



ZEE Systems, Inc.

SERVICE LETTER 58-003

- 1.0 EFFECTIVITY: All ZEE Systems, Inc. SZ58-003-1/-2/-3 Motors.
- 2.0 PURPOSE: To provide service, maintenance and preventive maintenance information for the SZ58-003-SERIES Motor.
- 3.0 COMPLIANCE: Compliance is mandatory when performing maintenance or preventive maintenance on the SZ58-003-SERIES Motor.
- 4.0 APPROVAL: This information is presented by ZEE Systems, Inc. This letter contains reference information and does not require regulatory agency approval. The information in this document does not affect the fit, form or function of the SZ58-003-SERIES Motor.
- 5.0 WEIGHT AND BALANCE: Compliance with this Service Letter does not affect the weight and balance of the SZ58-003 Motor.
- 6.0 ELECTRICAL LOAD AND PERFORMANCE DATA: Compliance with this Service Letter does not affect the weight and balance of the SZ58-003 Motor.
- 7.0 SPECIAL TOOLS: Refer to ZEE Systems, Inc. Process Specification SZ-004 for special tools and fixtures. The tools listed in Process Specification are for new equipment manufacture but may be used for assembly during rework or overhaul.
- 8.0 MANPOWER REQUIREMENTS: Disassembly, rework, assembly is estimated at 4 to 5 man hours. Brush run in is estimated at 4 to 6 hours. Test is estimated at 1.5 hours. Paperwork is estimated at .5 hours. These estimates do not included time to remove and reinstall the motor in the system.
- 9.0 INSTRUCTIONS: Refer to IPL for guidance to disassemble the motor. For minor maintenance disassemble the motor only enough to perform the service required.
- 9.1 Turning the Commutator: If inspection reveals that the commutator is rough, pitted, scored, or burned, refinish in a lathe that is accurately set up and adjusted. Remove only the material necessary to clean and true up the commutator surface. To insure uniformity of surface finish, a diamond tipped cutting tool with a maximum tool tip radius of 0.006 in. (including tool wear) is recommended for making the final surface cut on the commutator. Replace armature if refinished commutator diameter is less than 2.125 inches after refinishing. Hold commutator concentric with bearing journals within 0.0008 inch T.I.R., with bar to bar concentricity within 0.0002 inch.
- 9.2 Undercutting the Mica: If the depth of the undercut remaining after the turning operation has been completed is less than 0.032 inch, the mica between the commutator bars should be undercut to 0.026 wide and a depth of 0.032 deep. Use a triangular scraper to remove all excess mica, sharp edges, and burrs from between the commutator bars. Use a bristle brush



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to remove metal chips and mica particles from the slots between the commutator bars. Check for concentricity as described in 9.1.

9.3 Armature balancing: After commutator refinishing, check the armature for proper balance, which shall be within 2.7 grain-inches at the commutator end and within 3.4 grain-inches at the drive end. If balance correction is required, mill the stainless steel retaining bands at each end of lamination stack to a depth no deeper than 0.020 inch and 0.25 wide until the proper degree of balance is obtained. Only two 0.25 inch wide cuts are permitted in each band to maintain adequate hoop strength.

9.4 Brush Spring: Check brush spring tension by inserting a small hoop of wire under the tang of spring. Raise spring by means of a scale to a height of approximately 1/4 to 3/8 inch (6,35 to 9,53 mm). In this position spring tension should be between 32 and 48 ounces (.91 and 1.36 kg). Replace any spring whose tension is not within this range.

9.4.1 Remove defective spring from brush holder assembly. Wind the replacement spring approximately 3/4 turn and install on the brush holder spring support bar. Check the tension as described in 9.4.

CAUTION

DO NOT WIND SPRING FURTHER THAN NECESSARY TO INSTALL IN POSITION, OR SPRING MAY TAKE PERMANENT SET, AND PRODUCE INSUFFICIENT PRESSURE ON BRUSH.

9.5 Brush Holder Assembly replacement: Replace any worn, burnt or defective Brush Holders.

9.5.1 Removal: Loosen nuts (2-1) and remove the two screws (2-6) and washers (2-2) and non-metallic washers (2-3,2-4). Remove holder (2-7) and insulating sleeves (2-5). Remove all insulating enamel residue from the housing (2-24).

9.5.2 Installation: Install brush springs on holder as described in para. 6.4.1. Insert insulation sleeve (2-5) in housing (2-24). Place washer (2-2) on screw (2-6) and insert screws through insulation sleeves (2-5). Stack the non-metallic washers (2-3) then the holder (2-7), then non-metallic washers (2-3, 2-4) and then washers (2-2), secure with nuts (2-1). Tighten to 20-25 in-lbs. Coat edge of holder (2-7) base, washers (2-2,2-3,2-4), nuts (2-1) and screw heads (2-6) with red insulating enamel. Bake housing in an oven for one hour at a temperature of 150F (66C), remove and allow to cool to room temperature.

9.6 Brush Cover insulation replacement: Remove all existing insulation from brush cover(s) (1-14) and thoroughly clean the inside diameter of cover. Apply a single layer of 8 mil acrylic adhesive PTFE coated fiberglass insulation to the inside diameter flush with the edges and ends of the cover, trim any excess.



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9.7 Brush Inspection: Brushes may be inspected without removing the motor from the installation. If possible remove the brush covers to reveal the brushes. If brushes are removed completely from the motor for inspection mark the location and return each brush to its original holder.

9.7.1 Lift the brush spring off the brush and slide the brush from the holder. The brush should slide easily in and out of the holder. If the brush is tight in the holder or if there is excessive side to side movement of the brush in the holder the motor should be removed for repair or overhaul.

9.7.2 Check each brush for chips, cracks, pitting, signs of arcing or overheating. Check each brush for even wear (see fig. 2). Replace if defect is found.

9.7.3. Measure each brush contact from the center top to the seating area. If any brush contact is shorter than 0.750 (3/4) inches or displays unusual wear patterns replace all brushes. Brushes are not sold individually, order Kit P/N: Z6386AK, note: each individual brush assembly has two leads and two carbon contacts attached to one terminal lug (see FIG. 3 & 3A). Each kit contains 4ea assemblies.

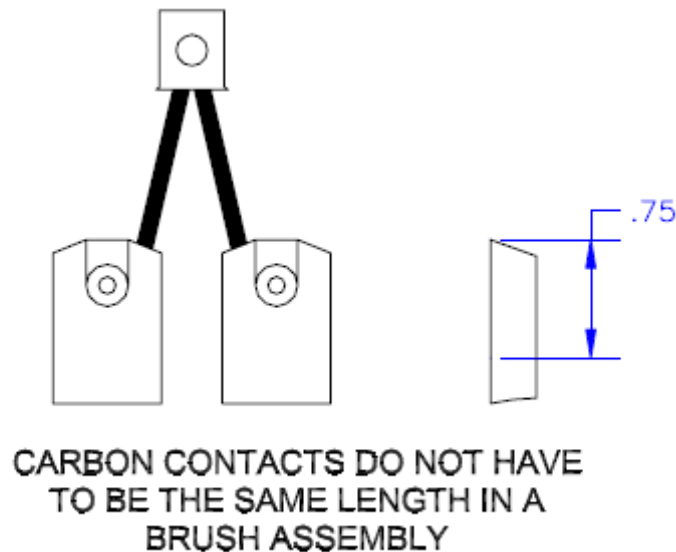


FIG. 3



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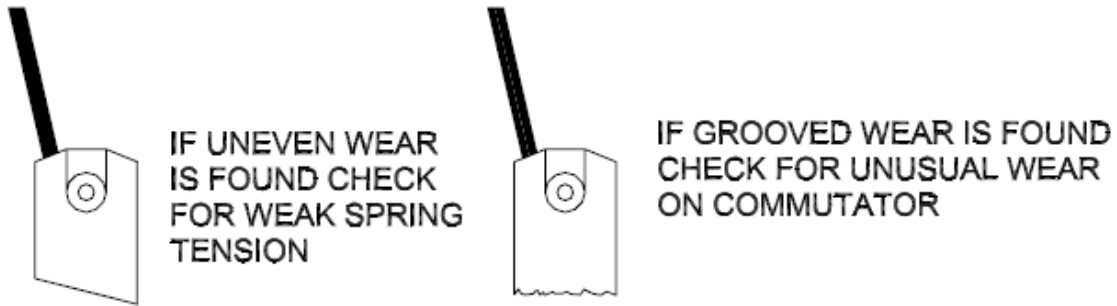


FIG. 3A

9.7.4 With the brushes removed inspect the armature commutator for signs of overheating or unusual wear. A blackened film of carbon on the commutator is normal. Check for deep grooves or other signs of uneven wear on the commutator. Turn the armature by hand and check that there is no binding or end play. If any defect is noted the motor should be removed from service and repaired or overhauled.

9.7.5 When returning brushes to the holder gently lower the brush spring onto each brush. Do not drop the spring onto the top of the brush as damage to the brush may result.

9.8 Illustrated Parts List (IPL): When performing service use only authentic ZEE Systems, Inc. replacement parts. Unapproved parts may cause damage or failure of the motor during operation. Use of unapproved parts will void any warranty. Refer to included pages of ZEE Systems, Inc. drawing SZ58-003CAD and SZ58-021-1B for additional information.

9.8.1 Motor Parts List and exploded view.

-ITEM	PART NUMBER	DESCRIPTION	ALTERNATE P/N	QTY/CODE	USAGE	NOTES
	SZ58-003-1	MOTOR, COMPRESSOR DRIVE			A	
	SZ58-003-2	MOTOR, COMPRESSOR DRIVE			B	
	SZ58-003-3	MOTOR, COMPRESSOR DRIVE			C	
-1	DA9-38	DIFFUSER		1	A	PRE MOD C
-2	DA9-39	FAN		1	A	PRE MOD F
-3	SZ37-012-3	PLACARD "+"		1		
-4	SZ37-012-5	PLACARD "-"		1		
-5	SZ38-006-3	COVER, FAN		1	A	
-6	SZ38-006-3A	COVER, FAN	ALT: Z99-501-1	1	A,B	MOD F
-7	SZ41-019-5	SPACER		1	A	MOD A
-8	SZ43-008-3	PULLEY		1	A	MOD B
-9	SZ58-004-3	ARMATURE		1	A,B	
-10	SZ58-004-3D	ARMATURE	ALT: SZ58-004-3	1	A,B	MOD D
-11	SZ58-008-3	COVER, BRUSH		1		
-12	SZ58-008-4	COVER, BRUSH		1		
-13	SZ58-020-1	END BELL, DRIVE END		1	A,B	



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-14	SZ58-021-1	END BELL, ANTI-DRIVE END	1	A	PRE MOD E
-15	SZ58-021-1A	END BELL, ANTI-DRIVE END	1	A	MOD E
-16	SZ58-021-1B	END BELL, ANTI-DRIVE END	1		MOD H
-17	SZ58-026-1	STATOR ALT: SZ58-026-2	1	A,C	
-18	SZ58-026-2	STATOR	1	B	
-19	SZ58-030-1	JUMPER ALT: Z99-030-1	1		
-20	SZ83-041-3	PULLEY	1	A	MOD A
-21	Z99-401-1	FAN	1		
-22	Z99-840-1	BEARING	1		
-23	Z99-840-3	BEARING	1		
-24	Z6386AK	BRUSH KIT ALT:Z6386K	1		
	Z6386CK		1		MOD M
-25	JH1163	WASHER	1		
-26	JH12990-1	RETAINER	1		MOD J, -1/-2
-27	JH12989-2	RETAINER	1		
-28	JH12990	RETAINER	1	A,B	
-29	05-325003	NUT, BEARING LOCK	1		
-30	05-340200	SCREW ALT: AN526C1032R10	4		
-31	05-349690	SCREW ALT: AN502-8-14)	4	A,B	PRE MOD J
-32	05-419000	KEY	1		
-33	400649-1	I.D. PLATE ALT: 259179-1	1		
-34	405690-1	PLACARD "ROTATION"	1		
-35	AN3-17A	BOLT	6	A,B	
-36	AN316-6R	NUT	2		
-37	AN4-4A	BOLT	1		
-38	AN6H6A	BOLT	1	A	MOD A
-39	AN501A10-6	SCREW	4		
-40	AN501A10-12	SCREW	8		

USAGE

<u>ITEM</u>	<u>PART NUMBER</u>	<u>DESCRIPTION</u>	<u>ALTERNATE P/N</u>	<u>QTY/CODE</u>	<u>NOTES</u>
-41	AN520A416-12	SCREW		8 A,C	MOD E
-42	MS20995C32	LOCK WIRE		AR A	MOD A
-43	MS21044N08	NUT, LOCK	ALT: AN365-832A	1	
-44	MS21245-4	NUT, CASTLE	ALT: AN364-428C	8 A,C	MOD E
-45	MS35206-245	SCREW		1	
-46	MS35265-28	SCREW	ALT: AN500A6	4	PRE MOD C
-47	MS35338-41	WASKER, LOCK	ALT: AN935-6	4	PRE MOD C
-48	MS35338-43	WASHER, LOCK	ALT: AN935-10L	14 A,B	MOD H
	MS35338-43	WASHER, LOCK	ALT: AN935-10L	16 C	MOD H
-49	MS35338-44	WASHER, LOCK	ALT: AN935-416	1	
-50	MS35338-46	WASHER, LOCK	ALT: AN935-616L	2	3EA w/ MOD A
-51	NAS1149F0332P	WASHER, FLAT	ALT: AN960-10L	6 A,B	
	NAS1149F0332P	WASHER, FLAT	ALT: AN960-10L	8 C	
-52	NAS1149F0432P	WASHER, FLAT	ALT: AN960-416L	1	
-53	NAS1149F0463P	WASHER, FLAT	ALT: AN960-416	8 A,C	MOD E
-54	NAS1149F0632P	WASHER, FLAT	ALT: AN960-616L	4	5EA w/MOD A
-55	SZ58-504-1	COVER, FAN		1 C	
-56	SZ58-505-1	END BELL ASSY, D.E.		1 C	
-57	SZ58-805-1	ARMATURE		1 C	
-58	405	KEY, WOODRUFF		1 C	
-59	AN3-12A	BOLT		8 C	
-60	MS35206-248	SCREW		4 A,B	MOD J



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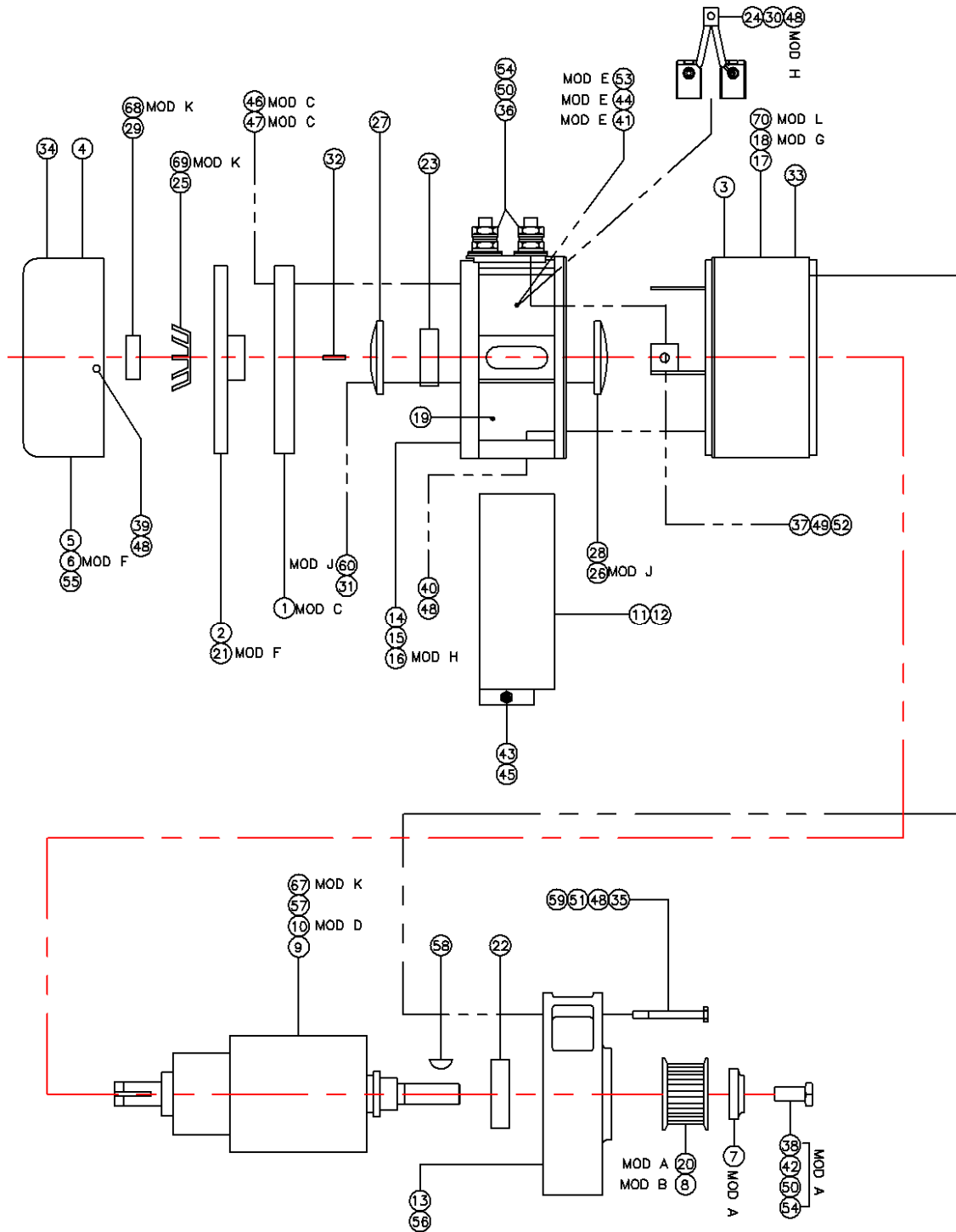
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	MS35206-248	SCREW	4	C	
-61	SZ58-029-1	BASE SUPPORT, ELECTRIC MOTOR	1	C	
-62	AN4-5A	BOLT	2	C	
-63	AN5-6A	BOLT	1	C	
-64	NAS1351-4-10	BOLT, SOCKET CAP	2	C	
-65	400649-1	I.D. PLATE	1	C	
-66	SZ58-000-1	PLACARD	1	C	
-67	SZ58-806-1	ARMATURE	1	A,B	MOD K
-68	05-325004	NUT	1	A,B	MOD K
-69	05378003	WASHER	1	A,B	MOD K
-70	SZ58-026-1A	STATOR	1	A,B	MOD L



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SZ58-003 Exploded View



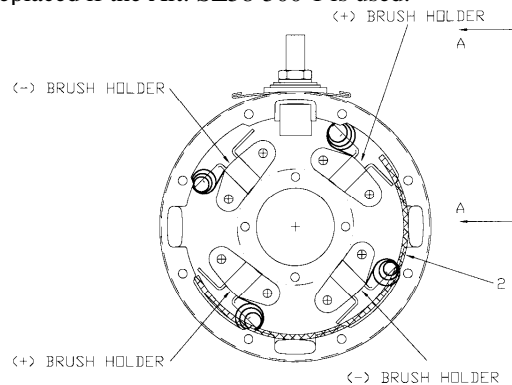
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9.8.2 End Bell Assembly, Commutator End Parts List and exploded view. The SZ58-021-1 is not shown. Motors with the SZ58-021-1 must be returned to ZEE Systems, Inc. for rework or replaced with the SZ58-021-1B.

<u>JTEM</u>	<u>PART NUMBER</u>	<u>DESCRIPTION</u>	<u>ALTERNATE P/N</u>	<u>QTY/CODE</u>	<u>USAGE</u>	<u>NOTES</u>
	SZ58-021-1A	END BELL ASSY, COMM END			A	
	SZ58-021-1B	END BELL ASSY, COMM END			B	
-1	SZ58-021-1	HOUSING		1		
-2	SZ58-030-1	JUMPER	ALT: Z99-030-1	1	A	
	Z99-030-1	JUMPER		1	B	
-3	SZ58-401-1	SPACER, STUD		1		
-4	SZ58-007-3A	BAND		1		
-5	JH12922	HOLDER, BRUSH	ALT: SZ58-500-1	4	A	#1
	SZ58-500-1	HOLDER, BRUSH		4	B	
-6	JH12539-2	SPRING, BRUSH		8		
-7	AN365-1032C	NUT, LOCK	ALT: MS21045-3	8		
-8	05-374002	WASHER, INSULATING	ALT: JH12519-4	8		
-9	05-631018	SLEEVE, INSULATING	ALT: Z99-8541-1	4		
-10	05-370092	WASHER		4		
-11	NAS1149F0332P	WASHER, FLAT	ALT: AN960-10L	4		
-12	MS35266-65	SCREW	ALT: AN501A10-12	4		
-13	MS21045-4	NUT, LOCK	ALT: AN364-428C	4		
-14	NAS1149F0463P	WASHER, FLAT	ALT: AN960-416	8		
-15	MS35266-81	SCREW	ALT: AN501A416-12	4		
-16	AN316-6R	NUT		2		
-17	MS35338-46	WASHER, LOCK	ALT: AN935-616	2		
-18	NAS1149F0863P	WASHER, FLAT	ALT: AN960-816	3		
-19	05-374-041	WASHER, INSULATING		1		
-20	05-631023	SLEEVE, INSULATING	ALT: Z99-8540-1	1		
-21	DA10-122	TERMINAL STRIP		1		
-22	DA10-121M	STUD	ALT: SZ58-503-1	2	A	
	SZ58-503-1	STUD		2	B	
-23	DA10-126	INSULATING TERMINAL	ALT: SZ58-501-126	1	A	
	SZ58-501-126	INSULATING TERMINAL	ALT: DA10-126	1	B	
-24	DA10-129S	SLEEVE		1		
-25	NAS1149F0632P	WASHER, FLAT	ALT: AN960-616L	1		

#1 All 4 Brush Holders must be replaced if the Alt: SZ58-500-1 is used.

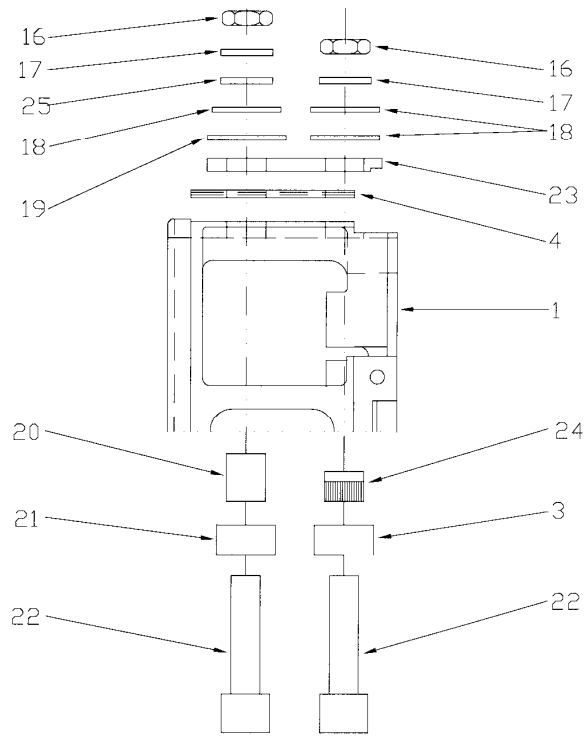


Commutator End Bell Layout. See Exploded Views for Details



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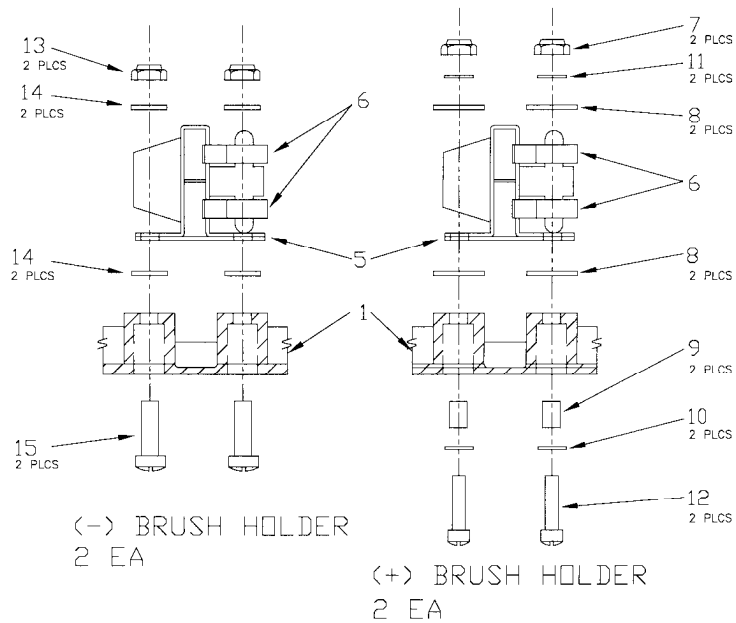
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VIEW A-A

BRUSH HOLDERS OMITTED FOR CLARITY

Commutator End Bell, Terminal Hardware Exploded View.



Commutator End Bell, Brush Holder Hardware Exploded View.



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9.9 REFERENCE MATERIAL:

ZEE Systems, Inc., Process Specification SZ-004.
ZEE Systems, Inc., Acceptance Test Report SZ58/Z99 Motor Test.
ZEE Systems, Inc. Service Information Letter SIL 58-001.

10.0 TESTING: ZEE Systems, Inc. test report data is based on proprietary equipment.

CAUTION

This is a high torque motor. DO NOT apply full 28 VDC voltage unless the motor is secured by mechanical devices. Injury could occur trying to hold the motor by hand. Damage to the motor could occur.

10.1 Motors may be tested under no load conditions as follows. The Fan Cover and Brush covers are attached. After brushes are completely run in, 1) SLOWLY apply voltage to the motor. At 28VDC the running current should be 28-33A. Run the motor for 10 minutes, 2) after 10 minutes, with the motor running, check the running current again. The motor should be warm but not hot to the touch. Feel the air exiting the motor it should be warm but not hot to the touch. There should not be any excessive vibration. The motor should run smooth and quietly.

11.0 IDENTIFICATION: Mark any modifications performed during service.

11.1 Minor modifications which do not affect the fit form or function are recorded on the I. D. Plate as modifications.

11.1.1 MOD "A" Attach 1ea SZ83-041-3 Pulley, 1ea SZ41-019-5 Spacer, 1ea NAS1149F0632P Flat Washer, 1ea MS35338-46 Lock Washer, 1ea AN6H6A Bolt to output shaft.

11.1.2 MOD "B" 1ea SZ43-008-3 Pulley is supplied with motor to be attached in the field.

11.1.3 MOD "C" The following parts are deleted and not used, 1ea DA9-38 Diffuser, 4ea MS35265-28 Screw, 4ea MS35338-41 Lock Washer.

11.1.4 MOD "D" Use SZ58-004-3D Armature as alternate.

11.1.5 MOD "E" Change mounting and attaching hardware for the 2ea negative brush holders. Add: 8ea NAS1149f0463p Flat Washer, 4ea MS21245-4 Castle Nut, 4ea AN502A416-12 Screw. Delete: 4ea AN501A10-10 Screw, 8ea AN365-1032C Nut, 4ea 05-374002 Washer, 4ea 05-631018 Sleeve, 2ea SZ58-030-2 Strap. Using and deleting the parts listed change the end bell to the SZ58-021-1A configuration.



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11.1.6 MOD "F" Use Fan Z99-401-1 as alternate for DA9-39 Fan. Use Fan Cover SZ38-006-3A or Z99-505-1. Fan Cover SZ38-006-3 cannot be used with the Z99-401-1 Fan.

11.1.7 Mod "G": Add SZ58-026-2 Stator Assy to the L/M & F/D. When using the SZ58-026-2 Stator identify the motor assembly as SZ58-003-2 or SZ58-003-1 (MOD G).

11.1.8 MOD "H" Add SZ58-021-1B End Bell assembly to L/M & F/D. SZ58-021-1B is an alternate and interchangeable for SZ58-021-1A. Use existing stock of SZ58-021-1A until depleted.

11.1.9. Skip MOD "I"

11.1.10. MOD "J" (-1 & -2 only) use JH12990-1 Retainer. Attach with 4ea MS35206-248 Screw.

11.1.11. MOD "K" Use 1ea SZ58-806-1 Armature. Attach using 1ea 05-378003 Washer and 1ea 05-325004 Nut.

11.1.12. MOD "L" Use Stator Assy SZ58-026-1A as alternate for SZ58-026-1. Motors with Mod "L" stator (-1A) can be used in all applications. Motors with "Pre Mod "L" (-1) Stator cannot be used in later applications.

11.1.13 MOD "M" use brush kit Z6386CK. Kit contains 4 each Z6386C Brushes.

12.0 RECORDS: Make appropriate maintenance entries as required by your local civil aviation authority.

13.0 MATERIAL COST and AVAILABILITY: Contact ZEE Systems, Inc. or one of its approved Dealers, Distributors or Factory Authorized Repair Facilities. Contact information is available on the internet at www.zeeco-zeesys.com.

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