

INDEX

AC breakdown	X-3	Capability pull curves	IX-1
Actuating card	I-6, I-10, III-2	Card, actuating	I-7, III-2
Actuation of contacts	III-1, IX-2	Chatter,	
Adjustments,		hesitation	I-12
check	IX-7	initial	I-11
soak	II-2	rebound	I-12
test	II-2	shock	I-12
use of other than M specification	II-2	Check adjustments	IX-7
Adjusting tools	VIII-5	Choice of load or mass-controlled operate time	VII-2
Administration costs	XI-5	Circuit,	
AG relay design procedure	IX-8, IX-16	equivalent	VII-7
Airgap,		preparation	II-3
critical load	IX-2, IX-19	simulated	VII-8
critical load, AG relay	IX-25	variations	XI-2
determination	IX-4	Code,	
unoperated	IX-4, IX-6	information	II-1
values, AF, AJ, AK relays	IX-19	numbers	II-1
Allowable heating	IV-4	Coil,	
Allowable number of spare contacts	II-1	assembly	X-3
Ampere turns,		available	X-3
hold AF, AJ relay	IX-6	conductance	VII-9
hold AG relay	IX-11, IX-25	cost	X-7
minimum	X-6	cost comparisons	XI-1, XI-3
nonoperate	IX-5, IX-13, IX-26	design	X-4
operate AF relay	IX-19, IX-21	dimensions	I-2
operate AG relay	IX-12	fast operate	X-6
operate AJ relay	IX-19, IX-22	filled	X-1
operate AJ relay with laminations	IX-19, IX-23	full spool	X-4
operate AK relay	IX-19	most economical	XI-3
operate, detailed method	IX-5	secondary windings	X-5
operate, simplified method	IX-4	selection of wire insulation	XI-2
release	IX-6	specific resistance	X-4
release AG relay	IX-11, IX-12	use of formex wire	X-3
Annual code cost	XI-6	winding dimensions	X-3
Annual power	XI-4	winding methods	XI-6
Armature,	I-4	Conductance,	
back tension	II-2, VIII-2, IX-3	coil (Gc)	VII-9
	IX-6, IX-10	core (Gc)	VII-9
back stop	III-2	sleeve (Gs)	VII-9
embossing	IX-8	thermal	IV-2, X-6
hinge tension	IX-4, IX-10	Contact,	
leg clearance	I-5, VIII-3	actuation	I-8, III-1, IX-2
rebound	I-5, I-13	adjustment	I-5
travel	I-8, II-3, III-1	arrangement	I-1, III-2
	VIII-2	chatter	I-11
Assembly methods	XI-6	cover	I-10
Available coils	X-3	force	I-8, II-3, III-2
Average			VIII-2, IX-3
operate current	VII-4	gauging	II-2, VIII-1, VIII-5
operate time	VII-4	insulating	II-3
release time	VII-4	life, make only	VI-2
Backstop position	IX-4	life unprotected	VI-2, VI-3
Back tension	II-2, VIII-2, IX-3	light force	IX-3
	IX-6, IX-10	metal	II-3
speed coils	VIII-2	numbering	III-4
Balance spring	I-5, III-3	protection	VI-3
tension	IX-3, IX-10	protection, determination of	VI-4
thickness, AF, AJ, AK relays	IX-4	rebound	I-12
thickness, AG relay	IX-10	reliability	VI-5
Battery and ground on		replacement	VI-2
adjacent springs	II-3	sequence(s)	I-8, III-2, VIII-1
Before turnover gauging	VIII-2	size	VI-2
blocking relays	II-3	stagger time	VII-5
Break-contact load points	IX-2	trouble-free operation	VI-2
Buffer spring	III-4, VIII-3, IX-10	welding method	VI-1
cost	XI-1	Core,	
gauging	IX-4	conductance	VII-9
tension	VIII-3, IX-11	laminations	I-4, X-3
		plate	I-5
		plate dimension A	IX-4, IX-6

INDEX (Cont)

Core - (cont)			
Plate P numbers	IX-6	maximum	IX-14
Correction for,		Grounding strap	I-14
saturation	VII-2, VII-3	Heating,	
stop-disc height	VII-10	allowable	IV-3
Costs,		conditions	IV-3
buffer spring	XI-1	duty cycle	IV-2
coils	X-2, XI-1	effect on release time	IX-9
extra adjustments	XI-1	formulae	IV-4
extra relay features	XI-7	48-hour limit	IV-2
extra springs	XI-1	indefinite	IV-2
laminations	XI-1	intermittent	IV-2
long life features	XI-1	limits	IV-3
marker holding time	XI-3	maintenance	IV-2
new code	XI-5	normal	IV-1
power	XI-4, XI-5	trouble	IV-1
sleeves	XI-1	Hesitation	I-13
Cover, contact	I-10	Hesitation chatter	I-12
Critical		High-operation relays	II-1
load airgaps	IX-2, IX-19, IX-25	Hinge tension	IX-4, IX-10
load points	IX-2, IX-20	Hold ampere turns	IX-6, IX-11
operate loads,		Hold procedure,	
AF, AJ, and AK relays	IX-20	AF, AJ, AK relays	IX-19
AG relay,	IX-27	Hold procedure, AG relay	IX-25
release loads	IX-24	Inductance values	VII-6
Crosstalk	V-4	Information, code	II-1
Current flow requirements	II-2, IX-6, IX-8, IX-13	Initial chatter	I-11
Definitions		Initial watts	IV-3
average operate time	VII-1	Initial watts, duty cycle applies	IV-2
average release time	VII-9	Insulating contacts	II-3
maximum operate time	VII-1	Interleaving	X-1
maximum release time	VII-9	Intermittent heating	IV-2
minimum operate time	VII-1	Laminations	I-4, X-3
minimum release time	VII-9	cost of	XI-1
Design procedure for		Layers of wire, number of	X-5
AG relay	IX-9, IX-25	Leg clearance, armature	I-5, VIII-3
AG relay with shunt	IX-17	Life expectancy	I-11
AG relay with sleeve	IX-16	Life, long	I-11, II-1
fastest operate time	VII-5	Life, unprotected contacts	VI-2
Determination of airgaps	IX-4	Light contact force	IX-3
Dimension A, core plate	IX-4, IX-6	Load-controlled operate time	VII-2
Dimensions, winding	X-3	Load curves, maximum	IX-5
Duty cycle	IV-2	Load points,	
Effect of heating on release time	IX-9	AF, AJ, AK relays	IX-20
Electrical operate time	VII-2	AG relay	IX-25
Electrical release time	VII-9	critical	IX-2, IX-20
Embossed armature	IX-8	Long life features,	I-11
Equivalent circuits	VII-7	cost of	XI-1
Equivalent nonoperate	VII-3, IX-6	Magnetic interference,	V-1
Extra features, cost of	XI-1	on AK relay	V-4
Extra springs, cost of	XI-1	on relay adjustment	V-1
Fast operate coil design	X-6	on relay performance	V-3
Filled coils	X-1	pattern	V-1
Flexible mounting	I-13	Magnetic structure	I-4
Formula, winding resistance	X-5	Maintenance,	
Formex wire, use of	X-3	heating	IV-2
Full spool coil	X-4	specifications	II-3
Gauging		test gauging	VIII-2
before turnover values	VIII-2, VIII-5	Make-contact load points	IX-2
buffer spring	IX-4	Marker holding time, cost of	XI-1, XI-3
contacts	II-2, VIII-1	Mass-controlled operate time	VII-4
maintenance test	VIII-2, VIII-5	Maximum,	
M specification	VIII-1, VIII-5	armature back tension	IX-6
readjust	VIII-1, VIII-5	gram load determination	IX-14
wired equipment test	VIII-2, VIII-5	load curves	IX-5
Gram load,		operate time, load-controlled	VII-3
determination	IX-3	operate time, mass-controlled	VII-4
hold	IX-20	operated load, AF, AJ, AK relays	IX-20
		operated load, AG and AK relays	IX-29
		release time,	
		AG and AK relays	IX-11

INDEX (cont)

release time, (cont)		Operate times,	II-3
no shunt	VII-10	AF, AJ relays	VII-2
protected	VII-11	AG relays	VII-2
with shunt	VII-11	AK relays	VII-5
with sleeve	VII-11	average	VII-4
AK domed armature	VII-12	electrical	VII-2
Mechanical operate time	VII-2	load-controlled	VII-2, VII-3
Mechanical requirements	VIII-1, VIII-2	mass-controlled	VII-2, VII-4
Minimum,		mechanical	VII-2
ampere turns	X-6	short coil	VII-4
circuit closure, AG relay	IX-9	short pulse	I-14
operate time, load-controlled	VII-3	types of problems	VII-1
operate time, mass-controlled	VII-4	Operated position, (definition)	IX-4
operated loads, AF, AJ, and AK relays	IX-24	maximum load,	
operated loads, AG and AK relays	IX-30	AF, AJ, and AK relays	IX-20
release ampere turns,		maximum load,	
AG and AK relays	IX-11	AG and AK relays	IX-29
release time,		minimum load,	
AG and AK relays	IX-11	AF, AJ, and AK relays	IX-24
AK domed armature	VII-12	minimum load,	
no shunt	VII-10	AG and AK relays	IX-30
protected	VII-11	Optimum turns	VII-6, X-6
with shunt	VII-11	Permissible number of spare contacts	II-1
with sleeve	VII-11	Position, backstop	IX-4
Mounting	I-1	Power,	
Mounting centers	I-8	annual	XI-4
Mounting, flexible	I-13	cost of	XI-1, XI-4
M specification gauging	VIII-1	distribution	XI-4
Network, protection	VI-3	plant size	XI-4
New relay, when to code	XI-1	Pitch, winding	X-5
Noninductive,		Procedure for obtaining hold,	
shunt AG relay	IX-8	AF, AJ, and AK relays	IX-6, IX-19
shunt AF, AJ relays	VII-3	AG relay	IX-25
shunt AK relay	IX-8	AG relay with shunt	IX-17
windings	X-3	AG relay with sleeve	IX-16
Nonoperate,		nonoperate, AF, AJ relays	IX-5
ampere turns	IX-5	nonoperate, AG relay	IX-26
AF, AJ relays	IX-5	operate, AF, AJ, AK relays	IX-19
AG relay	IX-12, IX-26	operate, AG relay	IX-11, IX-25
equivalent	IX-6	release,	
for speed coils	IX-6	AF, AJ, AK relays	IX-24
Normal heating	IV-1	AG relay	IX-26
Number,		AG relay with shunt	IX-17
code	II-1	AG relay with sleeve	IX-16
layers of wire	X-5	Protection networks	VI-3
turns	X-5	Pull curves, capability	IX-1
turns per layer	X-5	Ratio, stop disc-to-card	VIII-1, IX-4
Numbering of terminals	III-4	Readjust gauging	VIII-1
Number of springs		Rebound chatter	I-12
AF relays	I-1	Relay,	
AJ relays	I-4	AF	I-1
AK relays	I-4	AG	I-1
Open circuit release, no shunt	VII-10	AJ	I-3
Operate ampere turns,		AK	I-4
AF relay	IX-21	AL	I-4
AG relay	IX-12, IX-25	AM	I-4
AJ relay	IX-22	blocking	II-3
AJ relay with laminations	IX-23	high number of operations	II-1
detailed method	IX-5	insulating contacts	II-3
procedures	IX-19, IX-25	life	I-11
simplified method	IX-4	test connections	II-3
Operate current, average	VII-4	transmission	I-4
Operate loads,		24 make	I-4, III-1
critical AF, AJ, AK relays	IX-20	24 break	I-4, III-1
critical AG relay	IX-27	Release ampere turns	IX-6
maximum AG and AK relays	IX-29	for maximum release time	VII-10
minimum AG and AK relays	IX-30	for minimum release time	VII-10
		minimum	IX-6

INDEX (Cont)

Release load, AF, AJ relays	IX-6, IX-24	Stop discs	I-4, VIII-3
Release procedure		correction for release	VII-10
AF, AJ, and AK relays	IX-24	effective height	IX-4
AG relay	IX-26	Stop disc-to-card ratio	VIII-1, IX-4
Release time	II-3	Strap, grounding	I-14
AF, AJ, AK relays	VII-10	Tension,	
AF, AJ relays, protected	VII-11	balance spring	IX-3, IX-10
AF, AJ, AK relays,		buffer spring	IX-10
resistive shunt	VII-11	hinge	IX-3, IX-10
AF, AJ relays, sleeve	VII-11	Terminal,	
AG, AK relays	IX-8, IX-11	connection to	I-1
AG relay, shunt	IX-17	numbering	III-4
AG relay, sleeve	IX-16	Test adjustments	II-2
AK relay, domed armature	VII-12	connection	II-3
average	VII-11	gauging values	VIII-2
determination	IX-11	Thermal conductance	IV-2, X-5
effect of heating on	IX-9	Thermal resistance	IV-3
electrical	VII-9	Thickness, balance springs	IX-4, IX-10
factors	VII-9	Times,	
soak effect	VII-11, IX-9	operate	II-3
shunt down	VII-12	release	II-3
Requirements,		Tools, adjusting	VIII-5
Circuit Requirements Table	IX-9	Transmission windings	X-5
current flow	II-2, IX-6	Travel,	
mechanical	VIII-1, VIII-2	armature	I-8, II-3
Resistance,			III-1, VIII-2
rise in	IV-3	stages	III-1
thermal	IV-3	time on operate	VII-2
variation	II-3, X-5	time on release	VII-9
Saturation, effect on operate time	VII-3	Trouble-free operation	VI-2
effect on release time	VII-11	Trouble heating	IV-1
Secondary winding	X-3, X-5	Turns,	
Selection of coils	XI-2	optimum	VII-6, X-6
Sequences of contacts	I-8, III-2, VIII-1	per layer	X-5
Shock chatter	I-12	Twin wires	III-1
Short-circuited winding	IX-8	U turns	X-5
Short pulses operation	I-13, I-14	Unoperated airgap, AF, AJ relays	IX-4, IX-6
Shunt down release time	VII-12	Unoperated airgap, AG relays	IX-25
Simulated circuits	VII-8	Unprotected contact life	VI-2, VI-3
Single wires	III-1	Use, other than M specification	
Sleeve,	IX-8, X-4	adjustments	II-2
conductance	VII-9	Values of airgaps	IX-19
cost of	XI-1	Watts, initial	IV-3
Slow release windings	X-4	Welding, contact	VI-1
Slow release relays	IX-8	Wire constants	X-4, X-13
Soak,		Wired equipment test gauging	VIII-1
adjustment	II-2	Wire insulation	X-3
effect	IX-9	Winding	
effect on operate time	VII-3	arrangements	X-4
effect on release time	VII-11	dimensions	X-3
requirements	IX-9	pitch	X-5
Spare contacts, allowable number	II-1	resistance formulae	X-5
Specifications, maintenance	II-3	resistance variation	II-3, X-5
Speed coil design	X-6	rise in resistance	IV-3
Speed coil, nonoperate or release	IX-6	secondary	X-3, X-5
Spring,		temperature limits	IV-4
assemblies	I-6	transmission	X-5
balance	I-5, III-3	Wear pads	I-11, II-1
buffer	III-4, VIII-3, IX-10		
combination numbers	III-3, VIII-2		
number of, AF relay	I-1		
number of, AK relay	I-4		
positions	III-3		
tension of balancing	IX-3, IX-10		
Stagger time (definition)	VII-9		
load-controlled operate	VII-5		
mass-controlled operate	VII-5		
release with no shunt or sleeve	VII-9		
release with shunt or sleeve	VII-11		