ГТ40ПЧ8Б & ГТ40ПЧ8В

POWER GENERATORS

MAINTENANCE MANUAL

8А0.311.017 РЭ

ГТ40ПЧ8Б & ГТ40ПЧ8В

MAINTENANCE MANUAL

RECORD OF REVISIONS

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		Revised	Added	Deleted				

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ГТ40ПЧ8Б & ГТ40ПЧ8В

MAINTENANCE MANUAL

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ГТ40ПЧ8Б И ГТ40ПЧ8В

MAINTENANCE MANUAL

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ГТ40ПЧ8Б & ГТ40ПЧ8В

MAINTENANCE MANUAL

INTRODUCTION

The present Maintenance Manual is intended for proper operation of the ГТ40ПЧ8Б and ГТ40ПЧ8В power generators and for maintaining them in a working order.

The Maintenance Manual contains the description of the generator design, principle of operation, main data, maintenance and operation instructions, as well as the pertinent information on their shipment and storage.

ГТ40ПЧ8Б & ГТ40ПЧ8В

MAINTENANCE MANUAL

GENERATORS – DESCRIPTION AND OPERATION

1. GENERAL

1.1. Purpose

Power generators ГТ40ПЧ8Б (Ref. Fig. 1) and ГТ40ПЧ8В (Ref. Fig. 2) have been designed to supply AC power of stabilized voltage and frequency to various loads of the end item.

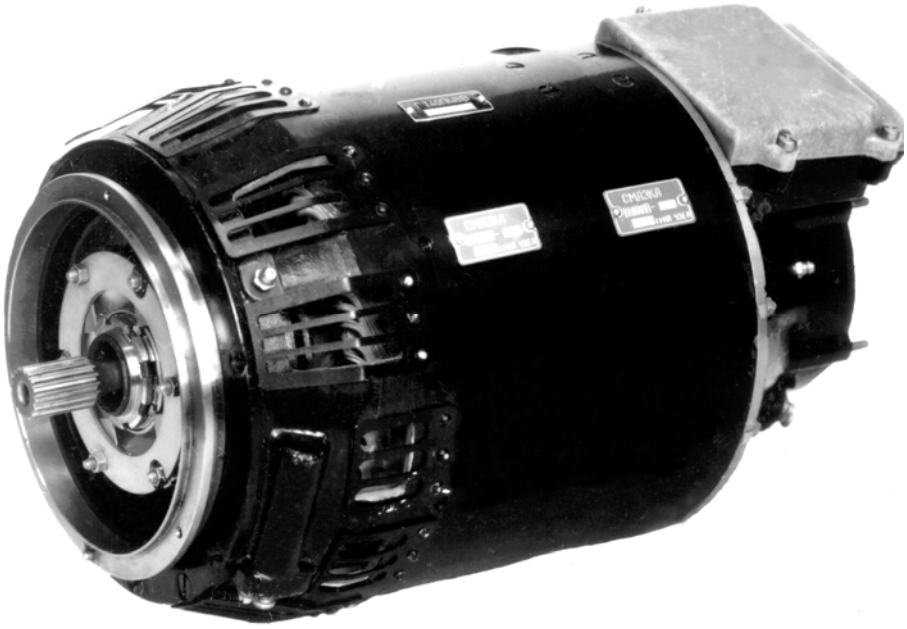
The ГТ40ПЧ8В power generator differs from the ГТ40ПЧ8Б generator by the dimensions of the connecting flange. Besides the ГТ40ПЧ8В generator does not have a sleeve at the cooling air outlet and its field ring assembly is provided with a flat. The generator operates in the СП3Н2П40Б power supply system.

Mounted on the generator end frame is the current transformer unit, which makes up the differential protection system to safeguard the generator and its feeder against short-circuiting.

The generator is fitted with a phasing washer, which permits to set the rotor in a fixed position at a certain angle with respect to the stator (to ensure parallel operation of the generators from the common drive). When the rotor turns, the washer is sheared off at points where its section is weakened by the cutouts so that it does not hinder free rotation of the generator any longer.

The generator phasing operation is performed in accordance with special Instruction.

ГТ40ПЧ8Б Generator
Figure 1



ГТ40ПЧ8В Generator
Figure 2

The generator incorporates a decoupler whose main function is to automatically disconnect the generator shaft from the drive in the event of breakdown of the ball bearings.

The direction of the generator rotation is counterclockwise when viewed from the side of the drive.

The generator operating position is horizontal.

The attachment of the generator on the drive is ensured with the aid of a multi-link clamp.

1.2. Main Data

(a) Generator

– Phase number.....3
– Phase sequence .....A-B-C
– Phase connection.....star-type with the power neutral available for connection
– Rated linear voltage .....208 V
– Rated power.....40 kV·A
– Rated current .....111 A
– Rotational speed .....7600 to 8400 rpm
– Frequency .....380 to 420 Hz

– Power factor (cos φ) at rated load (lagging).....0.8, minimum

– Generator efficiency at rated load and cos φ =1).....0.83, minimum

– Generator operation load (continuous):

at 20 kV·A with additional pulse power
take-off of 20kV·A (in pulse).....30 to 40 % of service life

load pulse duration ..... 20 to 100 ms with an interval of 4 s

at 30 kV·A.....70 to 60 % of service life

– In the event of malfunction of one of the channels or parallel operation failure, the generator shall provide a load of 50 kV·A continuously during 4 hours at a cooling air temperature of not in excess of +5 °C. This duty cycle is permissible only once during 100 operating hours.

(b) Pilot exciter

– Phase number.....3

– Phase sequence 6-5-4

– Phase connection.....star-type with the power neutral available for connection

– Idle speed linear voltage at rotational speed of 8000 rpm.....45.5 to 48.3 V

– Frequency .....760 to 840 Hz

– Excitation mode.....from permanent magnet

– Generator overload capacity:

within 5 minutes
(at rotational speed of 8000 rpm ±5 %).....60 kV·A

within 5 seconds
(at rotational speed of 8000 rpm ±2 %).....80 kV·A

NOTE: Repeated overloads may be relieved on termination of the successive operational duty cycle not oftener than in 30 minutes. The operating time, in this case, within the service period of 1000 hours shall be 5 hours, maximum, at a load of 60 kV·A, and 15 minutes, maximum, at a load of 80 kV·A.

(c) Duty cycle .....continuous

(d) Mass .....31 kg, maximum

(e) Generator construction .....enclosed

(f) Generator shall operate properly under the following conditions:

– Relative air humidity at a temperature of up to +35 °C .....up to 98 %
– Ambient air temperature:

operating ..... +60 °C down to minus 60 °C

maximum limit value..... +80 °C down to minus 60 °C

– Cyclic temperature fluctuations ..... +80 °C down to minus 60 °C
– Atmospheric pressure ..... up to 61.3 kPa (460 mm Hg)
– Total pressure of air blown at the generator inlet..... 2.45 kPa (250 mm Hg), minimum
– Blown air temperature ..... +60 °C, maximum
– When exposed to hoarfrost and dew
– When attacked by mildew fungi
– When exposed to sea fog (for the generator installed on a helicopter)
– When exposed to effects of detrimental factors specified by Technical Standard HO.005.058.

(g) In conditions of mechanical effects the generator:

– Shall not be adversely affected and shall operate properly when subjected to vibrations of the following characteristics:

frequency ..... 5 to 300 Hz

acceleration..... up to 49 $m \cdot s^{-2}$ (5g)

– Shall function properly and shall not be affected when subjected to impacts of the following characteristics:

acceleration..... up to 58.8 $m \cdot s^{-2}$ (6g)

pulse duration..... 5 to 15 ms

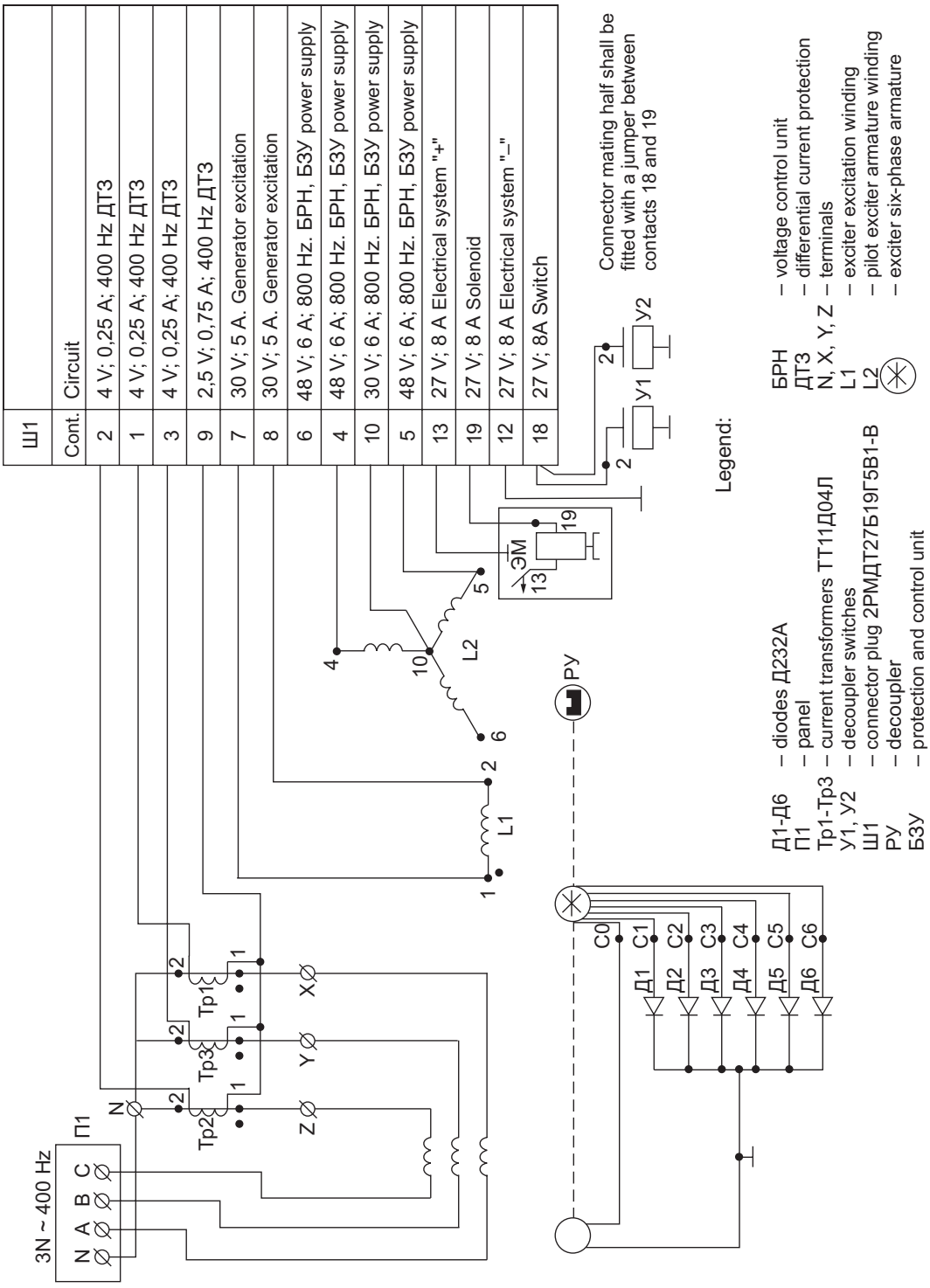
– Shall withstand linear accelerations ..... up to 10g.

2. DESCRIPTION

2.1. Design

The ГТ40ПЧ8Б (ГТ40ПЧ8В) generator is essentially a six-pole brushless power generator equipped with built-in six-phase exciter and rotary rectifier unit and designed to supply DC power to the excitation winding of the main power generator. To ensure independent excitation, as well as to feed power to the protection and control circuits the generator is equipped with a three-phase pilot exciter (control generator) which is arranged on the generator and exciter common shaft and whose excitation is effected through the inter-

mediary of a permanent magnet. The schematic circuit diagram of the generator is shown in Fig. 3.



ГТ40ПЧ8Б (ГТ40ПЧ8В) Generator. Schematic Circuit Diagram

Figure 3

The principle components of the generator are the field ring assembly, rotor, end frame and decoupler.

Field ring assembly (20) (Ref. Fig. 4) of the cylindrical shape is cast from aluminium alloy and provided with the end face wall on the drive side. The steel bushing pressed-in into the generator field ring assembly serves for mounting ball bearing (2). The field ring assembly has flange (1) screwed on thereto for attachment of the generator to the drive by means of a quick-disconnect clamp.

The field ring assembly is fitted with cooling air escape ports, which are covered with housing (53) that has an air outlet tube.

Fitted in on the ribs and secured with the locking screws inside the generator field ring assembly are stator (14) of the main power generator with winding (15) and the exciter stator (18) with winding (21). The cores (magnetic circuits) of the stators are stacked up from electrical-sheet steel plates, which are bonded with adhesive or welded to each other over their external cylindrical surface. Winding (15) is of a two-layer lap winding arranged in the grooves on the interior surface of the core, whereas winding (21) is located immediately on the poles stamped in the core sheets.

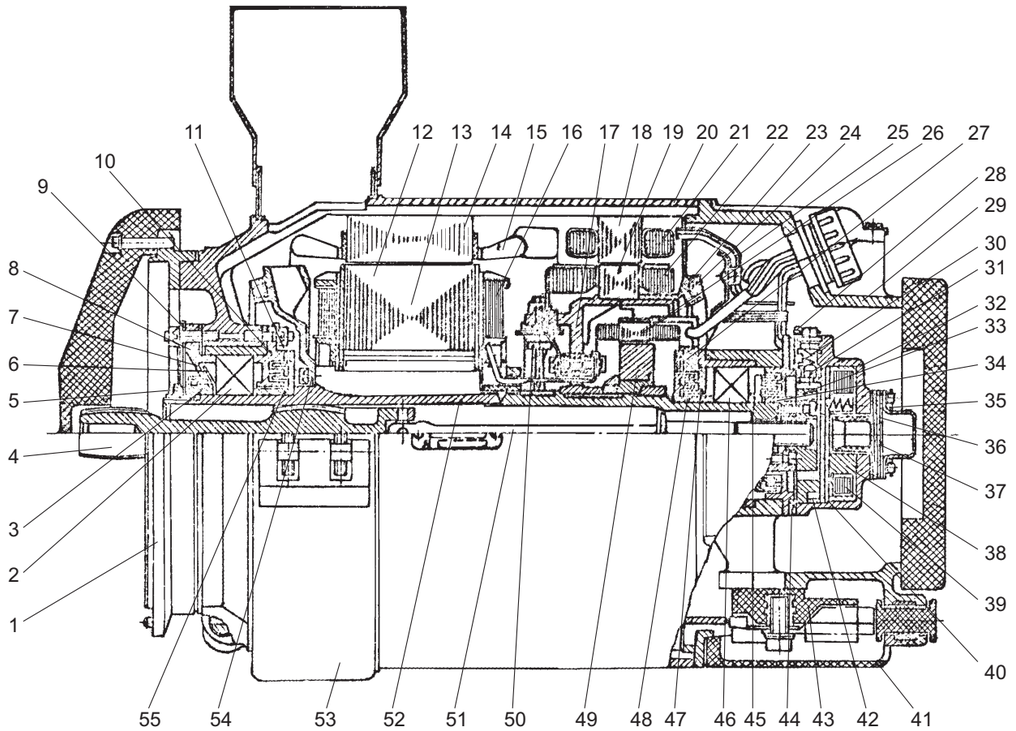
Rotor (12) consists of hollow shaft (52) that mounts the following components press-fitted on its ribs: main generator rotor (13) with excitation winding (16), exciter rotor (19) with winding (22) and permanent magnet (49) made in the form of a twelve-pole star and operating as pilot exciter rotor.

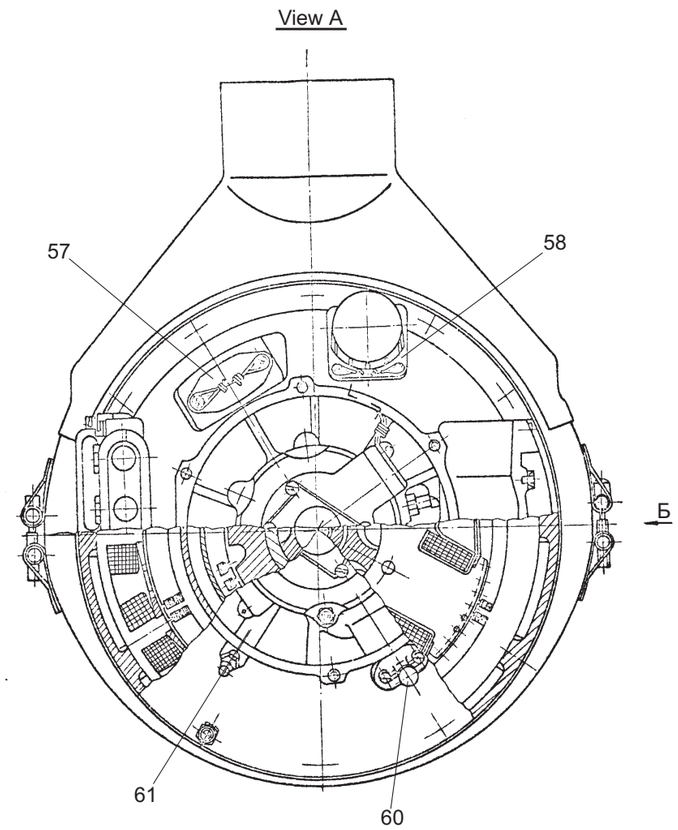
Attached to the ribs of shaft (52) by screws in the area of air escape ports is blower (54).

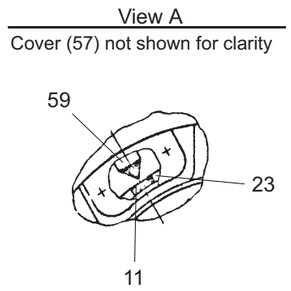
Rotor (13) is assembled from the electrical-sheet steel plates stamped in the shape of a six-pole star and joined together by longitudinal welds. Winding (16) is wound directly on the poles.

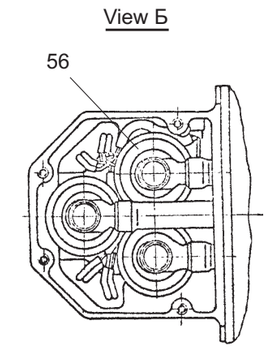
Rotor (19) is assembled from the sheet plates, which are bonded to each other. The outer cylindrical surface of the rotor has grooves that accommodate winding (22) which is essentially the exciter armature winding. For rectifying alternating current, rotor (19) is provided with six rectifiers (50) (diodes Д232А). Rotor (19) and the rectifiers are secured on hub (17).

Rotor (12) runs in two ball bearings (2) and (46). The outer race of ball bearing (2) is rigidly fastened by flanges (8), (10) in the field ring assembly to prevent it from axial displacement, while the inner race is secured on the shaft with the aid of nut (3). As for ball bearing (46), only its inner race is rigidly fixed by flange (34), whereas its outer race may freely displace in the axial direction to compensate for the tolerances on the length of the shaft and field ring assembly components and for uneven elongation of the shaft and field ring assembly as a result of temperature changes.









1. Flange
2. Ball Bearing
3. Nut
4. Drive Shaft
5. Nut
6. Phasing Washer
7. Deflector
8. Flange
9. Washer
10. Flange
11. Switch
12. Rotor
13. Main Generator Rotor
14. Main Generator Stator
15. Main Generator Stator Winding
16. Main Generator Excitation Winding
17. Hub
18. Exciter Stator
19. Exciter Rotor
20. Field Ring Assembly
21. Exciter Stator Winding
22. Exciter Rotor Winding
23. Balancing Ring
24. Balancing Weights
25. Shutter
26. Pilot Exciter Armature
27. Switch
28. Flange
29. End Frame
30. Spring
31. Roller
32. Decoupler Casing
33. Cam
34. Flange
35. Spring
36. Panel
37. Bus
38. Decoupler
39. Solenoid
40. Small Armature
41. Cover
42. Pin
43. Terminal Panel
44. Flange
45. Labyrinth Bushing
46. Ball Bearing
47. Flange
48. Labyrinth Bushing
49. Permanent Magnet – Exciter Rotor
50. Rectifier
51. Control Link
52. Hollow Shaft
53. Housing
54. Blower
55. Labyrinth Bushing
56. Current Transformer Unit
57. Cover
58. Connector Receptacle
59. Plate
60. Plunger
61. Lubrication Fitting

ГТ40ПЧ8Б Generator. Sectional View
Figure 4

The end face of nut (3) is fitted with slots that hold phasing washer (6) in a fixed position and prevent it from turning. The washer is clamped on between nuts (3) and (5) on the rotor shaft. Locking of nut (5) is achieved by pressing-in its thin-walled bead into the shaft slots. The outer section of the washer is attached by means of three nuts to flange (8) with thick-walled washer (9) placed in between.

The outer section of washer (6) has three oval cutouts at points where it is attached to flange (8). These cutouts enable the rotor to be smoothly turned with respect to the stator during phasing operation. If it is required to select a larger angle of turn, the position of the phasing washer may be reset in the slots of nut (3).

After accomplishing phasing procedure, surface H of balancing ring (23) is coated with red enamel at a length of about 10 mm. Then a mark is applied to the painted surface just opposite the mark available on plate (59), which is fastened to end frame (29).

A new phasing may be carried out by aligning the marks and installing new phasing washer (6), which is included in the set of the generator spare parts.

Mounted on shaft (52) are labyrinth bushings (55), (48) and (45) whose keys are used in conjunction with the tenons on flanges (10), (47) and (28) and do a good job of sealing the ball bearing assemblies and preventing thereby lubricant from getting into the interior space of the generator.

Utilization of bushing (45) inside the assembly improves the efficiency of the sealing. This feature is important for higher functional reliability of the decoupler operation as the hardened lubricant may hinder normal displacement of its moving components.

The sealing on the drive side is provided by deflector (7) and the external thread on nut (3). The nut side that faces the drive is fitted with a thread which protects the ball bearing assembly from ingress of foreign matter from the drive inner space. The right-hand thread on the other side of the nut and the deflector are used to seal the assembly and to prevent lubricant outflow.

Located inside shaft (52) is drive shaft (4) with spherical splines and control link (51). The control link is attached to the shaft with the aid of the universal joint coupling which enables the shaft to swing without any hindrance (with no bending stress acting on the control link string). The opposite end of the control link is fitted with a thread.

End frame (29) is cast from aluminium alloy and equipped with a bushing for holding ball bearing (46). The end frame is attached to the field ring assembly by means of studs and nuts.

Arranged on the end frame are terminal panel (43) with cover (41), connector receptacle (58) and current transformer unit (56).

The inner section of the end frame is used for attachment of flange (47) with pilot exciter armature (26) and the frame opposite side accommodates decoupler (38) which is secured to the end frame through the intermediary of flange (28).

Secured to the end frame ribs is shutter (25) intended to protect the electric wires running from the pilot exciter winding switches and winding (21) to the connector receptacle from catching up the rotor.

The end frame has a service opening that offers access to balancing weights (24) in the assembled generator. The opening is closed with cover (57). Another service opening that gives access to weights (24) on the opposite side of the rotor (it is also closed with a cover) is arranged on the end face wall of the generator field ring assembly.

The external surface of end frame (29) is also provided with ball-type lubrication fitting (61) for replenishing the bearing assembly with lubricant and with plunger (60) whose purpose is to draw away used lubricant. Besides, one more lubrication fitting and the plunger are arranged on the field ring assembly between housing (53) and flange (1) to lubricate ball bearing (2).

Lubricant is forced into the bearing assembly through the lubrication fitting with the aid of a metering grease gun. The lubricant is delivered through passages to the space between ball bearings (2), (46) and flanges (10), (47) and, on passing through the ball bearing, it enters the passages in the plungers. The job of the plungers is to draw away used and excess lubricant from the bearing assemblies as the latter are filled with fresh lubricating agent.

Decoupler (38) incorporates casing (32), flange (44), solenoid (39), small armature (40), two rollers (31), cam (33) and the disconnecting device which is essentially insulation panel (36) fitted with copper current-carrying bus (37).

Cam (33) has an inner threading intended for driving in the threaded end of the control link of shaft (4). In the course of normal operation, armature (40) is pressed by springs (35) against flange (44), whereas rollers (31) are held in position on the armature by keys. To avoid sticking of the flange to the armature the use is made of a gap provided by pins (42) which are pressed-in into the flange.

In the event of failure of one of the ball bearings, the outer surface of bushing (55) or (48) comes in contact with the interior surface of switch (11) or (27) to close the electrical circuit via the generator frame.

The switch is essentially a copper ring molded with a plastic material. The inner surface of the ring is coated with insulation material in order to avoid false operation of the circuit when current-conductive particles get into the gap. The gaps between the inner surfaces of the switches and the outer surfaces of the flanges are smaller than the radial gaps in the labyrinth seals and air gaps between the generator stators and rotors. This type of de-

sign enables the switch to operate before the rotating and fixed components of the generator begin to catch up in the radial direction.

As the circuit becomes closed with the switch, current is applied to solenoid (39), which causes armature (40) to displace to the right so that rollers (31), assisted by springs (30), pop up through the holes in the armature in the direction towards the generator axis. Then the rollers get stuck between the bosses located on the interior cylindrical surface of flange (44) and on the external surface of cam (33). The cam motion comes to a halt and the screws that secure the cam to flange (34) are sheared off. Rotor (13) continues to rotate together with shaft (4). The threaded end of control link (51) begins to screw into cam (33), which is now at rest, and shaft (4) displaces to the right to be pulled out from the drive.

The threaded end of control link (51) passes into the cylindrical projection of panel (36) and exerts pressure on the panel base so as to open the base-fitted projection, which is linked with the remaining portion of the panel by means of sheared ribs. As this takes place, the copper bus in panel (36) of the disconnecting device breaks to de-energize the winding of solenoid (39), which has not been designed for continuous duty cycle.

The cylindrical projection of panel (36) is used to protect the circuit against repeated short-circuiting through the mediation of shaft (4).

Current transformer unit (56) is fastened on the generator end frame and operates in conjunction with the current transformers arranged in a separate unit of the system to ensure differential protection of the generator and its feeder against short-circuiting on the current circulation principle.

The unit consists of the three toroidal current transformers mounted on current-conductive rods, which are soldered to the zero-potential flat bus. The leads running from the phase ends of the main generator stator winding are placed on the end faces of the rods and clamped thereon with screws. The threads for screws are made directly in the rods. The zero-potential bus is arranged on the insulation panel.

The transformer unit is attached to the end frame by use of three screws fitted with insulation bushes.

The overall and mounting dimensions of the generators are shown in Figs 5 and 6.

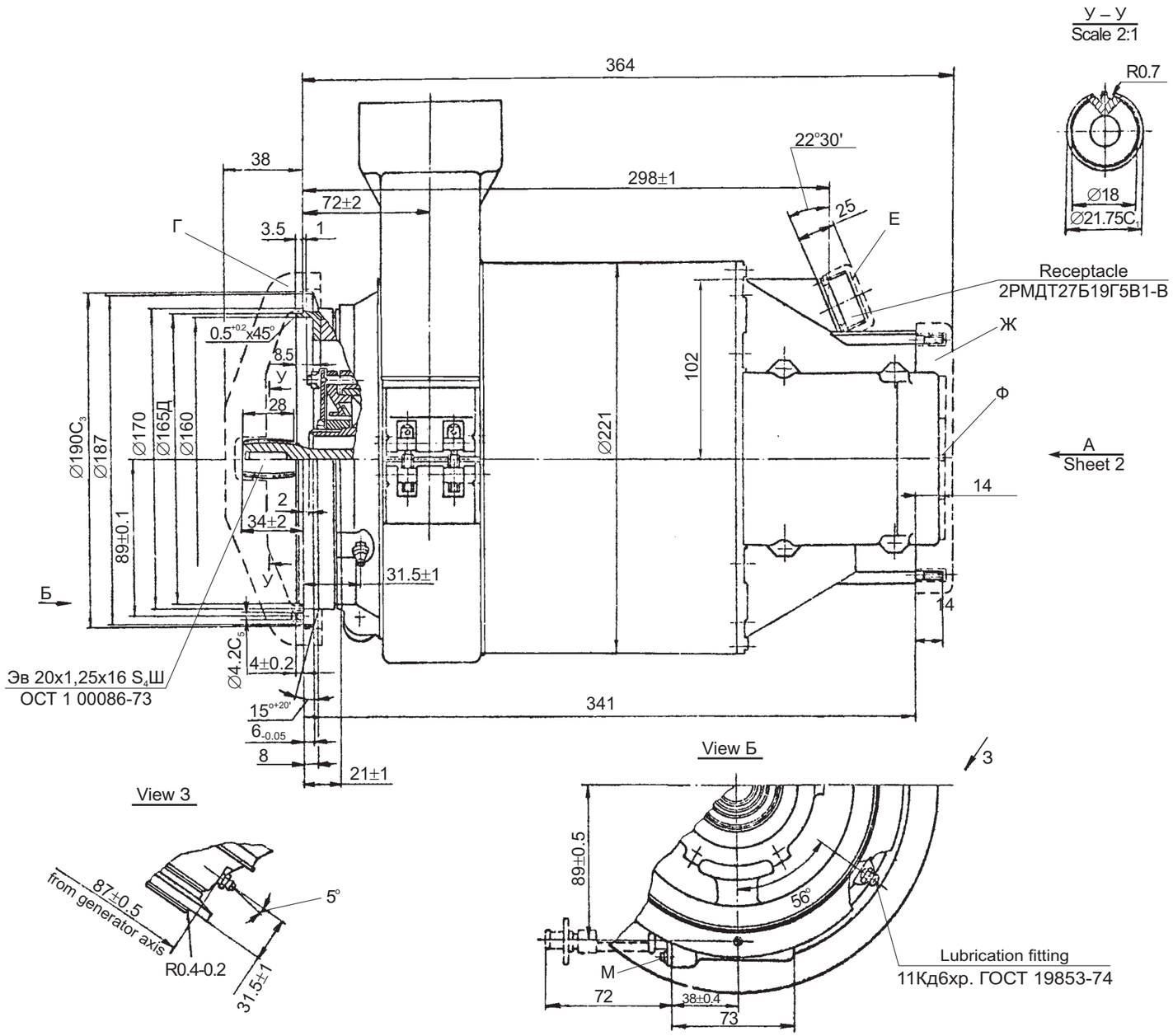
2.2. Cooling System

The generator is cooled with the air supplied through the central hole available in end frame (29) (Ref. Fig. 4). Attached to the end frame is the tube with an air duct (when installed on a helicopter). The air flows through the passages in the rotor and field ring assembly and is discharged from the ports covered with housing (53). The housing has a tube that is coupled to the air duct which serves for delivering the air overboard.

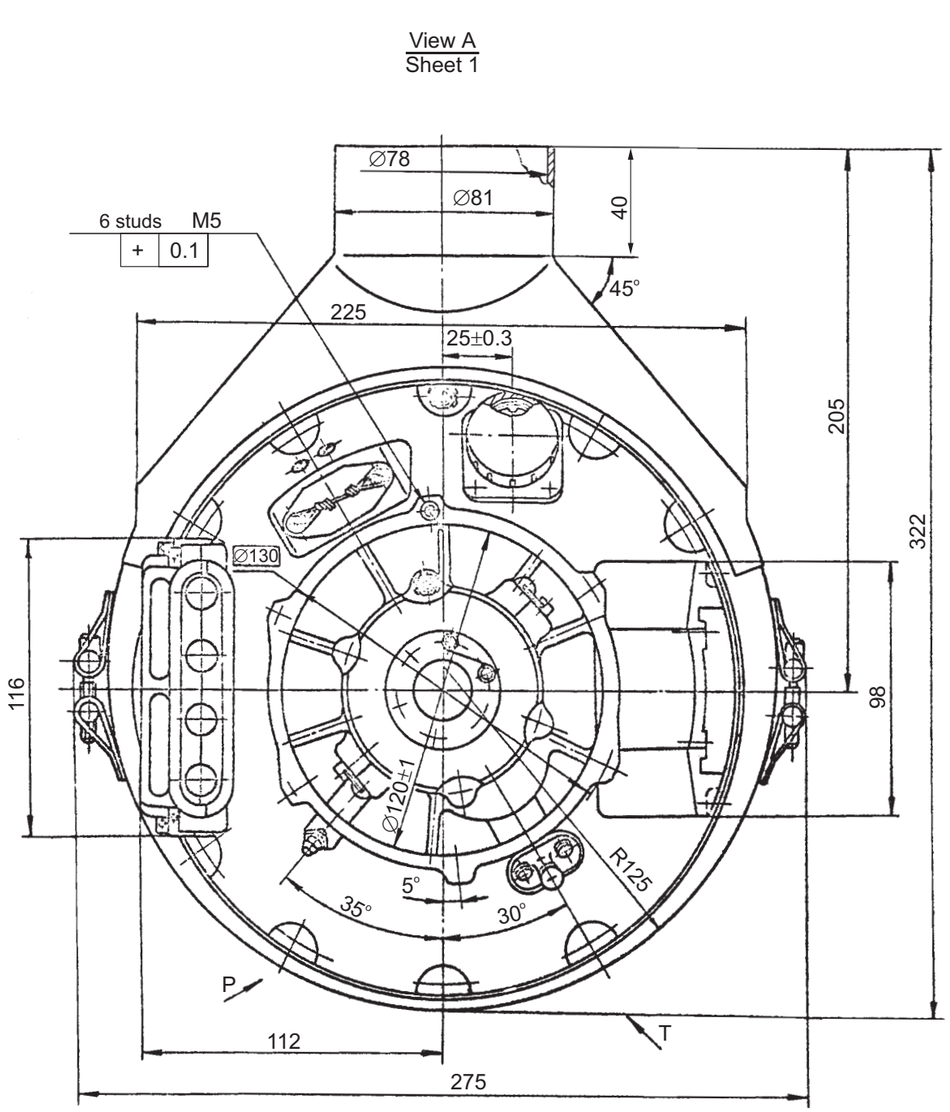
The process at which the air is discharged directly overboard is applied for the reason of safety as the air that comes into the engine compartment from the generator might hamper suppression of fire, if fire hazard occurs.

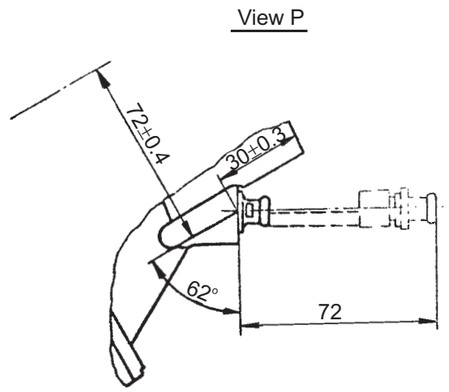
The rotor passages for air flow are made up by the free space between the coils of winding (16), shaft splines, the gaps between hub (17) and armature (26), as well as by the gaps between the poles of magnet (49). The air passages in the field ring assembly are formed by free space between the coils on the poles of winding (21) and the field ring assembly ribs.

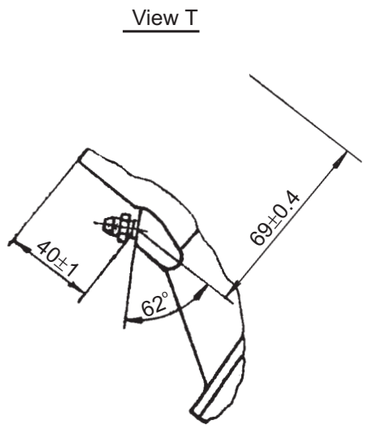
When operating in the self-ventilation mode on the ground, the pressure required for forcing the air through the generator is created with the aid of blower (54).



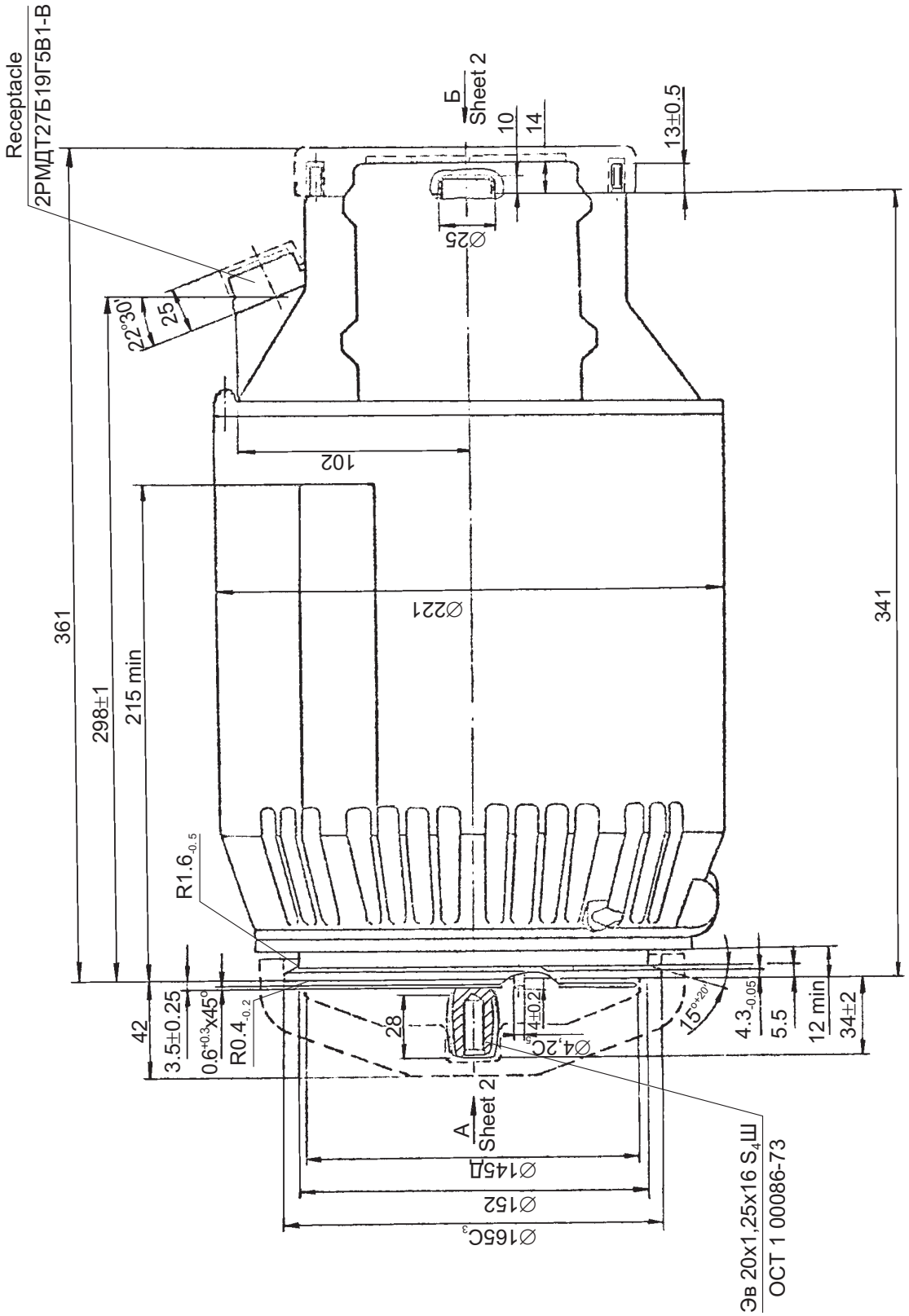
ГТ40ПЧ8Б Generator. Overall and Mounting Dimensions
Figure 5 (Sheet 1 of 2)



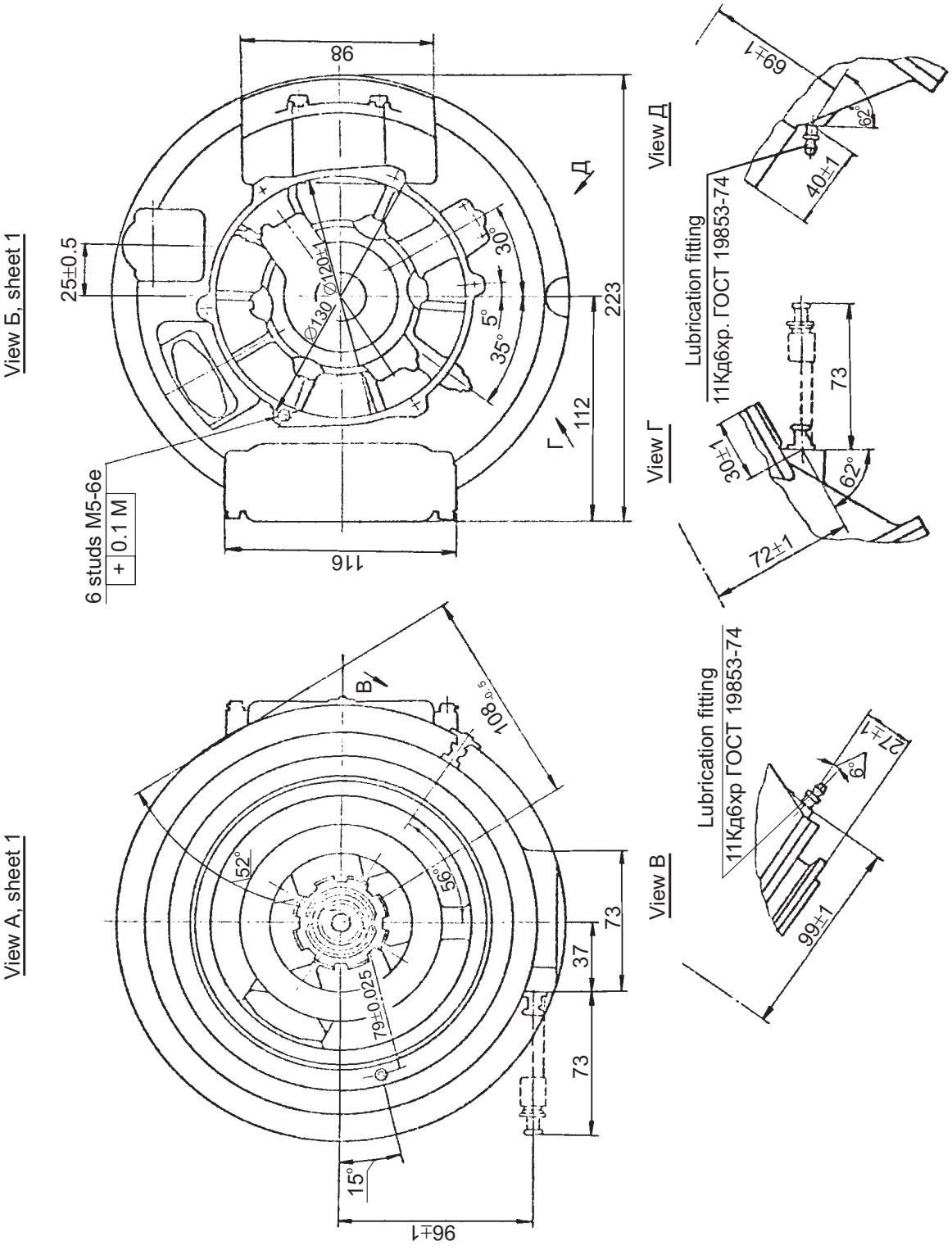




ГТ40ПЧ8Б Generator. Overall and Mounting Dimensions
Figure 5 (Sheet 2 of 2)



ГТ40ПЧ8В Generator. Overall and Mounting Dimensions
Figure 6 (Sheet 1 of 2)



ГТ40ПЧ8В Generator. Overall and Mounting Dimensions
Figure 6 (Sheet 2 of 2)

GENERATORS – TROUBLE SHOOTING

Trouble	Possible cause	Remedy
Generator failure to supply voltage	Open circuit in the exciter or generator winding circuits	Check the resistance of the excitation winding. In finding that the resistance is equal to ∞, forward the generator to the Manufacturer for repair
	No contact with external electrical circuits	Tighten attachment screws of cable lugs on the terminal panel
	The decoupler has operated	Forward the generator to the Manufacturer for repair
Generator excessive overheating	The load exceeds the rated value	Check the load and the duty cycle
	Short-circuit in turns of the main generator AC winding or the exciter armature	Forward the generator to the Manufacturer for repair
	Air flow rate is low	Check the air duct line

GENERATORS – MAINTENANCE PRACTICES

The operation of the generators may be carried out either on the basis of the operational status, or within the period of the assigned service life. The generator assigned service life is specified in its Certificate.

For operating the generators on the basis of the operational status, it is essential to install no less than two generators on the end item with due regard for ensuring their power redundancy and to perform serviceability checks of each generator before the flight.

The generator shall be arranged on the end item in such a way as to provide easy access for its servicing.

The generator operational status check is accomplished by the use of means available on the end item.

In finding some faults by visual checks or detecting symptoms of undisruptive malfunction of the generator, the latter should be replaced with a serviceable one from the set of spare parts prior to the next flight.

The list of probable troubles and failures and their effect on the output parameters of the generator is presented in Section TROUBLE SHOOTING.

The maintenance of the generator in service is performed within the scope and intervals provided for by the Maintenance Schedule.

The supplied generator has already been adjusted by the Manufacturer and does not required any additional adjustment in service.

Prior to installation of the generator on the end item, do the following:

– measure the insulation resistance of the generator electrical circuits between terminal A and the frame, between contacts 7, 10, 13, 9, 18 of the connector receptacle and the frame with the aid of a megohmmeter rated at 500 V.

  The insulation resistance shall not be less than 20 megohms.

– use the TT-3 tester to check the continuity of the following generator circuits: leads A-N, B-N, C-N, contacts 4-10, 5-10, 6-10, 7-8, 13-19, 9-1, 9-2, 9-3 of the connector receptacle.

	TASK CARD No. 201	Page(s) 203, 204	
	DEPRESERVATION		
Operations and Technical Requirements (TR)		Corrective Actions	Checked by
1. Open up the shipping container (to be done in a storeroom). 2. Cut the polyethylene film bag. 3. Take out the generator from the bag. 4. Remove silica gel bags and dehydrator from the generator. 5. Take off the paraffin paper and parchment-like paper. **NOTE:** To avoid any possibility of damage, the generator shipment is performed with the housing and tube removed. See to it that the ventilation ports are covered with a film. The housing should be mounted after installation or immediately before installation of the generator on the end item. Prior to mounting of the housing the film should be removed from the ventilation ports. 6. Remove the blank from flange (1) (Ref. Fig. 4) of the generator.			

Operations and Technical Requirements (TR)	Corrective Actions	Checked by
7. Wipe off the preservation grease with rags moistened in Nefras taking care to prevent Nefras from getting on wires, windings, rubber parts and other generator parts that may be affected by gasoline. Wipe dry the generator with clean rags.		

Test Equipment	Tools and Fixtures	Materials
–	–	Rags Nefras C-50/170

	TASK CARD No. 202	Page(s) 205
	INSPECTION	

Operations and Technical Requirements (TR)	Corrective Actions	Checked by
1. Check to assure that the blanks and safety caps are attached to flange (1) (Ref. Fig. 4), connector receptacle (58), end frame (29) and panel (43), and that the film and sheathing cord binding is present on the generator ventilation ports. 2. Make certain that the terminal panel, connector receptacle and other generator components are free from cracks, nicks and dents. 3. Inspect the paint coating for freedom from traces of corrosion and other defects.	Remove the revealed traces of corrosion in compliance with Task Card No. 210	

Test Equipment	Tools and Fixtures	Materials
–	–	–

	TASK CARD No. 203	Page(s) 207–209
	INSTALLATION	

Operations and Technical Requirements (TR)	Corrective Actions	Checked by

1. Prior to installation of the generator, inspect it for external condition and check the generator electrical circuits.
2. Remove the shipping blank from generator flange (1) (Ref. Fig. 4).
3. Make use of the phasing washer to check that the rotor, which is fixed at a preset angular position with respect to the stator, does not turn.

   If the rotor rotates, perform the rotor phasing procedure once again.
4. Mount the generator onto the drive and secure with the aid of the clamp.

   The clamp tightening torque is given in the Table below.

Generator	Clamp	Clamp tightening torque applied during generator installation, kgf·m	Permissible slackening of clamp tightness in service, kgf·m
ГТ40ПЧ8Б ГТ40ПЧ8В	Strap-type with blocks	1.55 to 1.75 0.65 to 0.75	1.40, max. 0.56, max.
ГТ40ПЧ8Б ГТ40ПЧ8В	Double-block clamp	2.5	–
ГТ40ПЧ8Б ГТ40ПЧ8В	Multi-link strap clamp	1.60 to 1.75	1.4, max.

Operations and Technical Requirements (TR)	Corrective Actions	Checked by
CAUTION: NEVER TURN THE ROTOR RELATIVE TO STATOR DURING INSTALLATION PROCEDURE AS THIS MAY DISRUPT THE PRESET PHASING. 5. Take off the shipping blank from end frame (29), remove the film from the generator ventilation ports, install housing (53) together with its tube on the generator ventilation ports and couple the generator to the cooling system. **NOTES:** 1. The tube for the cooling air discharge may be turned to any angle. It is permissible to mount the housing along with its tube before installation of the generator on the drive. 2. The tube for delivery of cooling air is to be installed by the User. 6. Remove cover (41) and connect the generator to the electrical system. Terminals A, B, C, N of the panel located on the end frame are designed for the utilization of cable lugs 5834-10-1-Cp. The tightening torque, applied to the screws at terminals A, B, C, N should be equal to (165±10) kgf·cm ((16.5±1) N·m). **NOTE:** The terminal panel is used to receive screws 3151A-8-18 Кд fitted with spring (8H) and safety washers (2154A-8 Кд). **CAUTION:** DO NOT USE SCREWS OF A LARGER LENGTH TO AVOID THE TERMINAL PANEL BREAKAGE. 7. Install cover (41) in its place. **NOTE:** Do not fail to lock the attachment screws of housing (53) with the tube and the fastening screws of cover (41) with locking wire after their installation.		

Operations and Technical Requirements (TR)	Corrective Actions	Checked by
8. Remove the safety cap from the connector receptacle and connect the generator to the equipment. The generators are supplied with receptacles 2РМДТ27Б19Г5В1-В, whereas the connector plugs are provided by the User. **NOTE:** The generator prototypes are supplied with the cable connector mating half and therefore do not have a safety cap on the connector receptacle.		

Test Equipment	Tools and Fixtures	Materials
Multimeter Ц4352	Combination pliers Torque wrench Wrench with adjustable torque 54416/025 100-800	Wire 0,6-10

	TASK CARD No. 204	Page(s) 211, 212	
	REMOVAL		
Operations and Technical Requirements (TR)		Corrective Actions	Checked by
1. Take off cover (41) (Ref. Fig. 4) and disconnect current-carrying buses A, B, C, N. 2. Uncouple the air supply tube from the generator. 3. Disengage the connector. 4. Remove the clamp and detach the generator. 5. Reinstall cover (41) in its place. 6. Remove housing (53) along with the tube from the generator. **NOTE:** The housing with the tube may be removed immediately before the generator detachment. 7. Install shipping blanks and safety caps on flange (1) of the generator, end frame (29), connector receptacle and terminal panel. Cover the ventilation ports with a film, and secure the film with the aid of sheathing cord.			

Operations and Technical Requirements (TR)	Corrective Actions	Checked by

Test Equipment	Tools and Fixtures	Materials
–	Torque wrench Combination pliers Wrench S = 10, S = 14 Screwdriver	Wire 0,6-10 Polyethylene film 0.08 to 0.1 μm thick Sheathing cord ШЧХБПЛ 2.0

	TASK CARD No. 205	Page(s) 213
	SERVICEABILITY TEST	

Operations and Technical Requirements (TR)	Corrective Actions	Checked by
1. The serviceability test is performed during pre-flight running of the engine. 2. Measure the voltage at the outputs of the generator operating at idle speed and at a load of about 55 A during 20 minutes. The generator output voltage shall be 115 to 119 V at a frequency of 380 to 420 Hz. 3. With the generator running at idle speed determine the difference in voltage ΔU between outputs A-A, B-B, C-C of the generators. The difference shall not be in excess of 8 V. **NOTE:** The User who has special test equipment at his disposal is allowed to carry out serviceability test in accordance with the special Instruction that has been agreed upon with the generator Manufacturer.		

Test Equipment	Tools and Fixtures	Materials
AC voltmeter rated at frequency 400 Hz, scale range 250 to 300 V, acc. class 0.5 or better Digital frequency meter of any type	–	–

	TASK CARD No. 206	Page(s) 215
	CHECKING SCREWS ON PANEL TERMINALS AND GENERATOR CONNECTOR NUT FOR PROPER TIGHTENING	

Operations and Technical Requirements (TR)	Corrective Actions	Checked by
Check the points where electrical wires A, B, C are connected to the generator terminals for reliability of contact and the connector nut for tightness. The tightening torque applied to screws at terminals A, B, C, N is (16.5±1) N·m ((1.65±0.1) kgf·m).	In the event of slackening of contact joints, tighten the wire attachment nuts and the connector nut	

Test Equipment	Tools and Fixtures	Materials
–	Torque wrench Wrench with adjustable torque 54416/025 100-800	Wire 0,6-10

	TASK CARD No. 207	Page(s) 217
	CHECKING GENERATOR CLAMP FOR TIGHTENING TORQUE	

Operations and Technical Requirements (TR)	Corrective Actions	Checked by
Use a torque wrench to perform this check. The tolerable slackening of the generator clamp tightness is specified in Task Card No. 203.		

Test Equipment	Tools and Fixtures	Materials
–	Torque wrench	–

	TASK CARD No. 208	Page(s) 219
	REPLENISHING BEARING ASSEMBLIES WITH LUBRICANT	

Operations and Technical Requirements (TR)	Corrective Actions	Checked by
1. Heat the generator and metering grease gun containing lubricant. **NOTE:** In order to ensure adequate filling lubricating agent, it would be a good idea to heat the generator and the metering grease gun to a temperature not higher than +16 °C. 2. Unlock and drive out the screws and take out plungers (60) (Ref. Fig. 4). 3. Use the metering grease gun to replenish the bearing assemblies with lubricant in the amount of 4 to 5 g by injecting the lubricant through the ball-type lubrication fittings. 4. Clean the plungers to remove old lubricant and reinstall them.		

Test Equipment	Tools and Fixtures	Materials
–	Metering grease gun	Lubricant СЭДА

	TASK CARD No. 209	Page(s) 221, 222	
	REPEATED PHASING		
Operations and Technical Requirements (TR)		Corrective Actions	Checked by
1. Unlock and unscrew nut (5) (Ref. Fig. 4) and three nuts, which secure phasing washer (6) to the generator field ring assembly. 2. Unlock and drive out the screws and remove cover (57) from the opening of end frame (29). 3. Rotate the rotor to align the marks on plate (59) attached to end frame (29) with those on balancing ring (23). 4. Take off the phasing washer in conjunction with thick-walled washer (9) and replace it with a new one. 5. Fasten the washer on the shaft with the aid of nut (5). 6. Reinstall washer (9) in its place and screw on three attachment nuts finger-tight by first replacing locking washers under the nuts with new ones. 7. Check the marks for alignment. Misalignment of the axes shall not be in excess of 0.3 mm. 8. Tighten and lock three nuts that secure the phasing washer to the generator field ring assembly. The tightening torque to be applied to the nuts is 0.3 to 0.35 kgf·m. 9. Lock nut (5).			

Operations and Technical Requirements (TR)	Corrective Actions	Checked by
10. Install cover (57) in its place and fasten it with screws. Use new locking wire for locking the screws.		

Test Equipment	Tools and Fixtures	Materials
–	Torque wrench	Wire 0,6-10

	TASK CARD No. 210	Page(s) 223, 224	
	CLEANING AND PAINTING		
Operations and Technical Requirements (TR)		Corrective Actions	Checked by
1. In case of contamination of external surfaces clean the generator with rags moistened in Nephras, then wipe it dry with clean dry rags. 2. In detecting small spotty damage of the paint coating, apply a double coating of enamel ЭП-140 (without primer) to the affected areas. Drying conditions: 24 hours at a temperature of +15 to +35 ^{o}C or 5 to 6 hours at a temperature of +50 to +60 ^{o}C. 3. In the event of deterioration of paint coating as deep as the luster metal surface, clean up the damaged area with sand paper of grain size 5, treat it with clean rags moistened in Nephras and then wipe with clean dry rags. Recondition the affected areas by applying one coating of primer ЭП-076 or АК-070. Drying condition: 1 to 2 hours at a temperature of (25$\pm$10) ^{o}C. This done, apply a double coating of enamel ЭП-140. The drying condition is the same as prescribed by Step 2.			

Operations and Technical Requirements (TR)	Corrective Actions	Checked by

Test Equipment	Tools and Fixtures	Materials
–	–	Rags Nephras C-50/170 Enamel ЭП-140 Sand paper Primer ЭП-076 or АК-070

ГТ40ПЧ8Б & ГТ40ПЧ8В

MAINTENANCE MANUAL

GENERATORS – STORAGE INSTRUCTIONS

1. The generators preserved and packed by the Manufacturer shall be stored in fundamental non-heated storerooms at an ambient air temperature of +30 to minus 40 ^{o}C and a relative air humidity of up to 95 %.

   The storerooms must be properly protected against penetration of vapours and gases, which may cause corrosion of the items.

   Store the generators in their packages on wooden racks.

   Once in a while (at least once a year) check the colour of silica gel.

   If silica gel indicator turns completely rosy along the entire length of the indicating dehydrator, the generators should be subjected to depreservation and repeated preservation.

2. To carry out new preservation of the generator, proceed as follows:
   - wipe the output end of the shaft, mounting surfaces and other open areas of the generator which are free from paint coating with clean rags moistened in Nephras C3-80/120, taking care to prevent Nephras from getting onto wires, windings, rubber parts and other generator components that may be affected by the Nephras ;
   - coat the treated areas with a thin uniform layer of grease СЭДА after heating it to a temperature of +(70$\pm$10) ^{o}C;
   - wrap the grease-coated areas of the generator with parchment-like paper and paraffin paper of grade БП-3-35;
   - install shipping blanks and caps on all coupling points;
   - wrap the generator with parchment-like paper and paraffin paper;
   - arrange fabric bags with technical-purpose silica gel on the surface of the generator (using 1 kg of silica gel per 1 m^2 of the packing bag area) and fit on the silica gel indicating dehydrator;
   - place the generator into the packing bag made of polyethylene film of 90 to 100 micron; evacuate the air from the bag so that the film slightly fits the generator surface and seal the last seam of the bag.

GENERATORS – SHIPMENT

The generators preserved and packed by the Manufacturer may be shipped by any type of transport over any distance and at any speed.

When the generators are preserved for a period of up to 2 years, their shipment may be accomplished by a covered type of transport in which they are adequately protected against atmospheric precipitations.

In order to avoid any damage of the generator in shipment the housing and the tube should be removed from the generator.