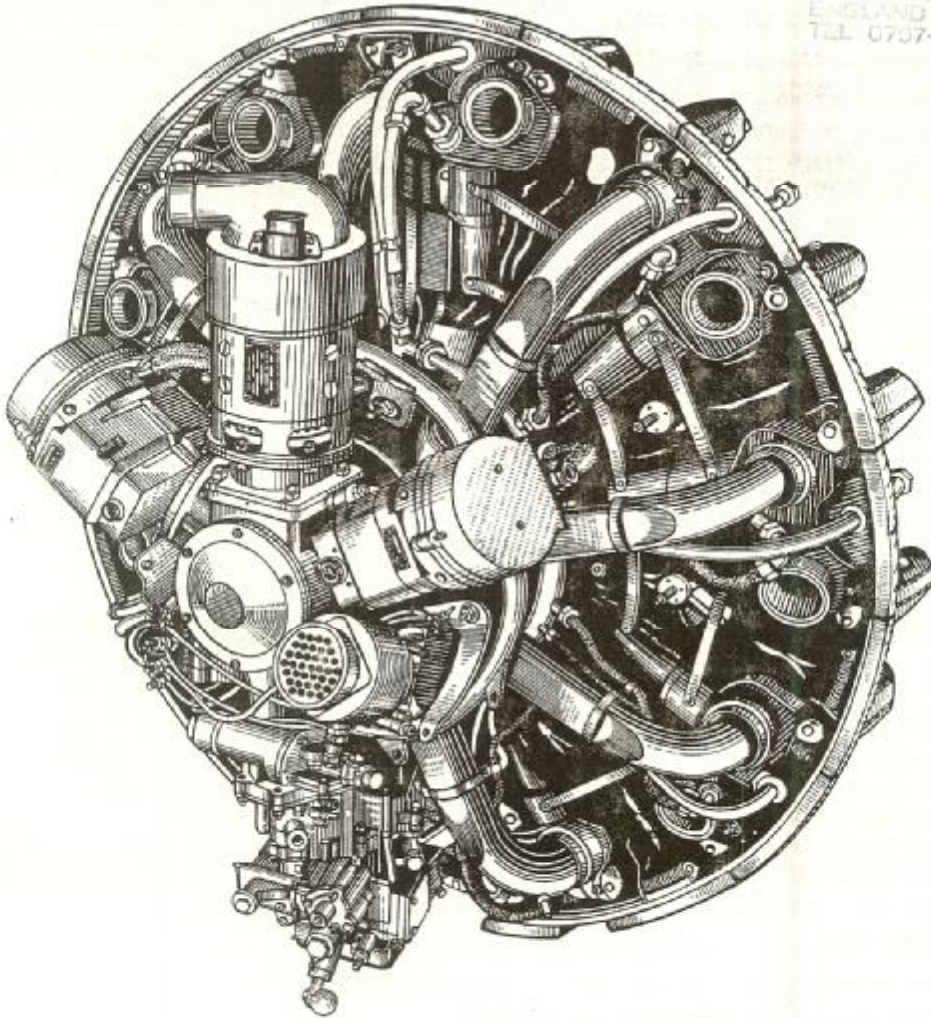


# M-14P

MAINTENANCE MANUAL

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Engine M-14P. Rear View

Figure 2

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# M-14P

## MAINTENANCE MANUAL

### 2. SPECIFICATIONS

#### 2.1. Engine

Designation .....	M-14P
Cooling system .....	Air-type
Engine starting system .....	Air-type
Engine continuous operation time:	
At take-off rating .....	Up to 5 min
At maximum permissible speed of rotation .....	Up to 1 min
At other ratings .....	Not limited
Inverted engine operation:	
Ratings .....	Nominal
Continuous operation time .....	Up to 2 min
Total time within service life .....	Up to 18 %
Maximum permissible speed of rotation .....	2950 (101 %) r/min
Acceleration (pickup) from 760 r/min (idle) to take-off rating on stationary airplanes .....	Up to 3 s
Maximum permissible crankshaft speed drop when changing over to one-magneto operation at nominal rating II and cruise rating I (low-pitch airscrew) ..	85 r/min (3 %)
Number and arrangement of cylinders .....	9, radial, single-row
Cylinder numbering .....	Counterclockwise if viewed from rear cover side, top cylinder is No. 1
Cylinder bore .....	105 mm
Piston stroke:	
Cylinder No. 4 .....	130 mm
Cylinders Nos 3 and 5 .....	130.15 mm
Cylinders Nos 2 and 6 .....	130.23 mm
Cylinders Nos 8 and 9 .....	130.39 mm
Cylinders Nos 1 and 7 .....	131.25 mm
Total displacement .....	10.161 l
Compression ratio .....	6.3±0.1
Direction of rotation of crankshaft and airscrew shaft .....	LH
Engine dry mass .....	214 kg <sup>+2 %</sup>
<b>NOTE:</b> Engine dry mass does not include mass of the generator, compressor, fine filter with pipelines, engine frame ring, exhaust manifold parts, tachometer generator.	
Engine overall dimensions:	
Diameter (over valve mechanism case covers) .....	(985±3) mm
Length .....	(924±3) mm

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## MAINTENANCE MANUAL

### 1.2.2. Gearbox

Type ..... Six-satellite, planetary,  
single-stage

Transmission ratio ..... 0.658

### 1.2.3. Airscrew

Designation ..... V530TA-D35

Type ..... Variable-pitch, push-type

### 1.2.4. Blower

Type ..... Centrifugal, single-stage,  
single-speed, mechanical drive

Drive transmission ratio ..... 8.16

### 1.2.5. Carburetor

Designation ..... AK-14P

Type ..... Floatless

Number per engine ..... 1

Carburetor fuel inlet pressure:

At operating ratings ..... (0.2 to 0.5) kgf/cm<sup>2</sup>

At minimum speed of rotation ..... Not less than 0.15 kgf/cm<sup>2</sup>

Air temperature at carburetor inlet ..... 10 to 45 °C

Fuel grade and octane rating ..... Gasoline B91/115 GOST 1012-72,  
octane rating at least 91  
(Ref. Appendix 1)

**NOTE:** Foreign-made fuel and oil grades allowed for use with the engine and their physical and chemical properties are given in Appendix 1.

### 1.2.6. Fuel Pump

Designation ..... 702ML

Type ..... Rotary-type

Number per engine ..... 1

Drive transmission ratio ..... 1.125

Drive direction of rotation ..... LH

### 1.2.7. Fine Fuel Filter

Designation ..... 8D2.966.064

Type ..... Sump-type

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# M-14P

## MAINTENANCE MANUAL

Number per engine .....	1
Working fluid .....	Gasoline B91/115 GOST 1012-72
Working pressure .....	0.2 to 0.5 kgf/cm <sup>2</sup>
Maximum throughput .....	5 l/min
Filtering fineness .....	36 to 40 μm

### 1.2.8. Oil Pump

Designation .....	MN-14A
Type .....	Gear-type, with delivery and scavenging sections
Number per engine .....	1
Drive transmission ratio .....	1.125
Drive direction of rotation .....	LH
Main line oil pressure (measured through special connection on oil pump):	
Operating ratings .....	4 to 6 kgf/cm <sup>2</sup>
Minimum speed of rotation .....	Not less than 1 kgf/cm <sup>2</sup>
Engine inlet oil temperature:	
Recommended .....	50 to 65 °C
Minimum permissible .....	40 °C
Maximum at prolonged operation .....	Up to 75 °C
Maximum permissible for up to 15 min of continuous operation .....	Up to 85 °C
Maximum permissible engine outlet oil temperature .....	Up to 125 °C
Maximum temperature difference between engine inlet and outlet oil .....	50 °C
Cylinder head temperature measured by thermocouples installed under rear spark plugs of hottest and coldest cylinders:	
Recommended .....	140 to 190 °C
Minimum permissible for normal operation of engine .....	120 °C
Minimum at prolonged operation .....	140 °C
Maximum at prolonged operation .....	220 °C
Maximum permissible at take-off and climbing for up to 15 min and not more than 5 % of service life .....	240 °C
Oil flow rate through engine at inlet oil temperature of 50 to 65 °C at nominal rating I .....	Up to 13.5 kg/min
Heat transfer to oil at nominal rating I .....	225 kcal/min
Summer and winter oil grades .....	MS-20 GOST 21743-76

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## MAINTENANCE MANUAL

NOTE: Foreign fuel and oil grades allowed for use with engine and their physical and chemical properties are given in Appendix 1.

### 1.2.9. Magneto

Designation ..... M-9F  
Type ..... Four-spark, shielded  
Number per engine ..... 2  
Drive transmission ratio ..... 1.125  
Drive direction of rotation ..... LH  
Ignition cable system and type ..... Shielded harness PVS-5

### 1.2.10. Spark Plug

Designation ..... SD-49SMM  
Type ..... Ceramic-insulator  
Number per cylinder ..... 2  
Firing order ..... 1-3-5-7-9-2-4-6-8

### 1.2.11. Compressed Air Distributor

Type ..... Slide-valve  
Drive transmission ratio ..... 0.5  
Drive direction of rotation ..... LH

Compressed air distributor is adjusted with cylinder No. 4 piston being at 12° (with respect to crankshaft angle) after TDC in expansion stroke

Distributor slide valve hole should open hole for supply of air to cylinder No. 4 by 1 mm, maximum, (down slide valve rotation)

Timing angle (cylinder No. 4) (Ref. Fig. 3):

Beginning of admission before TDC .....	(20±4)°
End of admission after BDC .....	(54±4)°
Beginning of exhaust before BDC .....	(65±4)°
End of exhaust after TDC .....	(25±4)°

Clearance between rocker roller and valve stem (adjusted on cold engine for checking timing):

Inlet valve .....	1.1 mm
Exhaust valve .....	1.1 mm

Clearance between rocker roller and valve stem (adjusted on cold engine for operation):

Inlet valve .....	(0.3 <sup>+0.15</sup> <sub>-0.1</sub> ) mm
Exhaust valve .....	(0.3 <sup>+0.15</sup> <sub>-0.1</sub> ) mm

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## MAINTENANCE MANUAL

Advance angle for LH and RH magneto (before TDC at end of compression stroke) ..... (23±1)°

### 2.12. Air Compressor

Designation ..... AK-50A  
Type ..... Piston-type  
Number per engine ..... 1  
Drive transmission ratio ..... 0.9  
Drive direction of rotation ..... RH

### 2.13. Generator

Designation ..... GSR-3000M, series 4  
Type ..... DC  
Number per engine ..... 1  
Drive transmission ratio ..... 2.5  
Drive direction of rotation ..... LH

### 2.14. Speed Governor

Designation ..... R-2, series 04  
Type ..... Centrifugal  
Drive transmission ratio ..... 1.045  
Drive direction of rotation ..... RH

### 2.15. Engine Tachometer Generator

Designation ..... DEE-1  
Type ..... Electric  
Number per engine ..... 1  
Drive transmission ratio ..... 0.9  
Drive direction of rotation ..... LH

### 2.16. Filter with Chip Detector

Type ..... Electric with plate element  
Number per engine ..... 1  
Operating voltage ..... Up to 29 V  
Current ..... 0.15 to 0.25 A  
Location ..... Oil sump

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# M-14P

## MAINTENANCE MANUAL

Chip warning device ..... Warning lamp on pilot's instrument board

Operating ratings of the M-14P engine are given in the Table, the throttle characteristic is shown in Fig. 3, external and altitude characteristics, in Figs 4 and 5, while the timing diagram is represented in Fig. 6.

Rating	Reduced power near ground	Crankshaft speed of rotation, r/min	Specific fuel consumption, g/hp·h	Blower outlet pressure, mm Hg
Take-off	360 hp <sub>-2</sub> %	2900±1 (99 %)	285-315	125 <sub>-15</sub> (surplus)
Nominal I	290 hp <sub>-2</sub> %	2400±1 (82 %)	280-310	95 <sub>-15</sub> (surplus)
Nominal II	240 hp <sub>-2</sub> %	2050±1 (70 %)	265-300	75 <sub>-15</sub> (surplus)
Cruise I	0.75 of measured power at nominal rating II	1860±1 (64 %)	210 to 230	735±15 (absolute)
Cruise II	0.6 of measured power at nominal rating II	1730±1 (59 %)	215 to 235	670±15 (absolute)
Idle	-	Up to 760 (26 %)	-	-

- NOTES: 1. Engine power and fuel specific consumption rates for all the ratings shall be ensured at non-loaded generator and compressor.
2. Upper power limit and blower outlet supercharged pressure at take-off, nominal I and nominal II ratings are not limited.
3. Given in brackets are nominal values of the crankshaft speed of rotation in percent against the unified tachometer (99.4 % corresponds to 2900 r/min of the crankshaft).

### 1.3. CONSTRUCTION

For engine construction (its longitudinal section) refer to Fig. 7.

### 2. OPERATION

#### 2.1. GENERAL

The engine should be operated by skilled personnel after special training in aviation equipment maintenance.

Prior to operating the engine, check completeness of the technical publications and get familiar with the documents.

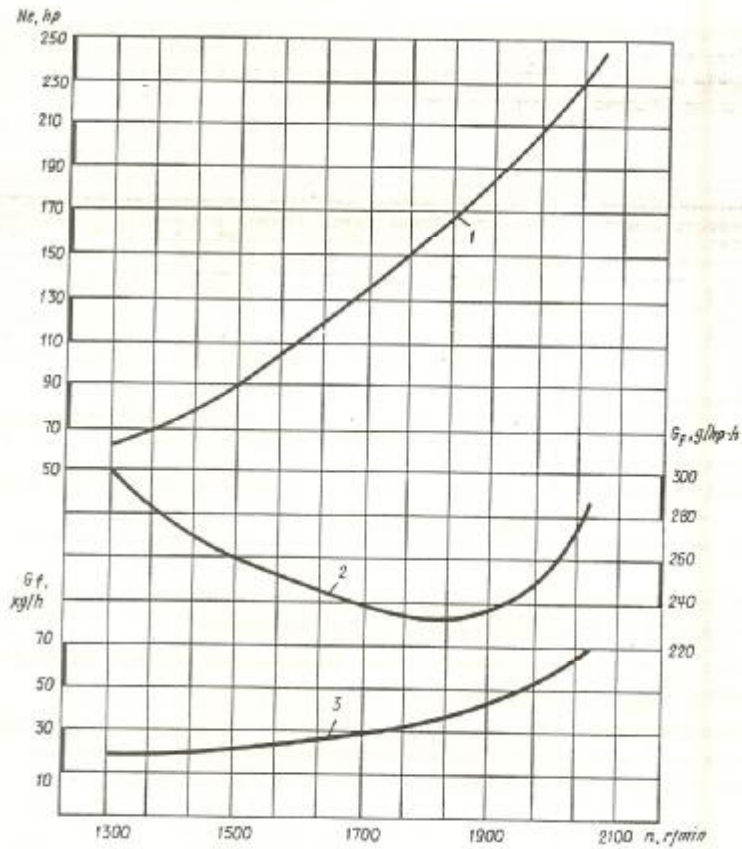
All operations performed on the engine and its accessories in service shall be written in the engine Log Book and in accessory Certificates.

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- 1 - power curve
- 2 - specific fuel consumption curve
- 3 - per-hour fuel consumption curve

### Throttle Characteristics

Figure 3

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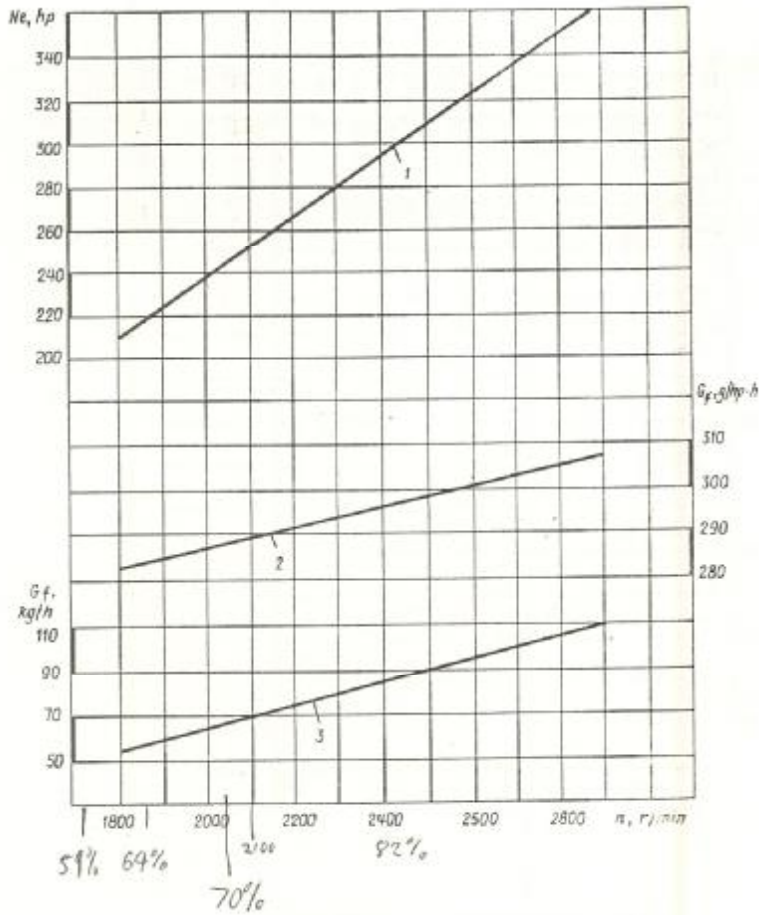
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## MAINTENANCE MANUAL



- 1 - power line
- 2 - specific fuel consumption line
- 3 - per-hour fuel consumption line

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### External Characteristics

Figure 4

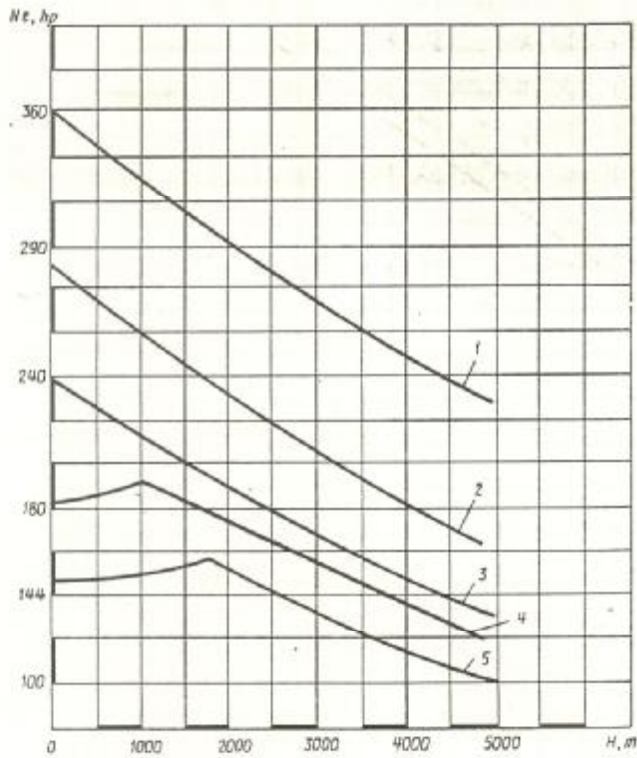
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# M-14P

PERFORMANCE MANUAL



- 1 - at take-off rating ( $n = 2900$  r/min)
- 2 - at nominal rating I ( $n = 2400$  r/min)
- 3 - at nominal rating II ( $n = 2050$  r/min)
- 4 - at cruise rating I ( $n = 1860$  r/min)
- 5 - at cruise rating II ( $n = 1730$  r/min)

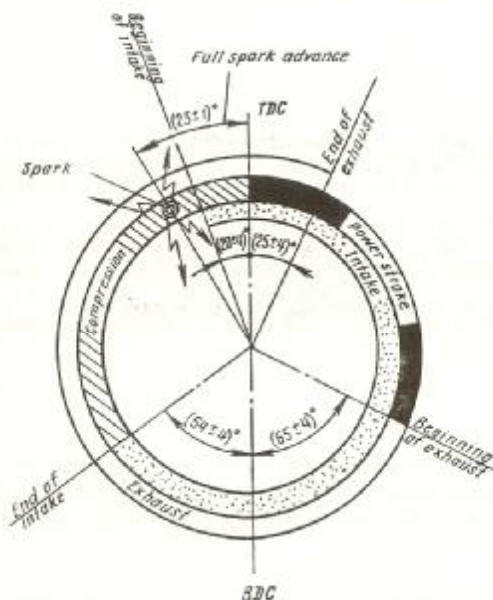
Design Altitude-Performance Characteristics

Figure 5

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Timing Diagram

Figure 6

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**CAUTION:** WHEN OPERATING THE ENGINE, IT IS PROHIBITED TO DO THE FOLLOWING:

- (1) USE FUEL, OIL, GREASE GRADES AND COMPRESSED GASES WHICH ARE NOT SPECIFIED IN THIS MANUAL.
- (2) USE OTHER TOOLS THAN INDICATED IN APPENDIX 2. TO PERFORM MAINTENANCE OF THE CARBURETOR, MAGNETO AND SPEED GOVERNOR USE THE TOOLS INCLUDED IN THE INDIVIDUAL SFTA SETS FOR THESE UNITS.
- (3) CHANGE THE SPECIFIED SEQUENCE OF OPERATIONS PERFORMED ON THE ENGINE.
- (4) CUT OUT TWO MAGNETOS SIMULTANEOUSLY WITH THE CARBURETOR THROTTLE OPEN FULLY ON THE OPERATING ENGINE.
- (5) PERFORM FLIGHTS BEFORE DETECTION AND ELIMINATION OF THE CAUSE OF ILLUMINATION OF THE "CHIP IN ENGINE" WARNING LAMP. IF THE "CHIP IN ENGINE" WARNING LAMP COMES ON, CONCENTRATE YOUR ATTENTION ON READINGS OF ENGINE INSTRUMENTS AND ACCORDING TO THE SITUATION, TAKE A DECISION FOR LANDING.
- (6) ROTATE THE ENGINE AIRSCREW SHAFT BEFORE DEPRESERVATION OF THE MAGNETO AND COMPRESSOR TO PRECLUDE DAMAGE TO MAGNETO PARTS AND COMPRESSOR COUPLING.

The carburetor air intake shall be provided with a dust filter installed by the Supplier.