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No.EL/4.2.15

Date : 01.08.2018

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, चन्द्रपेखरपुर, 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 मालीगाँव 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, गार्डेनरीच, 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.

Modification Sheet No: RDSO/2018/EL/MS/0442 (Rev '1')

1.0 Title :

GR-0 indication of middle & trailing locomotives through additional signalling lamps in leading locomotive in multiple unit/consist operation of two/three locomotives.

2.0 Object

To get GR-0 indication of middle & trailing locomotives in leading locomotive in multiple unit/consist operation of two/three locomotives.

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3.0 Existing arrangement:

3.1 Background:

- 3.1.1 In the Multiple Unit (MU) operation of two conventional electric locomotives or Consist operation of three conventional electric locomotives, GR-0 indications of trailing locomotives were not available to loco pilot in leading locomotive initially.
- 3.1.2 Some Railways have reported the problem of rail burning due to rotation of wheels in trailing locomotive, which happens when loco-pilot stops the train, GR of leading locomotive comes to zero notch and GR of trailing locomotive does not come to zero notch due to non-synchronisation of the notches. In such cases, as no indication of GR-0 of trailing locomotive is available to the loco-pilot in leading locomotive, rail burning may happen.
- 3.1.3 To overcome the problem, Modification Sheet number RDSO/2015/EL/MS/0442 (Rev '0') dated 11.9.2015 provides for, GR-0 indication of trailing locomotive through additional signalling lamp in leading locomotive in multiple unit operation of two locomotives.
- 3.1.4 However, this modification sheet was applicable only for multiple operation of two locomotives and it was not applicable in consist operation of three locomotives.
- 3.1.5 To overcome the problem of rail burning due to rotation of wheels in trailing locomotives in consist operation of three locomotives, the circuit given by Modification Sheet number RDSO/2015/EL/MS/0442 (Rev '0') dated 11.9.2015 is modified by this revision of modification sheet.
- 3.1.6 After implementation of this revised modification sheet, LSGR indications of middle locomotive and trailing locomotive will be available to loco pilot in the leading locomotive.

3.2 Existing Circuit

- 3.2.1 For conventional electric locomotives not equipped with Microprocessor based control & fault diagnostic system (MPCS), existing connection for giving indication of LSGR of other locomotive in leading locomotive in multiple unit operation of two locomotives is given as annexure- 'A'(as per Modification Sheet number RDSO/2015/EL/MS/0442 (Rev '0') dated 11.9.2015).
- 3.2.2 For conventional electric locomotives equipped with Microprocessor based control & fault diagnostic system (MPCS), existing connection for giving indication of LSGR of other locomotive in leading locomotive in multiple unit operation of two locomotives is given as annexure- 'C' (as per Modification Sheet number RDSO/2015/EL/MS/0442 (Rev '0') dated 11.9.2015).

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4.0 Modified Arrangement:

- 4.1 For implementing this modification, one three-position programmable switch is required, however, in locomotive, four-position programmable switches like HVMT/HVSL etc. are already used and hence circuit is given with use of four-position programmable switch. The switch may be provided suitably in the switch panel. The four-position programmable switch is called as 'Loco Selector Switch (HLS)'.
- 4.2 Total four additional signaling lamps (two in each cab) are required to be provided in each locomotive. Two additional signaling lamps (one in each cab) provided in locomotive as per Modification Sheet number RDSO/2015/EL/MS/0442 (Rev '0') dated 11.9.2015 may be retained and used.
- 4.3 For conventional electric locomotives not equipped with Microprocessor based control & fault diagnostic system (MPCS), modified connection for giving indication of LSGR of middle and trailing locomotives in leading locomotive in consist operation of three locomotives is given as annexure- 'B'.
- 4.4 For conventional electric locomotives equipped with Microprocessor based control & fault diagnostic system (MPCS), modified connection for giving indication of LSGR of middle and trailing locomotives in leading locomotive in consist operation of three locomotives is given as annexure- 'D'.
- 4.5 After implementing of the above arrangement, loco-pilot in leading locomotive will get indication of GR-0 of middle locomotive and trailing locomotive as LSGR(M) and LSGR(T) respectively.
- 4.6 This is applicable both for multiple unit operation of two locomotives and consist operation of three locomotives.

5.0 Works to be carried out:

5.1 For conventional locomotives not equipped with MPCS

- 5.1.1 Remove wire no. 215 from multiple coupler jumper pin B-18/B-19 (if connected) and connect wire no. 215 from QV62 to LSGR directly.
- 5.1.2 Remove cross connections between B-18 & B-19 (if available).
- 5.1.3 Rename the LSGRO lamp to LSGR(T) if provided, else provide additional signalling lamp LSGR(T) in both cabs at suitable location.
- 5.1.4 Provide additional signaling lamp LSGR(M) in both cabs at suitable location.
- 5.1.5 Install a four-position programmable Locomotive Selector Switch 'HLS' in switch panel for selection of leading loco, middle loco or trailing loco during MU/Consist operation.
- 5.1.6 Connect the wire 215 from QV-62 relay or LSGR lamp of locomotive to four-position programmable Locomotive Selector Switch 'HLS' as shown in Annexure-B.

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- 5.1.7 Define Multiple Coupler wire B-18 as wire number 256, and connect it to position '2' of four position locomotive selector switch HLS as shown in Annexure-B.
- 5.1.8 Define Multiple Coupler wire B-19 as wire number 257, and connect it to position '3' of four position locomotive selector switch HLS as shown in Annexure-B.
- 5.1.9 Connect the wire number 257 (of multiple coupler jumper B-19) to LSGR(T) (Signalling lamp indication of GR-0 for trailing locomotive) as shown in Annexure-B.
- 5.1.10 Connect the wire number 256 (of multiple coupler jumper B-18) to LSGR(M) (Signalling lamp indication of GR-0 for middle locomotive) as shown in Annexure-B.

5.2 For conventional locomotives equipped with MPCS (applicable both for MPCS version-2 & version 3)

- 5.2.1 Remove wire no. 173 from multiple coupler jumper pin B-18/B-19 (if connected) and connect wire no. 173 from O-30 to LSGR directly.
- 5.2.2 Remove cross connections between B-18 & B-19 (if available).
- 5.2.3 Rename the LSGRO lamp to LSGR(T) if provided, else provide additional signalling lamp LSGR(T) in both cabs at suitable location.
- 5.2.4 Provide additional signaling lamp LSGR(M) in both cabs at suitable location.
- 5.2.5 Install a four way programmable Locomotive Selector Switch HLS in switch panel for selection of leading loco, middle loco or trailing loco during MU/Consist operation.
- 5.2.6 Connect the wire 173 from O-30 or LSGR lamp of locomotive to four-position programmable Locomotive Selector Switch 'HLS' as shown in Annexure-D.
- 5.2.7 Define Multiple Coupler wire B-18 as wire number 276, and connect it to position '2' of four position locomotive selector switch HLS as shown in Annexure-B.
- 5.2.8 Define Multiple Coupler wire B-19 as wire number 277, and connect it to position '3' of four position locomotive selector switch HLS as shown in Annexure-B.
- 5.2.9 Connect the wire number 277 (of multiple coupler jumper B-19) to LSGR(T) (Signalling lamp indication of GR-0 for trailing locomotive) as shown in Annexure-B.
- 5.2.10 Connect the wire number 276 (of multiple coupler jumper B-18) to LSGR(M) (Signalling lamp indication of GR-0 for middle locomotive) as shown in Annexure-B.

5.3 For conventional locomotives equipped with MPCS version 3

- 5.3.1 MPCS V3 already incorporates functionality of displaying LSGR of middle & trailing locomotives in display screen of MPCS through Inputs I-90 & I-91.
- 5.3.2 To enable this functionality, I-90 of MPCS V3 has to be connected to wire no. 276 (MU Coupler B-18) and I-91 has to be connected to wire no. 277 (MU Coupler B-19).
- 5.3.3 With this connection, in addition to the physical additional signaling lamps LSGR(M) & LSGR(T), GR '0' indication of middle locomotive will also be available as LSGR Trail 1 and GR '0' indication of trailing locomotive will also be available as LSGR Trail 2 in the display screen of MPCS V3 to the loco pilot in leading locomotive.

5.3.3

6.0 Instructions for Operation:

6.1 For consist operation of three locomotives:

- 6.1.1 In the locomotive which is driven by the loco pilot, Locomotive Selector Switch HLS to be kept in position '1' for leading locomotive.
- 6.1.2 In the other two locomotives, Locomotive Selector Switch HLS to be kept in position '2' for middle locomotive and position '3' for trailing locomotive.
- 6.1.3 If loco pilot changes the locomotive, the Locomotive Selector Switch HLS positions to be changed in all three locomotives accordingly.
- 6.1.4 With this arrangement, GR '0' indication of middle locomotive will be available as LSGR(M) and GR '0' indication of trailing locomotive will be available as LSGR(T) to the loco pilot in leading locomotive.
- 6.1.5 GR '0' indication of leading locomotive will be available as LSGR in leading locomotive and GR '0' indication of leading locomotive will not be displayed in middle and trailing locomotives.
- 6.1.6 GR '0' indication of middle locomotive will be available as LSGR in middle locomotive and as LSGR(M) in leading, middle and trailing locomotives.
- 6.1.7 GR '0' indication of trailing locomotive will be available as LSGR in trailing locomotive and as LSGR(T) in leading, middle and trailing locomotives.
- 6.1.8 In locomotives equipped with MPCS V3, in addition to the physical additional signaling lamps LSGR(M) & LSGR(T), GR '0' indication of middle locomotive will also be available as LSGR Trail 1 and GR '0' indication of trailing locomotive will also be available as LSGR Trail 2 in the display screens of MPCS V3.

6.2 For multiple unit operation of two locomotives:

- 6.2.1 In the locomotive which is driven by the loco pilot, Locomotive Selector Switch HLS to be kept in position '1' for leading locomotive.
- 6.2.2 In the other locomotive, Locomotive Selector Switch HLS to be kept in position '3' for trailing locomotive.
- 6.2.3 If loco pilot changes the locomotive, the Locomotive Selector Switch HLS positions to be changed in both the locomotives accordingly.
- 6.2.4 With this arrangement, GR '0' indication trailing locomotive will be available as LSGR(T) to the loco pilot in leading locomotive.
- 6.2.5 GR '0' indication of leading locomotive will be available as LSGR in leading locomotive and GR '0' indication of leading locomotive will not be displayed in trailing locomotives.
- 6.2.6 In locomotives equipped with MPCS V3, in addition to the physical additional signaling lamp LSGR(T), GR '0' indication of trailing locomotive will also be available as LSGR Trail 2 in the display screen of MPCS V3.

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6.3 Loco pilots to be counselled for proper operation of Locomotive Selector Switch HLS and suitable instructions may also be pasted in the locomotive cabs.

6.4 Following instructions already issued vide letter number EL/4.2.15 dated 22.7.2013, 22.8.2014 & 14.5.2018 may please be re-iterated to loco pilots:

“In MU/Consist operation, before braking, ensure MP on zero position so that notches in leading and trailing locomotives becomes zero”

7.0 Application to class of locomotive:

WAG-7 and WAG-5 class of 25 KV AC tap changer electric locomotives which are operated as multiple unit of two locomotives or consist of three locomotives.

8.0 Material Required:

- i. Two signalling lamps for each cab are required, thus total 4 signalling lamps per locomotive will be required. Out of these 4 signalling lamps, existing LSGRO lamp in each cab can be retained and two signalling lamps will be required additionally per locomotive.
- ii. One programmable switch (four position) like HVMT/HVSL required per locomotive.
- iii. Control cable of 2.5 mm² size (length as per requirement) is required.

9.0 Material Rendered Surplus: NIL

10.0 Reference: Nil

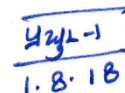
11.0 Modification Drawings:

Modified circuit enclosed as Annexure-B & D.

12.0 Agency of Implementation:

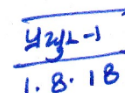
All Electric locomotive sheds, MTR/POH workshops.

Enclosures : Annexure-A to D.


4242-1
1.8.18

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

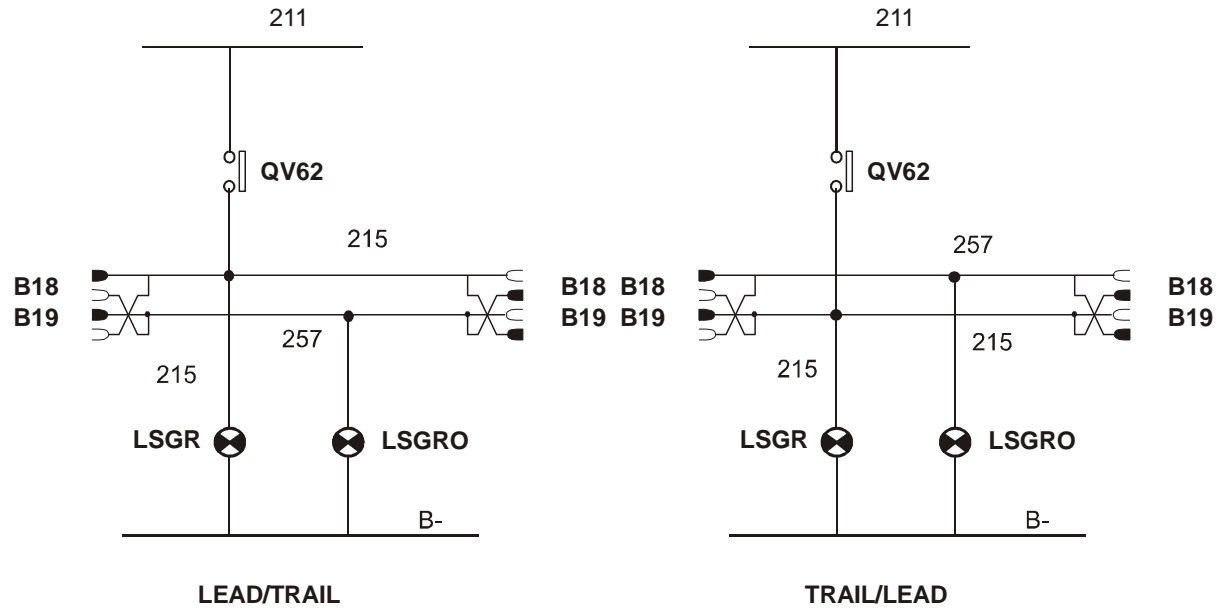
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4242-1
1.8.18

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

Existing Circuit Diagram for GR-0 indication of trailing locomotive in leading locomotive in Multiple Unit (MU) operation (For Non-MPCS locomotive)

(As per Modification Sheet number RDSO/2015/EL/MS/0442 (Rev '0') dated 11.9.2015)



Note: LSGR = LSGR lamp of same locomotive

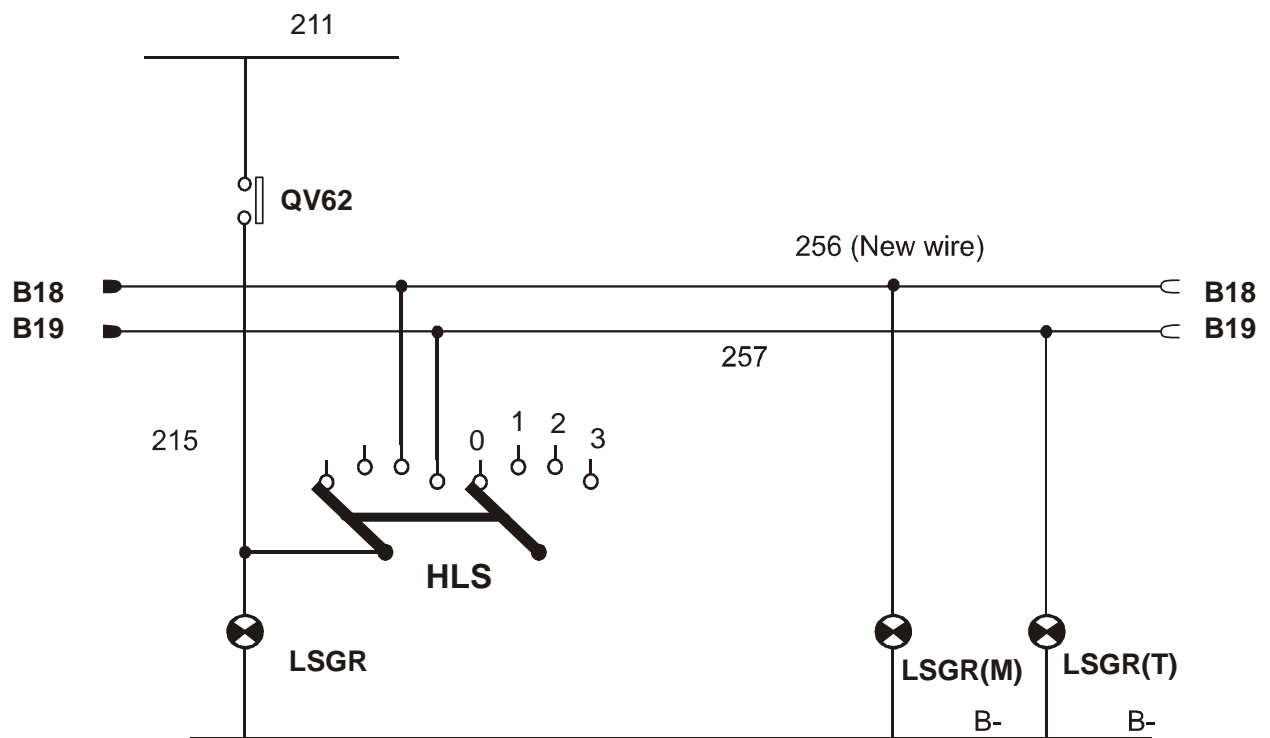
LSGRO = LSGR lamp of other locomotive

Wire no. 215 = wire for LSGR

Wire no. 257 = wire for LSGRO

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Modified Circuit Diagram for GR-0 indication of middle & trailing locomotives in leading locomotive in Multiple Unit (MU)/Consist operation (For Non-MPCS locomotive)



Modified circuit as per MS 442 Rev-'1' for Non MPCS locos

Note:

LSGR(M) : Signalling lamp for indication of GR-0 of the middle locomotive

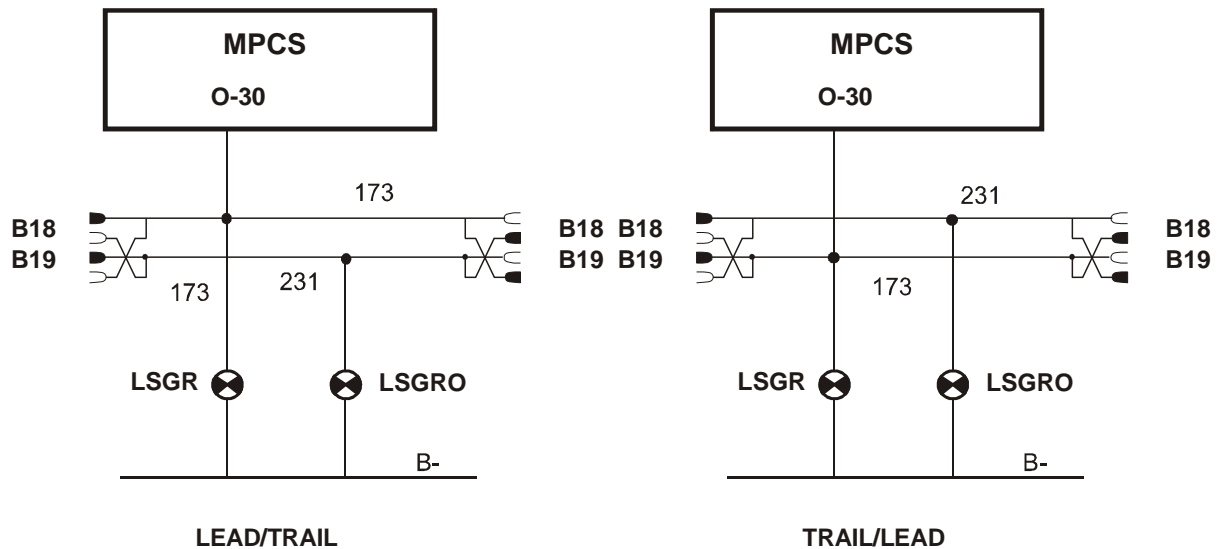
LSGR(T) : Signalling lamp for indication of GR-0 of the trailing

HLS : Locomotive Selector Switch (Position 1 for leading locomotive,
2 for middle locomotive &
3 for trailing locomotive)

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Existing Circuit Diagram for GR-0 indication of trailing locomotive in leading locomotive in Multiple Unit (MU) operation (For MPCS locomotive)

(As per Modification Sheet number RDSO/2015/EL/MS/0442 (Rev '0') dated 11.9.2015)



Note: LSGR = LSGR lamp of same locomotive

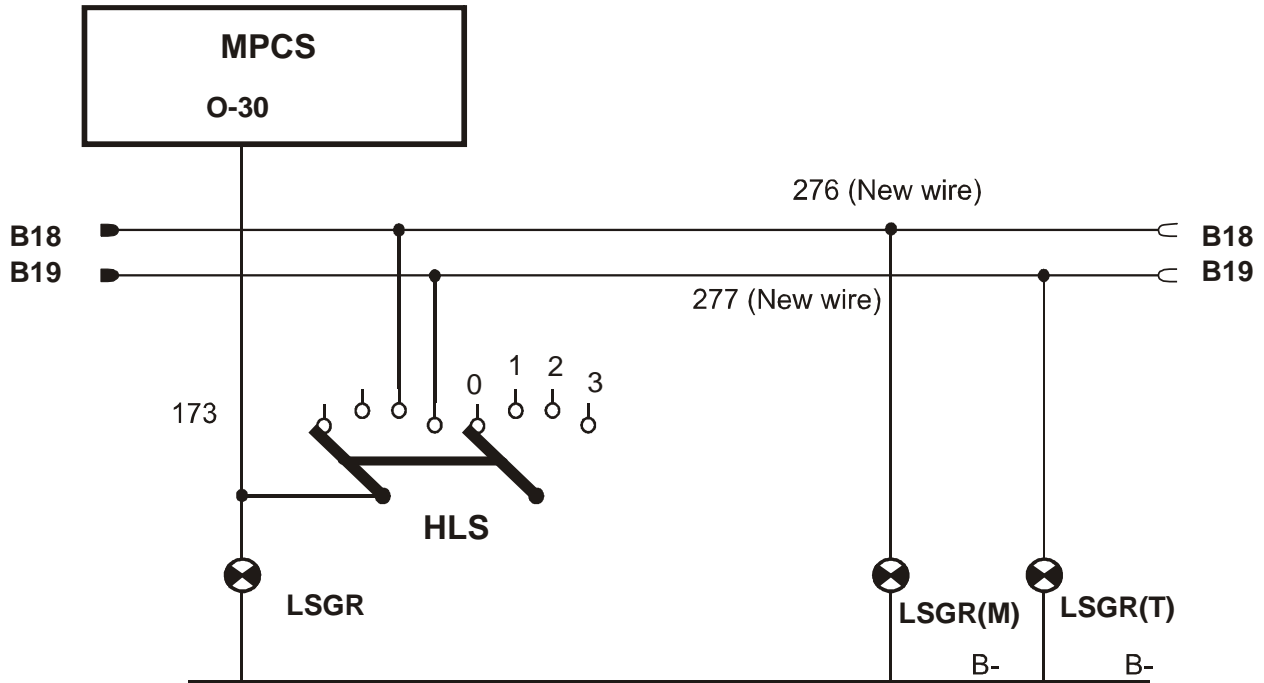
LSGRO = LSGR lamp of other locomotive

Wire no. 173 = wire for LSGR

Wire no. 231 = wire for LSGRO

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Modified Circuit Diagram for GR-0 indication of middle & trailing locomotives in leading locomotive in Multiple Unit (MU)/Consist operation (For MPCS locomotive)



Modified circuit as per MS 442 Rev-'1' for MPCS locos

Note:

LSGR(M) : Signalling lamp for indication of GR-0 of the middle locomotive

LSGR(T) : Signalling lamp for indication of GR-0 of the trailing

HLS : Locomotive Selector Switch (Position 1 for leading locomotive,
2 for middle locomotive &
3 for trailing locomotive)

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