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No. EL/3.2.19 (G)

Dated 23.07.2010

The Chief Electrical Engineer,

1. Central Railway, Mumbai, CST-400 001.
2. Northern Railway, Baroda House, New Delhi-110001.
3. North Central Railway, Block A2, Allahabad- 211 033
4. Eastern Railway, Fairlie Place, Kolkata -700 001.
5. East Central Railway, Hazipur-844101.
6. East Coast Railway, Chandrashekharpur, Bhubaneswar-751016
7. Southern Railway, Park Town, Chennai-600 003.
8. South Central Railway, Secunderabad-500 371.
9. South Eastern Railway, Garden Reach, Kolkata -700 043.
10. South East Central Railway, Bilaspur-495004
11. Western Railway, Churchgate, Mumbai-400 020.
12. West Central Railway, Jabalpur-482001.

MODIFICATION SHEET No. RDSO/2010/EL/MS/0388 Rev.'0'  
Dated 23.07.2010

**1.0 TITLE :**

- 1.0 Provision of additional 1000 LPM compressor in WAP-4 class of Electric locomotive with segregated pneumatic valves layout arrangement.
- 1.1 Provision of additional 203 Litre air reservoir in series with existing 203 Litre reservoir and replacement of existing 53 Litre capacity auxiliary reservoir by 100 litre reservoirs in WAP-4 locomotives

**2.0 OBJECT:**

Railways have been reporting problem of MR air pressure drop on line ever since 'Duranto' train was introduced on Indian Railways while working with WAP-4 locomotives hauling LHB coaches with air suspension springs and control discharge toilets system in these trains.

It is observed that when the driver controls the train by application of brake for observing speed restrictions particularly while passing through 'ghat' section, the MR air pressure drops up to 5.3 Kg/cm<sup>2</sup>. In the conventional rake since control toilet discharge system and air springs are not available, therefore, this problem is

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not observed while working the with conventional rakes by WAP-4 class of electric locomotives.

Further study reveals that the duty cycle of compressors in WAP-4 locomotives while working 'Duranto' train is more than 90%. It, therefore, has become necessary to increase the capacity of compressor and reservoir in WAP-4 locomotive keeping into account that such trains will increase in future.

### **3.0 EXISTING ARRANGEMENT:**

In the existing WAP-4 class of electric locomotive there are two (02) compressors of 1000 LPM capacity each with air dryer in pneumatic control circuit. There are four (04) reservoirs of 150 Litre each & one (01) reservoir of 203 Litre capacity for maintaining MR air pressure and one (01) 53 litre capacity reservoir for auxiliary circuit feeding air to electro pneumatic contactors and tap changer.

### **4.0 MODIFIED ARRANGEMENT :**

The possibility of providing an additional 1000 LPM compressor in WAP-4 class of locomotives has been examined, and it is observed that there are different types of equipment layout arrangement in the WAP-4 class of locomotives:

- The Locomotives with segregated pneumatic valves arrangement having Arno converter.
- The locomotive with Bi-plate/Tri plate pneumatic panel / CLW made pneumatic panel with Arno or 180 KVA Static Inverter.
- The Locomotives with Crew Friendly Cabs having Bi-plate/Tri plate pneumatic panel with 180 KVA Static Inverter.

#### **4.1 Provision of additional compressor and reservoir**

Provision of additional onboard 1000 LPM compressor can only be made possible on those WAP-4 class of locomotives which have segregated pneumatic valves.

It is not possible to provide on crew friendly cabs WAP-4 class of electric locomotives fitted with 180 KVA Static Inverter, Bi-plate / Tri plate pneumatic panel, due to space constraints.

#### **4.2 Mounting arrangements:**

For providing additional onboard 1000 LPM capacity compressor and 203 litre reservoir following work has to be carried out on WAP-4 class of electric locomotive fitted with segregated pneumatic valves pipelines arrangements :-

- i. Provision of 1000 LPM capacity compressor in existing space in front of MVMT-1 on two additional mounting channels size 150 x 75 x 10thk. x 1600mm length as per IS:2062 to be

diagonally welded on long beam of the locomotive at distance between the channel 350 mm. as shown in the enclosed sketch-1

- ii. Compressor mounting pad of size as same as pads in other existing compressor with 14mm Ø tapped hole to be welded on the channel at a distance of 350 x 800 mm.
- iii. Oil tray of existing size 920mm x 400mm to be fixed up below the compressor unit.
- iv. The Existing Compressor unit -2 needs to be shifted by about 300 mm towards Cab-1 end and the complete unit is required to be rotated by 180° for feasibility of compressor motor terminals.
- v. With the rotation of compressor unit-2, the clearance with stool of MVMT-1 is reduced. To maintain proper clearance for maintenance point of view, top plate of the MVMT-1 stool shall be chopped off by about 25mm.
- vi. An additional Electromagnetic Contactor nomenclature C-103 is required to be provided in AC-2 panel for this additional compressor. The on delay control circuit of the compressor is to be made as per RDSO's Modification Sheet No. ELRS/MS/0298, Rev. '0' dated 14.11.2000 and drawing No. SKEL-4568/2, Alt. '0' (Modified circuit with 3 x 1000 LPM Compressor).
- vii. An additional magnetic un-loader valve is to be mounted on the existing bracket of other compressor's unloader valves.
- viii. An additional reservoir of 203 Litre capacity has to be fitted under Cab-1 at similar location as existing 203 Litre is fitted under Cab-2. The MR equalizing and Feed Pipelines tapping shall be changed after this additional reservoir of 203 Litre as shown in the sketch -2.
- ix. RGCP setting needs to be revised from Cut-OUT at 9.5 kg/cm<sup>2</sup> to 10.0 Kg/cm<sup>2</sup> and Cut-IN pressure setting to remain unchanged as 8.0 Kg/cm<sup>2</sup>.
- x. The existing 53 Litre capacity auxiliary air reservoir of shall be replaced with 100 Litre capacity reservoir in the same location to avoid chattering of electro-pneumatic contactors due to low air pressure.

**5.0** Trials with an additional 1000 LPM capacity compressor & an additional 203 Litre capacity reservoir have already been carried out on WAP-4 locomotive No. 22246 of ELS/Kanpur.



## 6.0 APPLICATION TO CLASS OF LOCOMOTIVES:

WAP-4 class of electric locomotives having segregated pneumatic valves arrangements.

## 7.0 MATERIAL REQUIRED:

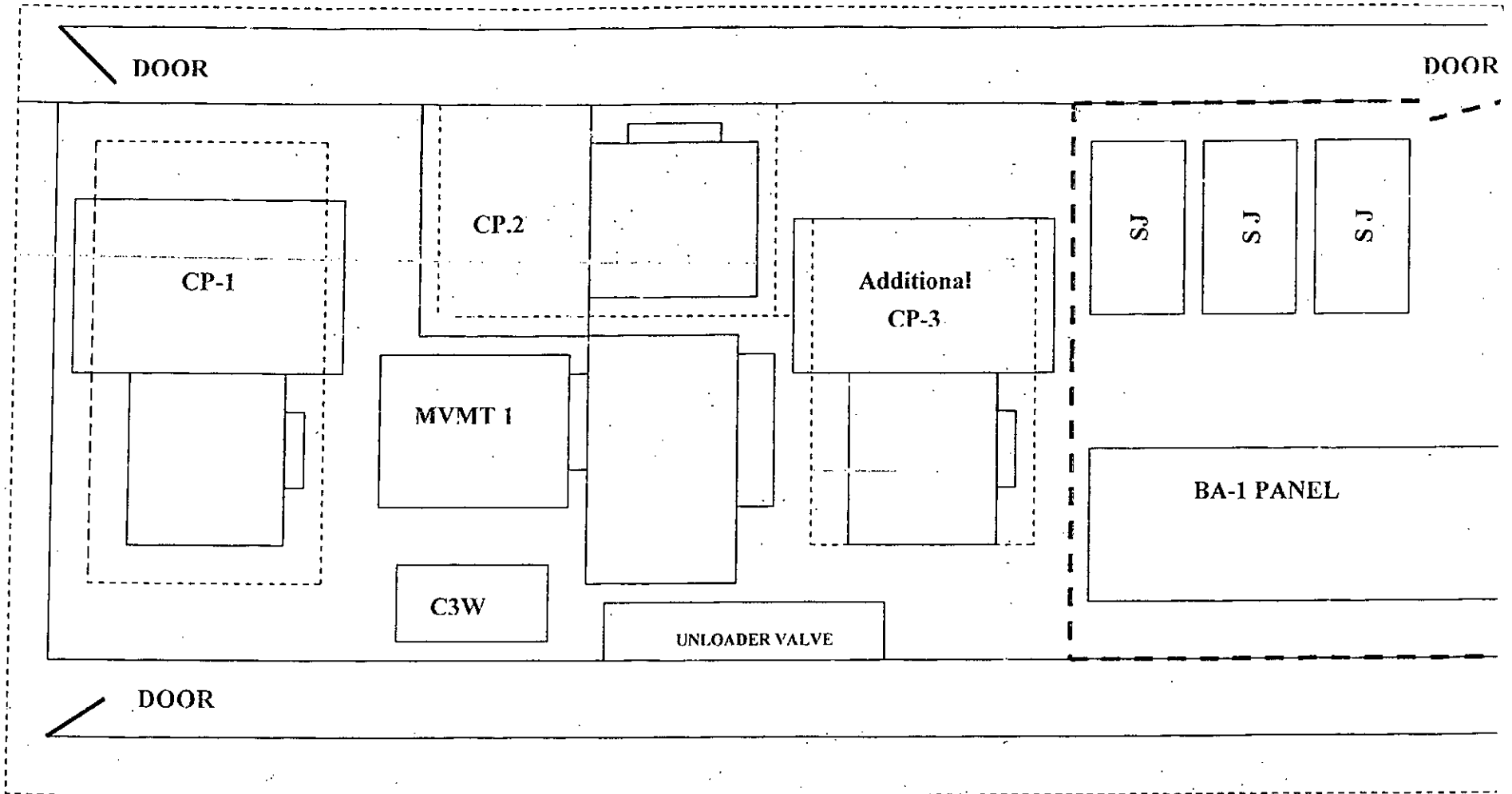
- i. One 1000 LPM compressor with complete pipe line arrangement.
- ii. One Safety valve set at 10.5 Kg/cm<sup>2</sup>.
- iii. M.S. channel size 150 x 75 x 10thk x 1600 mm lengths as per IS: 2062 -2 nos.
- iv. Compressor mounting pads- 4 nos. similar to existing sizes.
- v. Compressor oil tray size 920mm x 400mm similar to existing.
- vi. Fasteners like bolts, plane washers, spring washers etc. for mounting compressor, unloader valves, EMC etc. of requisite sizes and nos. of RDSO's / CLW's approved sources.
- vii. Welding electrodes- MMAW electrodes approved by RDSO under class A3 / B1, as per IRS M-28-02 should be used. Preferably, 4.0mm diameter of electrode shall be taken to facilitate welding work. The electrodes must be preheated to about 250° C for two hours before use. MIG/MAG welding filler wires approved by RDSO under class -1 as per IRS M-46-03 in 1.2 mm diameter can also be used. The shielding gas for MIG / MAG process shall be carbon dioxide (CO<sub>2</sub>).
- viii. 203 Litre capacity reservoir with mounting bracket in series with existing 203 Litre capacity reservoir.
- ix. 100 Litre capacity reservoir with mounting bracket to replace existing 53 Litre auxiliaries reservoir.
- x. One EMC contactor similar to other compressors for additional compressor.
- xi. Seamless or stainless steel pipe line 1¼" & ½" size with fittings requisite length.
- xii. 10mm<sup>2</sup> Control Cable for electrical connection of additional compressor motors of requisite length.
- xiii. 10mm<sup>2</sup> insulated lugs for electrical connection of additional compressor of requisite numbers.
- xiv. 2.5mm<sup>2</sup> Control Cable for electrical connection of additional unloader magnetic valve of requisite length.
- xv. 2.5mm<sup>2</sup> insulated lugs for electrical connection of additional unloader magnetic valve of requisite numbers.

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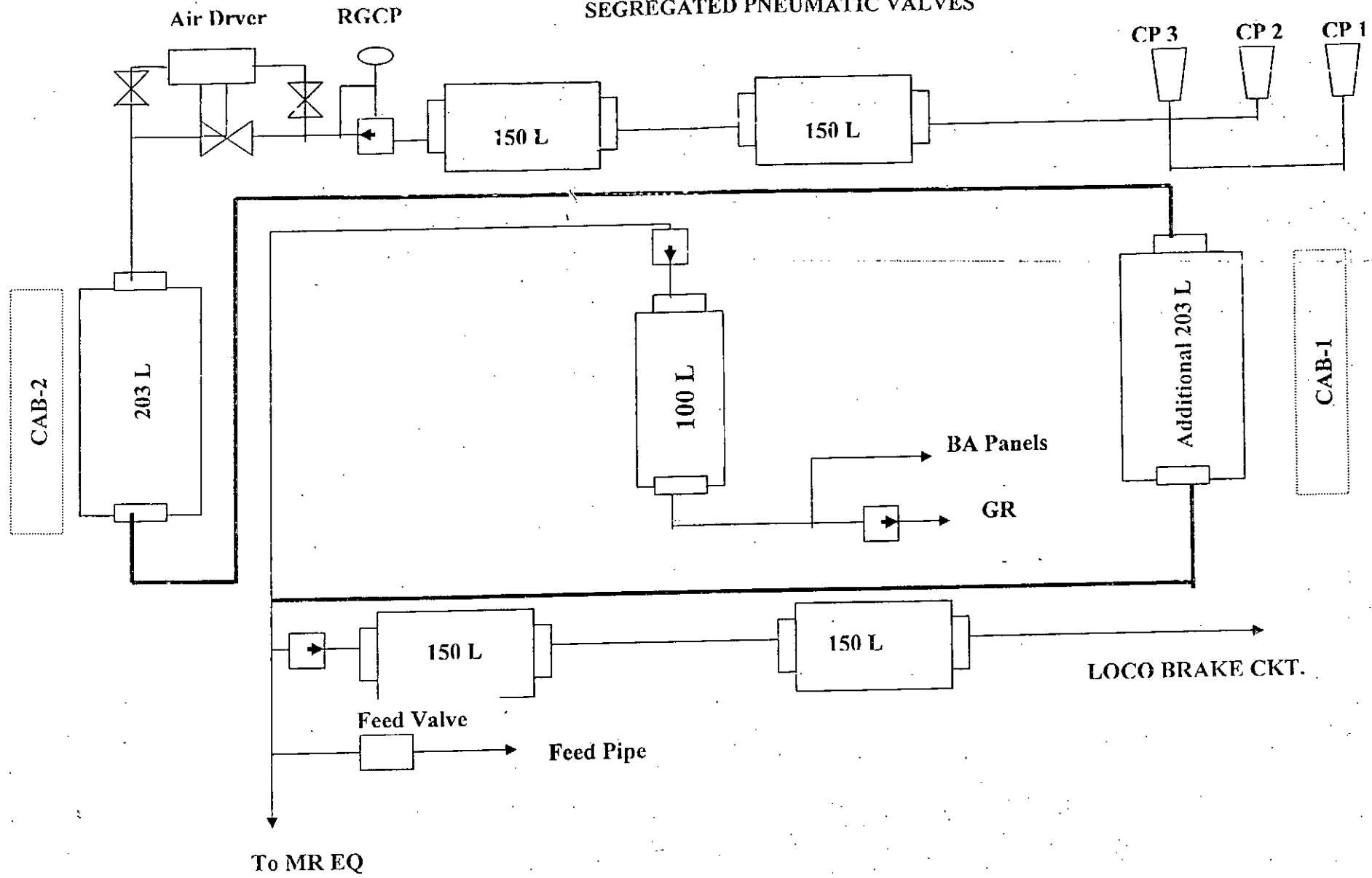
ADDITIONAL 1000 LPM COMPRESSOR MOUNTING LOCATION ON WAP-4 LOCOMOTIVE  
WITH SEGREGATED PNEUMATIC VALVE

SKETCH-1



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PIPE LINE ARRANGEMENT OF WAP-4 LOCO NO. WITH SEGREGATED PNEUMATIC VALVES



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- xvi. One magnetic unloader valve Rotex make or any other make of RDSO/CLW approved source.

**8.0 MATERIAL RENDERED SURPLUS:**

- i. One 53 Litre capacity reservoir.

**9.0 REFERENCE:**

Railway Board vide letter No. 2003/Elect (TRS)/440/1Pt.dated 20.11.09 have advised to study the additional air requirement of WAP-4 electric locomotive hauling coaches having air suspension spring and Controlled Discharge Toilet System (CDTS) being provided in "DURANTO" Train.

Railway Board vide letter No. 2003/Elect (TRS)/440/1Pt.dated 16.06.2010 have approved for provision of an additional compressor of 1000 lpm capacity along with an additional reservoir of 203 litres and replacement of 53 litre reservoir with one 100 litre reservoir on WAP-4 class of locos having segregated pneumatic valves.

**10.0 MODIFICATION DRAWING:**

Sketchs -1 & 2

**11.0 AGENCY OF IMPLEMENTATION:**

All the Electric Loco Sheds & Electric Loco Workshops having WAP-4 class of locos having segregated pneumatic valves layout arrangement.

(A.K. Goswami)  
13/7

**Encl:** Sketches -1 & 2

for Director General/Elect.

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**Encl:** Sketch-1 & 2

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for Director General/Elect.

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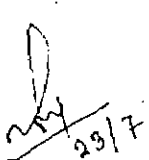
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