



No. EL/4.2.15/Gen

Date 14.3.2019

प्रमुख विद्युत अभियंता,	Principal Chief Electrical Engineers,
1. मध्य रेलवे, मुम्बई सीएसटी-400 001	1. Central Railway, Mumbai, CST-400 001.
2. पूर्व मध्य रेलवे, हाजीपुर-844 101	2. East Central Railway, Hazipur-844 101.
3. पूर्व तटीय रेलवे, चन्द्रशेखरपुर, भुवनेश्वर-751 017	3. East Coast Railway, Chandrashekharpur, Bhubaneswar -751 017.
4. पूर्व रेलवे, फेयर्ली प्लेस, कोलकाता-700 001	4. Eastern Railway, Fairlie Place, Calcutta-700 001.
5. उत्तर मध्य रेलवे, ब्लाक ए-2, सुबेदारगंज इलाहाबाद-211 033	5. North Central Railway, Block-A, Subedarganj, Allahabad- 211 033.
6. उत्तर रेलवे, बडौदा हाऊस, नई दिल्ली-110 001	6. Northern Railway, Baroda House, New Delhi-110 001.
7. उत्तर पश्चिम रेलवे जयपुर- 302006	7. North Western Railway, Jaipur- 302 006
8. उत्तर पूर्व रेलवे गोरखपुर- 273001	8. North Eastern Railway, Gorakhpur-273001
9. उत्तर पूर्व फ्रेन्टीयर रेलवे मालीगॉव गुवाहाटी-781011	9. North East Frontier Railway, Maligaon, Guwahati- 781011
10. दक्षिण मध्य रेलवे, रेल निलायम, सिकंदराबाद-500 371	10. South Central Railway, Secunderabad-500 071.
11. दक्षिण पूर्व मध्य रेलवे, बिलासपुर- 495 004	11. South East Central Railway, Bilaspur-495 004.
12. दक्षिणपूर्वरेलवे, गार्डनरीच, कोलकाता-700 043	12. South Eastern Railway, Garden Reach, Kolkata-700 043.
13. दक्षिण रेलवे, पार्क टाउन, चेन्नई-600 003	13. Southern Railway, Park Town, Chennai-600 003.
14. दक्षिण पश्चिम रेलवे हुबली-580020	14. South Western Railway, Hubli- 580020
15. पश्चिम मध्य रेलवे, जबलपुर-482 001	15. West Central Railway, Jabalpur-482 001.
16. पश्चिम रेलवे, चर्चगेट, मुम्बई- 400 020	16. Western Railway, Churchgate, Mumbai-400 020
17. चित्तरंजन रेल इंजन कारखाना, चित्तरंजन- 713 331	17. Chittaranjan Locomotive Works, Chittaranjan-713 331
18. डीजलरेलइंजनकारखाना, वाराणसी-221004	18. Diesel Locomotive Works, Varanasi-221 004.

**Technical circular number RDSO/2019/EL/TC/0150 (REV. '0') dated 14.3.2019**

**Sub: Proper connection of MU coupler in Microprocessor based Control & fault diagnostic System (MPCS) V3 locomotives to ensure proper working of Vigilance Control Device (VCD)**

**Ref:** ECoR letter number ECoR/EL/TRS/433/01<A>/1981 dated 10.10.2018

### 1.0 Background:

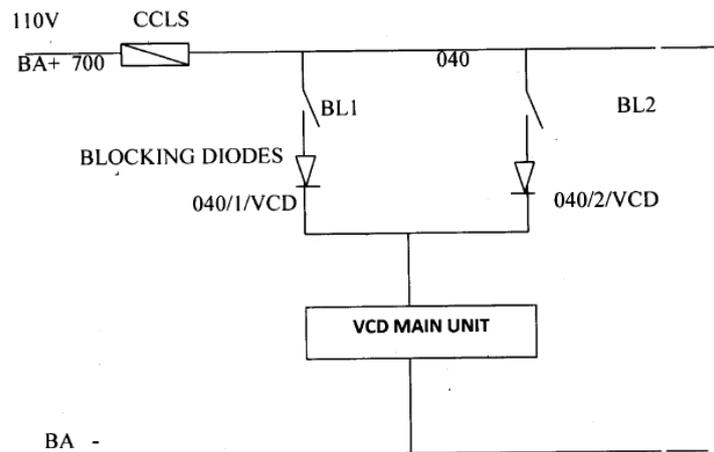
- 1.1 ECoR vide letter under reference had informed that in MPCS V3 locomotives, during Multiple Unit (MU) operation, Vigilance Control Devices (VCD) are active in both leading and trailing locomotives when battery (HBA) is switched on, and driver needs to bypass VCD in trailing locomotive through HVCD switch. Again, when there is a direction reversal of MU locomotives, driver needs to change the HVCD switch position in both the locomotives.

92/4-1

- 1.2 In non-MPCS conventional locomotives and in conventional locomotives equipped with MPCS V2, in MU operation, VCD is in active mode only in leading locomotive and remains in suppressed mode in trailing locomotive.
- 1.3 This issue is examined and it is observed that in locomotives equipped with MPCS V3, in MU operation, VCD in rear locomotive becomes active due to improper MU coupler connections.
- 1.4 Proper MU coupler connections are specified in this technical circular for implementation.

**2.0 VCD circuit in non-MPCS conventional electric locomotives and in conventional electric locomotives equipped with MPCS V2:**

- 2.1 Separate VCD is provided in non-MPCS conventional electric locomotives and in conventional electric locomotives equipped with MPCS V2.
- 2.2 Connection diagram of VCD as per Modification sheet no. RDSO/2015/EL/MS/0444 Rev. '0' dated 08.01.2016 is given below:



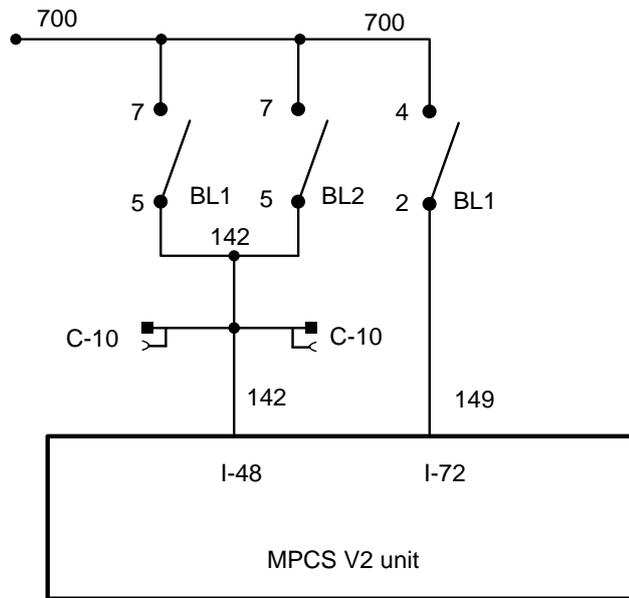
**Figure '1': Connection Diagram of VCD**

- 2.3 As per above connection diagram, VCD Main Unit gets supply through BL-1 or BL-2. Thus, VCD will be in active mode in leading locomotive where BL key is connected. VCD main unit will not get any supply in rear locomotive, where BL key is not provided, and thus, VCD will remain in de-active mode in rear locomotive in non-MPCS conventional electric locomotives and in conventional electric locomotives equipped with MPCS V2.

*32/2-1*

### 3.0 Relevant connection diagram and logic for MPCS V2 locomotives

- 3.1 In MPCS V2 locomotives, VCD is a separate device and VCD functionality is not incorporated in MPCS V2.
- 3.2 VCD connection in MPCS V2 locomotives is also as per figure 1.
- 3.3 Relevant portion of sheet number 12/21 and 13/21 of circuit diagram no. CLW.3W.15000.004 Alteration B1 dated 21.8.2008, for MPCS V2 locomotives is given below:



**Figure '2': Relevant Connection Diagram of MPCS V2**

- 3.4 As per above connection diagram, input I-48 (ORed connection of BL1 & BL2) is connected to MU coupler pin number C-10 to give BL command from leading locomotive to rear locomotive during MU operation for working of control circuit. This input is available when BL1 or BL2 key is in ON position in leading locomotive.
- 3.5 Input I-72 (connected to BL1 only) is not connected to MU coupler.
- 3.6 In single locomotive operation, when HBA is switched 'ON' and BL key is in ON position, its VCD will be in active mode as per connection diagram given in figure '1'. Status of Inputs I-48 and I-72 will depend upon the cab in which BL key is made ON. If BL-1 is made ON, both I-48 and I-72 will be 'True' (or 'High' or '1') and if, BL-2 is made ON, I-48 will be 'True' (or 'High' or '1') and I-72 will be 'False' (or 'Low' or '0'). From I-48 and I-72, MPCS determines the active cab.
- 3.7 In Multiple Unit Operation, VCD of rear locomotive will be in de-active mode as per connection diagram given in figure '1'. MU Coupler pin no. C10 will become 'High' when either BL1 or BL2 is made 'ON' in leading locomotive, which will make input I-48 of trailing locomotive MPCS V2 also 'True' (or 'High' or '1'). Input I-72 of trailing locomotive MPCS V2 remains 'False' (or 'Low' or '0').

*32/2-1*

3.8 Status of Input I-48 and I-72 of MPCV V2 is used in control logic of the locomotive and it does not affect working or non-working of VCD, which is a separate device which is not controlled by MPCV V2.

#### 4.0 **VCD operation in MPCV V3 locomotives:**

4.1 In MPCV V3 locomotives, there is no separate VCD and VCD functionality is incorporated in MPCV V3.

4.2 VCD will be in working condition only if the VCD\_Bypass Digital Input I-87 is low. When I-87 becomes high, VCD functionality is bypassed by MPCV V3. VCD bypass switch HVCD is connected to I-87.

4.3 VCD operation will be suppressed in following conditions as per clause 7.6.1 of Specification number ELRS/SPEC/MPC-FDS/0001 Rev. '3' of April 2013

4.3.1 Vehicle is stationary/Speed is less than 2.0 kmph

4.3.2 Vehicle is used in slave mode in MU operation

4.3.3 Brake application

4.3.4 Manual Control of GR

4.4 For implementing, the above requirements for suppression of VCD, following inputs are used:

4.4.1 When speed is low (analogue speed < 2 kmph) (or Digital Input I-126 (Speed Low input) is high (depending upon configuration) in MPCV V3 of M/s Medha make), or

4.4.2 Both Digital Inputs I-72 for BL1 and I-48/I-96 for BL2 are low, i.e. no cab is selected, or

4.4.3 Digital Input I-78 for P1 is high, or Digital Input I-46 for SWC is low, indicating brake application, or

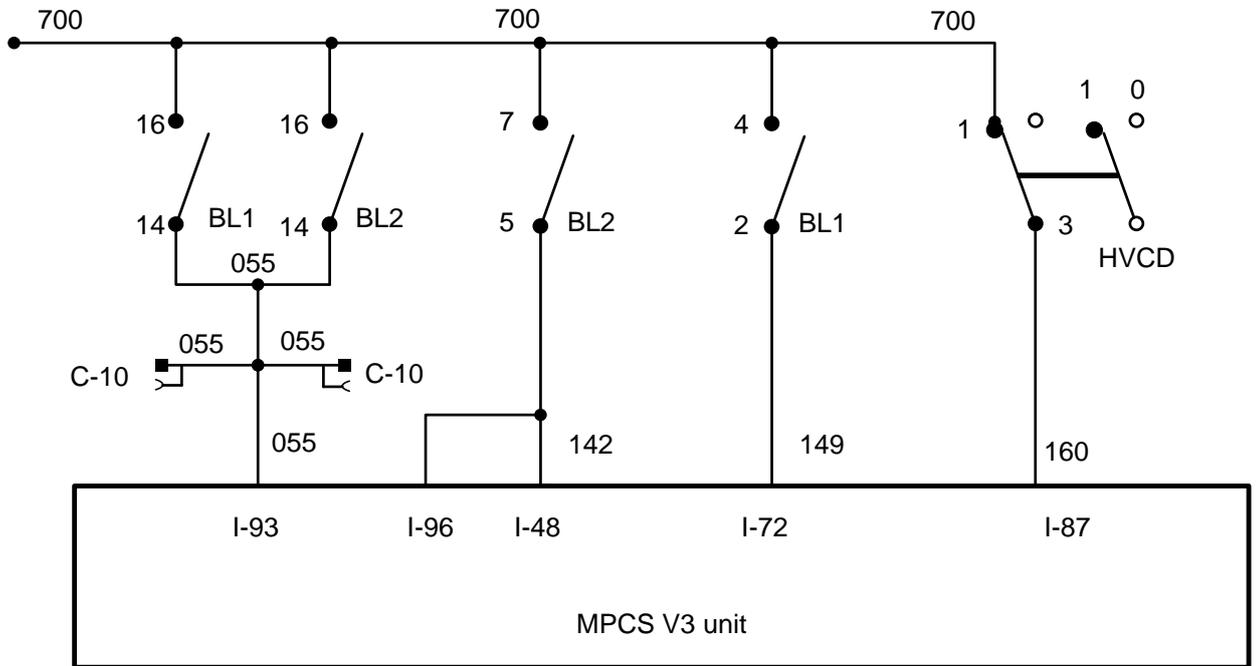
4.4.4 Digital Input I-21 for ZSMGR is low, indicating manual control of GR

4.5 If VCD is not bypassed and not suppressed, VCD will be active.

32/1-1

**5.0 Relevant connection diagram and logic for MPCS V3 locomotives**

5.1 Relevant portion of sheet no. 12/18 & 13/18 of circuit diagram no. CLW.3W.15000.094 dated 05.08.2014 'WAG-7 (Modular) schematic diagram for MPCS V3 locomotives' is given below:



**Figure '3': Relevant Connection Diagram of MPCS V3**

- 5.2 In MPCS V3, separate inputs are provided for both BL1 & BL2.
- 5.3 As per above connection diagram, input I-93 (ORed connection of BL1 & BL2) is connected to MU coupler pin number C-10 to give BL command from leading locomotive to rear locomotive during MU operation for working of control circuit. This input is available when BL1 or BL2 key is in ON position in leading locomotive.
- 5.4 Input I-72 (connected to BL1 only) is not connected to MU coupler.
- 5.5 Input I-48 (connected to BL2 only) is not connected to MU coupler.
- 5.6 Input I-96 is redundant input for BL2 and not connected to MU coupler.
- 5.7 In MPCS V3 locomotive, VCD functionality is active only when any one of inputs I-72 or I-48/I-96 becomes 'True' (or 'High' or '1'). VCD functionality remains in suppressed mode when both inputs I-72 and I-48/I-96 remains 'False' (or 'Low' or '0').

- 5.8 In single locomotive operation, when battery supply is switched 'ON' and BL key is made 'ON' in any cab, I-93 will become 'True' (or 'High' or '1') and any one of I-72 and I-48/I-96 will become 'True' (or 'High' or '1') and other input will become 'False' (or 'Low' or '0') depending upon whether BL1 is made 'ON' or BL2 is made 'ON'. In this case VCD functionality is active.
- 5.9 In multiple unit operation, in leading locomotive, when battery supply is switched 'ON' and BL key is made 'ON' in any cab, I-93 will become 'True' (or 'High' or '1') and any one of I-72 and I-48/I-96 will become 'True' (or 'High' or '1') and other input will become 'False' (or 'Low' or '0') depending upon whether BL1 is made 'ON' or BL2 is made 'ON'. In this case VCD functionality is active.
- 5.10 In multiple unit operation, in trailing locomotive, I-93 will become 'True' (or 'High' or '1') from MU coupler pin C-10 (through leading locomotive) and both inputs I-72 and I-48/I-96 will become 'False' (or 'Low' or '0') as BL1 and BL2 both are not 'ON'. In this case VCD functionality will not be active and VCD functionality will remain in suppressed mode in the trailing locomotive as both inputs I-72 and I-48/I-96 are 'False' (or 'Low' or '0').
- 6.0 **Reason of VCD activation in trailing locomotive in MPCS V3 MU:**
- 6.1 As per MPCS V2 circuit, input I-48 is driven by the ORed output of BL1 and BL2 and also connected to MU coupler pin C-10.
- 6.2 However, as per MPCS V3 circuit, input I-48 is driven by BL2 alone and I-48 is not connected to MU coupler.
- 6.3 If erroneously, input I-48 is also connected to MU coupler pin C-10, in case of MU operation, in trailing locomotive, I-48 will become 'True' (or 'High' or '1') from MU coupler pin C-10 (through leading locomotive). As I-48 is input for BL2, in this case, MPCS considers that BL2 is made 'ON' in the trailing locomotive and VCD functionality is made active by the MPCS V3.
- 6.4 Probability of input I-48 being connected to MU coupler pin C-10 is high, when MPCS V3 is provided as replacement of MPCS V2 in the locomotive. As previously, locomotive was equipped with MPCS V2, as per circuit diagram of MPCS V2, input I-48 is connected to MU coupler pin C-10. However, when MPCS V3 is provided in place of MPCS V2, as per circuit diagram of MPCS V3, input I-93 is connected to MU coupler pin C-10. If connection of input I-48 which was already connected to MU coupler pin C-10 is not specifically removed, both inputs I-48 and I-93 will get connected to MU coupler pin C-10. In such cases, VCD will remain in active mode in rear locomotive in MU operation.

52/2-1

**7.0 Solution of problem of VCD activation in trailing locomotive in MPCS V3 MU:**

- 7.1 Ensure that inputs I-72, I-48, I-96 & I-93 are connected as per sheet no. 12/18 & 13/18 of DRG no. CLW.3W.15000.094 dated 05.08.2014 for WAG-7 (Modular) schematic diagram for MPCS V3 locos.
- 7.2 According to sheet no. 12/18 & 13/18 of DRG no. CLW.3W.15000.094 dated 05.08.2014 for WAG-7 (Modular) schematic diagram for Rev-3 CPU (MPCS V3), **only I-93 shall be connected to MU coupler pin no. C-10.**
- 7.3 **If any of the inputs I-72 or I-48 or I-96 is connected to any MU coupler pin, the connection should be removed.**

**8.0 Application to Class of locomotives:**

This technical circular is applicable to all conventional electric locomotives provided with MPCS V3.

**9.0 Agency of Implementation:**

All Electric Locomotive Sheds, POH workshops and MTR Workshop Dahod.

  
14.3.19

**(P.K. Saraswat)**  
**for Director General (Elect.)**

**Enclosures: As above**

**COPY TO:** AS PER STANDARD MAILING LIST NO. EL-M-7.5.3-19 (LATEST REVISION).

  
14.3.19

**(P.K. Saraswat)**  
**for Director General (Elect.)**