We claim:

1. A test apparatus based on a DFDAU (Digital Flight Data Acquisition Unit), comprising:

a signal simulation portion;

a test portion operatively connected to the signal simulation portion;

wherein the signal simulation portion comprises:

an input interface, which receives test data,

a simulation signal generation circuit comprising logic that generates simulation signal according to the test data, and

an output interface, which is configured to be connected to one end of one or more signal transmission devices to be tested and output the simulation signal;

wherein, the test portion comprises:

a wiring extension device, which is used to form a wiring apparatus, and is configured to be connected to the other end of the one or more signal transmission devices to be tested, and receives the simulation signal passing through the one or more signal transmission devices to be tested,

a DFDAU unit, which is configured to receive simulation signal from the wiring extension device and obtain transmitted test data from the simulation signal, and

a comparison circuit comprising logic that is configured to compare the test data and obtained transmitted test data to determine whether to test data and obtained transmitted test data are identical.

2. The apparatus of claim 1, wherein the test data comprise data of aircraft condition composed according to aviation communication criterion or control command data.

3. The apparatus of claim 1, wherein the test data comprise data of aircraft condition from QAR (Quick Access Recorder) or control command data.

4. The apparatus of claim 2, wherein the DFDAU converts the simulation signal from the wiring extension device into data of aircraft condition or control command data and broadcasts the data of aircraft condition or control command data; wherein the comparison circuit compares the test data and data of aircraft condition or control command data broadcast by DFDAU.

5. The apparatus of claim 2, wherein the DFDAU converts simulation signal from the wiring extension device into data of aircraft condition or control command data, and generates a message relating to aircraft signal transmission device to be tested according to message trigger logic; wherein the comparison circuit compares the test data and data of aircraft condition or control command data in the message relating to the aircraft signal transmission device to be tested.

6. The apparatus of claim 1, wherein simulation signal generation circuit further comprises a discrete signal generation unit, a voltage signal generation unit, an analog signal generation unit and/or a bus signal generation unit; wherein the input interface is connected to each discrete signal generation unit, voltage signal generation unit, analog signal generation unit and/or bus signal generation unit via a bus system.

7. The apparatus of claim 6, where the discrete signal generation unit comprises an on/off signal generation unit.

8. The apparatus of claim 7, wherein the on/off signal generation unit comprises a relay array or switch array.

9. The apparatus of claim 6, wherein the analog signal generation unit comprises an alternating current voltage ratio (ACVR) generation unit, the ACVR signal generation unit comprises:

an alternating current voltage signal conversion unit, which is configured to be connected to a power source and generate an alternating current voltage signal with valid value and frequency;

a digital signal subcircuit, which is configured to receive digital signal;

a modulator, which is configured to receive the alternating current voltage signal and the digital signal and generate an alternating current voltage ratio signal according to the digital signal; and

an output transformer, which is configured to output the alternating current voltage ratio signal.

10. The apparatus of claim 9, wherein the digital signal subcircuit comprises:

a bus adapter, which is connected to the bus system to receive digital signal from the bus system;

a bus driving circuit, which is used to drive the digital signal; and

an electric level conversion circuit, which converts electric level of the digital signal into an electric level required by the modulator.

11. The apparatus of claim 9, wherein the modulator modulates valid value of the alternating current voltage signal according to digital signal input from the digital signal subcircuit so as to generate a corresponding alternating current voltage ratio signal.

12. The apparatus of claim 6, wherein the analog signal generation unit comprises a sync signal generation unit, the sync signal generation unit comprises:

an alternating current voltage signal conversion unit, which is configured to be connected to a power source and generate two sets of alternating current voltage signals;

a digital signal subcircuit, which is configured to receive input digital signal;

a modulator, which is configured to convert the two sets of alternating current voltage signals into two sets of alternating current voltage signals having phase difference, wherein the phase difference is based on the digital signal;

a first and second amplifiers, which are configured to amplify power of the two sets of alternating current voltage signals having phase difference; and

an output transformer, which is configured to output the amplified two sets of alternating current voltage signals having phase difference.

13. The apparatus of claim 12, wherein the modulator comprises: sin multiplier and cos multiplier; wherein, the two sets of alternating current voltage signals enter into the sin multiplier and the cos multiplier respectively and are converted into two sets of alternating current voltage signals having the phase difference.

14. The apparatus of claim 6, wherein the bus signal generation unit comprises an ARINC429 bus signal generation unit, an ARINC629 bus signal generation unit or a combination thereof.

15. The apparatus of claim 6 further comprises a signal conditioning adapter, which is configured to manipulate simulation signal generated by the signal generation circuit.

16. The apparatus of claim 1, the wiring extension device comprises a wiring board, the wiring board comprises:

a wiring board panel, which comprises a plurality of sockets, each socket capable of being communicatively connected to one output signal of the simulation signal generation circuit; and

a plurality of output interfaces, wherein each output interface comprises a plurality of output terminals, each output terminal corresponding to one socket of the wiring board panel;

wherein according to the type of output interface, each output interface is connected to a corresponding type of input interface of the DFDAU.

17. The apparatus of claim 16, the wiring board panel comprises: an analog signal zone, a bus signal zone, a power connection zone and a ground connection zone.

18. The apparatus of claim 16, the wiring board comprises an automatic switchover circuit comprising logic that is configured to automatically switch between each input signal of the wiring board panel and each output terminal of the plurality of output interfaces.

19. The apparatus of claim 1, wherein the wiring extension device comprises an input interface and an output interface;

the input interface comprises a plurality of input terminals, each input terminal capable of being communicatively connected to one output signal of the simulation signal generation circuit;

the output interface comprise a plurality of output terminals, each output terminal corresponding to one socket of the wiring board panel;

the wiring extension device comprises an automatic switchover circuit comprising logic that is configured to automatically switch between each input terminal of the input interface and each output terminal of the plurality of output interfaces.

20. The apparatus of claim 18, wherein the automatic switchover circuit further comprises a switch array arranged in rows and columns.

21. The apparatus of claim 1, wherein the wiring extension device comprises a wiring board panel comprising:

a universal meter circuit comprising logic that examines whether a connection is invalid through measuring current and voltage of the connection; and

a circuit scanning circuit comprising logic that is configured to automatically switch between each connection so as to connect the universal meter circuit to different connections.

22. The apparatus of claim 1, wherein:

one end of one or more of the signal transmission devices to be tested is connected to the output interface of the simulation signal generation portion of the apparatus, and

the other end of one or more signal transmission devices is connected to the wiring extension device of the test portion;

wherein:

the test portion is configured to receive additional test data from the one or more signal transmission devices;

the simulation signal generation circuit generates another simulation signal according to the additional test data;

the test portion is configured to receive another simulation signal from the wiring extension device;

the comparison circuit is configured to compare the additional test data from input to input interface and test data based on the another simulation signal from the wiring extension device.

23. The apparatus of claim 22, wherein the test data comprises data of aircraft condition or control command data composed according to aviation communication criterion.

24. The apparatus of claim 22, wherein the test data comprises data of aircraft condition or control command data from aircraft QAR (Quick Access Recorder).

25. The apparatus of claim 23, wherein the DFDAU unit is further configured to convert simulation signal from the wiring extension device into data of aircraft condition or control command data and broadcasts the data of aircraft condition or control command data;

wherein the comparison step comprises: comparing the test data from input to input interface and data of aircraft condition or control command data broadcast by DFDAU.

26. The apparatus of claim 22, wherein the DFDAU unit is further configured to:

convert a simulation signal from the wiring extension device into data of aircraft condition or control command data, and

generate a message relating to aircraft signal transmission device to be tested according to message trigger logic; and

wherein the test portion is further configured to compare the test data from input to input interface and data of aircraft condition or control command data in the message relating to the aircraft signal transmission device to be tested.