

TECHNICAL MANUAL

**AVIATION UNIT
AND AVIATION INTERMEDIATE
MAINTENANCE MANUAL**

**ENGINE, AIRCRAFT, GAS TURBINE
MODEL T63-A-720 P/N6887191
NSN 2840-01-013-1339**

**HEADQUARTERS, DEPARTMENT OF THE ARMY
2 NOVEMBER 1977**

TECHNICAL MANUAL
NO. 55-2840-241-23

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 2 November 1977

**Aviation Unit and Aviation Intermediate
Maintenance Manual**

ENGINE, AIRCRAFT, GAS TURBINE
MODEL T63-A-720 P/N 6887191
NSN 2840-01-013-1339

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms) located in the back of this manual directly to: Commander, US Army Aviation and Missile Command, ATTN: AMSAM-MMC-MA-NP, Redstone Arsenal, AL 35898-5230. You may also submit your recommended changes by E-Mail directly to 2028@redstone.army.mil or by fax (256) 842-6546/DSN 788-6546. A reply will be furnished directly to you. Instruction for sending an electronic 2028 may be found at the back of this manual immediately preceding the hard copy 2028.

ENVIRONMENTAL/HAZARDOUS MATERIAL INFORMATION

This document has been reviewed for the presence of Class I Ozone Depleting Chemicals. As of 1 January 1996, the status is: All references to Class I Ozone Depleting Chemicals have been removed from this document by substitution with chemicals that do not cause atmospheric ozone depletion.

DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited

	TABLE OF CONTENTS	Paragraph	Page
CHAPTER 1.	INTRODUCTION		1-1
Section I.	General	1-1	1-1
Section II.	Description.	1-2	1-2
CHAPTER 2.	SPECIAL TOOLS, TEST EQUIPMENT, AND CONSUMABLE MATERIALS		2-1
Section I.	Special Tools and Test Equipment	2-1	2-1
Section II.	Consumable Materials	2-2	2-4
CHAPTER 3.	PREPARATION FOR SERVICE STORAGE AND ENGINE HANDLING		3-1
Section I.	Preparation for Service Storage	3-1	3-1
Section II.	Engine Handling	3-18	3-13
CHAPTER 4.	TROUBLESHOOTING		4-1
CHAPTER 5.	ACCESSORIES SERVICEING		5-1
Section I.	General	5-1	5-1
Section II.	Fuel System	5-6	5-3
Section III.	Lubrication System	5-18	5-16
Section IV.	Anti-icing and Bleed Air Systems	5-31	5-22

TABLE OF CONTENTS (Cont)

	V. Ignition System	5-34	5-25
	VI. Miscellaneous Accessories	5-38	5-28
CHAPTER	6. ENGINE DISASSEMBLY		6-1
CHAPTER	7. CLEANING, INSPECTION, AND REPAIR		7-1
Section	I. Cleaning	7-1	7-1
	II. Inspection	7-8	7-4
	II. Repair	7-23	7-15
CHAPTER	8. ASSEMBLY OF SUBASSEMBLIES		8-1
CHAPTER	9. FINAL ENGINE ASSEMBLY		9-1
CHAPTER	10. FINAL ENGINE TEST		10-1
CHAPTER	11. TORQUES AND DIMENSIONAL LIMITS		11-1
Section	I. Torque Values	11-1	11-1
	II. Dimensional Limits	11-2	11-4
CHAPTER	12. SPECIAL INSPECTIONS		12-1
Section	I. Engine Hot End	12-1	12-1
	II. Compressor	12-3	12-3
	III. Abnormal Flight Maneuver Inspection	12-9	12-4
CHAPTER	13. OVERHAUL INTERVAL AND RETIREMENT SCHEDULE		13-1
APPENDIX	A. REFERENCES		A-1
APPENDIX	B. MAINTENANCE ALLOCATION CHART		B-1
INDEX			Index-1

LIST OF ILLUSTRATIONS

Number	Title	Page	Number	Title	Page
1-1.	Right Side View of Engine (Typical)	1-21	5-6.2	Start-Derich and Start-Accel (Tweaker) Adjustments	5-10.4
1-2.	Engine Airflow	1-3	5-7.	Fuel Control Max Flow Stop Adjustment	5-11
1-3.	Fuel System Schematic	1-5	5-8.	Fuel Control Fuel Filter	5-12
1-4.	Fuel Control System Schematic.	1-7	5-9.	Carbon Buildup on Fuel Nozzle	5-14
1-5.	Fuel Pump and Filter Assembly	1-9	5-9.1.	Removal of Accumulator and Union	5-15
1-6.	Engine Lubrication System Schematic	1-11	5-9.2	Installation of P/N MS 9015-04 Plug.	5-15
1-7.	Oil Pump Schematic	1-12	5-10.	Particle Accumulation on Magnetic Chip Detector	5-17
1-8.	Compressor Bleed Control Valve	1-13	5-10.1	Pressure Oil Tube and Pressure Oil Filtering Screen	5-18.1
1-9.	Compressor Bleed Control Valve Operation	1-13	5-11.	Oil Falter, Housing, Check Valve, and Regulator Valve	5-19
2-1.	Engine Turning Adapter 6799790	2-2	5-12.	External Oil Check Valve	5-20.1
2-2.	Compressor Vibration Pickup Mounting Bracket 6872539	2-2	5-13.	Engine Air Systems (Anti-icing and Bleed Air)	5-23
2-3.	Loop Clamps 6799952 and 6799953	2-2	5-14.	Anti-icing Valve Poppet Seat Replacement	5-24
2-4.	Compressor Protector Kit 6886204	2-2	5-15.	Anti-icing Valve Lever Repair	5-25
2-5.	Engine Assembly Lift 6796963	2-2	5-16.	Ignition System	5-26
2-6.	Mechanical Puller Kit 6796941	2-2	5-17.	Spark Igniter	5-27
2-7.	Modular Engine Test Stand LTCT10465-22	2-3	6-1.	Compressor Case Assembly	6-2
2-8.	Engine Assembly Turnover Stand 6795579	2-3	7-1.	Bleed Valve Jet and Nozzle Removal	7-3
2-9.	Ground Idle Wrench 6798292	2-3	7-2	Compressor Blade Damage Caused By Rub	7-5
3-1.	Engine Shipping Container	3-3	7-3.	Compressor Vane Erosion	7-6
3-2.	Engine Shipping Parts	3-4	7-4.	Gearbox Accessory Pad Locations	7-7
3-3.	Engine Shipping Container Stenciling and Labeling	3-9	7-5.	Outer Combustion Case Inspection	7-8
3-4.	Accessories Shipping Container	3-10	7-6.	Dent Limits-Top of Outer Combustion Case	7-9
3-5.	Accessories Shipping Container Stenciling	3-11	7-7.	Outer Combustion Case Air Tube Boss.	7-9
3-6.	Gas Producer Fuel Control Ports Identification	3-12	7-8.	Combustion Liner Inspection.	7-13
3-7.	Engine Assembly Turnover Stand 6795579	3-13	7-9.	Inspection of Combustion Liner Dome Louvers	7-14
3-8.	Combustion Section Removal	3-15	7-10.	Compressor Rotor Blade Leading and Trailing Edge Blend Limits.	7-15
4-1.	OH58C HIT TOT Worksheet	4-14.2	7-11.	Compressor Rotor Blade Tip Blend Limits	7-15
4-2.	OH58C HIT TOT Log	4-15	7-12.	Compressor Blade Surface Blending Limits	7-16
4-3.	Bendix Governor	4-16	7-13.	Compressor Stator Vane Blend Limits.	7-17
4-4.	Bendix Fuel Control	4-16	7-14.	Seal Puller Kit	7-18
4-5.	P. C. Gage Test Kit	4-16.3	7-15.	Gearbox External Seals	7-19
4-6.	Set-Up of P.C. Gage	4-163	7-16.	Gearbox External Stud Data	7-20
5-1.	Universal Fittings	5-2	10-1.	Idle Flight Automtation GPTOT Limits	10-3
5-2.	Fuel, Oil, and Air Tubing	5-5	10-2.	Diffuser Vent Orifice Installation	10-7
5-3.	Fuel System Components	5-6	11-1.	Typical Locknut Installation	11-4
5-4.	Fuel Filter Replacement	5-8	12-1.	Typical First-Stage Turbine Nozzle	12-2
5-5.	Fuel Control Quadrant and Pointer	5-10			
5-6.	Gas Producer Fuel Control Adjustmemts	5-10.1			
5-6.1	Start Acceleration and Start Derichment Adjustments.	5-10.2			

LIST OF TABLES

Number	Title	Page	Number	Title	Page
1-1.	Leading Particulars	1-14	7-1.	Combustion Liner Inspection	7-10
1-2.	Performance Ratings (Standard Sea Level Static Conditions)	1-14	10-1.	Operating Limits.	10-4
2-1.	Special Tools and Test Equipment	2-1	10-2.	Test Requirements	10-6
2-2.	Consumable Materials	2-4	10-3.	Functional Test Schedule	10-8
3-1.	Container Air Pressure vs. Ambient Temperature	3-8	11-1.	Torque Values	11-1
4-1.	Troubleshooting.	4-1	11-1.1	Minimum Prevailing Torque for Used Locknuts	11-4
5-1.	Recommended Torque for Airframe Engine Interface Connections	5-2.1	11-2.	Dimensional Limits	11-5
5-1.1	Adjustments to Improve Starting	5-10.3	12-1.	Overttemperature During Start	12-1
5-1.2	Torque Limits for Steel Couplings on Steel Fittings	5-15	12-2.	Overttemperature During Power Transients	12-1
5-2.	Anti-icing Air Valve Inspection and Repair	5-24	12-3.	First-stage Turbine Nozzle and Shield Inspection	12-2
			13-1.	Overhaul and Retirement Intend	13-1
				Maintenance Allocation Chart	B-1

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. Scope.

a. This manual is issued expressly for Aviation Unit Maintenance (AVUM) and Aviation Intermediate Maintenance (AVIM) activities. Its purpose is to familiarize maintenance personnel having limited technical training and experience with the maintenance functions to be performed on the Army Model T63-A-720 (Allison Gas Turbine Model 250-C20C) turboshaft engine. The study and use of this manual will enable maintenance personnel to perform the assigned functions with maximum efficiency. This manual provides all essential information to accomplish the three levels of maintenance on the complete engine, its components, and systems as prescribed in the Maintenance Allocation Chart (MAC). (Refer to Appendix B.)

CAUTION

Use only chrome plated steel or unplated steel tools for the disassembly or reassembly procedures described in this manual. The use of cadmium or zinc plated tools is not permitted since these platings are prone to chipping and flaking. Should these chips enter the engine they may contaminate the lubrication system, ultimately clogging the filters or produce intergranular attack on nickel or titanium base alloys at elevated temperatures.

1-2. Maintenance Forms and Records.

Maintenance forms, records, and reports which are to be used by maintenance personnel at all maintenance levels are listed in and prescribed by DA Pamphlet 738-751, Functional Users Manual for the Army Maintenance Management System - Aviation (TAMMS-A).

1-3. Reporting of Errors.

Reports of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports shall be submitted on DA Form 2028 (Recommended Changes to Publication and Blank Forms) or DA Form 2028-2 located in the back of this manual directly to Commander, U.S. Army Aviation and Missile Command, ATTN: AMSAM-MMC-LS-LP, Redstone Arsenal, AL 35898-5230. You may also submit your recommended changes by E-Mail directly to ls-lp@redstone.army.mil or by fax (256) 842-6546/DSN 788-6546. A reply will be furnished directly to you. Instruction for sending an electronic 2028 may be found at the back of this manual immediately preceding the hard copy 2028.

1-4. Destruction of Army Material to Prevent Enemy Use.

Procedures for destruction of Army materials to prevent enemy use are prescribed by TM 750-244-1-5.

Section II. DESCRIPTION

1-5. General

a. The T63-A-720 Series engine consists of a multi-stage, axial-centrifugal compressor, a single combustion chamber, a two-stage gas producer turbine, a free-two-stage power turbine, and a power and accessory gearbox. (See figure 1-1.)

b. The major engine systems are fuel and control, lubrication, ignition, anti-icing air, temperature measurement, and compressor acceleration bleed air.

c. Engine description includes a discussion of each major component and each major system.

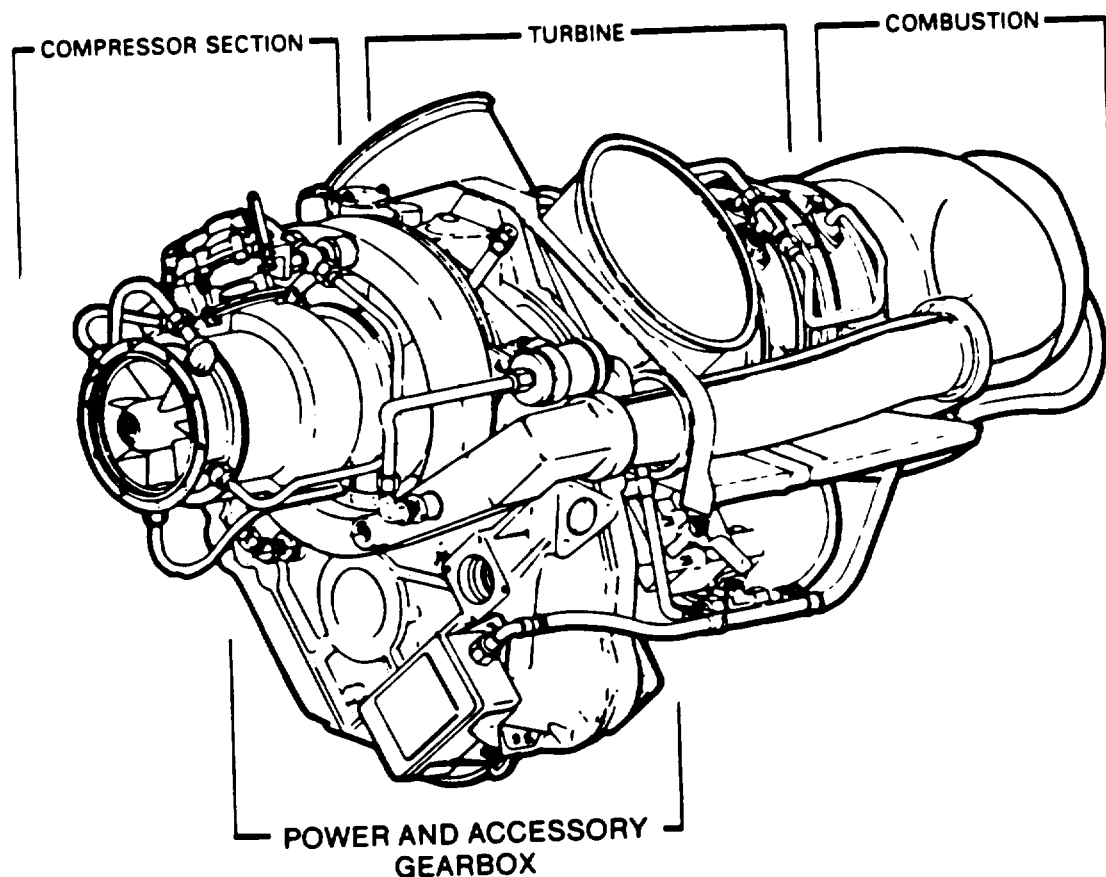


Figure 1-1. Left Side View of Engine
(Typical)

323678