWN:**

1. Throttle idle.
2. Allow propeller to feather for 60 seconds.
3. Turn electrics off except for the inverter and battery.
4. Condition lever to shut off position.
5. Turn inverter and master off. (A good time to check engine oil is soon after shut down.)

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