UNCLASSIFIED

AD NUMBER: AD0855992

LIMITATION CHANGES

TO:

Approved for public release; distribution is unlimited.

FROM:

Further Distribution only by permission from Air Force Aero Propulsion Lab, Wright-Patterson AFB, OH 45433. 1 Mar 1959

AUTHORITY

AFAPL, LTR, 3 JAN 1974

THIS PAGE IS UNCLASSIFIED

CATALOGED BY WCOSI
TI-51,221
AD855992
DO NOT DESTROY
RETURN TO
WCOSI — LIBRARY
FILE COPY
1
FILE COPY
DDC
AUG 6 1969

WADC TECHNICAL REPORT 59-150

WADC-TR-59-150

J79 TURBOJET ENGINES.

ERIK W. LINDNER

PROPULSION LABORATORY

AF-3011

9 p.

MARCH 1959

STATEMENT #5 UNCLASSIFIED

This document may be further distributed by any holder only with specific prior approval of AFAPL/APC-4 W.P.AFB, Ohio 45433

WRIGHT AIR DEVELOPMENT CENTER

DDC AUG 6 1969 A

MLL (400 358)

NOTICES

When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data, is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

- - - - - - - -

Copies of WADC Technical Reports and Technical Notes should not be returned to the Wright Air Development Center unless return is required by security considerations, contractual obligations, or notice on a specific document.

WADC TECHNICAL REPORT 59-150

J79 TURBOJET ENGINES

Erik W. Lindner

Propulsion Laboratory

March 1959

Project No. 3011

Wright Air Development Center
Air Research and Development Command
United States Air Force
Wright Patterson Air Force Base, Ohio

ABSTRACT

This Technical Report covers the development of the J79 turbojet engine for use in the F-104 aircraft. The project was initiated in February 1953. The Preliminary Flight Rating Test of the YJ79-GE-3 engine was completed in December 1955. The Model Test of the J79-GE-3 engine was completed in December 1956. The J79-GE-3A engine is used in F104 A/B aircraft presently in the Air Defense Command inventory. It is recommended that further support of the F-104 Weapon System be covered by a service type project.

PUBLICATION REVIEW

This report has been reviewed and is approved.

FOR THE COMMANDER:

Charles M. Michaels

CHARLES M. MICHAELS
Chief, Air Breathing Propulsion Div.
Propulsion Laboratory

J79 TURBOJET ENGINES

I. DISCUSSION

Project 3011, "J79 Turbojet Engines" was approved on 13 February 1953. The original requirement for this project was stated as follows:

"This project is necessary to perform the initial development of an efficient supersonic, lightweight turbojet in the 14,000 pound thrust class (augmented) for the MX-1964 aircraft program. An engine of this category is necessary to meet performance required by Headquarters, United States Air Force Development Directive No. 00034, dated 26 February 1952, Headquarters, United States Air Force GOR SAB-51 dated 8 December 1951, and Headquarters, United States Air Force GOR SAR-51 dated 1 February 1952".

The following subtasks were established to support this project:

1. 30103 - J79-GE-1 Turbojet Engine
2. 30104 - J79 Power Controls
3. 30313 - J79-GE-3 Turbojet Engine
4. 30314 - J79 Engine Advanced Compressor

The work under Task No. 30103 was transferred to Project 3158-30453 in December 1956.

All work under Task No. 30314 was completed and the task closed out in November 1956.

Task 30104 was terminated in May 1957 because a portion of the work was transferred to project 3158-30453. The portion of this task remaining was transferred under the basic engine project (3011). Since this left only task 30313 under the basic engine project 3011, this task was also closed out and all the work hereafter performed under the basic engine project.

The J79 engine was designed by the General Electric Company using background and design information acquired on the XJ53 engine program and other related engine design studies. The inclusion of the ejector type nozzle and the variable stator type compressor was based primarily on testing conducted by the Lewis Propulsion Laboratory on ejector type nozzles and on results of advanced compressor design research. The engine was originally designed as the power plant for the B-58 aircraft. From the inception of the design of the J79 engine in January 1953, the concept of light weight and low frontal area combined with high performance has been the goal established. The engine was first run in June 1954 indicating a major design deficiency in the compressor, and testing was again started in November 1954 after redesign of the compressor rotor. Design to modify the engine for fighter application was started in

March 1954 since the engine appeared to offer attractive possibilities as the propulsion unit for the F-104 aircraft. This model was designated the J79-GE-3 engine. The YJ79-GE-3 engine passed the 50 hour Preliminary Flight Rating Test (PFRT) in December 195[illegible], subject to penalty tests. The first flight of this engine was accomplished in a contractor bailed aircraft, the XF4D on 8 December 1955. First flight of this engine in a F-104 was accomplished by Lockheed on 17 February 1956. The engine also exhibited deviations to the Model Specification in thrust and specific fuel consumption. A performance improvement program was initiated which resulted in qualifying for flight a 50 hour engine model in April 1956, and completion of the 150-hour model test in December 1956. Eighty-six (86) J79-GE-3 engines were shipped for installation into F-104A/B aircraft.

Current designation of the 150-hour production model of the engine for the F104-A/B is J79-GE-3A. These engines incorporate a modified compressor rear frame, allowing an increased bleed air extraction, and a "Block III" fuel control system, which is the production version of the earlier prototype control used on J79-GE-3 engines. This model (J79-GE-3A) completed the 150 hour model test in August 1957, and is used in F-104A/B aircraft which were delivered to the Air Defense Command. First delivery of the weapon system to Air Defense Command occured on 26 January 1958. A total of 245 J79-GE-3A engines were delivered.

The development of the J79-GE-3 engine was accomplished by the General Electric Company under the provisions of Contract No. AF33(600)-28812, dated 27 October 1954. The major portion of work to be accomplished under this contract has been completed and termination on the remaining items is suggested by the Propulsion Laboratory in a Disposition Form to Air Materiel Command (LMEPC), dated 9 March 1959.

II. RECOMMENDATIONS

It is recommended that further support of the F-104 Weapon System be covered by a service type project. Necessary contractor support can be accomplished under the provisions of the Product Improvement Contract (AF33(600)-38588 for CY 1959).