

भारत सरकार GOVERNMENT OF INDIA  
रेल मंत्रालय MINISTRY OF RAILWAYS  
(रेलवे बोर्ड) (RAILWAY BOARD)

सं. 2012/Tele/11(10)/1

नई दिल्ली, दिनांक:12/02/2013

**TELECOM CIRCULAR No. 04/2013**

**General Manager,  
All Indian Railways.**

**Director General/RSDO, Lucknow.**

**Director/IRISET, Secunderabad.**

**Director/CAMTECH, Gwalior**

**Sub: Utilisation of Quad cables for provision of connectivity between station to mid-section and station to station using phantom arrangements on VF grade primary circuits.**

**Ref: (i) Board's letter No. 2003/Tele/TP/1 dated 08.8.2003**

**(ii) Board's letter No. 2004/Tele/TE/3 dated 14.07.2004**

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Railway Board's letter under reference.(i), had standardised allocation of quads/pairs in 6 Quad cable for working of various circuits. Thereafter, vide Board's letter under ref (ii), guidelines were issued that when 4/6 quad copper cable is laid alongwith OFC, *spare quads should be kept in good condition to be available for safety enhancement works such as BPAC, TAWS etc. and for extending communication circuits needed during crisis management from points in mid-sections.*

2. Many Railways have terminated one pair from the spare quad in all the EC sockets for this purpose. The downside of this arrangement is that the pair thus terminated on the sockets at every km, no longer remains as spare and hence cannot be used afterwards for any safety enhancement works as envisaged in the Board's letter under reference(ii).

3. Of late, demand of circuits on quad cable has increased on account of networking of Data-loggers, Remote Control & TPC at Traction Substations, UTS connectivity at Flag stations, Auto-Signal huts etc. Successful trials of a scheme to build up a communication link from mid-section to the nearest block station as well as between adjoining stations through phantom arrangements utilising working quads have been reported by various Railways. This scheme can be used for extending Auto-telephone, Data circuits etc. from mid-section during unusuals.

4. Therefore to optimise the utilisation of quads/pairs of quad cables, following instructions are issued for implementation in all sections equipped with 4/6 Quad cables with or without OFC:-

- i) Except the nominated quad for EC no additional pair should be terminated at the EC sockets. For extending Auto-telephone, Data circuits etc. to mid-sections to meet any urgent requirement (temporary in nature) phantom circuit should be built up using the EC quad and terminated in the pins 3&4 of the EC socket.

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- ii) Only RDSO approved 2-T type VF transformers with centre tapping for the quad cable side coils and of appropriate impedance ratios shall be used for building of such Phantom circuits over quad cables. Phantom circuits would offer nearly half the loop resistance compared to a dedicated pair over the same circuit length and thus will permit higher bandwidth for data circuits as well as longer distance for Auto phone circuits. Typical schemes for building up phantom circuits on working quads to serve various purposes are shown in the diagrams enclosed.
- iii) Spare quads/pairs in the 4/6 quad cable shall be terminated only at the station cable huts and kept in good condition to be available for future requirements including safety enhancement works such as BPAC, TAWS etc. between adjacent block stations.
- iv) This arrangement of phantom circuit on pin 3&4 of EC sockets may only be utilized to meet any data/voice circuit requirement for emergent situations that are temporary in nature be it Railnet, Internet, UTS, Remote Control etc. at midsection, SPs, SSPs, Intermediate stations etc. or between adjoining station.
- v) These instructions shall also be applicable in sections where Quad cable work is in progress.
5. Please acknowledge receipt.

Encl: Typical schemes as mentioned above.



(राकेश रंजन)

निदेशक/दूरसंचार

दूरभाष: 011-23388504, 030-44613

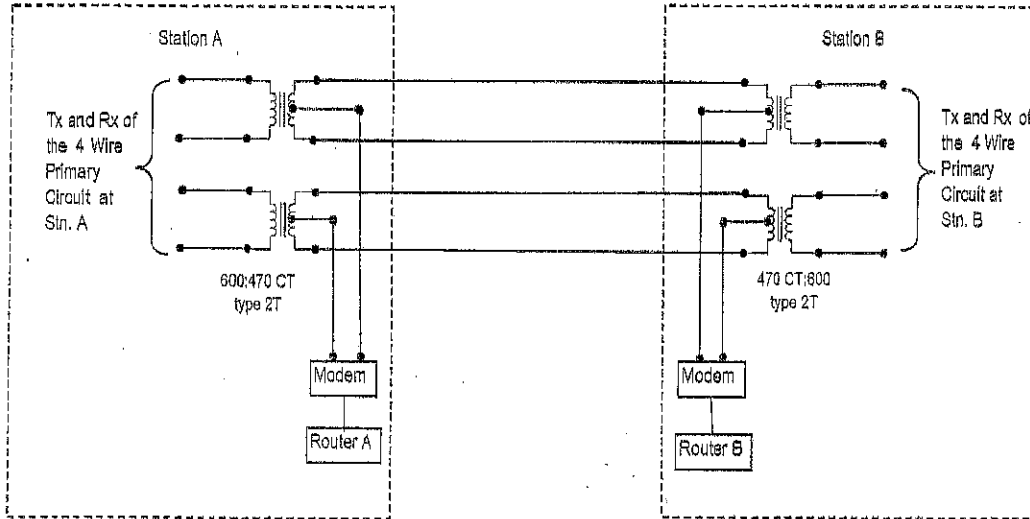
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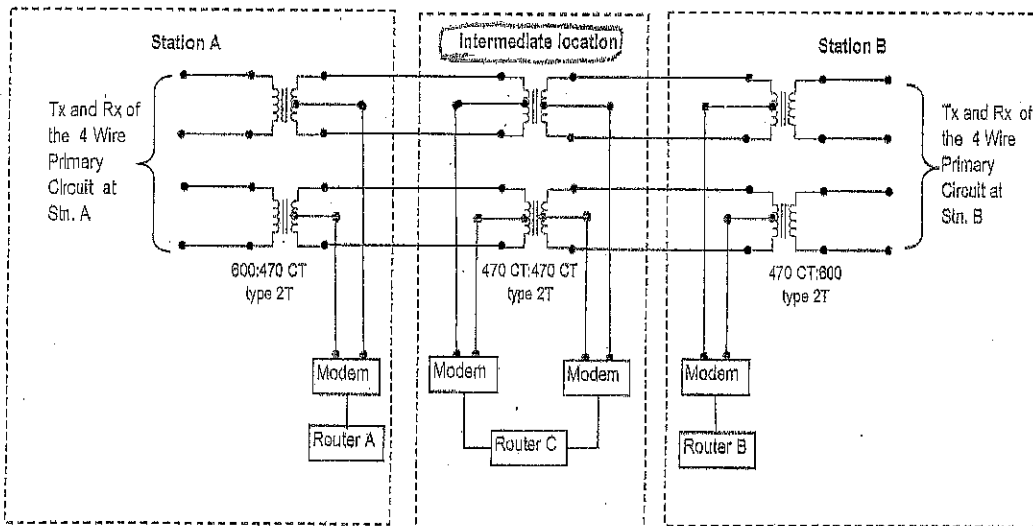
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Typical arrangement for building and terminating of phantom circuit at Cable huts / ASM's office in 4/6 Quad cables with or without OFC



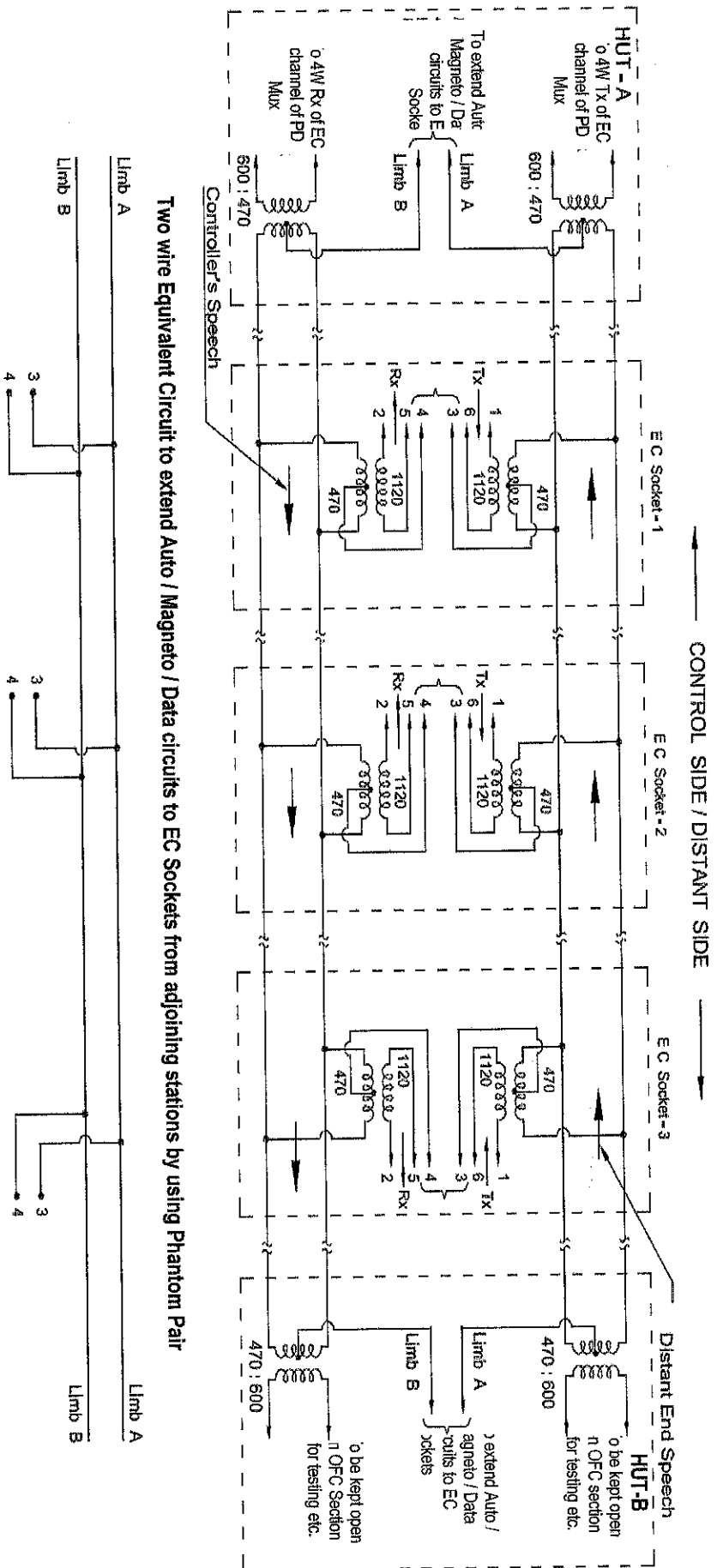
(a) Typical use of Phantom arrangement built over a quad to extend data circuits with GHDSL Modems between two neighbouring stations 'A' and 'B'.



(b) Typical use of Phantom arrangement built over a quad to extend data circuits with GHDSL Modems at an Intermediate location 'C' e.g UTS at a Flag Station, Remote control RTU locations etc from the neighbouring stations 'A' and 'B'. The VF signals of the primary circuit are repeated at the intermediate location through 470 CT:470 CT type 2T which will offer negligible Insertion loss.

*ndw*

Typical arrangement for building and terminating of phantom circuit at the EC Sockets and cable huts / ASM's office in 4/6 Quad cables with PD Mux in OFC or Equalizer Amplifier arrangements



Note:-

1. At cable huts VF Transformers shall be of 470  $\Omega$ (C/T): 600  $\Omega$  type for PD Muxes and 470  $\Omega$ (C/T):470 type for Equalizer Amplifiers. and at EC socket shall be of 470  $\Omega$ (C/T): 1120  $\Omega$  type.
2. EC Socket pins 2&5 are for TPC-Tx, pins 1&6 are for TPC-Rx and pins 3&4 are for terminating the phantom pair to extend Auto/ Magneto / Data circuits at EC Sockets.
3. The overall DC loop resistance of the 2 W equivalent (phantom) circuit from any point to any point shall be equal to  $18 + 56 \times (L/2)$   $\Omega$  excluding local lead (if any). L is the quad cable length in kms between the two ends of the intended phantom circuit, 56  $\Omega$  / km is the loop resistance of 0.9 mm quad cable and 18  $\Omega$  is the DC resistance of the 470  $\Omega$  winding of 2T.
4. To extend a common Auto Number for multiple block sections, drop Subscriber-end circuits at all the desired PD Muxes and configure those in semi-conference mode. In this arrangement one remote user at a time shall be able to use the common Auto number. For satisfactory working of Auto phones the net loop resistance of the 2 wire equivalent circuit should be within 1000  $\Omega$ .

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