



ZEE Systems, Inc.

SERVICE LETTER 99-800-1

1.0 EFFECTIVITY: All ZEE Systems, Inc. Z99-800-1 Motors.

2.0 REASON: To provide service information for the Z99-800-1 Motor.

3.0 COMPLIANCE: Compliance is mandatory when performing service on the Z99-800 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 Z99-800-1 Motor.

5.0 WEIGHT AND BALANCE: Compliance with this Service Letter does not affect the weight and balance of the Z99-800 Motor.

6.0 ELECTRICAL LOAD AND PERFORMANCE DATA: Compliance with this Service Letter does not affect the weight and balance of the Z99-800 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 include time to remove and reinstall the motor in the system.

9.0 SERVICE INFORMATION: Refer to the following data when performing service.

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



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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. In this position spring tension should be between 32 and 48 ounces. 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 para. 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 (Positive) Assembly replacement: Replace any worn, burnt or defective Brush Holders.

9.5.1 Removal: Loosen nuts (2-7) and remove the two screws (2-12) and washers (2-11/-10) and non-metallic washers (2-8). Remove holder (2-5) and insulating sleeves (2-9). Remove any insulating enamel residue from the housing (2-1).

9.5.2 Installation: Install brush springs on holder as described in para. 6.4.1. Insert insulation sleeves (2-9) in housing (2-1). Place washers (2-10) on screws (2-12) and insert screws through insulation sleeves (2-9). Stack the non-metallic washers (2-8) then the holder (2-5), then non-metallic washers (2-8) and then washers (2-11), secure with nuts (2-7). Tighten to 20-25 in-lbs. Coat edge of holder (2-5) base, washers (2-8/-11), nuts (2-7) and screw heads (2-12) 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 Holder (Negative) Assembly replacement: Replace any worn, burnt or defective Brush Holders.

9.6.1 Removal: Loosen nuts (2-13) and remove the two screws (2-15) and washers (2-14). Remove holder (2-5). Remove any insulating enamel residue from the housing (2-1).

9.6.2 Installation: Install brush springs on holder as described in para. 6.4.1. Place washers (2-114) between the holder (2-5) and the housing (2-1) and insert screws through insulation sleeves (2-9). Stack washers (2-14), secure with nuts (2-13). Tighten to 20-25 in-lbs.



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9.7 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.

9.8 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.

9.8.1 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.

9.8.2 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.

9.8.3. 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.

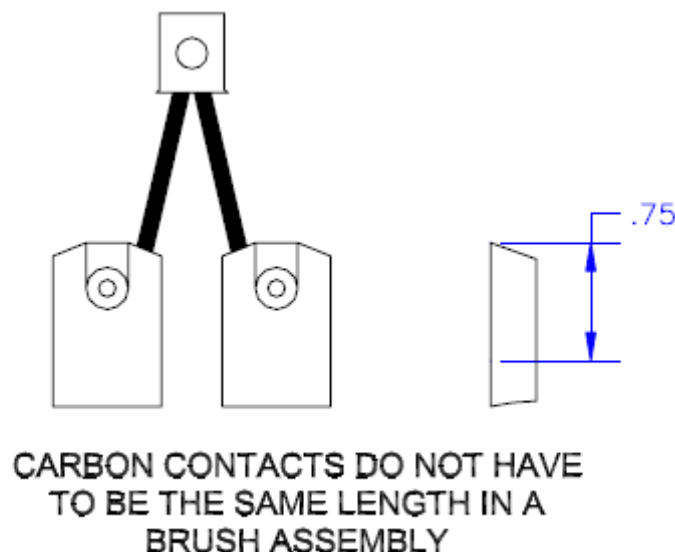


FIG. 3



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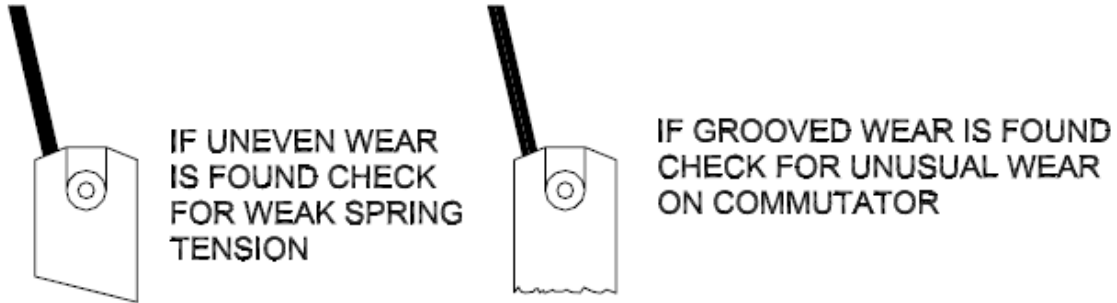


FIG. 3A

9.8.4 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.

9.8.5 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.

10.0 PARTS LIST: 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.

10.1 Motor Parts List and exploded view.

Table with 6 columns: FIG-ITEM, PART NUMBER, DESCRIPTION, ALTERNATE P/N, QTY, NOTES. Lists 16 items including motor, fan cover, armature, brushes, end bells, stator, bearings, brush kit, and washer.



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-17	JH12990-1	RETAINER		1	(MOD B)
-18	JH12989-2	RETAINER		1	
-19	JH12990	RETAINER		1	
-20	05-325003	NUT, BEARING LOCK		1	
-21	05-340200	SCREW	ALT: AN526C1032R10	4	
-22	05-349690	SCREW	ALT: AN502-8-14)	4	(PRE MOD B)
-23	05-419000	KEY		1	
-24	400649-1	I.D. PLATE	ALT: 259179-1	1	
-25	405690-1	PLACARD "ROTATION"		1	
-26	NOT USED				
-27	AN3-17A	BOLT		6	
-28	AN316-6R	NUT		2	
-29	AN4-4A	BOLT		1	
-30	AN501A10-6	SCREW		4	
-31	AN501A10-12	SCREW		8	
-32	MS21044N08	NUT, LOCK		1	
-33	MS35206-245	SCREW		1	
-34	MS35206-248	SCREW		4	
-35	MS35338-43	WASHER, LOCK	ALT: AN935-10L	18	
-36	MS35338-44	WASHER, LOCK	ALT: AN935-416	1	
-37	MS35338-46	WASHER, LOCK	ALT: AN935-616L	2	

FIG-ITEM	PART NUMBER	DESCRIPTION	ALTERNATE P/N	QTY	NOTES
-38	NAS1149F0332P	WASHER, FLAT	ALT: AN960-10L	6	
-39	NAS1149F0432P	WASHER, FLAT	ALT: AN960-416L	1	
-40	NAS1149F0632P	WASHER, FLAT	ALT: AN960-616L	4	
-41	SZ58-806-1	ARMATURE		1	(MOD C)
-42	05-378003	WASHER		1	(MOD C)
-43	05-325004	NUT		1	(MOD C)
-44	Z14-300-1	BRUSH COVER		1	(MOD D)
-45	Z14-300-2	BRUSH COVER		1	(MOD D)
-46	Z26-032-1	SWITCH ASSY, THERMAL		1	(MOD E)
-47	MS35206-226	SCREW	ALT: AN515-6R4	2	(MOD E)
-48	MS35338-41	WASHER, LOCK	ALT: AN935-6	2	(MOD E)
-49	NAS1149FN616P	WASHER, FLAT	ALT: AN960-6L	2	(MOD E)
-50	N3	CLAMP		1	(MOD E)
-51	SZ58-026-1A	STATOR		1	(MOD F)



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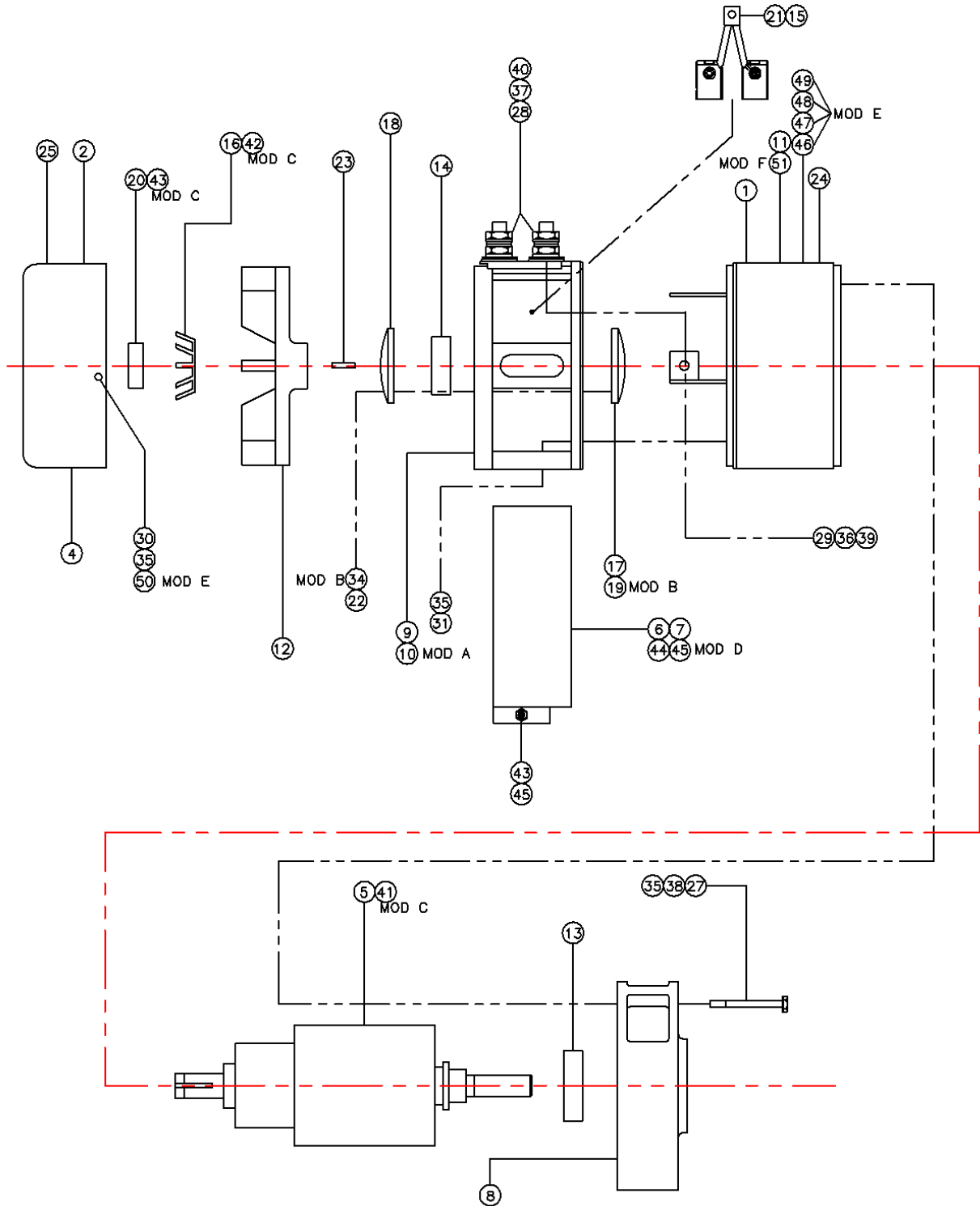


FIG. 1



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10.2 End Bell Assembly, Commutator End Parts List and exploded view. Motors with the SZ58-021-1 must be replaced with the SZ58-021-1B.

<u>FIG-ITEM</u>	<u>PART NUMBER</u>	<u>DESCRIPTION</u>	<u>ALTERNATE P/N</u>	<u>QTY</u>	<u>USAGE CODE</u>	<u>NOTES</u>
2A/B/C	SZ58-021-1A	END BELL ASSY, COMM END			A	
	SZ58-021-1B	END BELL ASSY, COMM END			B	
-1	SZ58-021-3	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		

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

Commutator End Bell Layout. See FIGURES 2B & 2C for Details

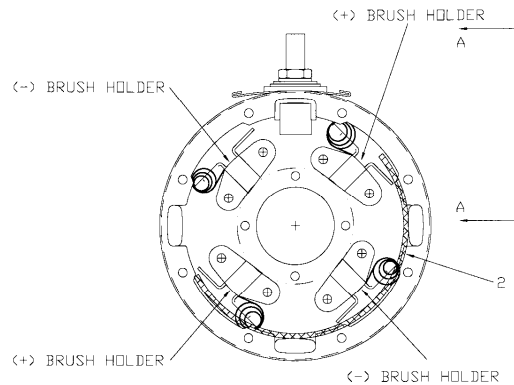


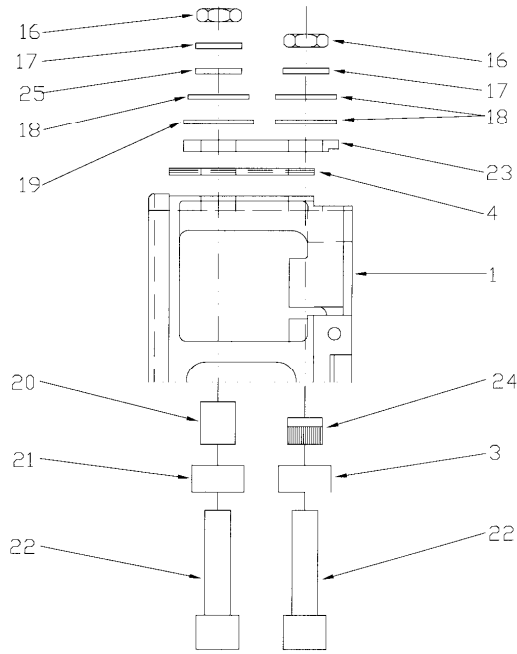
FIG. 2A



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Commutator End Bell, Terminal Hardware Exploded View.



VIEW A-A

BRUSH HOLDERS OMITTED FOR CLARITY

FIG. 2B

Commutator End Bell, Brush Holder Hardware Exploded View.

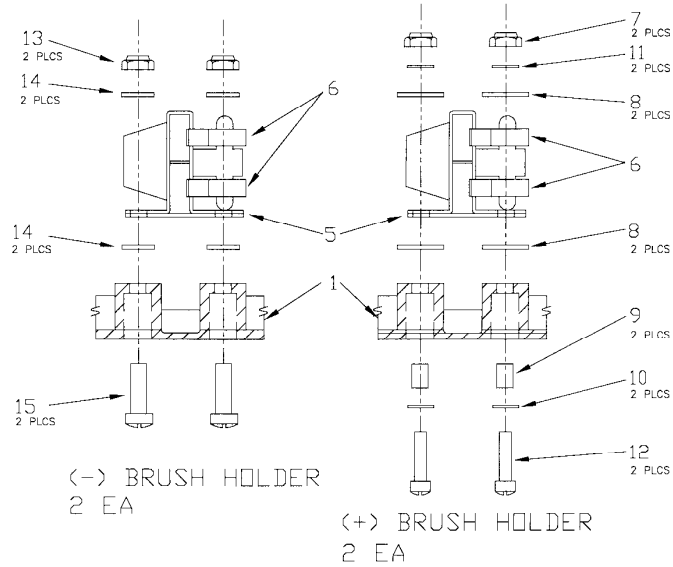


FIG. 2C



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11.0 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.

12.0 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.

12.1 Motors may be tested under no load conditions as follows. The Fan Cover and Brush covers must be attached to insure proper internal cooling. 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.

13.0 IDENTIFICATION: Mark any modifications performed during service.

13.1 Modifications to the motor may be made as product improvements or minor design changes. The following modifications have been assigned to the Z99-800-1 Motor. The modifications are recorded on the motor I. D. Plate. Not all modifications apply to all motors and applications. When ordering parts have the modification status of the motor available to insure the proper parts are acquired.

13.1.1 MOD "A" Add the SZ58-021-1B End Bell as an alternate and interchangeable for the SZ58-021-1A. Use existing stock of SZ58-021-1A until depleted. Ref E.O. 99-800-1.

13.1.2 MOD "B" Use the JH12990-1 Retainer. Attach with 4ea MS35206-248 Screws.

13.1.3 MOD "C" Use the SZ58-806-1 Armature. Attach with 1ea 05-378003 Washer and 1ea 05-325004 Nut.

13.1.4 MOD "D" Use the Z14-300-1 and Z14-300-2 Brush Covers.

13.1.5 MOD "E" Attach 1ea Z26-032-1 Thermal Switch Assembly to the motor Stator SZ58-026-1A. Attach using 2ea MS35338-41 (Alternate: AN935-6) Lock Washer, 2ea NAS1149FN616P (Alternate: AN960-6L) Flat Washer and 2ea MS35206-226 (Alternate: AN515-6R4) Screw. Pull the leads together about every 6 inches with MS3367 Cable



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Ties. Run wires through 1ea N3 Clamp on Fan Cover using existing hardware. MOD “E” must be used with MOD “F”.

13.1.6 MOD “F” Use Stator Assembly SZ58-026-1A. Motors with MOD “F” may be used in all applications. Motors with the pre-MOD “F” Stator (SZ58-026-1) can only be used with MODS “A”, “B”, “C” and “D”.

13.1.7 MOD “G” Use Brush Kit Z6386CK.

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

15.0 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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