AUXILIARY GENERATOR TYPE GY-20-C2

DATA

Type	GY-20-C2
Model	5GY20C2
Rotation (Facing Commutator End)	CCW
Classification	4-pole, commutating pole, self-excited, direct-current generator
Nominal Rating	800 to 2400 RPM 75 V, 9 KW

Resistance at 25 C

Shunt Field	9.15 ohms
Commutating Field	.02 ohms
Armature	0.0509 ohms

Brush Data

Pressure	48-oz.
Size	1/2-in. x 1-in. x 1 3/4-in.
(See Renewal Parts Bulletin for correct catalog number when ordering renewals)	

Nominal Air Gap

Exciting Field	.050-in.
Commutating Field	.130-in.

Commutating Side Mica

Thickness	.020-in.
Grooving Depth	3/64-in.

Bearing Grease Capacity

Commutating End Bearing	2 1/4 oz.
Fan End Bearing	2 1/4 oz.

Weight	619 lb.

Illustrations

Longitudinal	A-118713
Connection Diagram	A-118699
Outline	A-118698
Correct Stone Fit	A-118678
Puller Tools	A-118788
Pulley Puller	A-118709

AUXILIARY GENERATOR TYPE GY-20-C2

FUNCTION

This device provides power for electric auxiliaries, control system and battery charging.

DESCRIPTION

The auxiliary generator is a 4-pole, direct-current, commutating pole type, self-excited generator which is mounted on the top right-hand side of the traction generator (facing commutator end). The generator is supported on three brackets, two of which are on the generator side and bolted to the generator. The third or outer bracket is supported by a turn-buckle which provides a method for adjustment of belt tension. See "BELT TENSION ADJUSTMENT".

The generator is belt driven from a pulley on the main generator shaft extension by V-type belts.

VENTILATION

Ventilation is provided by a fan mounted on the armature shaft on the end opposite the commutator. Air is drawn in at the commutator end and passes through the armature ventilating ducts as well as over the armature and field surfaces. The heated air is expelled by the fan through openings in the frame.

OPERATION

Looking at the commutator end, the armature rotates in a CCW direction. The auxiliary generator develops power for charging the locomotive storage battery, operating the control circuits and provides field excitation for the exciter.

INSPECTION AND LUBRICATION

Lubricate unit in accordance with Lubrication Chart. Fittings should be wiped clean before adding lubricant.

Cleaning and Inspection should be in accordance with Inspection Schedule.

OVERHAUL

At 120,000 miles, or approximately every year, apparatus should be disassembled for complete overhaul and any damage or worn out parts should be replaced.

Check condition and tension of V belts. To adjust, see "BELT TENSION ADJUSTMENT".

TO REMOVE AUXILIARY GENERATOR FROM LOCOMOTIVE

1. Disconnect electric terminals

2. Loosen hinge bolts connecting auxiliary generator to traction generator frame.

3. Loosen turnbuckle and drop auxiliary generator until belts can be removed from pulley.

4. Screw eye bolt into nut welded on top of auxiliary generator frame, and take up weight with crane or hoist.

5. Remove turnbuckle and hinge bolts.

6. Place auxiliary generator horizontally on a firm support.

CLEANING, INSPECTION AND TESTING

After auxiliary generator has been removed from locomotive, blow out armature and windings with clean, dry compressed air.

Inspect condition of brushes, bearings, commutators, windings and string band.

A megohmeter test can be used to check insulation resistance of armature and windings to determine over-all condition of machine. To check insulation resistance of armature, lift all brushes before applying megohmeter test. Insulation resistance should not read less than one meghom.

DISSASSEMBLY

REMOVAL OF ARMATURE FROM FRAME (See Plate A-118713)

1. Remove auxiliary generator from locomotive.

2. Remove commutator covers 17.

3. Raise brushes and cover commutator 16 with heavy cardboard.

4. Remove nut 3 and lockwasher 4 holding pulley 22 in place (commutator end).

5. Remove pulley 22. Use puller Cat. 6727219G1. See Plate A-118709.

6. Remove (5/16 - 18 x 1) capscrews 23 (inner row) commutator end.

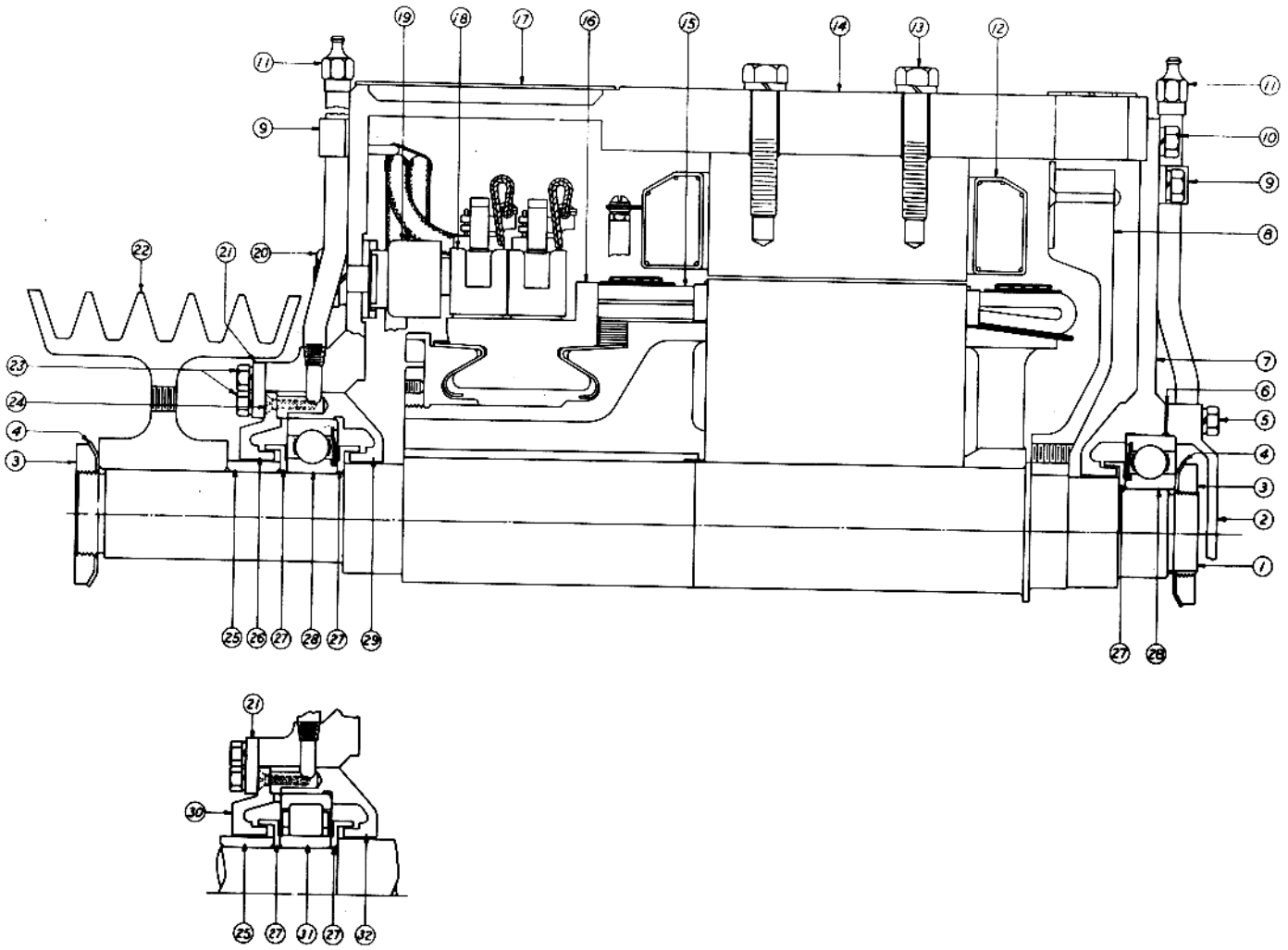
7. Remove capscrews 10(3/8 - 16) fan end.

8. Using the three tapped jackscrew holes in fan end framehead 7, jack framehead out of its fit in the frame 14.

Entire armature with bearing housing and fan can be removed from the frame through the fan end.

REMOVAL OF BEARING (Commutator End)

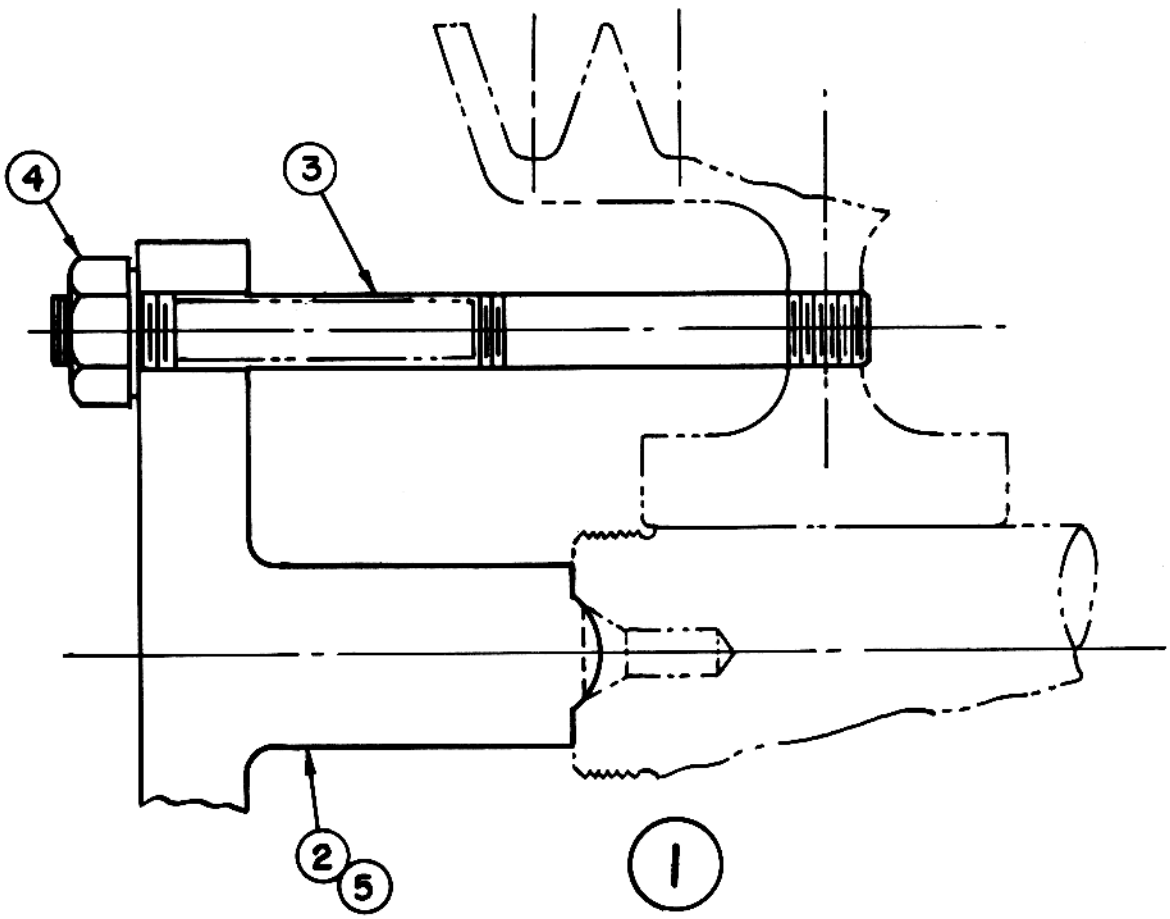
1. Remove auxiliary generator from locomotive.



32 BEARING HOUSING
31 ROLLER BEARING
30 BEARING CAP
29 BEARING HOUSING
28 BALL BEARING
27 FLINGER
26 BEARING CAP
25 SPACER
24 MACHINE SCREW
23 CAP SCREW
22 PULLEY
21 END PLATE
20 NUT
19 BRUSH HOLDER STUD
18 BRUSH HOLDER
17 COVER
16 COMMUTATOR
15 ARMATURE WINDING
14 MAGNET FRAME
13 POLE PIECE CAP SCREW
12 FIELD COILS
11 LUBRICANT FITTING
10 CAP SCREW
9 PIPE CLAMP
8 FAN
7 FRAME HEAD
6 GASKET
5 CAP SCREW
4 LOCKWASHER
3 NUT
2 BEARING CAP
1 SHAFT

A-118713

LONGITUDINAL SECTION AUXILIARY GENERATOR GY-20



5	Clamping Plate
4	Nut Hex. 1/2"x – 13
3	Stud
2	Clamping Plate
1	Assembly

A-118709

PULLEY PULLER AM806 & GY20

2. Remove armature from frame.

3. Remove two (10-32 x 3/4 inch) screws 24 and take off bearing cap 30.

4. Apply puller to tapped holes in bearing housing 32 (5/16-in. -18). Housing 32, two flingers 27, spacer 25, and bearing 31 can then be removed from the armature.

5. Remove bearing from housing with extended puller, or by placing wooden block against inner flinger 27 and tapping lightly with a mallet.

REMOVAL OF BEARING (Fan End)

1. Remove auxiliary generator from locomotive.

2. Remove armature from frame.

3. Remove clamp 9 from grease pipe.

4. Remove capscrews 5 and remove bearing cap 2.

5. Remove nut 3 and lockwasher 4 from shaft.

6. Apply puller to tapped holes in framehead and remove framehead 7, bearing 28, and flinger 27, from shaft.

7. To remove bearing 28 from framehead, place wood block against flinger 27 and tap lightly with a mallet.

REMOVING FIELD COILS - See Plate A-118713

To remove a field coil from auxiliary generator frame proceed as follows:

1. Remove auxiliary generator from locomotive.

2. Blow out armature and field coils with clean, dry compressed air.

3. Remove armature.

4. Disconnect field coil leads.

5. Remove bolts 13.

6. Remove field coil and pole piece through fan end.

7. Tie accompanying shims to pole piece just removed.

8. Tap field coil with a non-metallic hammer to remove from pole piece.

REPAIRS

ARMATURES

The armature should be closely inspected for the condition of bands, wedges, coils, insulation, general assembly and commutator.

Armature bands and core wedges should be tight and secure. Solder in the bands should be intact. If solder has thrown off, the cause should be determined and corrected and bands replaced by tight banding.

The coil insulation should be clean and free from blisters, flakes or cracked insulating varnish surface.

When the condition of the insulating varnish on the armature is such that treatment is necessary, or if the banding is loose, the following should be observed:

1. Clean air holes through core. Clean creepage surface back of risers and creepage surface on armature head.

2. Remove bands and banding base if necessary.

3. Clean all surfaces with cloth dipped in carbon tetrachloride or equivalent, and blow out with dry compressed air. Protect windings from air blast.

4. Heat armature to a temperature of 140 C to 150 C (284F - 302F): to hold end windings in place, apply narrow temporary bands to each end winding, using fibre base to protect windings.

5. Dip hot 110C - 120C (230F - 248F) in Glyptal 2480 varnish; for viscosity refer to section "PREPARATION OF VARNISHES UNDER TRACTION MOTOR". Hold armature in varnish for 5 to 10 minutes. Armature should be held on a swivel hook with the commutator end up and be submerged in varnish up to the commutator risers.

6. Thoroughly drain excess accumulation of varnish by spinning and wipe varnish from shaft, using a cloth soaked in Toluol.

7. Bake for 16 hours at an oven temperature of 140 C to 150 C (284 F - 302 F).

8. Measure the insulation resistance while armature is hot. The armature should be baked until the insulation resistance is at least one megohm.

9. Replace temporary bands with permanent binding.

10. Repeat 4, 5, 6 and 7.

11. Cool armature to approximately 50 C (122 F) and dip in Glyptal No. 1201 red enamel to provide the outside finish; for viscosity refer to "PREPARATION OF VARNISHES" under TRACTION MOTOR.

12. Thoroughly drain excess enamel and remove all enamel from the shaft.

13. Bake for 16 hours at oven temperature of 140 C (284 F).

If armature is in good condition and banding is not replaced, the above varnish treatment should not be necessary. In such case, clean armature as in steps 1 and 3 above; then bake armature for 6 hours at 140 C to 150 C (284 F - 302 F) to remove moisture, cool to approximately 50 C (122 F) and proceed with treatment specified in steps 11, 12, and 13.

Measure insulation resistance with a megohmeter. If resistance is less than one megohm, bake armature until insulation resistance comes within limits.

REWINDING

If rewinding of armature is necessary, send unit to nearest G.E. Service Shop.

COMMUTATORS

The commutator should present a smooth surface free from pitting. If it has become pitted or damaged from any cause, stoning or turning will be necessary.

TURNING

If the commutator is badly worn or burned, remove the armature from the frame and turn in a lathe until a smooth finish is obtained.

Whenever possible, turn the commutator by supporting the armature in its own bearings. If the armature is held on lathe centers, be sure that these centers are true with respect to the bearing seats.

Make provisions to prevent copper chips from working into the armature and windings.

A side cutting tool with a point ground to about 1/16 inch radius should be used. The cutting side of the point should be given considerably more rake than is customary for working iron and steel. Run at a peripheral speed of approximately 300 ft. per minute.

After turning, round off the ends of the commutator bars to at least 1/16 inch radius, while the armature is still in the lathe.

UNDERCUTTING THE MICA

After a commutator has been turned, undercut the side mica to the correct depth. See DATA page. Special saws are available for this purpose and care must be taken not to cut the slots too wide. Remove the sharp edges of the commutator bars with a hand scraper or a knife. Do not

bevel the edges of the segments. Clean out the slots to remove all mica chips and fins, and be sure that no copper chips remain in the slot. A satisfactory tool for this operation can be made from a piece of worn-out hack-saw blade.

After the mica has been undercut and the slots cleaned out, the commutator is ready for sanding and final polishing.

STONING

A stone of proper curvature to fit the commutator surface with a span of approximately 30 degrees around commutator should be used. See Plate A-118678. Extreme care must be taken while the stoning process is taking place to prevent the copper dust from settling in the windings. Blow out armature with dry compressed air frequently.

After stoning, check the commutator surface for concentricity by using an eccentricity gage which will mount on the apparatus frame.

Check concentricity with apparatus mounted in its own bearings.

Wipe dirt or grease off string band. Be certain string band is tight and has a smooth surface. If finish has started to flake or chip, sand it lightly and blow out with dry compressed air. A coat of Glyptal No. 1201 red enamel should then be applied and permitted to dry.

BRUSHES

Cracked or chipped brushes should be replaced. New brushes should be fitted to commutator by drawing sandpaper (with rough side toward brush) between brush and commutator in direction of rotation. Sandpaper should be held close to commutator to avoid rounding brush edge.

BRUSH HOLDERS

Brush-holder clearance should be maintained at 1/16-in. clearance from commutator. If holder is worn or damaged, replacement of holder or part is necessary.

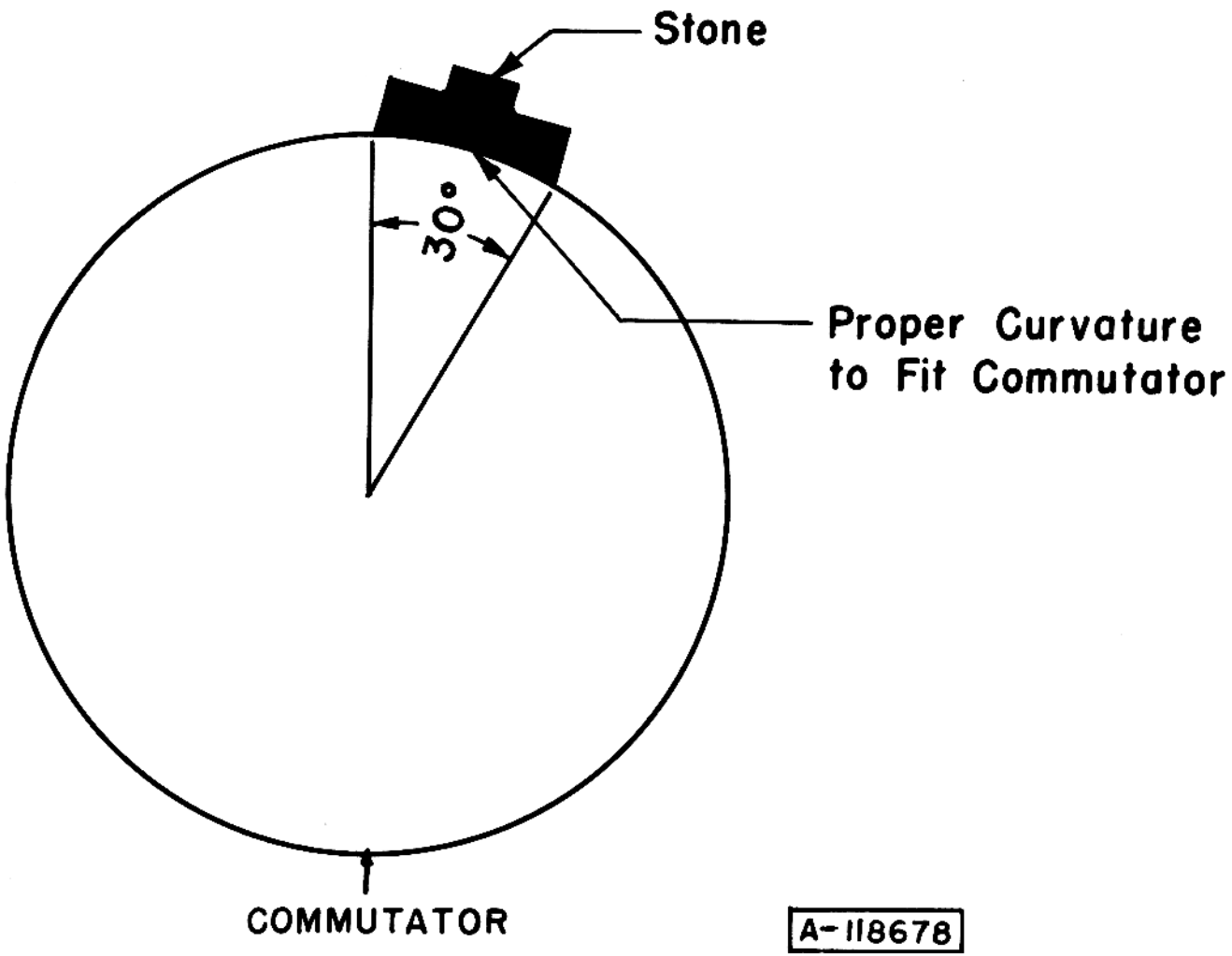
a. Disassembly

Disconnect cable terminal.

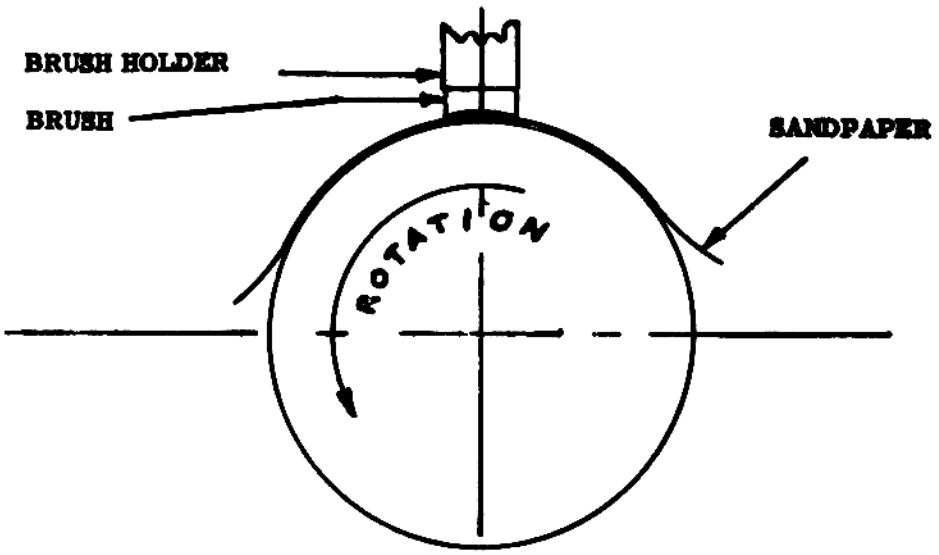
Remove brushes from holder and cover commutator with heavy paper to protect it. Remove nut holding brush holder to motor frame. Holder may then be lifted free.

b. Assembly

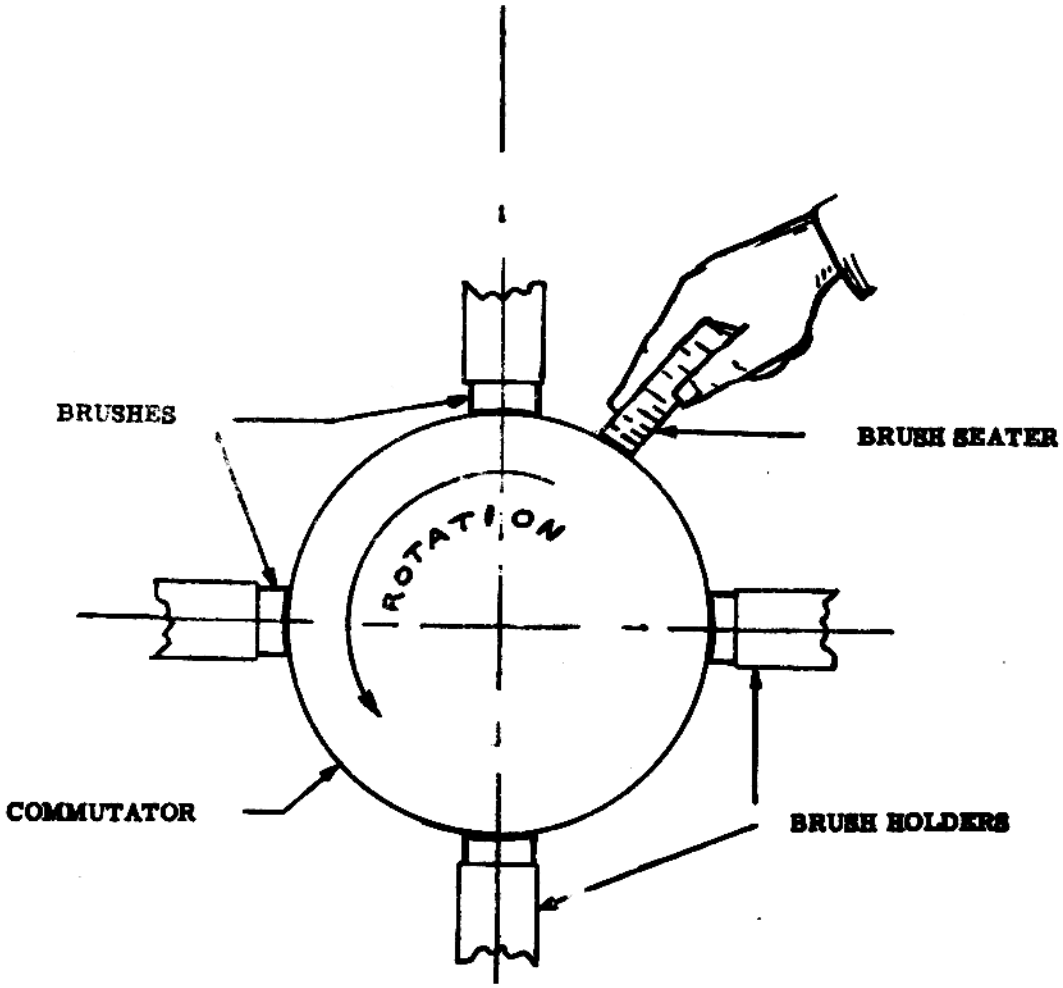
Cover commutator with heavy paper to protect it. Insert brush holder through hole in motor frame. Be sure key on end of stud is properly seated in keyway on end of frame. Assemble nut 20 and



CORRECT STONE FIT



SANDING BRUSHES



APPLICATION OF BRUSH SEATER A-118789 A

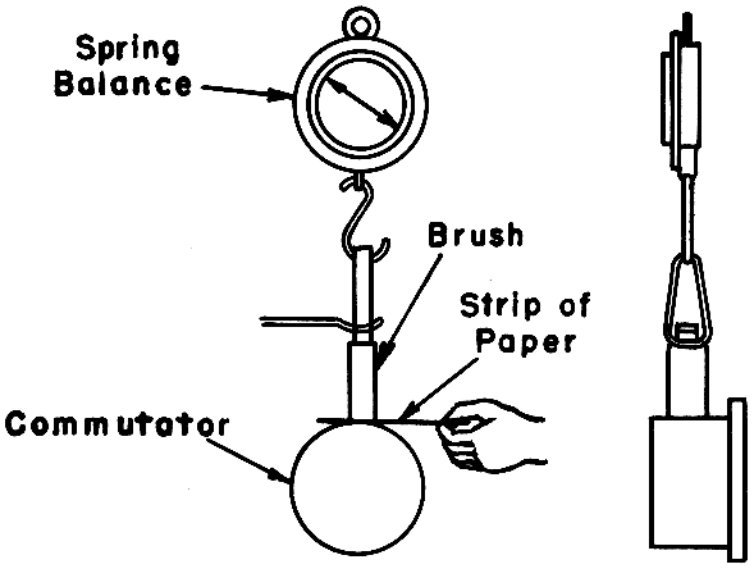


FIG.-1

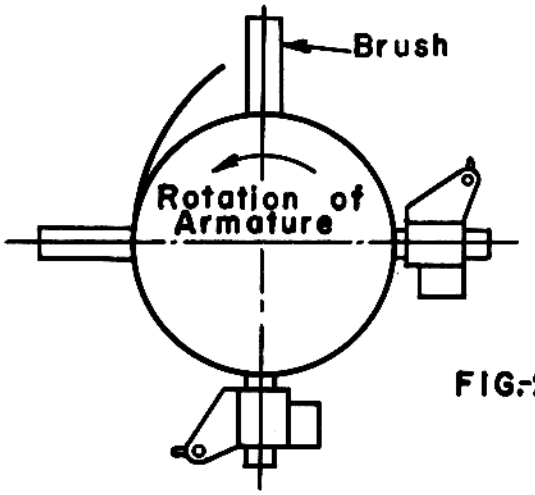
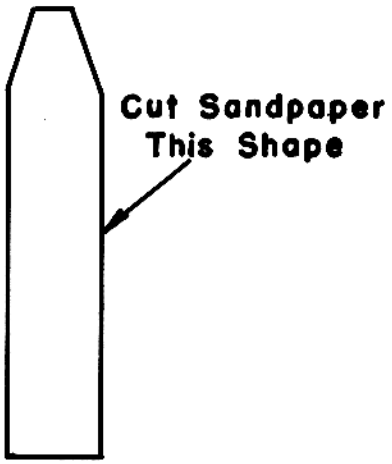


FIG.-2



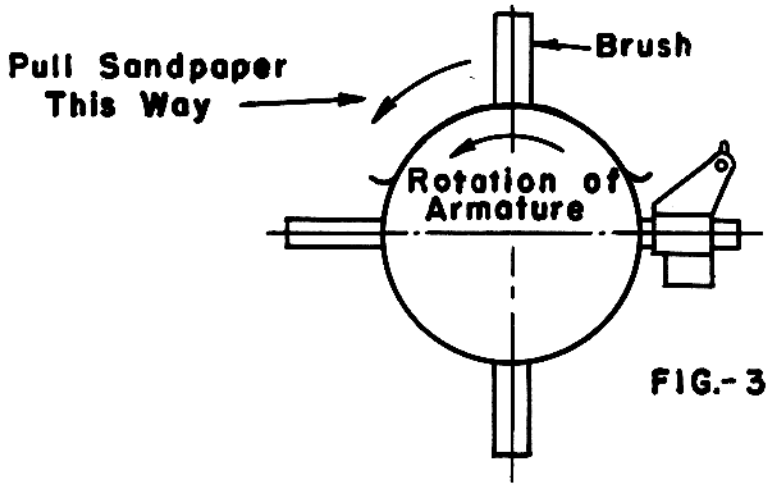


FIG.-3

METHOD OF SANDING AND OBTAINING BRUSH PRESSURE

for Generators and Motors

A-118563

tighten. Holder should be 1/16-in. from commutator. Care should be taken not to knock brush holders out of line. Check brush-holder carbonway with commutator bars; misalignment of more than a mica width should not be permitted. Remove paper and insert brushes. Check brush fit to commutator and if necessary, fit brushes as described under BRUSHES.

BRUSH PRESSURES

Brush pressure is checked by inserting paper between spring and brush, or between brush and commutator and lifting spring with a spring balance. When paper moves with slight pressure exerted, brush pressure reading has been reached. Check reading against DATA sheet.

FIELD COILS

If field coils have been in service for any length of time, and if varnish surface tends to peel or chip, clean with a cloth dipped in carbon tetrachloride and paint with Glyptal No. 1201 red enamel.

If field coils have burned or short-circuited internally, install new coil.

BEARINGS

Cleaning

As conditions dictate, bearing assemblies should be disassembled and thoroughly cleaned with kerosene or similar solvent for the purpose of removing the accumulation of old and hardened grease from bearings, housings and grease passages.

Inspection

After the bearing has been cleaned, rotate it slowly and feel for roughness in rollers or races. Visually inspect rollers and races for signs of pitting or galling, worn spots, loose rivets or loose or worn cages. Inspect for discoloration of rollers, and bearing races for evidence of overheating. Examine bearing fit in framehead for excessive wear. If the bearing condition is questionable, a new bearing should be installed and steps taken to have the questionable bearing reconditioned or scrapped or worn frameheads corrected.

After bearing has been cleaned in the solvent, and has been inspected, it should be further washed in a light mineral lubricating oil of SAE-10 grade, heated to 90 C (194 F). This is to prevent corrosion of the highly polished surfaces.

REPACKING

When the bearing compartment is clean and dry, repack with fresh grease. See DATA sheet for bearing grease capacity. When reassembling,

some grease should be packed in the bearing itself.

REASSEMBLY OF BEARING (Fan End) See Plate A-118713.

1. Place Flinger 27 in framehead 7.

2. Heat framehead 7 and flinger 27 to 180 C and drop bearing 28 into place. Be sure to assemble bearing with grease seal plate on inside toward the armature.

3. Heat assembly of framehead 7, flinger 27, and bearing 28 to 120 C and assemble on shaft. Be sure that flinger is flat and solidly against shoulder on shaft. Replace lockwasher 4 and nut 3. Tighten nut and lock.

4. Fill bearing 2/3 full of grease.

5. Assemble bearing cap 2 and gasket 6.

6. Replace pipe clamp 9 on grease pipe.

REASSEMBLY OF BEARINGS (Commutator End)

1. Place flinger 27 in bearing housing 32.

2. Heat bearing housing 32 and flinger 27 to 180 C and drop bearing 31 into place.

3. Heat assembly of bearing housing 32, flinger 27 and bearing 31 to 120 C and slide on commutator end of armature.

4. Heat flinger 27 and sleeve 25 to 180 C and install in position on armature tight against the bearing.

5. Fill bearing 2/3 full of grease.

6. Assemble bearing cap 30 and secure with two flathead screws 24 (10- 32 x 3/4 in.).

REASSEMBLY OF FIELD COILS.

1. Slide field coil onto pole piece.

2. Replace shims.

3. Place field coil and pole piece in frame, insert pole piece bolts 13 through frame and screw into pole piece. Tighten bolts evenly.

4. Replace armature.

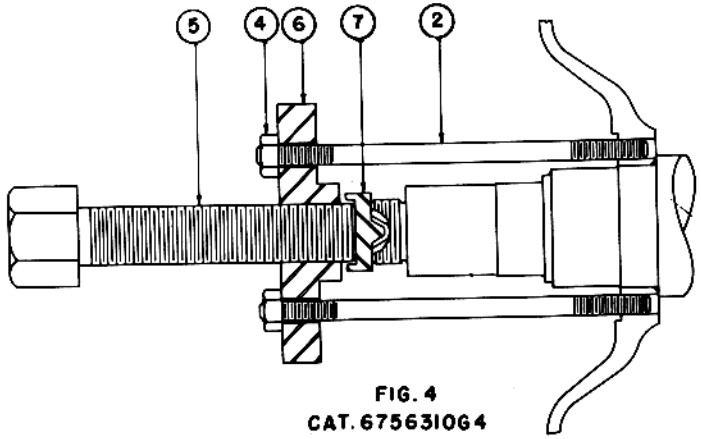


FIG. 4
CAT. 675631064
FAN PULLER
AM-806

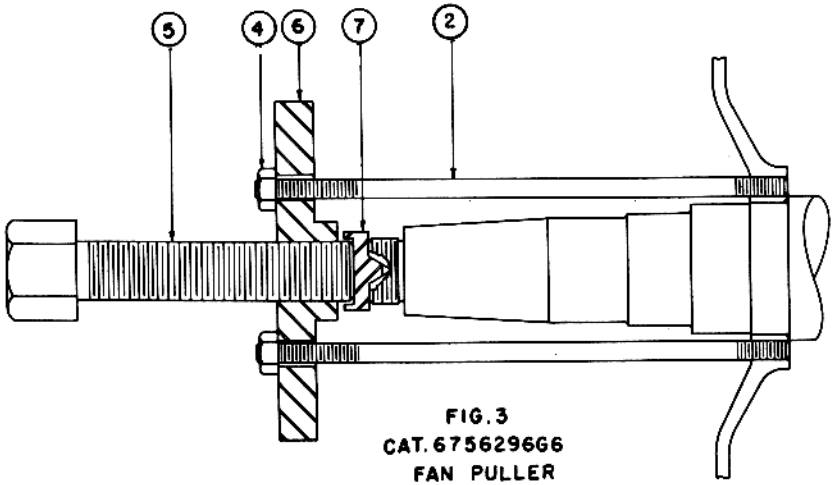


FIG. 3
CAT. 675629666
FAN PULLER
GY-20

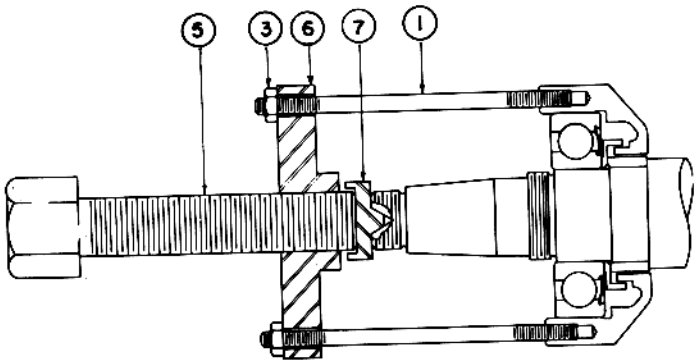


FIG. 1
CAT. 6756294G1
BEARING PULLER
COMMUTATOR END
GY-20 AND AM-806

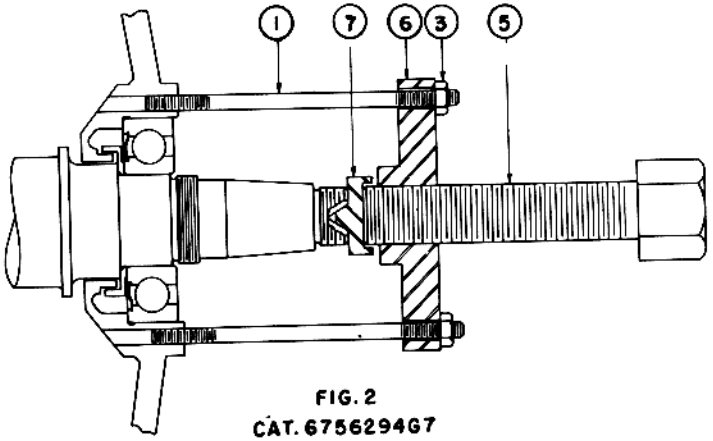


FIG. 2
CAT. 675629467
BEARING PULLER
END OPPOSITE COMMUTATOR
GY-20 AND AM-806

1. Stud $\frac{5}{16}$ in.-18
2. Stud $\frac{3}{8}$ in.-16
3. Nut $\frac{5}{16}$ in.-18
4. Nut $\frac{3}{8}$ in.-16
5. Bolt
6. Clamping Plate
7. Center Plug

A-118788

PULLER TOOLS FOR AM-806 AND GY-20

REASSEMBLY OF ARMATURE IN FRAME

1. Place in armature in frame.
2. Use guide pins to line up bearing cap 30 on pulley end.
3. Line up commutator end bearing housing 32 with grease holes through bearing fit, and bearing housing 32.
4. Assemble four capscrews 10 (3/8-in. - 16) at fan end of framehead and tighten evenly.
5. When assembling to frame insert bolts 23 (3/16 in. - 18) on pulley end and draw tight.
6. Heat pulley 22 to 120 C and place on shaft to fit tight against spacer 25.
7. Place lockwasher 4 on shaft against pulley 22.
8. Screw nut 3 against lockwasher 4. Tighten nut and lock.

TO REASSEMBLE AUXILIARY GENERATOR TO GENERATOR FRAME

1. Screw eye bolt into nut welded on top of auxiliary generator frame.
2. Lift generator to rest on top of traction generator frame by crane or hoist. Maintain a slight tension on sling to hold auxiliary generator in place.
3. Place hinge bolts through auxiliary generator and traction generator fittings.
4. Attach turnbuckle to fittings and tighten slightly.
5. Place belts on pulleys.
6. Adjust belts.
7. Tighten turnbuckle locking nuts and hinge bolts. See "BELT TENSION ADJUSTMENT".
8. Connect electric terminals.

INSPECTION AFTER REPAIRS

After repairs have been made, a careful check should be made that no foreign matter remains in the machine, and that there are no loose brushes or other obstructions on the commutator. Check the connections with the connection diagram. See that all bolts are drawn up tightly and locked.

TESTING AFTER REPAIRS

When generators have been repaired after running in service and all parts are thoroughly clean, measure insulation resistance with megohmeter. If insulation resistance measures not less then one megohm, apply the following high potential test to the windings.

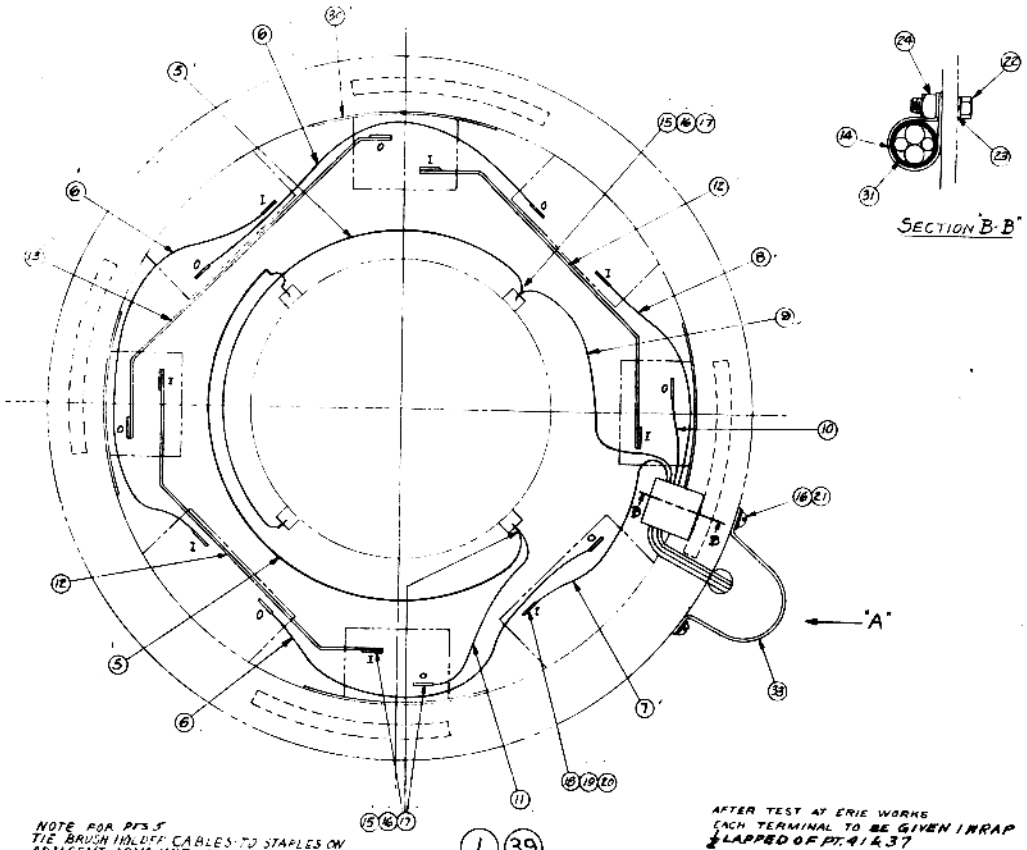
	Reconditioned	Rewound
Armature	800 V	1000 V
Assembled Machine	600 V	800 V

BELT TENSION ADJUSTMENT

To make belt adjustments correctly on the auxiliary generator (GY-20) take care that excessive strain is not placed on the hinge bolts. Proceed as follows:

1. Loosen hinge bolts.
2. Loosen locking nuts on turnbuckle.
3. Adjust turnbuckle.
4. Tighten hinge bolts and locking nuts on turnbuckle.
5. Tighten hinge bolts with torque wrench.

After adjustment is made, tighten all 3/4 inch hinge bolts for auxiliary generator, and turnbuckles with 170 to 200 lb. ft. torque.

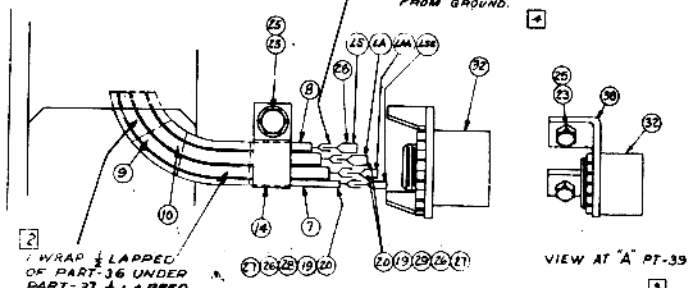


SECTION B-B

NOTE FOR PT. 5
TIE BRUSH HOLDER CABLES TO STAPLES ON ADJACENT ARMS WITH PT-34, ¼ BRUSH WITH PT-35. [1]

(1) (39)

AFTER TEST AT ERIE WORKS EACH TERMINAL TO BE GIVEN 1 WRAP ½ LAPPED OF PT. 41 & 37 TO INSULATE IT FROM THE OTHER TERMINALS AND FROM GROUND. [4]



[2] 1 WRAP ½ LAPPED OF PART-36 UNDER PART-37, ½ LAPPED

VIEW AT "A" PT-1

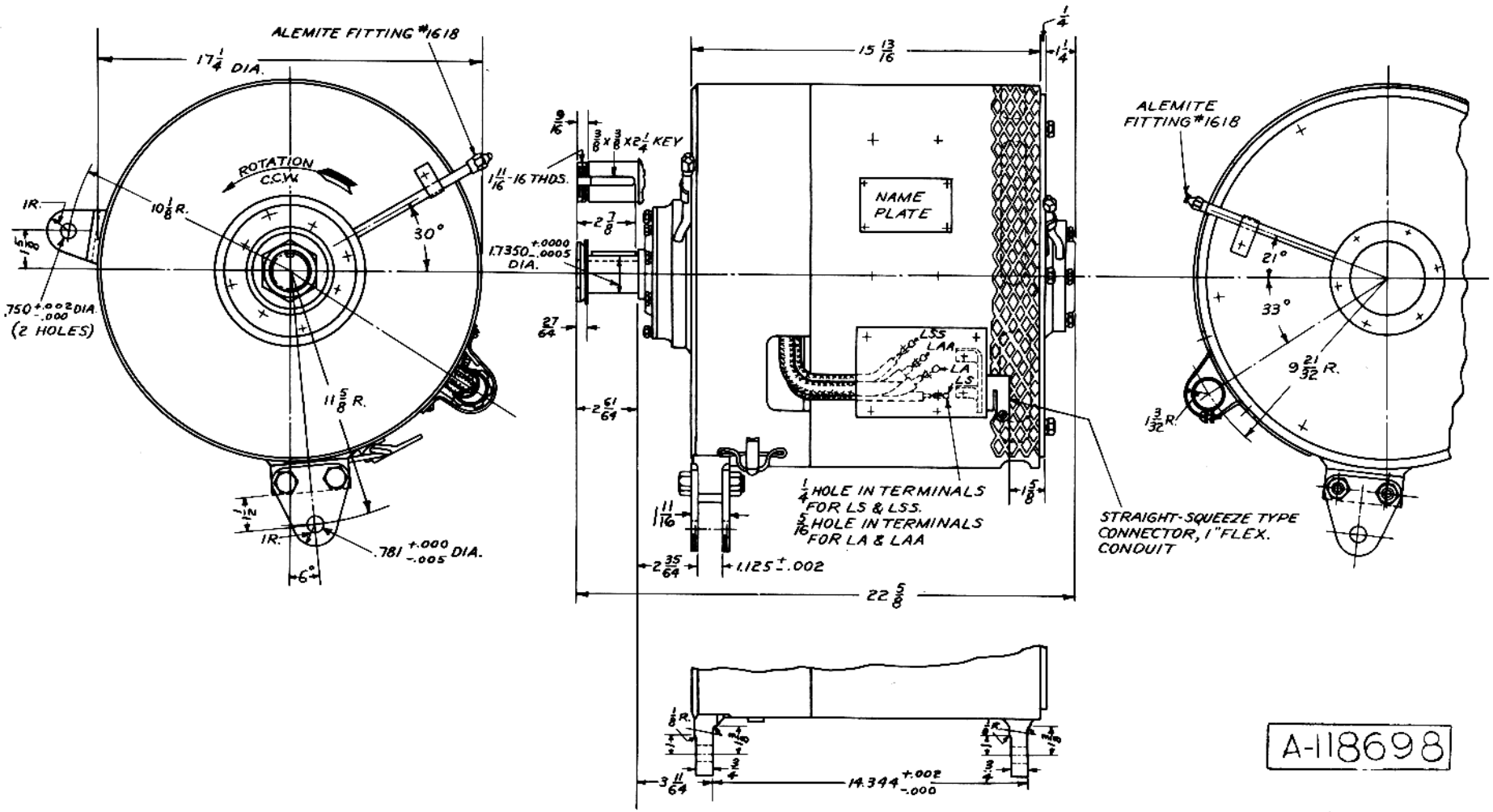
VIEW AT "A" PT-39 [3]

1		1		#514	Varnished Cloth	TAPE	41	INSULATION .007 x ½ - 4 FT
X	1				G-5	P-6744277	40	BOLTS & NUTS
	X						39	ASSEMBLY
1					PT-1	K-8820368	38	BRACKET
4		4		A2AIB16 OR A1D2B			37	INSULATION .007" x 1" x 12"
2		2		A1D2B	FIBER		36	INSULATION .01 x ¾ x 10"
?		?		GLYPTOL BODY ENAMEL			35	ENAMEL
1		1		A2A1E6	STAY BINDING	SEE NOTE	34	TAPE .015 x ¾ - 6 FT
		1			PT 1	K-6742791	33	COVER
1		1		CAT. SR6125			32	CONNECTION (PANELETTE TYPE)
2		2		#504	Varn. Cloth		31	INSULATION .030 x 2 x 6"
4		4			PT. 1	V-6717705	30	PAD
2		2				V 463927	29	TERMINAL
2		2				V-463926	28	TERMINAL
4		4		C1L3	STEEL		27	MACH. SCREW RD HD #10-32 x ½ LG
4		4				V-414725	26	WASHER
3		1		C1C2	STEEL		25	CAPSCREW HEX HD ⅝-18 x ¾ LG
1		1		C2L5	STEEL		24	NUT SQUARE ⅝-18
4		2		STEEL			23	LOCKWASHER POS STD FOR ⅝ SCREW
1		1		C1C2	STEEL		22	CAPSCREW HEX HD ⅝-18 x 1" LG
3		3		C1L3	STEEL		21	MACH. SCREW RD HD ¼-20 x ½ LG
12		12		C50E5B	STEEL		20	NUT HEX. #10-32
12		12		STEEL			19	LOCKWASHER POS STD FOR #10 SCREW
8		8		C1L3	STEEL		18	MACH SCREW RD HD #10-32 x ⅝ LG
12		12		C50E5A	STEEL		17	NUT HEX. ¼-20
14		14		STEEL			16	LOCKWASHER POS STD FOR ¼ SCRW
12		12		C1C2	STEEL		15	CAPSCREW HEX HD ¼-20 x ½ LG
2		2			Pt. 1	V-6717376	14	CLAMP, CABLE
			1		Pt. 1	M-6733646	13	CONNECTION STRAP
			2		Pt. 2	M-6733616	12	CONNECTION STRAP
				1	G-7	M-6733408	11	CABLE
				1	G-6		10	↓
				1	G-4		9	↓
				1	G-3		8	↓
				1	G-2		7	↓
				3	G-1	M-6733408	6	↓
				2	G-1	K-6727552	5	CABLE
			X		G-4	P-6744272	4	BOLTS, NUTS & ETC.
		-	X		G-3	P-6744272	3	CONNECTION STRAPS
		1		X	G-2	P-6744272	2	CABLES & LEADS
							1	ASSEMBLY
G-6	G-5	G-4	G-3	G-2	G-1			

CONNECTION ASSEMBLY

AUX. GEN. GY-20

A-118699



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AUXILIARY GENERATOR GY-20-C

OUTLINE