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III. MISCELLANEOUS

1. RESULTS OF ANALYSIS OF MIG-15 COMPONENT PARTS CAPTURED IN KOREA:

Power Plant

The engine is a scaled-up version of the Nene turbo-jet engine. The combustion chamber has approximately 15% greater area throughout, the turbine blades are longer and of a wider chord and the exhaust nozzle area is approximately 30% larger than the Pratt & Whitney Nene Engine (J-42) final tailpipe, but almost identical with the exhaust nozzle area of the Tay engine (J-48).

The basic design features of the MIG-15 power plant such as (1) combustion chamber of larger inlet and outlet areas; (2) larger turbine blades; (3) fuel nozzles with flow numbers between the Nene and the Tay; and (4) increased exhaust nozzle area infer a substantial increase in mass air flow. This increase in mass flow, along with turbine inlet temperature conditions of 1550-1600°F - permissible because of good heat-resistant blade material, and reasonable component efficiencies indicate that the basic MIG-15 turbo-jet power plant should be capable of attaining a maximum sea level static thrust of approximately 6000 pounds.

The power plant did not include an afterburner. The airplane tailpipe diameter and length are of a size that would permit the use of an afterburner with approximately 1000 pounds thrust augmentation. It is estimated that a sea level dry maximum thrust of 7000 pounds would be possible with the use of a small afterburner.

Mechanical Construction

The turbine blades and combustion chamber assembly are of the basic Rolls-Royce Nene engine design with the exception of the turbine blade fir-tree attachment configuration.

Results of Analysis of MIG-15 Component Parts Captured in Korea (Cont'd)

The construction of the horizontal tail surface is very similar to that of the North American F-86.. Except for a steel main spar, the horizontal tail is constructed of ALCLAD 24S.

The materials used in the engine are generally similar to those used by Rolls-Royce and Pratt & Whitney, and indicate that this power plant could operate at turbine inlet temperatures similar to the Nene and the J-48.

Design and Workmanship

The combustion chamber design of the engine infers that the Soviets included a substantial amount of native development along with their known procedure of direct duplication and copying. Construction of this component reveals that the Soviets have overcome a weakness which has constantly plagued and confused the extremely competent combustion development organization of Lucas, Ltd, England - developers of Rolls-Royce combustion systems. Modifications for increased dilution air represents an improvement which could not be successfully attained by either Pratt & Whitney or Lucas.

Other evidences of Soviet native development capabilities are also exhibited in the combustor element of the power plant. The insertment of reinforcement rings in the liner perforations located in the hot zone of the combustion chamber, the increase in gage of metal used in the hot zone liner section and an improved duplex fuel nozzle illustrates Soviet capabilities in the field of development as pertains to gas turbines.

General workmanship reflected in all of the turbo-jet engine parts is excellent, and entirely acceptable by American standards and practices. Proficiency in the art of welding was particularly evident. Analysis of Soviet welding techniques and practices showed that the Soviets had a firm grasp

of the art of resistance welding - particularly impressive was the quality of proficiency attained in welding three thicknesses.

The general quality of workmanship and type of construction of the horizontal stabilizer appears to be comparable to American standards except for the method of distributing mass balance weights for achieving static and dynamic balance of control surfaces. The Soviets attached mass balance weights of approximately three pounds each to the elevator tips in a "glove type manner" while the usual American practice for alleviating flutter of a control surface is to employ distributed balance weights rather than concentrated balance weights.

The structural design is clean of inherent structural difficulties such as fatigue cracking, except for the method used in obtaining elevator balance. The workmanship on the surface appears to be excellent with the exception of one practice, that is, spiking nuts both large and small in place to prevent them from coming loose.

Characteristics and Performance

Although an estimate of 6000 pounds thrust would give a sea level maximum speed of 584 knots and a sea level rate of climb of 10,400 feet per minute, the condition of the captured turbine blades indicate that the higher turbine inlet temperatures have not been used and that an operating thrust of less than 6000 pounds is being utilized. Assuming a reduction of approximately 8% in the estimated design rating of the power plant, because of lower turbine inlet temperatures and possibly a slight reduction in component efficiencies, a sea level maximum rate of climb of 9700 feet per minute is calculated to be attainable by the MIG-15.

Results of Analysis of MIG-15 Component Parts Captured in Korea (Cont'd)

If the power plant incorporates a water injection system, approximately 6750 pounds thrust would be provided for short duration at takeoff.

Consideration of all characteristics exhibited by the horizontal tail indicate that the elevator control system should be boosted if high acceleration pull-outs and turns equivalent to F-86 performance are to be realized. Insufficient components were available to determine the existence of such a boost system, however, reports from the theater of operations have consistently commented on the low accelerations developed by the MIG-15 in such maneuvers, indicating that the airplanes might not yet be equipped with elevator boost.

Since the range is determined primarily by the aircraft configuration it is anticipated that the combat range and radius will not be substantially changed due to the larger thrust engine. A more powerful engine merely indicates that the aircraft will obtain maximum range at a higher altitude.

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2. EVALUATION OF THE MIG-15 AGAINST THE F-84-E:

The following excerpts are from FAF IR-15-51, 13 May 1951, and are furnished for Roundup readers interested in a comparison of characteristics of the MIG-15 against the F-84-E:

Speed

The MIG has excellent acceleration characteristics and against the F-84E has been able to join combat and break off combat at will. Encounters with F-86's have indicated that the MIGs are capable of speeds up to Mach.9. The MIG has, on many occasions, pulled away from the F-86 in dives. The most recent report of such a maneuver indicated the MIG-15 attained a speed of 1.1 in the dive. With the low Mach on the F-84E (8.3) the MIG is able to

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