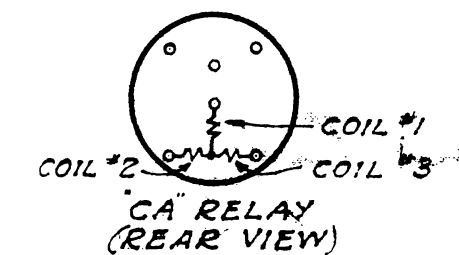


FUNCTION (1)	APPLIES TO (2)	POWER TRANSFORMER (3) (4)		RELAY SETTING (5)	MINIMUM PICK-UP AMPS THRU OPER. COIL FOR INTERNAL FAULT (6) (7)		CURRENT TRANSF. RATIOS (8) (9)		REMARKS (10)
		KVA	KV		RELAY COIL	12KV BASIS	LOW SIDE	HIGH SIDE	
TRANSFORMER FAULTS	STEP-UP STATIONS								
	METUCHEN	15000	12/125.4	5-5	3.0	780	4400/5	400/5	
	RICHMOND #13, 24, 31, 42	20000	12/125.4	5-5	3.0	1320	4400/5	400/5	
	RICHMOND #32, 41	15000 } 20000	12/125.4	5-5	3.0	1320	4400/5	400/5	
	ARSENAL BRIDGE	20000	13/138.6	5-5	3.0	780	2600/5	225/5	
	LAMOKIN #12, 11, 52, 51N	15000	12/125.08	5-5	3.0	360	1200/5	115/5	
	LAMOKIN #62, 4, 51S	20000	12/125.4	5-5	3.0	780	2600/5	225/5	
	SAFE HARBOR	20000	12/125.4	5-5	3.0	1140	3800/5	450/5	
	BENNING	15000	12/125.4	5-5	3.0	780	2600/5	225/5	
	ZOO	15000	138.6/48	5-5	3.0	720	200/5-15/5	225/5	
	STEP DOWN STATIONS								
	ALL SUBSTATIONS EXCEPT } WESTCHESTER BRANCH }	4500	138/12	5-5	3.0	360	1200/5	100/5	
	BRYN MAWR	5000	44/11.28	5-5	3.0	360	1200/5	390/5	
	PAOLI (44 KV)	5000	44/11.28	5-7.3	3.0	120	400/5	360/5	TRF. #13 COIL #2 ON LOW SIDE, #3 ON HIGH SIDE.
	PAOLI (44 KV.)	5000	44/11.28	5-7.3	3.0	120	400/5	360/5	TRF. #24 COIL #2 ON LOW SIDE, #3 ON HIGH SIDE.

NOTES

- 1) ALL RELAYS ON THIS DWG. ARE W.E. & M. CO.'S TYPE "CA" RATIO-DIFFERENTIAL RELAYS. SEE DWG. 2204B FOR OTHER TYPES.
- 2) TIME CHARACTERISTIC OF TYPE "CA" RELAYS SET ON 5-5 TAP.
- 3) THRU FAULT CHARACTERISTIC OF TYPE "CA" RELAYS: AN UNBALANCE OF 50% OF THE SMALLER CURRENT IS REQUIRED TO OPERATE THE RELAY WHEN SET ON THE 5-5 TAP.
- 4) VALUES GIVEN IN COLS (6) AND (7) MAY VARY ±10% - THE LOWER VALUES APPLY TO THE CASE WHERE THE CURRENT IN COIL #2 IS ZERO. THE HIGHER VALUES APPLY TO THE CASE WHERE THE CURRENT IN COIL #3 IS ZERO. INTERMEDIATE VALUES APPLY TO THE CASE WHERE ALL THREE COILS CARRY CURRENT, THE CURRENTS IN COIL #2 & #3 HAVING OPPOSITE DIRECTION.
- 5) EXCEPT WHERE OTHERWISE NOTED IN COL (10) THERE ARE TWO C/T'S, RATIO GIVEN, CONNECTED IN PARALLEL, ON THE HIGH SIDE AS WELL AS ON THE LOW SIDE OF THE POWER TRANSFORMER.

SECONDS		AMPERES THRU		
15000 KVA AND OVER	UNDER 15,000 KVA	COIL #1	COIL #2	COIL #3
.6	.20 to .24	20.0	20.0	0
.3	.12 to .16	20.0	0	20.0



3-20-59	9	aw	um	E.P.F.	REVISED FOR 44 KV REMOVAL
1-17-55	8				REMOVED L.I.C. REFERENCE
6-6-50	7				ENTERED SLOWER TIME FOR 15,000 KVA AND UP
11-23-48	6				PAOLI & BRYN MAWR TRF. CHANGES
4-8-47	5				REV. POW. TRANSF. RICH. EL.I.C.T. RATIO AT S.H. CHANGED METUCHEN RATIO & RICH. C.T.'S & SETTINGS
3-18-46	4				REVISED SAFE HARBOR SETTING
10-10-40	3				CORRECTED FOR HARRISBURG ELECTR.
7-25-39	2				ORIGINAL
10-3-35	1				

THE PENNSYLVANIA RAILROAD
EASTERN ELECTRIFICATION
RELAY DATA FOR 25 CYCLE SYSTEM
TRANSFORMER DIFFERENTIAL REL.

PHILADELPHIA, PENNA.
No 2204A
H. J. ...
CHIEF OF MOTIVE POWER
ELECTRICAL ENGINEER

(2) 10/12/38 NB (6) 10/21/47 JMA