CLAIMS

What is claimed is:

1. A gas turbine engine comprising:

a compressor section;

a low spool;

a fan,

said fan delivering air into said compressor section and into a bypass duct having a variable area nozzle, and said compressor section compressing air and delivering it into a combustion section;

the combustion section mixing air with fuel, igniting the fuel, and driving the products of the combustion across turbine rotors, said turbine rotors driving said low spool;

a control for said gas turbine engine, programmed to position said nozzle vane at startup of the engine to increase airflow across said fan.

2. The engine as set forth in claim 1, wherein said compressor section includes a high pressure compressor and a low pressure compressor, and said turbine rotors include a low turbine rotor driving said low spool and said low pressure compressor.

3. The engine as set forth in claim 2, wherein said fan is driven with said low pressure compressor by said low spool, and there being a gear reduction between said fan and said low spool.

4. The engine as set forth in claim 3, wherein said control includes stored desired positions for said nozzle to provide increased airflow into the compressor at startup at various conditions.

5. The engine as set forth in claim 4, wherein said various conditions include the altitude of an aircraft carrying the gas turbine engine, and an air speed of the aircraft.

6. The engine as set forth in claim 5, wherein the conditions also include a speed of the low spool when startup is occurring.

7. The engine as set forth in claim 6, wherein the position of said nozzle is selected to increase airflow across the fan while an aircraft associated with the gas turbine engine is in the air, and to increase windmilling speed of the turbine rotors.

8. The engine as set forth in claim 7, wherein a starter is also utilized in combination with the windmilling while the aircraft is in the air to start the engine.

9. The engine as set forth in claim 7, wherein said nozzle is moved toward a full open position to increase windmilling speed.

10. The engine as set forth in claim 2, wherein a variable inlet guide vane is positioned upstream of said low pressure compressor, and said control also positioning said variable inlet guide vane at start-up to increase air flow across said low pressure compressor.

11. The engine as set forth in claim 1, wherein said control includes stored desired positions for said nozzle to provide increased airflow into the compressor section at startup at various conditions.

12. The engine as set forth in claim 11, wherein said various conditions include the altitude of an aircraft carrying the gas turbine engine, and an air speed of the aircraft.

13. The engine as set forth in claim 12, wherein the conditions also include a speed of the low spool when startup is occurring.

14. The engine as set forth in claim 13, wherein the position of said nozzle is selected to increase airflow across the fan while an aircraft associated with the gas turbine engine is in the air, and to increase windmilling speed of the turbine rotors.

15. A method of starting a gas turbine engine comprising the steps of:

(a) providing a variable area fan nozzle on a bypass duct, and moving said nozzle to a position at startup of the engine selected to increase airflow across a fan; and

(b) starting said gas turbine engine.

16. The method as set forth in claim 15, wherein said position is selected to provide increased airflow across the fan at startup at various conditions.

17. The method as set forth in claim 16, wherein said various conditions include the altitude of an aircraft carrying the gas turbine engine, and the airspeed of the aircraft.

18. The method as set forth in claim 17, wherein the conditions also include a speed of a spool which drives said fan.

19. A variable area nozzle comprising:

a nozzle having an actuator to change a position of the nozzle; and

a control programmed to move the nozzle to a desired position at startup of an aircraft to be associated with the nozzle.

20. The nozzle as set forth in claim 19, wherein said position is selected based upon at least altitude and air speed.

CLAIMS

1. A gas turbine engine comprising:

a compressor section;

a low spool;

a fan;

said fan delivering air into said compressor section and into a bypass duct having a variable area nozzle, and said compressor section compressing air and delivering it into a combustion section;

the combustion section mixing air with fuel, igniting the fuel, and driving the products of the combustion across turbine rotors, said turbine rotors driving said low spool;

a control for said gas turbine engine, programmed to position said variable area nozzle at startup of the engine to increase airflow across said fan; and

said control including stored desired positions for said variable area nozzle to provide increased airflow into the compressor at startup at various conditions, said various conditions including the altitude of the aircraft carrying the gas turbine engine, an airspeed of the aircraft, and a speed of at least one spool associated with said gas turbine engine.

2. The engine as set forth in claim 1, wherein said compressor section includes a high pressure compressor and a low pressure compressor, and said turbine rotors include a low turbine rotor driving said low spool and said low pressure compressor.

3. The engine as set forth in claim 2, wherein said fan is driven with said low pressure compressor by said low spool, and there being a gear reduction between said fan and said low spool.

4. The engine as set forth in claim 3, wherein said control includes stored desired positions for said variable area nozzle to provide increased airflow into the compressor section at startup at various conditions.

5. The engine as set forth in claim 1, wherein the at least one spool is said low spool.

6. The engine as set forth in claim 5, wherein the position of said nozzle is selected to increase airflow across the fan while an aircraft associated with the gas turbine engine is in the air, and to increase windmilling speed of the turbine rotors.

7. The engine as set forth in claim 6, wherein a starter is also utilized in combination with the windmilling while the aircraft is in the air to start the engine.

8. The engine as set forth in claim 6, wherein said nozzle is moved toward a full open position to increase windmilling speed.

9. A gas turbine engine comprising:

a compressor section;

a low spool;

a fan;

said fan delivering air into said compressor section and into a bypass duct having a variable area nozzle, and said compressor section compressing air and delivering it into a combustion section;

the combustion section mixing air with fuel, igniting the fuel, and driving the products of the combustion across turbine rotors, said turbine rotors driving said low spool;

a control for said gas turbine engine, programmed to position said nozzle at startup of the engine to increase airflow across said fan;

wherein said compressor section includes a high pressure compressor and a low pressure compressor, and said turbine rotors include a low turbine rotor driving said low spool and said low pressure compressor; and

a variable inlet guide vane is positioned upstream of said low pressure compressor, and said control also positioning said variable inlet guide vane at start-up to increase air flow across said low pressure compressor.

10. The engine as set forth in claim 9, wherein said control includes stored desired positions for said nozzle to provide increased airflow into the compressor section at startup at various conditions.

11. The engine as set forth in claim 10, wherein said various conditions include the altitude of an aircraft carrying the gas turbine engine, and an air speed of the aircraft.

12. The engine as set forth in claim 11, wherein the conditions also include a speed of the low spool when startup is occurring.

13. The engine as set forth in claim 12, wherein the position of said nozzle is selected to increase airflow across the fan while an aircraft associated with the gas turbine engine is in the air, and to increase windmilling speed of the turbine rotors.

14. A method of starting a gas turbine engine comprising the steps of:

(a) providing a variable area fan nozzle on a bypass duct, and moving said variable area fan nozzle to a position at startup of the engine selected to increase airflow across a fan;

(b) starting said gas turbine engine; and

(c) storing desired positions for said variable area fan nozzle to provide increased airflow into the compressor at startup at various conditions, said various conditions including the altitude of the aircraft carrying the gas turbine engine, an airspeed of the aircraft, and a speed of at least one spool associated with said gas turbine engine.

15. The method as set forth in claim 19, wherein said position is selected to provide increased airflow across the fan at startup at various conditions.

16. The method as set forth in claim 15, wherein said various conditions include the altitude of an aircraft carrying the gas turbine engine, and the airspeed of the aircraft.

17. The method as set forth in claim 14, wherein said one spool is a spool which drives said fan.

18. A variable area nozzle comprising:

a nozzle having an actuator to change a position of the nozzle; and

a control programmed to move the nozzle to a desired position at startup of an aircraft to be associated with the nozzle; and

said control including stored desired positions for said variable area nozzle to provide increased airflow into the compressor at startup at various conditions, said various conditions

including the altitude of the aircraft carrying the gas turbine engine, an airspeed of the aircraft, and a speed of at least one spool associated with a gas turbine engine.

19. The method as set forth in claim 14, wherein a compressor section includes a high pressure compressor and a low pressure compressor, and a turbine section includes a low turbine rotor driving said low spool and said low pressure compressor.

20. The engine as set forth in claim 1, said control selecting one of said stored desired conditions based upon sensed ones of said various conditions, and moving said variable area nozzle to said selected one of said stored desired positions.

21. The method as set forth in claim 14, including the step of selecting one of said stored desired conditions based upon sensed ones of said various conditions, and moving said variable area nozzle to said selected one of said stored desired positions.

22. The variable area nozzle as set forth in claim 18, wherein said control selecting one of said stored desired conditions based upon sensed ones of said various conditions, and moving said variable area nozzle to said selected one of said stored desired positions.