CLAIMS

1. A method for detecting performance of an Airborn Auxiliary Power Unit (APU) starter, comprising:

rotating the APU with a starter system;

obtaining APU-related messages at multiple time points within one time period;

obtaining running parameters of the APU starter according to the messages, the running parameters comprise starting times (STAs);

calculating average value AVG and deviation index δ of the STAs within said time period;

determining whether performance of the APU starter is in a stable phase, decline phase, or failure phase according to the deviation index δ, the determining comprising:

in response to that the deviation index δ is less than a decline threshold value, determining that performance of the APU starter is in a stable phase,

in response to that the deviation index δ is greater than the decline threshold value and smaller than a failure threshold value, determining that performance of the APU starter is in a decline phase, and

in response to that the deviation index δ is greater than the failure threshold value, determining that performance of the APU starter is in the failure phase; and

determining the deviation index δ when the APU starter is in a stable phase,

wherein, the decline threshold value is about 1.5 to 2.0 times of the stable deviation index δ, and failure threshold value is about 2 to 3 times of the stable deviation index δ.

2. The method of Claim 1, wherein the time period is between 2 and 3 days.

3. The method of Claim 1, wherein around 5 to 10 APU-related messages are obtained within the time period.

4. The method of Claim 1, further comprising:

determining an STA for an immediately subsequent APU-related message;

in response to that the next STA is greater than AVG+nδ, determining whether STA+1 obtained from a next APU-related message is greater than AVG+nδ; and

in response to that the number of times for the STA obtained according to APU-related message is continuously greater than AVG+nδ exceeds preset warning number Z, sending out a warning,

wherein, n is a value from 2 to 5 and Z is a value from 3 to 5.

5. The method of Claim 4, in response to the starting time STA obtained according to APU-related messages is less than AVG+nδ, recalculating an average value AVG and deviation index δ of the STA.

6. The method of Claim 4, in response to that the number of times for starting time STA obtained according to APU-related message continuously greater than AVG+nδ exceeding the preset warning number Z, recalculating an average value AVG and deviation index δ of the STA.

7. The method of Claim 1, wherein the deviation index δ is a standard deviation.

8. The method of Claim 4, wherein n is 2 or 3, and Z is 3.

9. The method of Claim 1, further comprising:

determining that fuel unit of APU works in normal conditions.

10. The method of Claim 1, further comprising:

determining that other parameters of APU remain normal, the other parameters comprising:

APU exhaust gas temperature EGT, bleed air pressure PT, angle of inlet guide vane IGV and APU turbine efficiency NPA.

11. An apparatus for detecting performance of an APU starter, comprises a processor and a memory for storing computer readable instructions for instructing the processor implementing the following units:

a rotating unit configured to rotate the APU with a starter system;

a message acquisition unit, configured to obtain APU-related messages within a predetermined time period;

a message parsing unit configured to parse out running parameters of APU starter according to the APU-related messages, the running parameters comprising starting times (STAs) within the predetermined time period; and

a performance detection unit, configured to determine whether performance of the APU starter is in a stable phase, decline phase, serious decline phase or failure phase according to the STAs within the predetermined time period by:

in response to that the deviation index δ of the STAs within the predetermined time period is less than a decline threshold value, determining that performance of the APU starter is in a stable phase,

in response to that the deviation index δ of the STAs within the predetermined time period is greater than the decline threshold value and less than a failure threshold value, determining that performance of the APU starter is in a decline phase, and

in response to that the deviation index δof the STAs within the predetermined time period is greater than the failure threshold value, determining that performance of the APU starter is in the failure phase,

wherein, performance detection unit is configured to determine the deviation index δ when the APU starter is in a stable phase; and

the decline threshold value is about 1.5 to 2.0 times of the stable deviation index δ, and failure threshold value is about 2 to 3 times of the stable deviation index.

12. An apparatus for detecting performance of an APU starter, comprises:

a processor; and

a memory coupled to the processor, which stores computer readable instructions;

the computer readable instructions run on the processor to execute the following steps:

rotating the APU with a starter system;

obtaining APU-related messages within a predetermined time period;

parsing out running parameters of the APU starter according to the messages, the running parameters comprise starting times (STAs);

determining whether performance of the APU starter is in a stable phase, decline phase, serious decline phase or failure phase, the determining comprising:

in response to that the deviation index δ of the STAs within the predetermined time period is less than a decline threshold value, determining that performance of the APU starter is in the stable phase,

in response to that the deviation index δ of the STAs within the predetermined time period is greater than the decline threshold value and less than a failure threshold value, determining that performance of the APU starter is in the decline phase, and

in response to that the deviation index δ of the STAs within the predetermined time period is greater than the failure threshold value, determining that performance of the APU starter is in the failure phase, and

wherein, the deviation index δ is determined when the APU starter is in a stable phase; and

the decline threshold value is about 1.5 to 2.0 times of the stable deviation index δ, and failure threshold value is about 2 to 3 times of the stable deviation index δ.