

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

TECHNICAL MANUAL
DIRECT SUPPORT AND GENERAL SUPPORT
MAINTENANCE MANUAL
POWER PLANT, UTILITY, GAS
TURBINE ENGINE DRIVEN
(LIBBY WELDING CO. MODEL LPU-71)
FSN 6115-165-3842

This copy is a reprint which includes current pages from Changes 1

HEADQUARTERS, DEPARTMENT OF THE ARMY

JUNE 1972

TECHNICAL MANUAL

No. 5-6115-586-34

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 15 June 1972.**DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL****POWER PLANT, UTILITY: GAS TURBINE ENGINE DRIVEN****LIBBY WELDING CO. MODEL LPU-71****FSN 6115-165-3842**

		Paragraph	Page
CHAPTER	1	INTRODUCTION	
Section	I.	General	1-1 1-1
	II.	Description and data	1-4 1-4
CHAPTER	2.	DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE INSTRUCTIONS	
Section	I.	Repair parts, Special Tools, and equipment.....	2-1 2-1
	II.	Troubleshooting	2-3 2-3
	III.	General Maintenance	2-5 2-11
	IV.	Removal and Installation of Major Components and Auxiliaries	2-10 2-21
CHAPTER	3.	REPAIR OF ENGINE	
Section	I.	Engine Electrical and Plumbing Installation	3-1 3-1
	II.	Engine Accessories	3-4 3-15
	III.	Dual Pad Accessory Drive Assembly	3-9 3-24
	IV.	Accessory Gearcase Assembly.....	3-15 3-30
	V.	Compressor and Turbine Assembly	3-21 3-34
CHAPTER	4.	REPAIR OF SKID ASSEMBLY	4-1 4-1
CHAPTER	5.	REPAIR OF ELECTRICAL COMPONENTS	
Section	I.	Power Plant Electrical Installation.....	5-1 5-1
	II.	Engine and Skid Electrical Installation	5-32 5-60
CHAPTER	6.	REPAIR OF CONDITIONED AIR COOLING SYSTEM	
Section	I.	Tube Assemblies and Plumbing Fittings	6-1 6-1
	II.	Compressors, Condensers and Evaporators	6-3 6-13
	III.	Receivers	6-7 6-16
	IV.	Motor Driven Tube Axial Fan (Recirculating)	6-8 6-19
	V.	Motor Driven Tube Axial Fan (Condenser).....	6-9 6-25
CHAPTER	7.	REPAIR OF BLEED AIR AND EXHAUST HEATING INSTALLATION	7-1 7-1
CHAPTER	8.	REPAIR OF WATER SYSTEM PLUMBING INSTALLATION	
Section	I.	Tube Assemblies, Fittings, and Manual Valves.....	8-1 8-1
	II.	Surge Tank and Pressure Switch.....	8-5 8-1
	III.	Hot Water Tank, Thermostatic Switch, and Relief Valves	8-9 8-2
CHAPTER	9.	REPAIR OF ENCLOSURE ASSEMBLY	9-1 9-1
CHAPTER	10.	REPAIR OF ACCESSORY COMPONENTS	
Section	I.	General Information.....	10-1 10-1
	II.	Compressed Air and Vacuum System Accessory Components	10-2 10-1
	III.	Water System Accessory Components.....	10-5 10-5
	IV.	External Fuel Filter Assembly:	10-7 10-7
	V.	Electrical Cable Accessory Components.....	10-12 10-9
	VI.	Conditioned Air System Accessory Components	10-19 10-9
APPENDIX	A.	REFERENCES.....	A-1
INDEX			I-1

LIST OF ILLUSTRATIONS

Figure	Title	Page
2-1.	Refrigeration service unit	2-6
2-2.	Refrigeration service unit panel details	2-7
2-3.	Service unit connected to power plant	2-9
2-4.	Refrigeration service unit internal details.....	2-10
2-5.	Removal of engine and skid assembly (sheet 1 of 3)	2-22
2-5.	Removal of engine and skid assembly (sheet 2 of 3)	2-23
2-5.	Removal of engine and skid assembly (sheet 3 of 3)	2-24
2-6.	Removal of gas turbine engine.....	2-26
3-1.	Gas turbine engine wire harness installation.....	3-2
3-2.	Gas turbine engine wire harness assembly.....	3-3
3-3.	Gas turbine engine wire harness diagram and wire identification chart	3-4
3-4.	Engine and skid plumbing installation (sheet 1 of 5)	3-6
3-4.	Engine and skid plumbing installation (sheet 2 of 5)	3-8
3-4.	Engine and skid plumbing installation (sheet 3 of 5)	3-10
3-4.	Engine and skid plumbing installation (sheet 4 of 5)	3-12
3-4.	Engine and skid plumbing installation (sheet 5 of 5)	3-14
3-5.	Starter clutch assembly.....	3-16
3-6.	Pawls installed in spider	3-18
3-7.	Using clutch torquing holder and torque wrench adapter to check clutch slip torque	3-19
3-8.	Fuel control assembly	3-20
3-9.	Fuel atomizer assembly	3-22
3-10.	Oil temperature regulator valve.....	3-23
3-11.	Test set-up for oil temperature regulator	3-24
3-12.	Gas turbine engine assembly (sheet 1 of 2)	3-25
3-12.	Gas turbine engine assembly (sheet 2 of 2).....	3-26
3-13.	Dual pad accessory drive assembly	3-27
3-14.	Inspection of retainer.....	3-28
3-15.	Inspection of seal	3-29
3-16.	Determining shim requirements for input seal assembly	3-30
3-17.	Accessory gearcase assembly	3-31
3-18.	Installation of seal	3-32
3-19.	Installation of seal	3-33
3-20.	Inspection of torus	3-35
3-21.	Inspection of torus	3-36
3-22.	Inspection of liner	3-37
3-23.	Inspection of nozzle	3-38
3-24.	Repair of turbine plenum	3-40
3-25.	Repair of torus	3-41
4-1.	Fuel boost pump, exploded view.....	4-2
4-2.	Air inlet duct assembly, exploded view.....	4-4
4-3.	Air inlet plenum assembly, upper, exploded view.....	4-6
4-4.	Air inlet plenum assembly, lower, exploded view.....	4-7
4-5.	Heat shield assembly, upper, exploded view.....	4-9
4-6.	Heat shield assembly, lower, exploded view.....	4-10
4-7.	Engine skid assembly, exploded view	4-12
4-8.	Engine skid sub-assembly, exploded view	4-14
5-1.	DC power branched wire harness assembly	5-2
5-2.	Power plant dc power branched wire harness assembly	5-4
5-3.	DC power branched wire harness assembly	5-5
5-4.	Water system wire harness assembly.....	5-6
5-5.	Water system branched wire harness assembly	5-7
5-6.	Water pumps wire harness assembly	5-8
5-7.	Air conditioning system branched wire harness assembly	5-9
3-8.	Air conditioning system wire harness assembly	5-11
3-9.	Recirculating fans wire harness assembly	5-13
5-10.	Recirculating fans wire harness assembly	5-14
3-11.	Recirculating fans wire harness assembly	5-15
3-12.	400 Hz auxiliary power wire harness assembly.....	5-16
5-13.	Anti-ice thermostat wire harness assembly	5-17
3-14.	Condenser fans wire harness assembly	5-18
5-15.	Condenser fans wire harness assembly	5-20
5-16.	Remote power output wire harness assembly.....	5-22
3-17.	Compressor wire harness assembly	5-24
3-18.	Compressors wire harness assembly.....	5-25
5-19.	Compressors wire harness assembly.....	5-25

Figure	Title	Page
5-20.	Compressor and exhaust fans wire harness assembly	5-27
5-21.	AC power wire harness assembly	5-28
5-22.	Temperature sensors wire harness assembly	5-30
5-23.	Temperature sensors wire harness assembly	5-32
5-24.	Battery wire harness assembly	5-34
5-25.	Heat valves wire harness assembly	5-35
5-26.	Air conditioning power wire harness assembly	5-37
5-27.	DC power wire harness assembly	5-38
5-28.	Compressors wire harness assembly	5-39
5-29.	Remote fans wire harness assembly	5-40
5-30.	Condenser fans wire harness assembly	5-41
5-31.	Recirculating fans wire harness assembly	5-42
5-32.	Remove power wire harness assembly	5-43
5-33.	Auxiliary power tray assembly	5-45
5-34.	400 Hz auxiliary power wire harness assembly	5-47
5-35.	400 Hz auxiliary output 1 wire harness assembly	5-48
5-36.	400 Hz auxiliary output 2 wire harness assembly	5-49
5-37.	Water heater wire harness assembly	5-50
5-38.	Receptacle panel wire harness assembly	5-51
5-30.	60 Hz output wire harness assembly	5-52
5-40.	400 Hz output wire harness assembly	5-53
5-41.	400 Hz output wire harness assembly	5-54
5-42.	DC Standby wire harness assembly	5-55
5-43.	Slave receptacle cable assembly	5-55
5-44.	60 Hz output wire harness assembly	5-56
5-45.	Air conditioning and heat control panel wire harness assembly	5-58
5-46.	Electrical leads	5-59
5-47.	Engine skid power plant wire harness assembly	5-61
5-48.	Power wire harness assembly	5-63
5-40.	Battery wire harness assembly	5-64
6-1.	Conditioned air cooling system (sheet 1 of 6)	6-2
6-1.	Conditioned air cooling system (sheet 2 of 6)	6-4
6-1.	Conditioned air cooling system (sheet 3 of 6)	6-6
6-1.	Conditioned air cooling system (sheet 4 of 6)	6-8
6-1.	Conditioned air cooling system (sheet 5 of 6)	6-10
6-1.	Conditioned air cooling system (sheet 6 of 6)	6-12
6-2.	Thermostatic switch assembly inspection requirements	6-14
6-3.	Refrigerant leakage test setup	6-14
6-4.	Refrigerant leakage test setup	6-16
6-5.	Liquid refrigerant receiver	6-17
6-6.	Refrigerant leakage test setup	6-18
6-7.	Tube axial motor driven fan	6-20
6-8.	Holding fixture torque wrench	6-21
6-9.	Schematic wiring diagram	6-22
6-10.	End bell inspection requirements	6-22
6-11.	Rotor assembly inspection requirements	6-23
6-12.	Fan housing assembly inspection requirements	6-23
6-13.	Bearing installation	6-24
6-14.	End play measurement	6-25
6-15.	Tube axial motor driven fan	6-26
6-16.	Holding fixture torque wrench	6-27
6-17.	Schematic wiring diagram	6-28
6-18.	End bell inspection requirements	6-28
6-19.	Rotor assembly inspection requirements	6-29
6-20.	Fan housing assembly inspection requirements	6-29
6-21.	Bearing installation	6-30
6-22.	End play measurement	6-31
7-1.	Bleed air and exhaust heating installation (sheet 1 of 3)	7-2
7-1.	Bleed air and exhaust heating installation (sheet 2 of 3)	7-4
7-1.	Bleed air and exhaust heating installation (sheet 3 of 3)	7-6
9-1.	Enclosure assembly (sheet 1 of 10)	9-2
9-1.	Enclosure assembly (sheet-2 of 10)	9-4
9-1.	Enclosure assembly (sheet 3 of 10)	9-6
9-1.	Enclosure assembly (sheet 4 of 10)	9-8
9-1.	Enclosure assembly (sheet 5 of 10)	9-10
9-1.	Enclosure assembly (sheet 6 of 10)	9-12
9-1.	Enclosure assembly (sheet 7 of 10)	9-13

Figure	Title	Page
9-1.	Enclosure assembly (sheet 8 of 10)	9-14
9-1.	Enclosure assembly (sheet 9 of 10)	9-15
9-1.	Enclosure assembly (sheet 10 of 10)	9-16
9-2.	Shell assembly (sheet 1 of 9)	9-17
9-2.	Shell assembly (sheet 2 of 9)	9-18
9-2.	Shell assembly (sheet 3 of 9)	9-20
9-2.	Shell assembly (sheet 4 of 9)	9-22
9-2.	Shell assembly (sheet 5 of 9)	9-24
9-2.	Shell assembly (sheet 6 of 9)	9-26
9-2.	Shell assembly (sheet 7 of 9)	9-28
9-2.	Shell assembly (sheet 8 of 9)	9-30
9-2.	Shell assembly (sheet 9 of 9)	9-32
10-1.	Inflation and deflation ejector assembly	10-2
10-2.	Box and valve manifold assembly	10-4
10-3.	Compressed air hose assembly and vacuum hose assembly	10-5
10-4.	Water system accessory components	10-6
10-5.	External fuel filter assembly	10-8
10-6.	Conditioned air system accessory components	10-10
FO-1	Control panel wire harness assembly	FO-1
FO-2.	Engine skid wire harness assembly	FO-2

CHAPTER 1 INTRODUCTION

Section I. GENERAL

1-1. Scope

a. This manual contains instructions for the use of direct support and general support maintenance personnel maintaining the power plant, utility, gas turbine engine driven, Libby Model LPU-71, Type A, as allocated by the Maintenance Allocation Chart. It provides information on the maintenance of the equipment which is beyond the scope of the tools, equipment, personnel or supplies normally available to operator and organizational level maintenance personnel.

b. Appendix A contains a list of publications applicable to this manual.

1-2. Forms and Records

Maintenance forms and records and reports which are to be used by maintenance personnel at all maintenance levels are listed in and prescribed by TM 38-750.

1-3. Reporting of Errors

Report of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 Recommended Changes to Publications, and forwarded direct to the Commanding General, U. S. Army Mobility Equipment Command, ATTN: AMSME-MP, 4300 Goodfellow Boulevard, St. Louis, Mo. 63120.

Section II. DESCRIPTION AND DATA

1-4. Description

A description of the power plant, its major components and systems, and its accessory components is provided in TM 5-6115-586-12. Detailed description of specific components and assemblies is contained in the repair instruction chapters in this manual.

1-5. Differences Between Models

This manual covers only Libby Welding Company Power Plant Model LPU-71. There are no differences between units of this model.

1-6. Tabulated Data

a. *General.* This paragraph provides tabulated data in addition to that supplied in TM 5-6115586-12. This additional data is provided for the use of direct support and general support maintenance personnel.

b. Gas Turbine Engine Classification and Rating.

Acceleration time (start to governed speed)	60 seconds (max)
Compressor type	Two-stage centrifugal
Inlet air temperature	130° F (54° C) (max)
Combustion chamber type	Single reverse flow tube
Igniter plug type	Air gap
Reduction gearing	Spur
Starter motor duty cycle	One minute on, one minute off or five starts in ten minutes
Output shaft speed	6000 rpm
Turbine wheel speed (full load)	40,700 +/- 100 rpm
Governor type	Knife-edge centrifugal
Exhaust gas temperature (full load continuous operations)	1225°F (663° C)
Operating oil pressure	90 +/- 10 psig
Electrical system	24 vdc

c. Starter Assembly Classification and Rating.

Horsepower	1.5 (rated)
Operating voltage	24 vdc (rated)
Direction of rotation (viewing end of shaft)	Counterclockwise
Weight	14.9 lb (approx)
No load overspeed test:	

Voltage	27.5 vdc
Current	50 amps (max)
Speed	18,000 to 25,000 rpm
Rated *load test:	
Voltage	27.5 vdc
Current	135 amps (max)
Torque	300 ounce-inches
Speed	4500 to 5500 rpm

d. Starter Assembly Repair and Replacement Standards.

Armature end play	0.008 to 0.010 inch
Shaft seal leakage	10 cubic inches per hour (max)
Special repair compounds and materials:	
Remove minor nicks, scratches or burrs	Abrasive paper (Federal)
.....	Specification P-P-101, No. 600 Grit)
Outside motor finish removal	Abrasive Paper (Federal)
.....	Specification P-P-101, No.320 Grit)
Refinish motor exterior Primer	(Cati-Coat No.E42GP15 and Catalyst V77KP15) then one coat of enamel (Cati-Coat No.F55BP15 and Catalyst V66KP15, SherwinWilliams Co., Cleveland, Ohio, or equivalent; no known government specification)