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FLIGHT TEST REPORT

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FLIGHT TEST MEMORANDUM

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Flight Test of the XA-26-F Airplane, AAF No. 44-34586

Title

HEADQUARTERS,
AIR MATERIEL COMMAND
WRIGHT FIELD, DAYTON, OHIO

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Memorandum Report No. TSFTE-2010
21 August 1946

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I Introduction

A. Flight tests were conducted on the XA-26-F airplane, AAF No. 44-34586, at Wright Field, Ohio, from 10 April 1946 to 24 July 1946 during which time eleven successful flights were made plus one familiarization flight and three unsuccessful flights for a total flying time of approximately thirty-five hours. The test was flown by Captain W. K. Rickert as pilot and flight test engineer and Lts. J. D. Dodge and J. J. La Rue as observers. The test was requested by Mr. H. A. Sullivan, Service Engineering Sub-Division, Engineering Division, to obtain sufficient data for determining the performance of the XA-26-F airplane both with and without the aft engine operating and for comparison with performance of the A-26-D airplane.

B. The XA-26-F is an experimental twin engine, non-pressurized, attack type bombing and strafing airplane for medium and low altitude operations and capable of carrying medium bomb loads for medium ranges. It is a conventional all metal mid-wing monoplane with single fin and rudder, and equipped with fully retractable tricycle type landing gear. The approximate weight of the airplane empty, except for a crew of two and engine oil is 24,850 lbs. Power is provided by two Pratt and Whitney R-2800-83 engines herein referred to as the main engines. In addition, a General Electric J-31-GE-4 type gas turbine (jet) engine, hereafter called the aft engine, is located in the fuselage aft of the bomb bay and exhausts from a tail pipe through the tail cone of the airplane.

C. The XA-26-F is a modified A-26-D type airplane in which the upper and lower remotely controlled gun turrets were removed to provide space for the aft engine and airscoop. Armament of the XA-26-F consists of fourteen forward firing fixed machine guns. Bomb carrying capacity of the A-26-D airplane has not been altered except in the case of the test model. A fuel tank of 125 gallon capacity was located in the aft bomb bay to provide additional jet fuel for test purposes.

II Summary

A. The XA-26-F has considerably higher performance capabilities than the A-26-D, while the handling characteristics are substantially the same as previous A-26 models through the range of 28,000 to 35,000 lbs. gross weight. Satisfactory take-offs were made at indicated speeds down to 100 MPH. Handling characteristics were excellent with the c.g. at 29.3% of the MAC.

B. The performance outline of the airplane at a take-off gross weight of 35,000 lbs. and in level flight at 33,000 lbs. ± 1000 lbs. may be summarized and compared to the A-26-D as follows:

Condition	A-26-D	XA-26-F Aft Eng. Windmilling	XA-26-F Aft Engine *16000 - 16500
High Speed at Sea Level Mil Power	338 MPH	342 MPH	379 MPH
High Speed at Sea Level NRP	305 MPH	313 MPH	345 MPH

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Condition	A-26-D	XA-26-F Aft Eng. Windmilling	XA-26-F Aft Engine *16000 - 16500
High Speed - Low Blower	363 MPH	385 MPH	419 MPH
Critical Alt. Mil. Power	(6000 Ft.)	(7000 Ft.)	(7000 Ft.)
High Speed - Low Blower	346 MPH	372 MPH	404 MPH
Critical Alt. NRP	(10400 Ft.)	(11400 Ft.)	(12000 Ft.)
High Speed - High Blower	381 MPH	404 MPH	443 MPH
Critical Alt. Mil. Power	(18800 Ft.)	(19600 Ft.)	(20300 Ft.)
High Speed - High Blower	363 MPH	392 MPH	427 MPH
Critical Alt. NRP	(20500 Ft.)	(21800 Ft.)	(22500 Ft.)
Rate of Climb at Sea Level	1450 ft/min	1450 ft/min	1900 ft/min
Rate of Climb - Low Blower	1450 ft/min	1550 ft/min	2000 ft/min
Critical Alt. NRP	(7700 Ft.)	(7800 Ft.)	(8000 Ft.)
Rate of Climb - High Blower.	1100 ft/min	1200 ft/min	1640 ft/min
Critical Alt. NRP	(17600 Ft.)	(18000 Ft.)	(18400 Ft.)
Service Ceiling NRP	27700 ft.	29000 ft.	33800 ft.
Absolute Ceiling NRP	28700 ft.	30000 ft.	34800 ft.
Time to Climb to 10,000 ft.		6.8 min	5.2 min
Time to Climb to 20,000 ft.		15 min	11.4 min
Minimum Take-off Distance (Clear 50 ft. obst. 20° Wing Flaps)		3250 ft.	2760 ft.

* Note: Aft engine was operated at 16,000 RPM (rated RPM) in conjunction with normal rated power on main engines and at 16,500 RPM (max RPM) with military power on main engines.

III Condition of Airplane Relative to Tests

A. The XA-26-F is an unpainted, modified A-26-D airplane differing from the A-26-D in the following respects: The upper and lower flexible gun turrets of the A-26-D have been removed and an AAF Model J-31-GE-4 gas turbine (jet) engine installed in the aft fuselage with a large airscoop projecting above the fuselage just behind the bomb bay. In addition, the XA-26-F is equipped with four bladed high speed propellers with large spinners installed over the hubs. With reference to external drag producing items, the XA-26-F is otherwise identical to the A-26-D. Fuel is normally provided for the aft engine from the 125 gallon forward bomb bay tank at the expense of main engine fuel. An additional 125 gallon tank was installed in the aft bomb bay for test purposes. In Appendix II are photographs and dimensions of the airplane.

B. The XA-26-F is powered by two Pratt and Whitney R-2800-83, 18 cylinder, twin row, air cooled, radial engines with Bendix Stromberg PR-58E2-2 carburetors. These engines are rated by the manufacturer as follows:

(Auto Rich Mixture)

	Critical Altitude	Blower	R.P.M.	Man. Press.	H.P.
Military	3500	Low	2800	53.0"	2100
	17000	High	2800	49.5"	1700
Normal Rated	8000	Low	2600	41.5"	1700
	18000	High	2600	42.5"	1500

The aft engine is a General Electric Model J-31-GE-4 centrifugal compresser type gas turbine utilizing the reaction of expanding gases to provide thrust. The main engines operated satisfactorily during the tests in providing their rated powers, however, back-firing was encountered in auto-lean operation while using 100 octane fuel. Since no range data was to be taken and the engines were operating within their S.F.C. range in auto-rich at high power, no carburetor changes were made. Symptoms of detonation appeared occassionally at full military power particularly in high blower but the roughness soon smoothed out and the test continued. War Emergency Power tests were not successful because of rough engine operation and exhaust stack failures and rather than delay the program the War Emergency tests were omitted.

The aft engine operated satisfactorily throughout the tests with exception of bearing oil pressure while decreased with altitude below the desired lower limit. The General Electric Company representative stated this was a common occurrence in the J-13 type engine and not dangerous unless the bearing temperature exceeds its upper limit.

Serious failure of the main engine exhaust stacks occured on the second flight damaging the cowl flaps. When this trouble recurred, reworking of the exhaust stacks became necessary. Production type stacks for the Pratt & Whitney "B" type engine as used in A-26-B & C airplanes were adapted to these engines. This expedient reduced the frequency of stack failure enough to complete the test program without serious delay. For flights made previous to this change (April 30) the average exhaust outlet area was 40.32 sq. inch per engine at 15° angle to the thrust line and 42.6 sq. inch per engine after April 30 at the same angle.

The main engines were equipped with Hamilton Standard Hydromatic four bladed propellers (Blade drawing No. SK 11576, with a blade angle range of 27.5° to 92° at the 42 15/16 inch radius).

C. Instrumentation of this airplane included the calibration and installation of normal precision performance instruments by the Instrumentation Section of the Flight Test Division at Patterson Field, Ohio. Torque indicating nose sections were an integral feature of the R-2800-83 engines and power data was obtained from low pressure torque meters and pioneer flowmeters. A close check on the accuracy of the flowmeters was obtained by comparing calculated fuel consumption with the amount of fuel serviced at the end of the flight.

Additional instruments were provided to determine temperatures at many places in the aft fuselage around the jet engine and tail pipe.

The instruments were located in three panels including the pilot's panel, a special panel for the aft engine and a special observers panel on the right floor. All readings were taken by hand.

D. The airplane was weighed at Wright Field. The basic weight of the airplane was 23,997 lbs. With the inclusion of pilot and observer, 60 gallons of oil, 800 gallons of gasoline, 250 gallons of kerosene, 43 gallons of water, 700 lbs. of shot ballast and two lead filled bomb cases weighing 2650 lbs., the gross weight of the airplane was brought to 35,000 lbs. All tests were conducted with this weight at take-off, and the level flight data was reduced

to 33,000 lbs. ± 1000 lbs. gross weight. For all tests, the c.g. was located at 29.3% of the MAC.

IV Flight Characteristics

A. Taxiing and Ground Handling

Taxiing and ground handling characteristics are excellent. Though the brakes are somewhat sensitive, they are easy to become accustomed to. No difficulty was encountered in taxiing in strong cross winds.

B. Stability

No qualitative or quantitative stability tests were conducted, but when flying at a c.g. position of approximately 29.3% MAC no unstable characteristics were noted in the course of the test program. However, a report from Douglas Aircraft Company on the initial demonstration flight indicates unsatisfactory characteristics in high speed dives with the aft engine windmilling. The limited time available for this test program did not permit the instrumentation for, and inclusion of, dive tests to determine the trouble.

C. Take-off

Take-off tests were made on a dry concrete runway at 35,000 lbs. gross weight with the c.g. at 29.3% of the MAC, the rudder becomes effective at about 50 MPH with the elevators gaining control at about 80 MPH. Using 20° wing flaps, the airplane takes off easily after a medium run at a normal speed of 115 MPH and picks up speed quickly. Climbs are at a normal angle with only moderate trim changes necessary. The pilot's vision forward is partially blocked by the nose in the climb but the rapid initial rate of climb with gear up is sufficient to clear any obstacles found around modern airfields.

D. Trim and Balance

Adequate trim was available through the complete speed range down to the stalling speeds. With either propeller feathered, there was sufficient rudder and aileron trim to climb in unyawed flight. There is little change in trim with the actuating of the landing gear or cowl flaps. In the first 10-20° of travel of the wing flaps there is a slight nosing up tendency while during the rest of the flap travel there is a moderate nosing down tendency requiring trim change.

E. Controllability

Adequate control was available at all speeds tested down to the stalling speed and in all normal maneuvers with excellent balance of control forces or "feel" throughout the range.

F. Maneuverability

The airplane's response to the controls is excellent at all the speeds encountered in the course of the tests. There was no visible tendency to mush