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सत्यमेव जयते

भारत सरकार - रेल मंत्रालय  
अनुसंधान अभिकल्प और मानक संगठन  
लखनऊ - 226011  
Government of India - Ministry of Railways  
Research, Designs & Standards Organization,  
LUCKNOW - 226011

No. EL/4.2.15

Dated 27.07.2012

**Chief Electrical Engineer,**

- Central Railway, Mumbai CST-400 001.
- Northern Railway, Baroda House, New Delhi-110 001.
- North Central Railway, Hastings Road, Allahabad- 211001
- Eastern Railway, Fairlie Place, Kolkata -700 001.
- East Central Railway, Hazipur-844101.
- East Coast Railway, Chandrashekharpur, Bhubaneswar-751016.
- Southern Railway, Park Town, Chennai-600 003.
- South Central Railway, Secunderabad-500 371.
- South Eastern Railway, Garden Reach, Kolkata -700 043.
- South East Central Railway, Bilaspur-495004
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- West Central Railway, Jabalpur-482001.
- Chittaranjan Locomotive Works, Chittaranjan-713 331 (WB)

**SPECIAL MAINTENANCE INSTRUCTIONS**  
**NO. RDSO/2012/EL/SMI/ 0276 Rev '0' Dated: 27.07.2012**

**1. Title:**

Maintenance instruction of Dynamic braking excitation contactor C145 auxiliary contact for 25 kv ac electric locomotives.

**2. Brief history**

C145 contactor is an Electro Pneumatic type power contactor used to feed the supply to ATFEX excitation transformer at the time of dynamic braking. The driving mechanism of this type contactor is an electro valve and servomotor which works on air pressure. C145 contactor has 6 auxiliary contacts (3 N/C and 3 N/O) for loco control circuit.

**3. Object:**

Recently some cases of "C145 contactor stuck up and total loss of traction" have resulted failure of locomotive on line. Due to defect in C145 N/O auxiliary contact input I-68 for MPCS became high while MPCS output O-15 was low.

This problem occurs when loco pilot uses dynamic braking in loco and switches over from braking mode to traction mode and C145 power contact does not open OR due to malfunctioning of auxiliary contact C145. In these cases LSB does not extinguish in Traction mode resulting in notch not progressing. This situation arises due to one of the following reasons:

- (i) Power contact of C145 welded resulting auxiliary switch remains closed.
- (ii) Auxiliary contact of C145 itself becomes defective and remains in closed position.
- (iii) Due to worn out cam of auxiliary contact assembly.
- (iv) Inadequate crushing of auxiliary contact.
- (v) Due to loosening of mounting nuts of auxiliary fixed contact assembly of C145 or breakage of auxiliary contact support.

In this situation, loco pilot is supposed to ensure the correct position of CTF, reversers and C145. CTF and reversers can be checked visually but position of C145 power and auxiliary contact cannot be checked without removing the arc chute.

In the above condition in relay based locomotives, Loco pilot can wedge the Q50 relay manually and resume traction to clear block section observing laid down precautions. But in MPCS based locos Q50 relay is eliminated (its logic is in software) so there is no possibility to wedge it. AS such loco pilot is unable to take notches in traction mode to clear the block section.

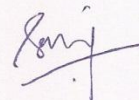
A draft modification sheet to address this problem was sent for comments to zonal railways vide letter no. EL/4.2.15 dt: 11.04.2012. This modification sheet proposed to use two N/O auxiliary contact of extreme outside position in series in I-68 branch. In the proposed modification sheet a bypass switch was also considered for bypassing the Q50 relay logic in traction side for clearing the section when this type of problem occurs.

Modification in the control circuit of C145 for using two auxiliary contacts in series in I-68 branch for MPCS based locomotives has been issued vide RDSO MS No. 0410 dt 04.06.12.

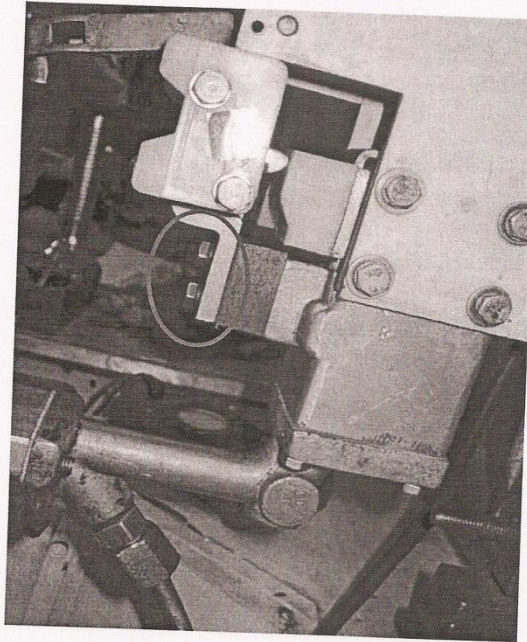
Further reviewing the matter it has been noted that there is a need to pay attention towards maintenance of auxiliary contact of C145. The item was discussed in 35<sup>th</sup> MSG at Erode in May 2012 and it was decided that with the improvement in maintenance practices of auxiliary contact of C145, bypass switch will not be required.

#### 4. instructions:

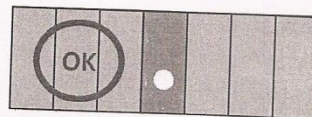
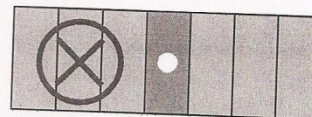
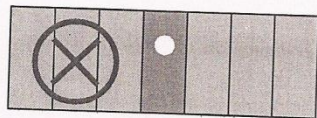
- 4.1 The loco pilot should take following actions in case "C145 stuck up" message comes on display unit of MPCS:-
  - a) Operate MP on braking side and traction side.
  - b) Operate battery OFF and ON & check if problem is solved.
  - c) Operate Auxiliary contact of C145 manually 4-6 times by electro pneumatic valve. Check for stuck up auxiliary contact if it becomes normal or not. If it becomes normal then resume traction, Inform TLC. If it does not become normal, follow Trouble Shooting Directory and inform TLC.
- 4.2 Following aspects in maintenance of auxiliary contact should be given due care:-
  - i. Condition of cam of auxiliary contact should be regularly monitored and worn out cams should be replaced on condition basis.



- ii. Proper fixing of fixed auxiliary contact assembly should be checked in each schedule of inspection.



- iii. CAM of auxiliary contact and fixed contact shall not be replaced in-situ in loco rather complete C145 assembly should be replaced with overhauled unit. The old C145 assembly should be taken to maintenance section for Cam replacement where proper operation can be checked.
- iv. Proper tightening of fixed auxiliary contact assembly should be ensured using spring washer during overhauling.
- v. The 'cam support' on which cams are fixed has a fixing hole of dia 6.2 mm which is shifted by 2.5 mm on one side as per CLW Drawing No. 4TWD.112.097. The fixing of cam support should be done in such a way that smaller portion remains on bottom side. Wrong fitment of cam support will cause inadequate crushing and pass spurious signal during vibration. Fitment of cam support plate in a correct manner is shown below:



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- vi. A study of measuring the gaps between lever and auxiliary assembly after overhauling was conducted by RDSO at ELS/CNB and the measurements are as below :-

S N	Loco No. & provided date	Sl. No. & O/H date of C-145	C-145 inter lock	Gap in mm (when C-145 open)
1	27243 24.04.12	34/E7-RR	Open	1.5
			Closed	4.5
2	27242 25.04.12	35/E7-RR	Open	1.5
			Closed	4.5
3	27510 26.04.12	33/E7-RR	Open	1.5
			Closed	4.5
4	27514 27.04.12	29/E7-RR	Open	1.5
			Closed	4.5
5	27998 29.04.12	36/E7-RR	Open	1.5
			Closed	4.5
6	27248 28.05.12	62/E7-RR	Open	1.4
			Closed	4.5
7	27445 11.05.12	49/E7-RR	Open	1.3
			Closed	4.5
8	27439 30.05.12	59/E7-RR	Open	1.4
			Closed	4.5

Check the cam support and their gap with the help of filler gauge during overhauling in maintenance section. As given above the gap between lever and auxiliary assembly after overhauling should be kept 4.5 mm minimum when auxiliary contact is closed and 1.5 mm maximum when auxiliary contact is open. The adjustment can be done by providing shims between distance piece and interlock plate.

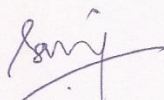
- vii. Running crew should be counseled for the operation of above as explained in clause 4.1.

**5 Application to class of locomotive:**

WAG-7, WAG5, WAP-4 and WAM-4 class of 25 Kv ac conventional tap changer electric locomotives.

**6 Agency of Implementation:**

Electric loco sheds, MTR/POH workshops and CLW

  
 (S. K. Gupta)  
 for Director General/Elect.