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Service Bulletin

THIS SERVICE BULLETIN APPLIES TO ALL MODULAR 10 SERIES RELAYS

Issue: Whisker like components were identified on the PC board edge connectors of GE relays of the Modular 10 series. These whiskers were identified as Tin Whiskers, which crystallize on the PC board edge connectors, and can grow long enough to bridge the pins of the PC board edge connectors. These Tin Whiskers can thus cause relay misoperations. This was found on older MOD10 relays, in the excess of 10 years.

Products: DLS, OST, PLS, SLS, TLS, TRS and TYS protection relays.

Fix: The relays should be cleaned, after Tin Whiskers were identified during Inspection, as follows: The cleaning should be performed in conjunction with the cleaning instructions supplied by AMP Canada Ltd. (per attachment).

- All voltages (auxiliary DC and VT and CT connections) should be removed from the relay, and the relay should thus be out of service.
- All relay modules should also be removed, and be kept in a static free environment, prior to and during cleaning of all effected PC board edge connectors.
- Unscrew the rear cover of a GE Relay rack and remove slowly, only as far as internal wiring allows. Using a nonconductive bristled brush, nylon for example, agitate and sever the whisker from the connectors. All tin whisker residues should be removed from the entire unit by vacuum. This should be done in a separate lab, if possible, to ensure no contamination of the existing equipment due to the tin whiskers. Inspect cleaned connectors, using a flashlight and magnifying glass, to ensure all whiskers have been removed.
- After the cleaning, the cover should be replaced, ensuring that no wires get trapped.
- The relays should be tested, we recommend high potential dielectric tests, but at least all acceptance tests should be performed before returning the relay to service.

Units affected: All Modular 10 relays are affected, specially those 10 years or more in service.

Symptoms: Unexplainable relay misoperations due to tin whiskers bridging pins of PC board edge connectors. Tin Whiskers can be observed on the PC board edge connectors using a strong light source and a magnifying glass.

Actions: Inspect the back plane of all Modular 10 relays, for the presence of Tin Whiskers, as per instructions below. The age of the relay can also be determined as per instructions below. Re-inspect the relays six months to a year after cleaning, and repeat cleaning if necessary, as per recommendation by Amp Canada Inc.

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Contact the Technical; Support Call Center
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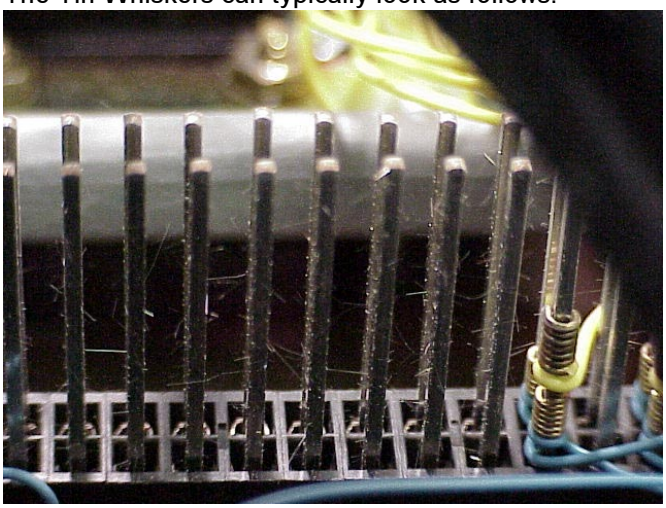
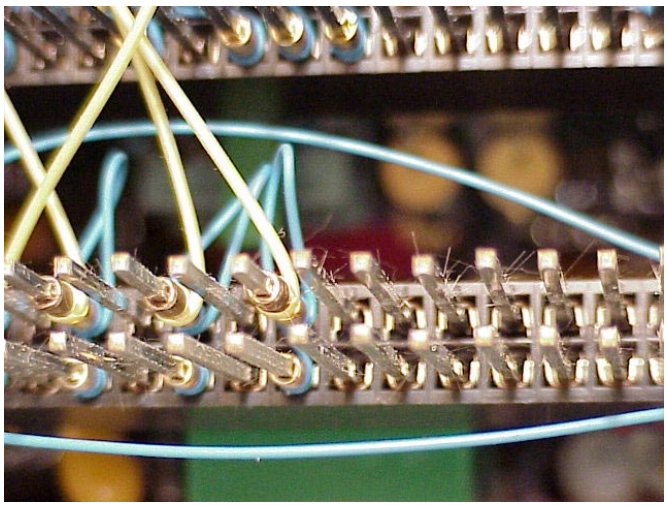
How to inspect the relay's backplane for the presence of Tin Whiskers

- Unscrew the rear cover of a GE Relay rack (**2FZ0100 - TLS rack A or B only for dual rack TLS relays, 2FZ0300 - SLS rack A or rack B only**) – slowly open the cover. Use a flash light and, a magnifying glass and inspect the edge connector pins for tin whiskers. Some of the whiskers can barely be seen with the naked eye
- On completion of the inspection, close the cover taking care not to trap wires between the cover and the rack casing. Tighten the screws of the rack cover.
- Proceed to the next rack if necessary and inspect as described above.

It is recommended to perform this inspection when the relay under inspection is not in service, since the relay can operate during inspection.

The Tin Whiskers can typically look as follows:





How to determine the age of the MOD 10 relay.

There are two ways to determine the manufacturing date of the relay:

- Using the relay serial number.

  The serial number of the relay starts with an alphabetical character, and is located on the inside upper right corner. The following table can be used to determine year of manufacturing:

Starting Character of Serial Number	Manufacturing Year
A	1990
B	1991
C	1992
D	1993
E	1994
F	1995
G	1996
H	1997
J	1998
K	1999

- Using the quality assurance acceptance code.

  The quality assurance acceptance code consists of two numbers followed by two alphabetical characters, e.g. 58PF, and is normally located on the inside upper right corner. Using the following table, the manufacturing date and month can be obtained:

215 Anderson Ave.
Markham, Ontario, Canada
L6E 1B3

Website: www.ge.com/indsys/pm
Email:info.pm@indsys.ge.com
Telphone: 1-905-294-6222
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DATE OF MANUFACTURE CODE

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DES
1965	AA	BA	CA	DA	EA	FA	GA	HA	JA	KA	LA	MA
1966	AB	BB	CB	DB	EB	FB	GB	HB	JB	KB	LB	MB
1967	AC	BC	CC	DC	EC	FC	GC	HC	JC	KC	LC	MC
1968	AD	BD	CD	DD	ED	FD	GD	HD	JD	KD	LD	MD
1969	AE	BE	CE	DE	EE	FE	GE	HE	JE	KE	LE	ME
1970	AF	BF	CF	DF	EF	FF	GF	HF	JF	KF	LF	MF
1971	AG	BG	CG	DG	EG	FG	GG	HG	JG	KG	LG	MG
1972	AH	BH	CH	DH	EH	FH	GH	HH	JH	KH	LH	MH
1973	AJ	BJ	CJ	DJ	EJ	FJ	GJ	HJ	JJ	KJ	LJ	MJ
1974	AK	BK	CK	DK	EK	FK	GK	HK	JK	KK	LK	MK
1975	AL	BL	CL	DL	E L	FL	GL	HL	JL	KL	LL	ML
1976	AM	BM	CM	DM	EM	FM	GM	HM	JM	KM	LM	MM
1977	AN	BN	CN	DN	EN	FN	GN	HN	JN	KN	LN	MM
1978	AP	BP	CP	DP	EP	FP	GP	HP	JP	KP	LP	MP
1979	AR	BR	CR	DR	ER	FR	GR	HR	JR	KR	LR	MR
1980	AS	BS	CS	DS	E S	FS	GS	HS	JS	KS	LS	MS
1981	AT	BT	CT	DT	ET	FT	GT	HT	JT	KT	LT	MT
1982	AU	BU	CU	DU	EU	FU	GU	HU	JU	KU	LU	MU
1983	AW	BW	CW	DW	EW	FW	GW	HW	JW	KW	LW	MW
1984	AX	BX	CX	DX	EX	FX	GX	HX	JX	KX	LX	MX
1985	AY	BY	CY	DY	EY	FY	GY	HY	JY	KY	LY	MY
1986	NA	OA	PA	RA	SA	TA	UA	VA	WA	XA	YA	ZA
1987	NB	OB	PB	RB	SB	TB	UB	VB	WB	XB	YB	ZB
1988	NC	OC	PC	RC	SC	TC	UC	VC	WC	XC	YC	ZC
1989	ND	OD	PD	RD	SD	TD	UD	VD	WD	XD	YD	ZD
1990	NE	OE	PE	RE	SE	TE	UE	VE	WE	XE	YE	ZE
1991	NF	OF	PF	RF	SF	TF	UF	VE	WF	XF	YF	ZF
1992	NG	OG	PG	RG	SG	TG	UG	VG	WG	XG	YG	ZG
1993	NH	OH	PH	RH	SH	TH	UH	VH	WH	XH	YH	ZH
1994	NJ	OJ	PJ	RJ	SJ	TJ	UJ	VJ	WJ	XJ	YJ	ZJ
1995	NK	OK	PK	RK	SK	TK	UK	VK	WK	XK	YK	ZK
1996	NL	OL	PL	RL	SL	TL	UL	VL	WL	XL	YL	ZL
1997	NM	OM	PM	RM	SM	TM	UM	VM	WM	XM	YM	ZM
1998	NN	ON	PN	RN	SN	TN	UN	VN	WN	XN	YN	ZN
1999	NP	OP	PP	RP	SP	TP	UP	VP	WP	XP	YP	ZP
2000	NR	OR	PR	RR	SR	TR	UR	VR	WR	XR	YR	ZR
2001	NS	OS	PS	RS	SS	TS	US	VS	WS	XS	YS	ZS
2002	NT	OT	PT	RT	ST	TT	UT	VT	WT	XT	YT	ZT
2003	NV	OV	PV	RV	SV	TV	UV	VU	WV	XV	YV	ZV
2004	NW	OW	PW	RW	SW	TW	UW	VW	WW	XW	YW	ZW
2005	NX	OX	PX	RX	SX	TX	UX	VX	WX	XX	YX	ZX
2006	NY	OY	PY	RY	SY	TY	UY	VY	WY	XY	YY	ZY

tyco Electronics

AMP

P.O. Box 3608
Harrisburg, PA 17105-3608

Noor Al-Shaikh
Quality Manager
AMP Canada Ltd.
Quality Department

February 14, 2000

Subject: P/N: 531268-1 GE Multilin, Hair like strings, laboratory analysis at a university has shown them to be conductive and tin, appearing on the contacts of this connector. The connectors were reported to have been in service since 1984 or 1986.

Mr. Noor Al-Shaikh,

Product Engineering from AMP provides the following statement based on information received about this problem. Samples were not available for analysis.

Tin whiskers can occur in pure electroplated tin plating. Stresses within the plated tin cause the whiskers to extend from the surface. AMP rarely specifies the use of pure tin plating because of the possible whisker growth problem.

AMP currently specifies (93%-7%) tin-lead alloy whenever possible to retard whisker growth and reduce lead exposure to the environment.

From our experience the plating stresses in tin that cause whiskers will relieve over time, and the frequency and magnitude of new whiskers will decrease accordingly.

We recommend using a nonconductive bristled brush, nylon for example, to agitate and sever the whisker from the contact and use a vacuum or compressed air to remove the whisker from the connector and the relay equipment.

Although, we believe a one time cleaning to remove the whiskers will be sufficient to solve this problem, an inspection of the connectors six month to one year after the cleaning is recommended.

Sincerely,

James S. Brosius, Quality Engineer
AMP Card Edge Connector Product Team

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