USAF EXPERIMENTAL FLIGHT TEST PILOT SCHOOL
Air Force Flight Test Center
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TEST PILOT SCHOOL
AIRCRAFT INVENTORY REQUIREMENTS
1960 - 1965

A Preliminary Study
prepared by the Staff of the
USAF Experimental Flight Test Pilot School

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I INTRODUCTION: Recent urgent inquiries from Headquarters ARDC regarding possible changes in the USAF Test Pilot School aircraft inventory necessitate an immediate estimate of aircraft requirements for the next five year period. No attempt has been made to predict the aircraft inventory requirements beyond 1965, nor is such a prediction considered possible at this time. The purpose of this study is to present the anticipated aircraft requirements with brief explanations of the selection of types, models, and quantities. A more comprehensive study is currently underway at the Test Pilot School for the purpose of planning the entire future training program. This study will cover anticipated future requirements for test pilots (including space vehicle crews), necessary revisions to the School curriculum, and the requirements for aircraft, personnel, equipment, and facilities. A proposal based on this study will be completed by 11 July 1960.

II CURRICULUM CHANGES: There are three primary reasons for making changes in the School curriculum which will dictate changes in the aircraft inventory:

a. The requirement, which has existed for some time, for flight training in the testing of supersonic aircraft.

b. The requirement for training in the testing of helicopter and STOL aircraft.

c. The increasing requirement for training in testing space vehicles.

A study recently completed by the Commandant of the USAF Test Pilot School, entitled "Future Requirements for Test Pilot Training 1960-1965," dated 29 December 1959, shows a continuing requirement for graduates of the present School curriculum at least through 1965. For this reason the basic course of instruction presently being given, with revisions to cover flight training in helicopter and supersonic aircraft, will be retained at least through 1965. Many of the principles now taught apply to all manned vehicle testing; however, the present unrevised course is primarily designed to prepare pilots for testing aircraft developed within the past fifteen years. This training quite adequately and comprehensively prepares students for testing subsonic aircraft. It gives acceptable academic training but incomplete flight training in test methods and techniques peculiar to supersonic aircraft; and it leaves relatively untouched the area of space vehicle testing. Several aircraft must be replaced with other types to eliminate these deficiencies.

III AEROSPACE RESEARCH TEST PILOT TRAINING: Unquestionably, the development of manned and unmanned vehicles which operate in the fringes of the earth's atmosphere and in space will be accelerated in the next ten to fifteen years. Since the USAF is the logical service to lead in such a development program, we must anticipate the trained manpower requirements and take action to meet the needs as they arise. One key catagory of personnel will be qualified, well trained test pilots. With the exception of a token number of Empire Test Pilot School graduates, all Air Force Experimental test pilots are supplied by the USAF Experimental Flight Test Pilot School. As the development of hypersonic vehicles operating in or near space increases, training in spacecraft testing must, therefore, assume an increasing role in the School training program.

Over a period of two or three years this will require major additions to the School training program, both in the academic and flying areas. A proposed Aerospace Test Pilot Course to be given at the USAF Test Pilot School is already being formulated.

Graduation from the present test pilot course will be prerequisite for entry into the Aerospace course. Present planning indicates that the Aerospace course will be ready to start in May 1961, provided that F-104B or F-104D aircraft are made available in February 1961. Serious consideration should also be given to the future addition of a rocket-powered vehicle, such as a two-place X-15.

IV HELICOPTER TRAINING CAPABILITY: Prior to the start of Class 60B in April 1960, the Test Pilot School curriculum did not include flight training in helicopter testing. Because Class 60B is composed primarily of Army pilots, the Army has loaned two HU-1 helicopters to the School for use with this Class. As a result, the School Staff, has built up a strong capability in both the academic and flight phases of helicopter training. It is desirable that this capability be retained after the termination of the Army class. In the first place, a continuing capability in this area would provide for high quality instruction of helicopter pilots assigned as students in the future. Secondly, it is desirable for all students who will be future test pilots to have a limited orientation in helicopter testing techniques. Such an orientation is presently included in the curriculum at the Empire Test Pilots' School in England.

V STABILITY OF THE AIRCRAFT INVENTORY: It is very important that the School aircraft inventory remain relatively stable, and that any necessary changes be planned well in advance. In the past, proposals from outside AFFTC have been made to drop aircraft from the School inventory, trade individual airplanes for others of the same model, or change models. Almost invariably these proposals have come from sources not familiar with the School training program.

Of necessity, the course is designed around the aircraft that are available in the School inventory. Changes in the inventory require numerous changes in such details as engine charts, calibration curves and techniques, data reduction methods, etc. These changes must be worked out in advance by the School staff, and they obviously cannot be accomplished overnight. In addition, several months of time and a considerable amount of manpower and material are required for instrumentation of the School aircraft. For the foregoing reasons, it is uneconomical and wasteful to continually revise the School aircraft inventory unless it contains models which no longer meet School requirements or which are no longer in the USAF inventory.

VI DISCUSSION OF THE PROPOSED INVENTORY: The proposed aircraft inventory schedule for the Test Pilot School is given in Figure 1. This schedule provides for; (a) Continuation of the present basic test pilot training course on a somewhat reduced basis through 1965, (b) Maintenance of the present helicopter flight test training capability; (c) Establishment of an advanced space test pilot training course within the framework of the present School organization, and (d) Sufficient overlap of release and acquisition dates to permit orderly integration of new models into the training program. A discussion of the proposed uses for the various aircraft models follows:

1. T-33: The six T-33's presently assigned provide the backbone of the basic test pilot course. Because of their reliability and the familiarity of almost all pilots with the T-33, they are used to the maximum extent possible in both performance and stability. Approximately thirty percent of the students training is accomplished in T-33's; and they provide the major portion of AFR 60-2 requirements for forty pilots assigned to the School. No additional T-33's can be used since all tests that can be accomplished in the T-33 are being flown in that aircraft. To maintain the total number of assigned aircraft as small as possible, two T-33's will be released when the four T-38's are assigned.

2. TF-102: Ordinarily the School prefers not to have one aircraft of a type because of the lack of flexibility. An exception has been made in the case of the TF-102 so that at least one delta wing airplane will be available to both performance and stability training section for use in the basic training course.

3. F-86: AFFTC has been directed to relaase the two remaining F-86's before 30 June 1960. Since two replacement F-104B's have not been delivered to the School, this would normally necessitate elimination of part of the course for Class 60B. Fortunately, Class 60B is the Army class, which will receive no instruction in the F-86. By rearranging the schedule for Class 60A, almost all of the training given in F-86's can be accomplished for this group before the aircraft are transferred.

4. T-28: The use of obsolete T-28's for training test pilots has in the past been questioned by individuals unfamiliar with test pilot training. Actually the T-28 is an excellent airplane for teaching fundamentals of instrument calibration and performance testing. It gives the student an opportunity to master basic techniques before attempting more exacting test in higher performance aircraft. The high in-commission rate and low operating costs of the T-28 have resulted, over the past eight years, in more test pilot training per Air Force dollar than in any other type of aircraft in the School inventory. AFFTC has been advised in telephone conversations with ARDC Headquarters that the T-28's will be phased out of the USAF inventory in the near future. The loss of the T-28's will mean the end of reciprocating engine performance flight training in the School. The School's T-28's should definitely not be transferred before Class 61A has completed the performance phase of the course in May 1961. After that date they can be released provided replacement aircraft have been physically in place at AFFTC for a period of at least two months. If they are transferred before replacement aircraft have been in place at AFFTC for the two month period, the transfer date should concide with what would normally be a Class starting date. No new class can then be accepted until replacement aircraft have been instrumented and placed in service at the School. Current plans include replacing the five T-28's with four T-38's. To avoid interrupting the training cycle, it is requested that the T-28's be retained until T-38's are delivered to the School.

5. B-57: The three B-57's are used entirely for training in stability and control testing. They are particularily well suited for assymetric power, but are used for stalls, aircraft dynamics, and several other stability and control test as well. They are equipped with the most modern, complete, and flexible instrumentation installation of any aircraft in the School inventory. The B-57's are the only multi-engine aircraft assigned to the School; and they are relied on heavily. It would be desireable to have two additional multi-engine aircraft; but in order to hold the number of assigned aircraft to the lowest possible

total, the B-57's are given priority maintenance consideration, and thereby fulfill School requirements for this type. The B-57's will be required through 1965.

6. H-43: In view of the development work planned in the helicopter and STOL aircraft field, a capability to provide training in helicopter testing should be maintained at the Test Pilot School. With the assignment of one H-43, this will be done. Helicopter pilots will be given thorough flight training in helicopter test techniques and methods; and all other students will receive limited orientation training.

The H-43 will be instrumented for instruction in both performance and stability testing.

7. F-104B: With the addition of two F-104B's to the School aircraft inventory in June 1960, flying training in testing of high-performance aircraft will be possible. Four T-38's planned as replacements for the School's T-28's will supplement the F-104B's in this phase of flight test training. Starting in January 1961, the F-104B's will be used increasingly more in space vehicle training; and it will be necessary to add two other F-104B's or F-104D's.

8. Rocket Powered Trainer: Initially, the addition of four F-104B's will provide sufficient high performance aircraft to accomplish approximately seventy-five percent of the flying training desired in the spacecraft course. Later a vehicle with speed and altitude performance which greatly exceed that of the F-104 should be made available to the School to provide training in the use and evaluation of reaction controls, optimum flight trajectories, re-entry problems, prolonged flight at zero "g's", and other phenomenon associated with space vehicles.

9. Variable Stability Aircraft: The availability of a variable stability aircraft would be an extremely valuable asset in teaching aircraft dynamics and in portions of the proposed space crew course. In the event that the tentative plans for acquisition of a variable stability aircraft in the Directorate of Flight Test become a reality, it is recommended that joint use of this vehicle with the Test Pilot School be arranged.

VII RECOMMENDATION: It is recommended that the proposed Test Pilot School aircraft inventory be supported and implemented by AFFTC, ARDC, and Hq. USAF.

Legend: oooo Primary Performance
" xxxx Primary Stability
//// Space
x-o-x-o Corresponding

CALENDAR YEAR

Aircraft Type	Aircraft Number	1960				1961				1962				1963				1964				1965			
T-33A	954	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	541	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	846	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
	425	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
	641	o	x	o	x	o	o																		
	392	o	x	o	x	x	o																		
TF-102A	353	o	x	o	x	o	x	o	x	o	x	o	x	o	x	o	x	o	x	o	x	o	x	o	x
F-86F	349	o	o																						
	412	o	o																						
T-28A	494	o	o	o	o	o	o																		
	495	o	o	o	o	o	o																		
	496	o	o	o	o	o	o																		
	569	o	o	o	o	o	o																		
	658	o	o	o	o	o	o																		
B-57E	258	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	262	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	267	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
F-104B	Unk			o	o	o	/	o	/	o	/	o	/	o	/	o	/	o	/	o	/	o	/	o	/
	Unk			o	o	o	/	o	/	o	/	o	/	o	/	o	/	o	/	o	/	o	/	o	/
	Unk							/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
	Unk							/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
T-38A	Unk						o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
	Unk						o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
	Unk						o	/	o	/	o	/	o	/	o	/	o	/	o	/	o	/	o	/	o
	Unk						o	/	o	/	o	/	o	/	o	/	o	/	o	/	o	/	o	/	o
H-43B	Unk					o	x	o	x	o	x	o	x	o	x	o	x	o	x	o	x	o	x	o	x
Space Training Vehicle	(X-15?)									/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
	TOTAL	17	17	17	17	18	22	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17			

Figure - 1