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भारत सरकार - रेल मंत्रालय
अनुसंधान अभिकल्प और मानक संगठन
मानक नगर, लखनऊ - 226 011
Government of India, Ministry of Railways
Research Designs & Standards Organisation
Manak Nagar, Lucknow - 226 011

No. TI/PSI/PROTCT/FLASH/09


Date: 09.02.2009

Chief Electrical Engineer

- i) Northern Railway, Baroda House, New Delhi - 110 001
- ii) Central Railway, 2nd Floor, Parcel Office Building, CST Mumbai - 400 001
- iii) Eastern Railway, Fairlie Place, Kolkata - 700 001.
- iv) North Eastern Railway, Gorakhpur (UP)
- v) Southern Railway, Park Town, Chennai - 600 003
- vi) South Central Railway, Railnilayam, Secunderabad -500 371.
- vii) South Eastern Railway, Garden Reach, Kolkata 700 043.
- viii) South Eastern Central Railway, Bilaspur 495 004
- ix) Western Railway, Churchgate, Mumbai - 400 020.
- x) East Coast Rly, B-2, BDA Rental Colony, Chandshekharpur, Bhubaneswar
- xi) East Central Railway, Hajipur (Bihar).
- xii) North Central Railway, Near Rly Station, Allahabad.
- xiii) South Western Railway, DRM Office, Bangalore.
- xiv) West Central Railway, DRM Office, Jabalpur.
- xv) Central Organisation for Rly Electrification, Nawab Yusuf Rd. Allahabad
- xvi) Director, Indian Railway Institute of Electrical Engineering (IRIEEN), Post Box No. 233, Nasik Road-422101.

Sub: Instruction no. TI/IN/0018 (Feb/2009) for application of existing panto flash over relay at traction sub-station (TSS) for single line section on Indian Railways.

Please find enclosed herewith a copy of the instruction no. TI/IN/0018 (Feb/2009) for application of existing panto flash over relay at 25 kV ac traction sub-station (TSS) with single line section on Indian Railways for your kind information and necessary action please.


(Sumit Bhatnagar)
For Director General/TI

Encl : As above

Copy to:
ED/EE(M)
Room No. 102-A, Railway Board.

Effective from: 09.02.2009	Instruction No. TI/IN/0018	Instruction for use of existing Panto flashover relay at 25 kV ac TSS with single line section
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MASTER COPY

TRACTION INSTALLATION DIRECTORATE



सत्यमेव जयते

**GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS**

Instruction No. TI/IN/0018 (Feb/2009)

For

**APPLICATION OF EXISTING PANTO FLASH OVER RELAY
AT TRACTION SUB-STATION (TSS) FOR SINGLE LINE
SECTION ON INDIAN RAILWAYS**

February 2009

ISSUED BY

**Traction Installation Directorate
Research Designs and Standards Organization
(Ministry of Railways)
Manak Nagar, Lucknow – 226011**

Effective from: 09.02.2009	Instruction No. TI/IN/0018	Instruction for use of existing Panto flashover relay at 25 kV ac TSS with single line section.
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1.0 Scope

This instruction stipulates the action to be taken by Zonal Railways / CORE as applicable for use of existing panto flash over relays of M/s Ashida (type: APFO/1) and M/s Alind (type: TVG-124) make at 25 kV, ac traction sub-station (TSS) with single line section.

2.0 Background

A specification no. TI/SPC/PSI/PROTCT/2983 for Panto flash over relay was developed by RDSO in 1998 for double line section to prevent the flashovers at FP insulated over lap (IOL) when electric locomotives enter from live to dead OHE. At present the panto flashover relays of M/s Ashida and M/s Alind make are already provided at number of TSS with double line sections.

Northern Railway requested to study the application of existing panto flash over relay for single line section of 25 kV ac traction system also. In this regard it is observed that the existing panto flashover relay as developed for double line section as per RDSO specification no. TI/SPC/PSI/PROTCT/2983 can also be used for single line sections also as per logic and connection diagram explained in this instruction.

3.0 Working of Panto flash over relay

3.1 Whenever there is tripping of circuit breaker due to fault on one of the sides of the FP IOL and a electric train enters from live to dead section of the FP IOL there shall be a heavy flash over when the panto leaves the IOL. Depending upon the intensity of current being drawn by the panto at that point of time, the extent of damage would be cutting of a few strands of catanery or parting of the OHE.

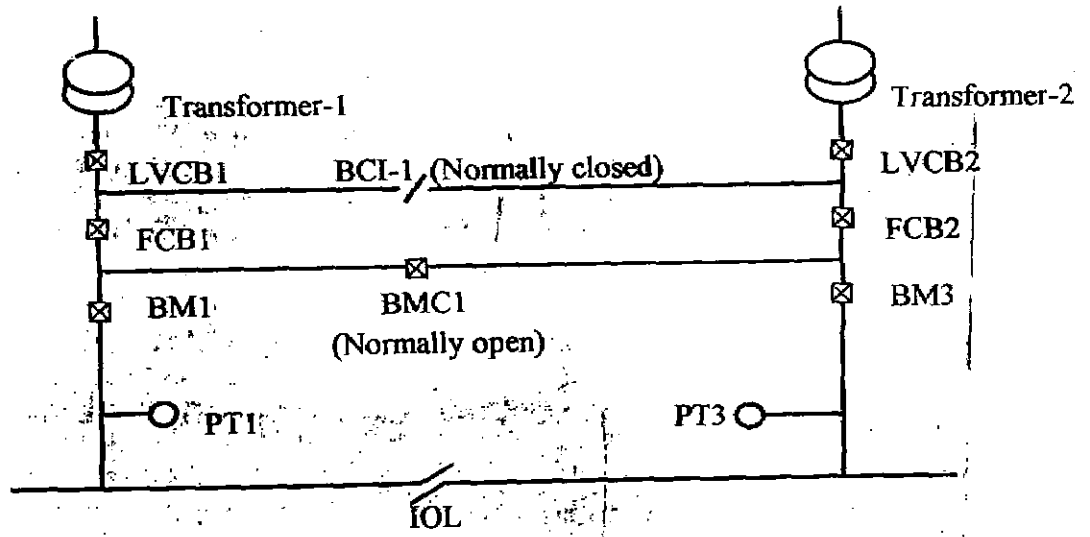
3.2 The various types of faults which can cause CB tripping are as follows:

- a) A permanent fault, and the CB is unable to hold.
- b) A transient fault which may not reappear on the reclosure of the Circuit Breaker.
- c) An intermittent fault which may go on reappearing within short intervals (like a tree swinging and touching the OHE).

3.3 If there is a permanent fault on one side of the TSS resulting in tripping of any one of the CBs and pantograph bridges the IOL from the live end, the second feeder CB shall also trip under the normal fault conditions. In such an event there shall be no possibility of any damage to OHE due to flashover.

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- 3.4 In case of transient faults, the quick reclosure of CB may obviate the problem but if the reclosure is delayed, the possibility of flashover will continue to exist.
- 3.5 The situation is worse in case of intermittent faults since in case of CB tripping a second time the TPC will go in for an fault isolation which will require some time. If in the intervening period, a train enters the insulated overlap, when there was no fault on the other side of the OHE, heavy flashover will take place which may cause extensive damage to OHE.
- 3.6 Logic for various conditions like status of different switching devices, PT's can be used by a microprocessor based relay to detect the eminent condition of flashover over IOL and other FCB can be tripped.
- 3.7 In case any side of the overlap is dead, due to any of the feeder breakers being tripped, the PT output at that side gets dipped considerably. If PT delivers a normal output on dead line, which can only be due to bridging of the live line by the panto, the relays sense this as an abnormal condition and release trip command to the feeder breaker, parallelly disabling auto reclose scheme, to prevent auto reclosing of this dead line.
- 3.8 Under extended feed condition i.e. in case the feed is extended to the failed TSS, the relay shall be disabled. This shall be recognised by the relay from the status of feeders and interrupters.
- 4.0 Working logic for panto flashover relay for use in single line section is given below:
- 4.1 Schematic lay out arrangement of TSS for single line section



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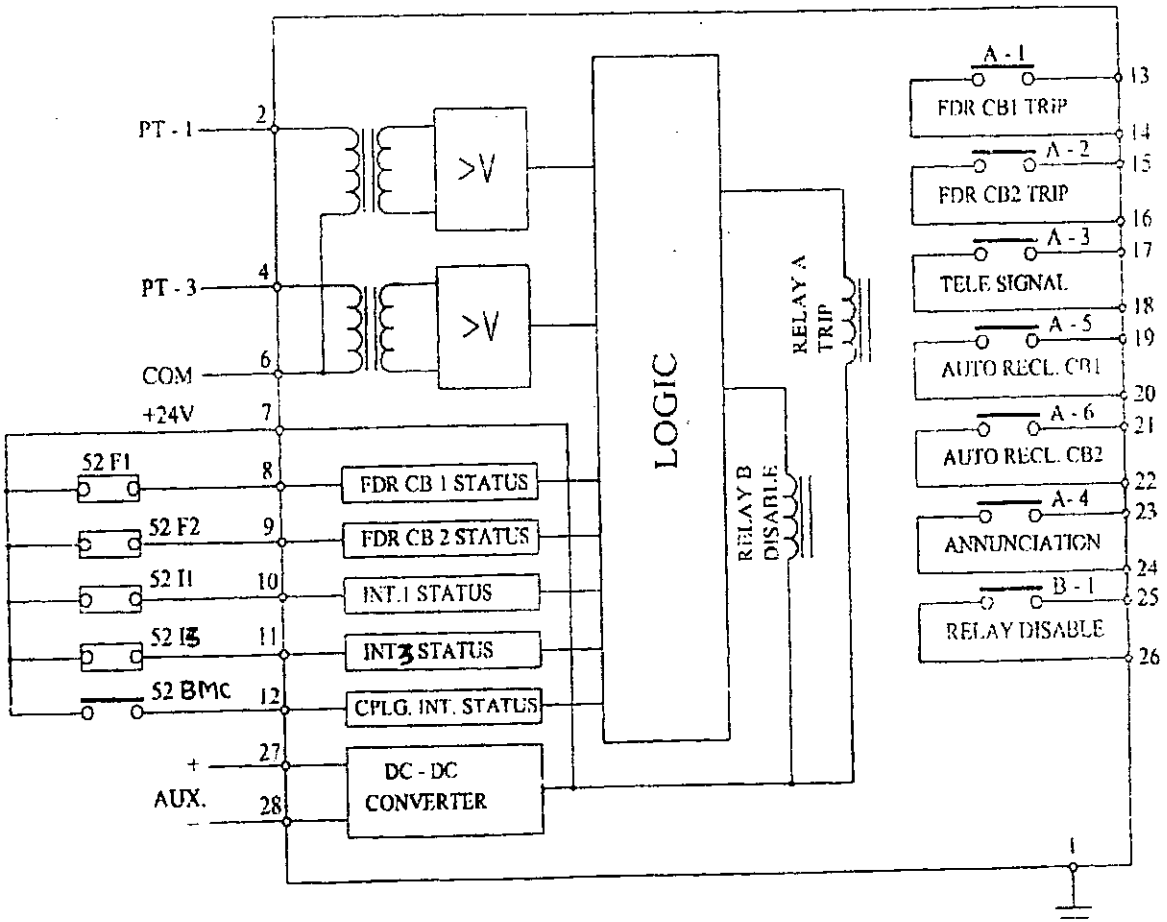
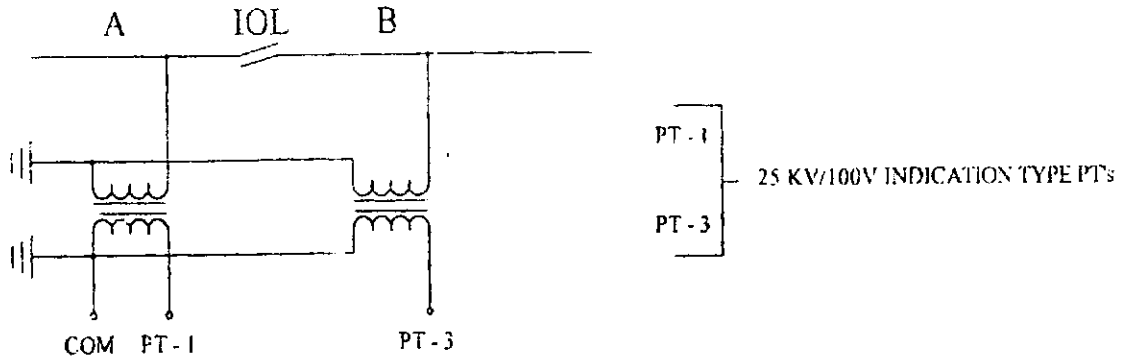
**4.2 Logic chart of panto flash over protection relay for single line section
(When the panto bridges the IOL momentarily)**

S. No.	FCB1	FCB2	BM1	BM3	BMC1	PT1	PT3	Relay operation	Supply Feed condition
1	1	0	1	1	0	1	1	Relay shall Trip	Normal
2	0	1	1	1	0	1	1	Relay shall Trip	Normal
3	*	*	0	*	*	*	*	Relay shall not Trip	Extended
4	*	*	*	0	*	*	*	Relay shall not Trip	Extended
5	*	*	*	*	1	*	*	Relay shall not Trip	Extended

- 1- Denotes Breaker or Interrupter closed / PT delivers output
- 0- Denotes Breaker or Interrupter tripped
- *- Denotes 1 or 0 status need not be cared or considered.

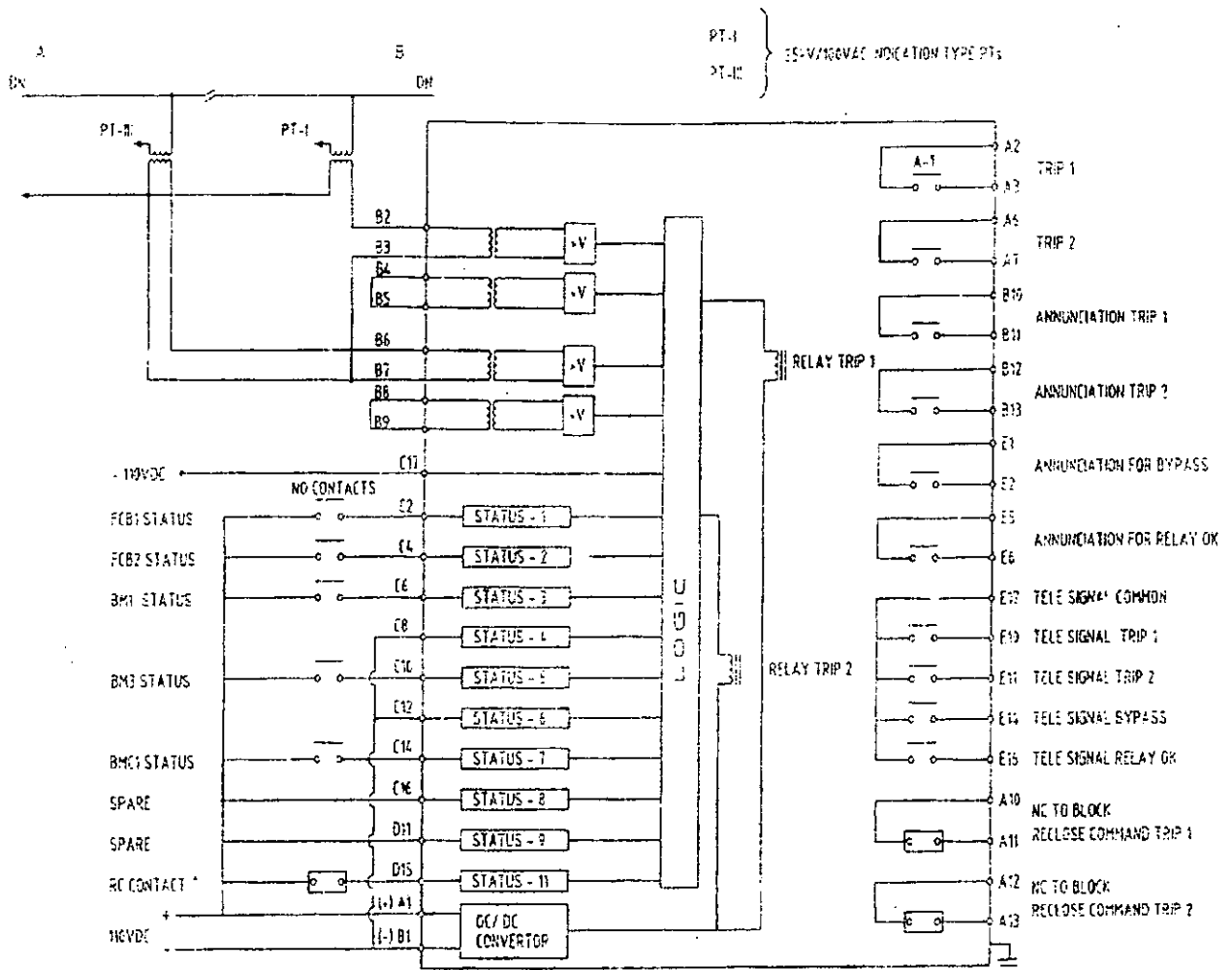
5.0 Connection diagram of panto flash over relay for single line section

5.1 M/s ALIND make (Type – TVG 124) panto flash over relay



5.2 M/s ASHIDA make [Type APFO / 1 (Logic-1)] panto flash over relay

ELECTRICAL CONNECTION OF APFO/1 (LOGIC-1) OF CONVENTIONAL 25KVAC TRACTION SYSTEM.



The connections as explained above may be adopted for using the existing relays for the single line section. In case of any further clarifications relay manufacturers may also be consulted.

6.0 References

M/s ASHIDA & M/s ALIND letter Nos. AEPL/0811/359/L dated 28th November 2008 & DD/EC/FR-4/01/0080/1187 dated 9th September 2008 respectively regarding the use of same panto flash over relay as approved for double line section in single line section.