

## Innovating tomorrow's solutions today

Morgan Advanced Materials offer Morganite & National Carbon Brushes Material Grades you can trust

## **Chart of common difficulties on Rotating Electrical Machines**

Symptoms					Symptoms					
M Serration and grooving of commutator or slip ring									Wear of slip ring on one polarity	N
L Excessive commutator wear-surface blackened									Copper picking in brush face	0
K Copper dragging									Brush chatter	Р
J Excessive commutator wear or slip ring wear-bright surface									Commutator surface streaky	Q
I Unequal brush wear									Commutator has unsymmetrical burn marks	R
H Rapid brush wear- while commutation good									Commutator has symmetrical burn marks	S
G Flexible burnt out or discoloured									Commutator has wavy pattern	т
F Brushes and brush holders too hot									Ghost marks on steel slip rings	U
E Commutator-slip ring-too hot									Glazed contact surface of brush	V
D Sparking vicious and trailing around commutator									Pitted contact surface of brush	W
<b>C</b> Green in sparks									Chipping of brush edges or brush breakage	X
B Sparking at entering edge									Failure to develop a protective skin	Y
A Sparking at leaving edge									Insufficient voltage on self exciting machines	Z
PROBABLE CAUSE OF TROUBLE	A B C D	EFGHI	JKL	<b>ΜΝΟΡ</b>	RST	υv	w x y	z	REMEDY	
I Interpole field too strong	x x	T	п	х	х	Г	х		Weaken interpole by divert or by increase gap	1
2 Interpole field too weak	x x		х	x	х				Strengthen interpole fields by reducing air gap	2
3 Interpole air gap too small	x x			x	x		х		Enlarge air gap to decrease effective interpole flux	3
4 Interpole air gap too large	x x		x	x	x				Reduce air gap to increase effective interpole gap	4
<ul><li>5 Air gaps uneven (bearings worn?)</li></ul>	x x	×		x	х		х		Renew bearings and realign machine	5
6 Overload machine	×	x x x x	x	x	x		x		Reduce and limit load on machine	6
7 Vibration from external causes, i.e. Prime mover: Nearby forge hammer etc	x			xxxx			x x	x	Locate and remove cause of vibration or mount machine on shock absorbers	7
<ul><li>8 Vibration from internal causes, i.e. out of balance, poor alignment etc</li></ul>	x		x		x x				Balance armature and check for bearing wear	8
	<b>^</b>					~ ^ v	~	^	¥	9
<ul> <li>9 Quasi electrolytic wear of slip ring</li> <li>10 Other bulk to construct the state of the state of</li></ul>			,		X	^	V	v	Reverse the polarity of rings periodically	7
<ul> <li>Oil and dirt on commutator or slip ring</li> </ul>		X X		X X			X		Clean commutator or slip ring	
Resistance between brushes and brush arms not uniform		X X X			X			X	Clean and tighten the connections	
<ul><li>I2 Grains of abrasive in brush contact face</li><li>I2 Example a structure in the s</li></ul>		_	X	X			X		Re-bed and clean the brush face	12
13   Faults in armature winding or equaliser connections		x			XX			X	Locate and cure fault or consult manufacturer	13
I4     Mica proud	x x x		X			_	XXX	X	Recess mica, or use more abrasive brush	14
15 Commutator or slip ring eccentric	X	X	X	XXXX				Х	Turn or re grind preferably at near rated speed	15
16 Commutator riser connections open circuited	x x x x				X			Х	Re-solder connections	16
17 High or low commutator segments	X X		X	X	x		X		Tighten commutator, turn, or re-grind	17
18 Commutator loose	x x x		Х	XXX	xx		х		Tighten commutator, re-mica if necessary,turn or re-grind	18
19 Flats on commutator or slip ring	x x x		Х	X X			xx		Locate and remove cause of flattening, turn or re-grind	19
20 Spring pressure too low	x	x x x x x	xxx	xxxx	xx	Х	x x	х	Adjust spring pressure to that recommended for brush grade	20
21 Spring pressure too high		xxx	хх	х			х		Adjust spring pressure to that recommended for brush grade	21
22 Spring pressure unequal	x	x x x	x	x x x	xx		x x		Adjust spring pressure uniformly to that recommended for brush grade	22
23 Brush grade unsuitable for machine duty	x x	x x x	ххх	x x x	х	х	x x x		Select one of our alternative grades or ask for our recommendation	23
24 Brush arc of contact excessive	x x x			х	х		х		Reduce the effective thickness of brush, preferably consult manufacturer	24
25 Brush arc of contact insufficient	x x x		х	х	х				Apply suitable circumferential stagger, preferably consult manufacturer	25
26 Brush flexible connection faulty		x x	<u> </u>					х	Fit a new brush with a sound flexible connection	26
27 Brush flexible too short or too stiff	x	x x x	(		х			х	Use brushes with flexible of correct length & flexibility	27
28 Imperfect brush bedding in	xx	x x		x			x	х	Bed brushes by our recommended method	28
29 Radial brush holders mounted at small reaction angle	x x	x x x	x	x x x	хх	х	хx	х	Adjust holders to a radial position, & correct distance from comm	29
30 Reaction type holder mounted trailing	xxx	x x x	x	x x x	хх	х	хх	х	Reverse holders or direction of rotation	30
31 Brush sticking or sluggish in brush holder	xx	x x x x	x	xx	xx		x	x	Check that brush size is correct, clean brushes and holders, remove any burrs	31
<ul><li>32 Brushes too loose in brush holder(holders worn?)</li></ul>		x x		X	x	_	хх		Replace holders, or order brushes of correct dimension	32
<ul><li>33 Terminal connections loose or dirty</li></ul>		x x x x		X	~	~		x	Clean terminals and terminal block. Tighten screws	33
		x		x x x x	XX	×	хх	^		34
<ul> <li>34 Brush holder mounted too far from commutator or slip ring</li> <li>35 Incorrect brush position</li> </ul>	x x x					_			Adjust holders to correct position	35
<ul> <li>35 Incorrect brush position</li> <li>36 Unaqual brush holder enging or alignment</li> </ul>			, X		X			X	Adjust holders to correct position	20
<ul> <li>36 Unequal brush holder spacing or alignment</li> <li>27 Unequal brush holder spacing or alignment</li> </ul>	X X X X			X	X		X		Correct spacing and alignment of holders	36
<ul> <li>37 Humidity of atmosphere low</li> <li>28 Humidity of atmosphere low</li> </ul>		X		X X		¥	ХХ		Humidify the cooling air or draw air from normal humidity source	37
<ul><li>38 Humidity of atmosphere excessive</li></ul>					X	X			Enclose machine or draw cooling air from normal humidity source	38
39 Dusty atmosphere		X		X			X		Remove cause if possible or install filter	39
40 Gas or acid fumes in atmosphere		X X		x x	X	X	XX	X	Arrange clean air cooling	40
41 Long periods of low or steady loads	x x	xx	х	x x x		Х	хх	Х	Change brush grade, ask for recommendation	41

## Technical training courses available

For a more comprehensive insight into carbon brushes and electrical machines request price and availability of our 300 page Carbon Brushes and Electrical Machines Manual from Morgan Advanced Materials

