

SUSPENSION SYSTEM IN EMU/MEMU

TYPES OF SUSPENSION

❖ PRIMARY

SUSPENSION : BETWEEN AXLE BOX
AND BOGIE.

❖ SECONDARY

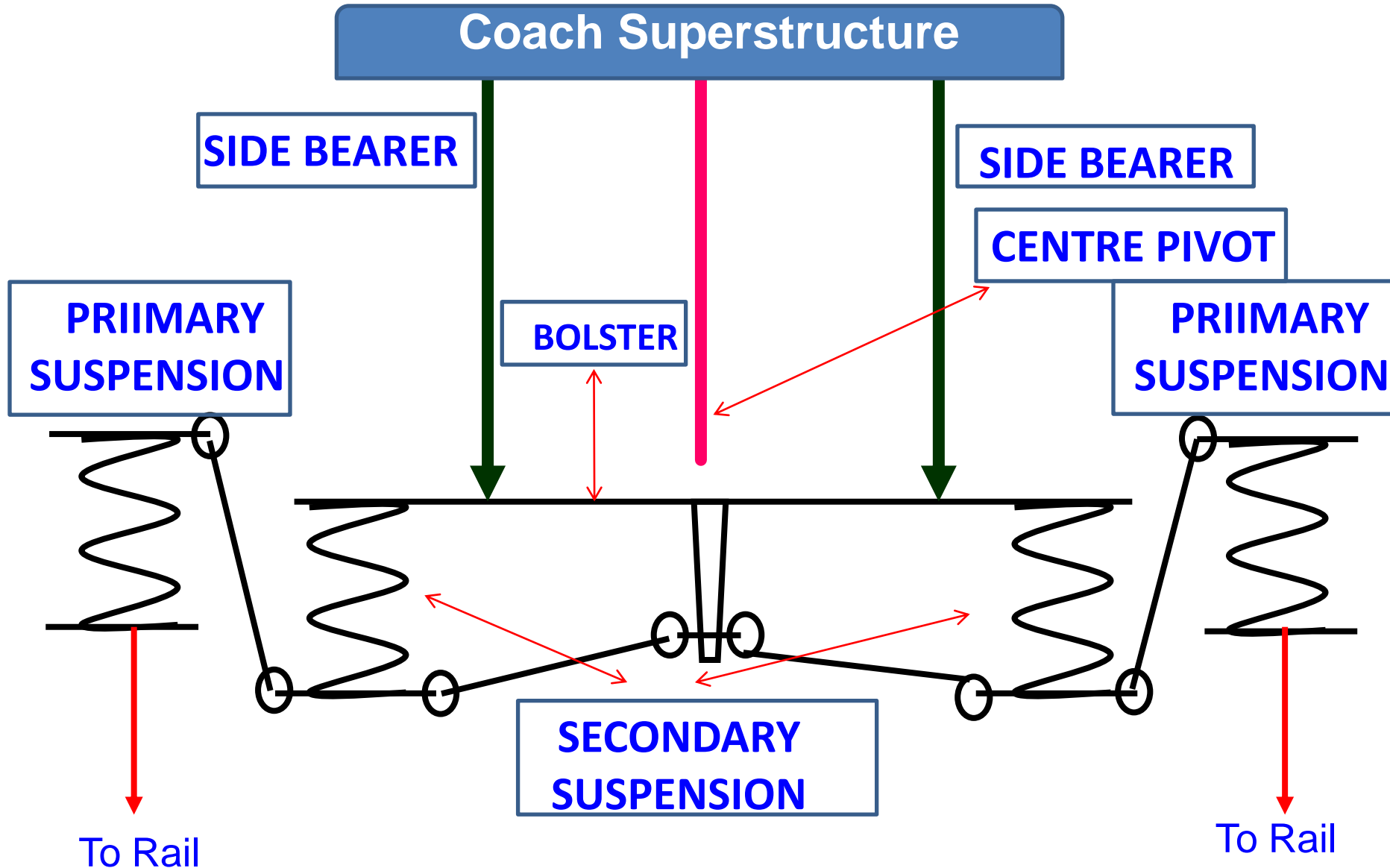
SUSPENSION : BETWEEN BOGIE AND BODY
(COACH BODY) BODY WEIGHT,
RESTS ON BOGIE BOLSTER-
SECONDARY SUSPENSION
(AIR SPRING OR HELICAL

SPRING)

EXISTING SUSPENSION SYSTEM



SUSPENSION SYSTEM IN EMU/MEMU



DOUBLE WISHBONE SUSPENSION ARRANGEMENT



The diagram illustrates a cross-section of a coach body supported by a bogie. The coach body is a dark green rectangle at the top. Below it are three bogie bolsters: two dark brown ones on the sides and a central green one. The side bolsters have blue arrows pointing down, indicating load. The central bolster is flanked by pink vertical lines. Below the bolsters is a blue horizontal bar. Underneath this bar are two blue oval air springs, each with a blue rectangular label 'AIR SPRING'. Between the air springs is the text 'MODIFIED SECONDARY SUSPENSION'. The entire assembly sits on a light blue base.

COACH BODY

BOGIE BOLSTER

AIR SPRING

**MODIFIED
SECONDARY
SUSPENSION**

AIR SPRING

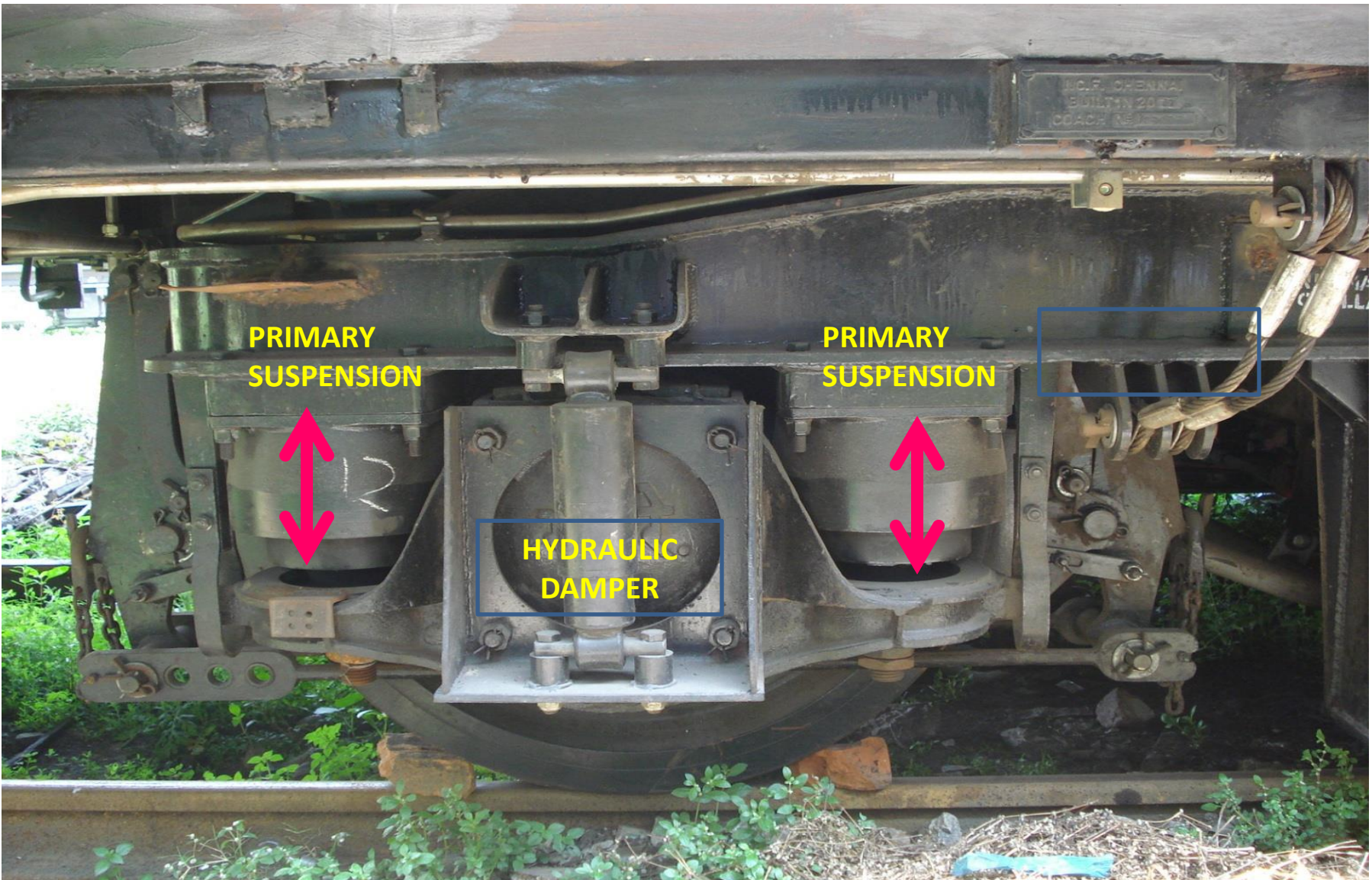
EXISTING PRIMARY SUSPENSION SYSTEM IN EMU



EXISTING SECONDARY SUSPENSION



NEW GENERATION SUSPENSION SYSTEM (METAONE RUBBER IN PRIMARY SUSPENSION)



NEWLY DEVELOPED AIR SUSPENSION SYSTEM AS SECONDARY SUSPENSION



INTRODUCTION

- **Air suspension, also called pneumatic suspension, uses the properties of air for the cushioning effect (springiness).**
- **It is a proven technology on Indian Railways and is being used on EMUs for last many years. Now these have been introduced in mainline coaches with ICF bogies because it is technically superior in many ways.**

ADVANTAGES OF AIR SUSPENSION SPRING

- **Provides better ride quality for passengers
Ride index with air springs is 2.72 against
3.37 in steel coil springs (lower the ride index
better the ride quality)**
- **LHB Ride index : 2.5 at 160 KMPH**
- **ICF Ride index : 3.5 at 130 KMPH**
- **Maintain constant buffer height even with dense
crush load on the coaches**
- **Improved reliability and less maintenance**
- **Isolation of structure borne noises**
- **Maintain one natural frequency at all speeds
which reduces vibrations and in turn reduces
passenger fatigue**

- **Automatic control of vehicle floor height.**
- **Excellent ride comfort.**
- **Safe running.**
- **Constant natural frequency from tare to full loads.**
- **Low design height.**
- **Integral input signal for load dependent braking and acceleration.**
- **Isolation of structure borne noise.**
- **Great durability for 15 years life expected.**

ADVANCEMENT USAGE OF AIR SPRING

- **To start with, these springs are being provided on hybrid coaches of Duronto rakes which have stainless steel body and conventional ICF bogies.**
- **Trials of air springs on high speed FIAT bogies of stainless steel coaches have also been completed with satisfactory results and in due course, all coaches will be provided with air springs.**

WORKING PRINCIPLE OF AIR SPRING

- **Air springs are basically pressurized air chambers made up of rubber bellows which maintain constant height under varying loads.**
- **The height of the air springs is controlled continuously by adjusting the air pressure in the bellows with the help of a *load levelling device* connected between the bogie frame and the base plate of air springs.**
- **The air springs replace only the secondary suspension, whereas primary suspension continues to use steel coil springs.**
- **An auxiliary air reservoir of 150 litre capacity is provided below each coach which is fed....**

....from feed pipe through a non-return valve, maintains 7 bar pressure in loco compressor and air springs operate at a limiting pressure of 6 kg/cm².

- SAFETY OF OPERATIONS :The C&W staff at nominated points and train passing staff should vigilantly see that all the bellows are in inflated condition.**
- This can also be checked by seeing that the levelling valve lever is in horizontal position.**

Rubber Below



CUT-SECTION OF AIR SPRING

Emergency Rubber
Springs

WHAT IS REQUIRED TO BE DONE BY PILOT/MOTER MAN IN CASE BELLOW OF AIR SPRING PUNCTURED OR DEFLATED

- **In case of heavy leakage or deflated air defective bogie is to be isolated with the help of isolation valves and driver should observe a speed restriction of 60 Kmph upto terminal point for maintenance.**
- **The air springs have inbuilt emergency rubber springs for safety with which train can work at a maximum speed of 60 Kmph up to a distance of 1000 kms.**
- **For further details refer RDSO Maintenance manual , visit “Technical Information ” page on RCF website www.rcfkapurthala.com**

3 – POINT AIR SUSPENSION SYSTEM

- **In this system the 2 bellows of one bogie is controlled by individual leveling valves.**
- **But the 2 bellows of other bogie are controlled by only one leveling valve.**

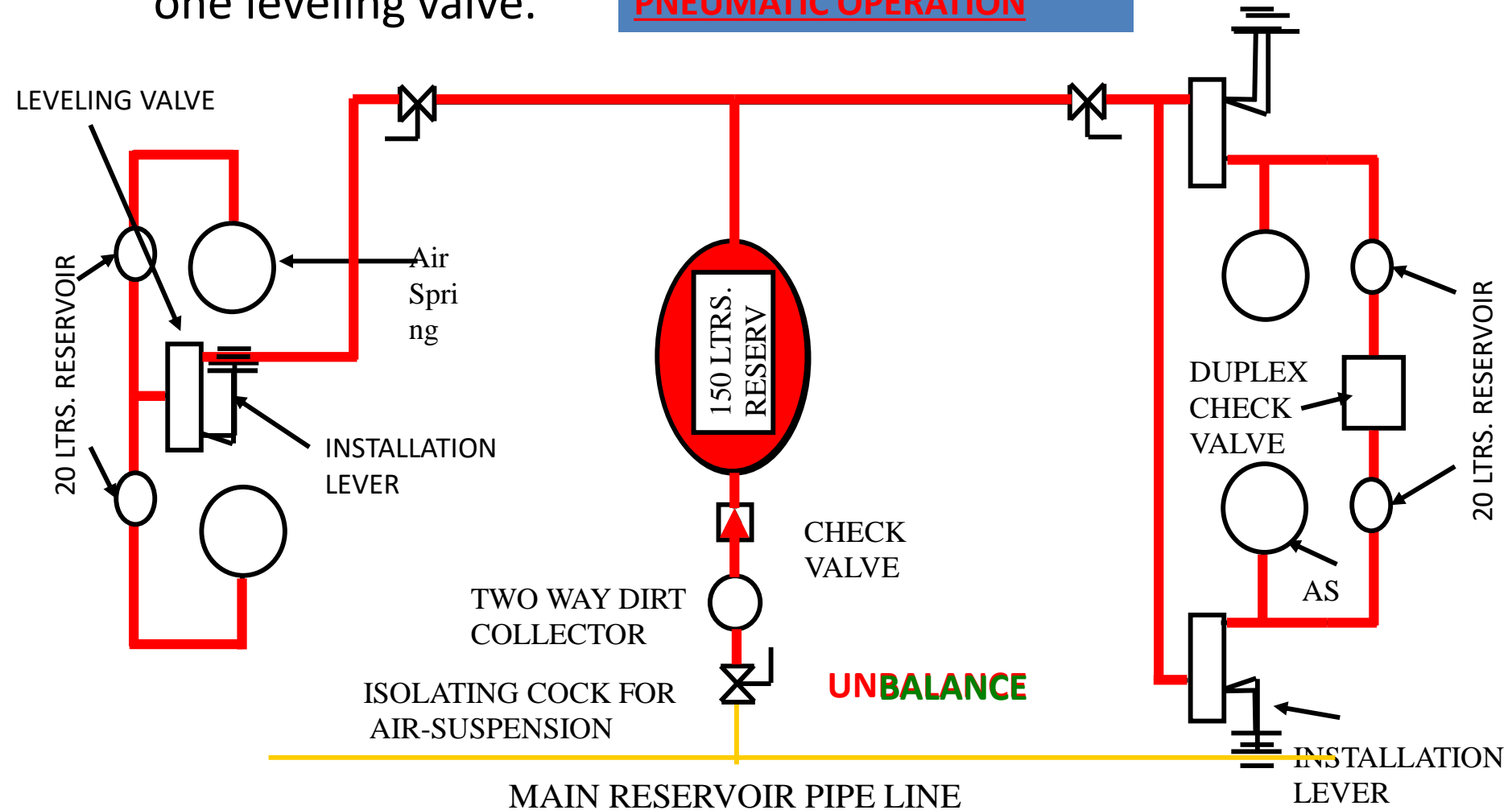
4 – POINT AIR SUSPENSION SYSTEM

- **In this system all the 4 bellows of two bogie are controlled by individual leveling valves.**

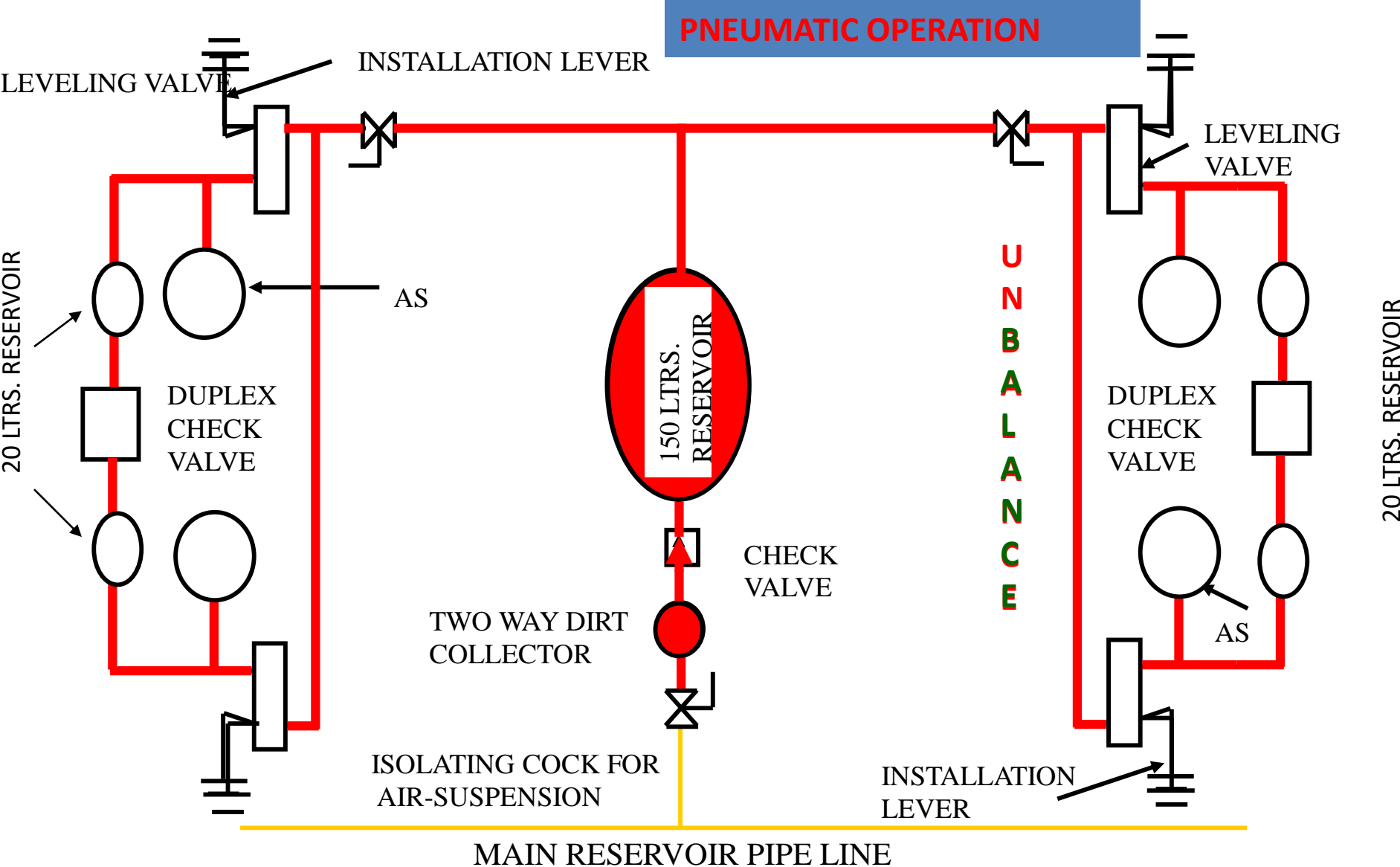
3 – POINT AIR SUSPENSION SYSTEM

- In this system the bellow of one bogie is controlled by individual leveling valve.
- But the bellows of other bogie are controlled by only one leveling valve.

PNEUMATIC OPERATION



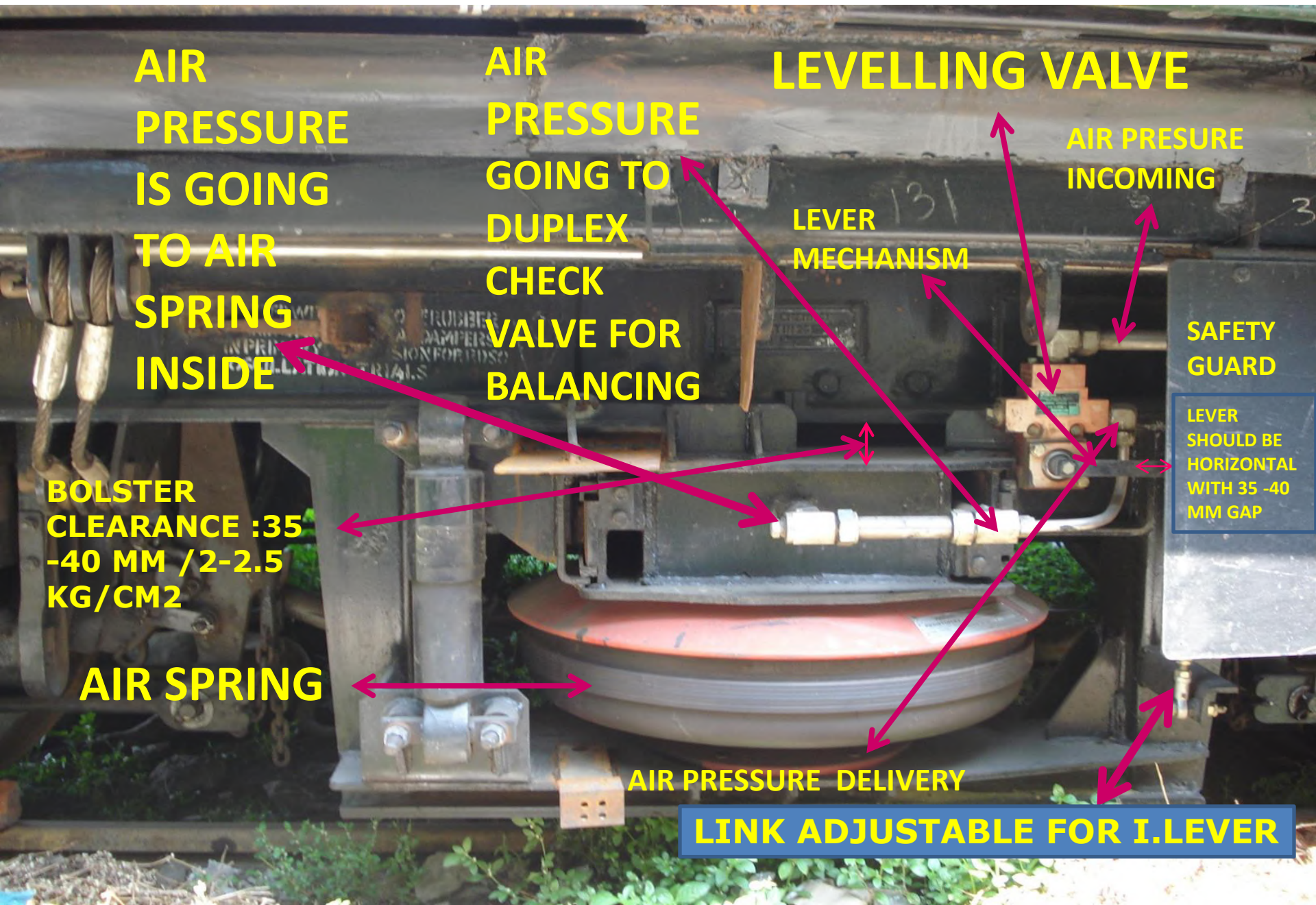
SCHEMATIC DIAGRAM FOR 4-POINT AIR-SUSPENSION







NEW SECONDARY SUSPENSION SYSTEM IN EMU



AIR
PRESSURE
IS GOING
TO AIR
SPRING
INSIDE

AIR
PRESSURE
GOING TO
DUPLEX
CHECK
VALVE FOR
BALANCING

LEVELLING VALVE

AIR PRESURE
INCOMING

LEVER
MECHANISM

SAFETY
GUARD

LEVER
SHOULD BE
HORIZONTAL
WITH 35 -40
MM GAP

BOLSTER
CLEARANCE :35
-40 MM /2-2.5
KG/CM2

AIR SPRING

AIR PRESSURE DELIVERY

LINK ADJUSTABLE FOR I.LEVER

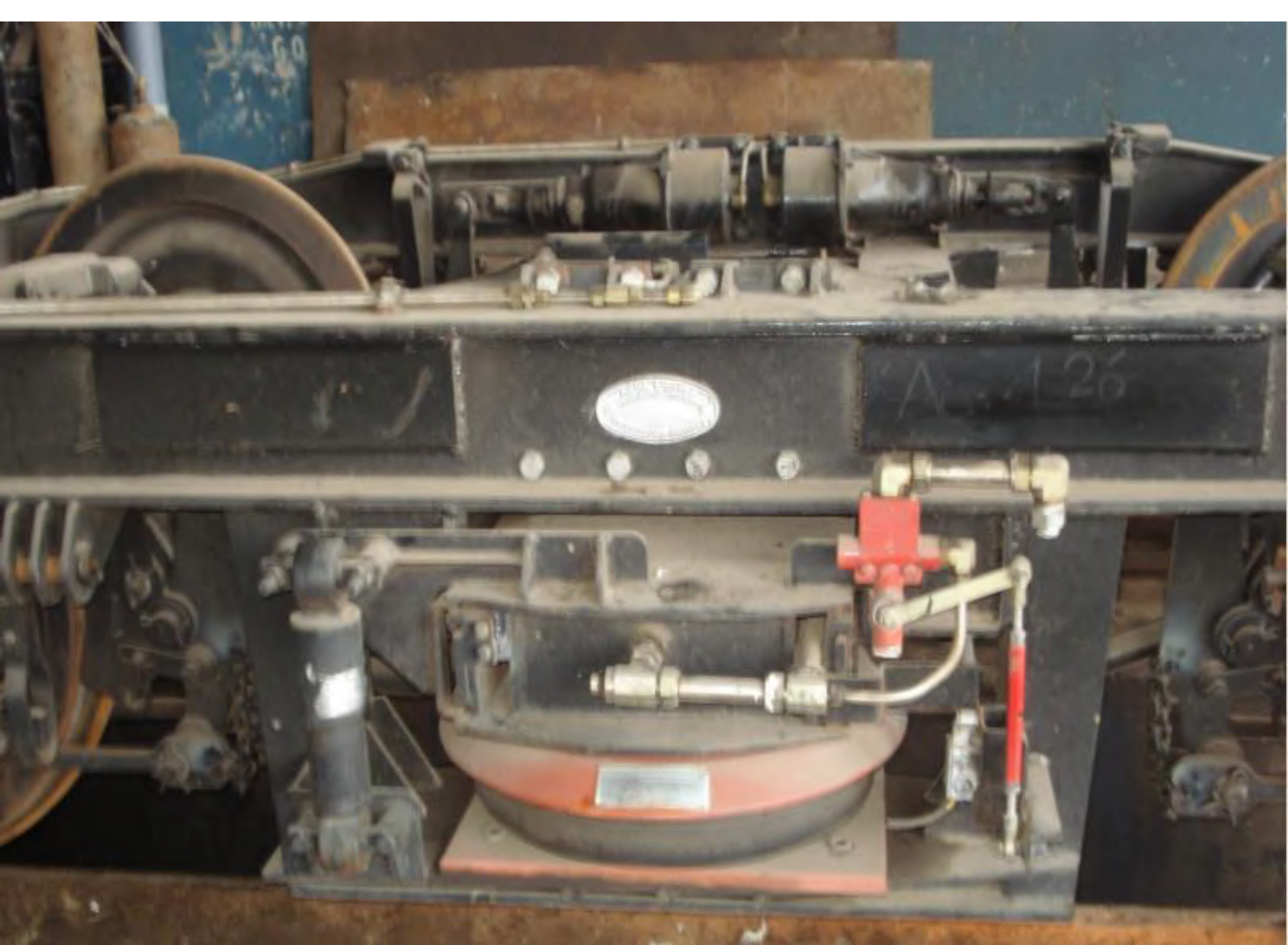
A photograph of the underside of a vehicle chassis, showing the air spring and levelling lever assembly. A vertical orange rod is connected to a horizontal lever arm at the bottom. A large, thick, braided air line runs horizontally across the upper right. Various metal brackets, bolts, and a curved metal plate are visible. Red arrows indicate the movement of the safety guard, the vertical rod, and the lever arm. A blue box contains text about the air spring, and another blue box contains text about the lever arm's function.

Safety Guard

MOVES UP AND
DOWN
AS PER THE
LOAD ON
COACH BODY

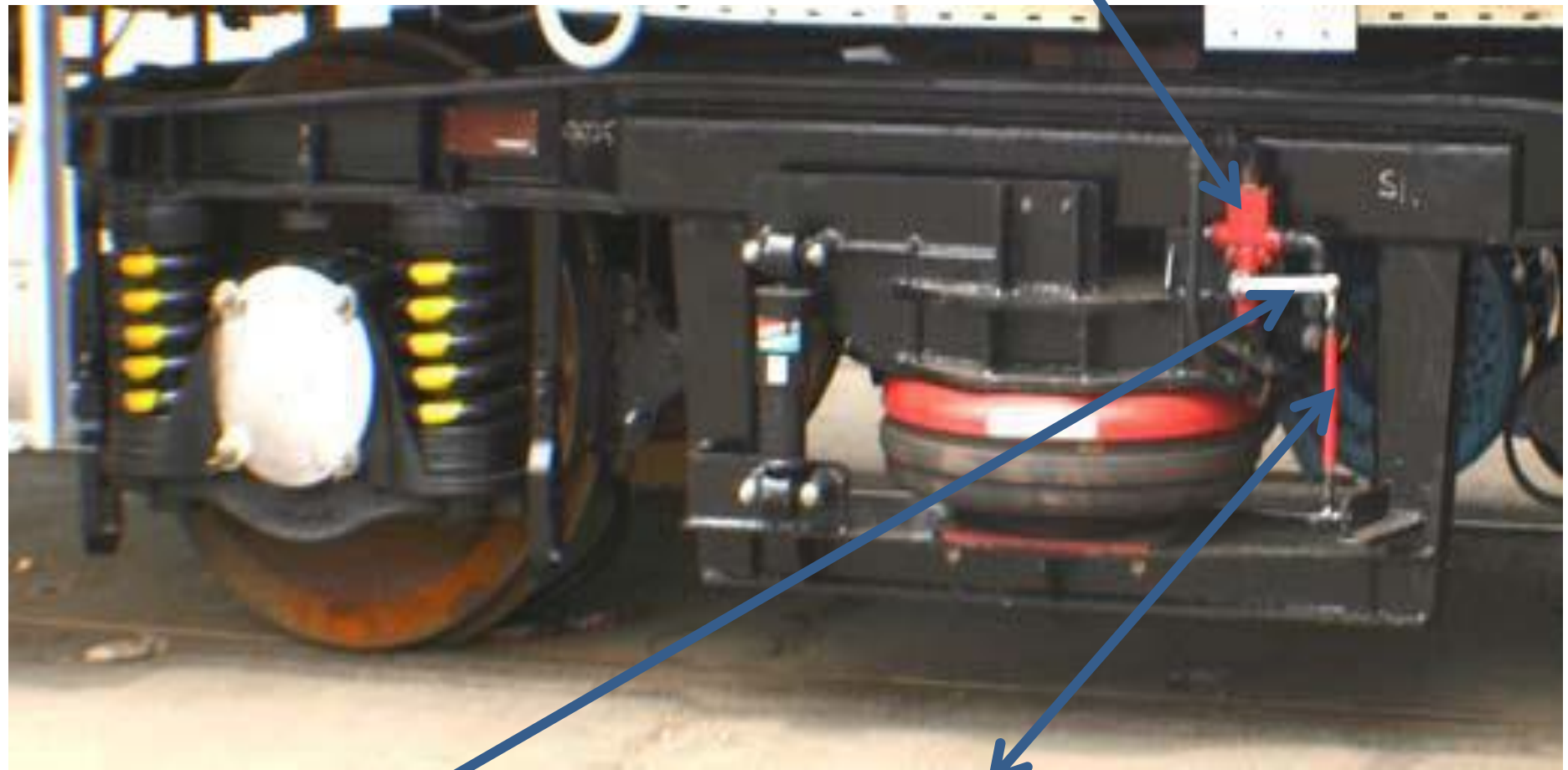
AIR SPRING

INSTALLATION LEVER FOR LEVELLING VALVE



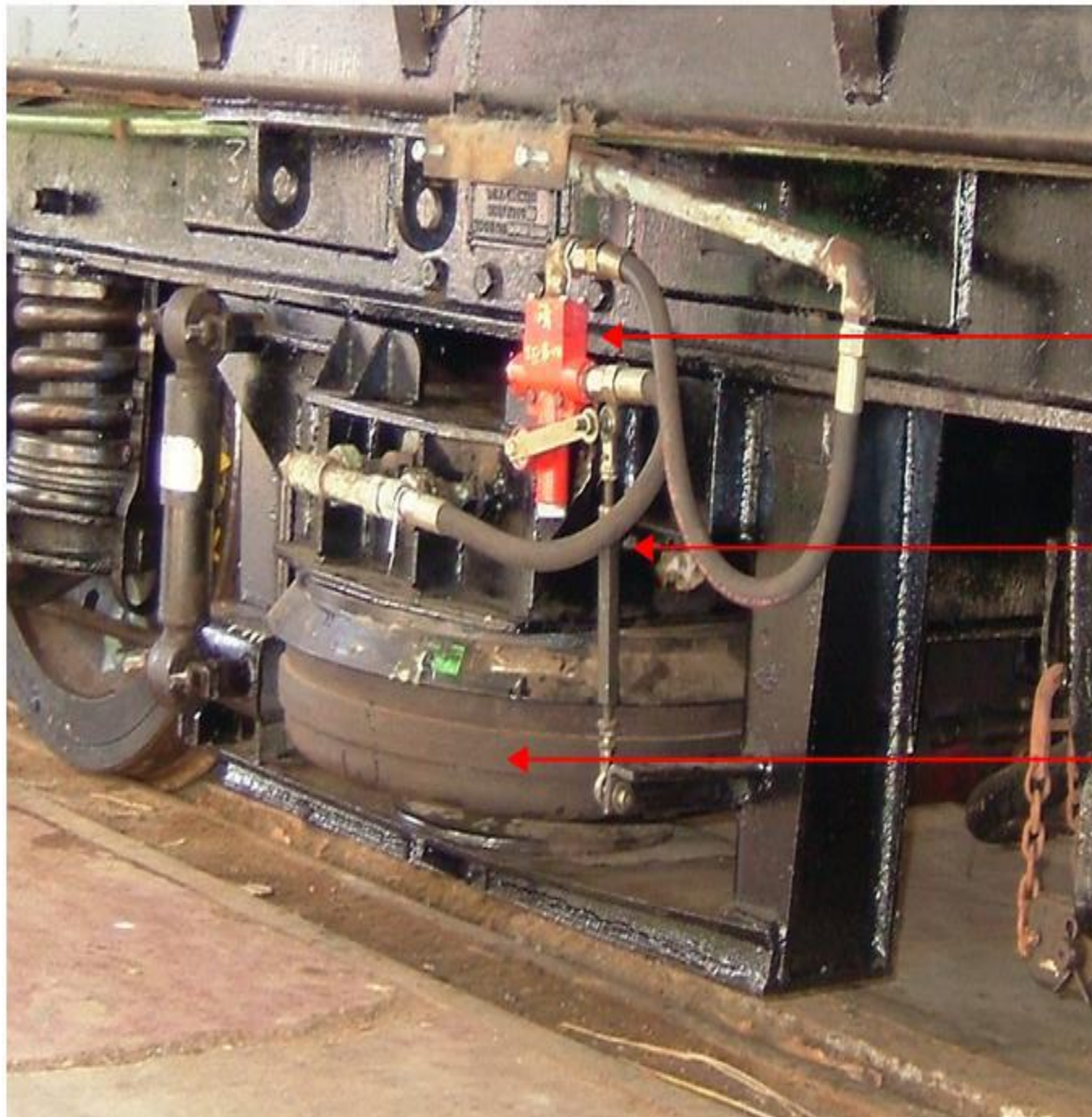


Levelling Valve



Link for levelling valve

Installation Lever



Levelling
Valve

Levelling
Rod

Air Spring



TR/L CABLES

ADJUSTED TO 100
100 INCH
100

AC 100

100 INCH
100

100 INCH
100

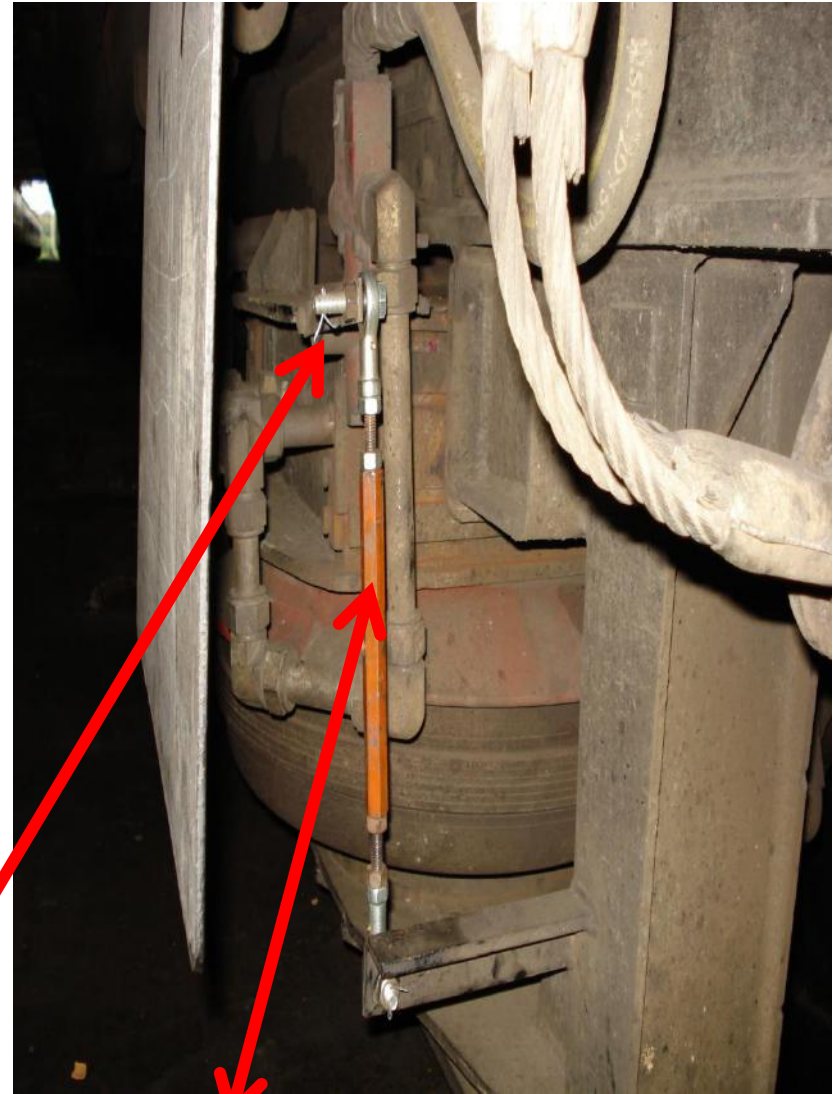
100 INCH
100

100 INCH
100

INSTALLATION LEVER

This is fitted between link of Leveling valve and bogie frame. The ball and socket joint at both ends are provided to give flexibility. By increasing the length of installation lever, the bellow height increases and reducing its length the bellow height decreases.

ONE END OF **LINK** CONNECTED
TO **IL** ANOTHER END IS
CONNECTED TO **LV**



INSTALLATION LEVER-IL



INSTALLATION LEVERS DEFECTIVE AND GOOD

DETAILS OF FAILURE

INSTALLATION LEVER OF LEVELLING VALVE LEVER





LEVELLING VALVE UNDER OVERHAULING

AIR SPRING

1. SPIGOT – It is the part of top plate which connects the air path for bellow from bolster. Two 'o' rings are provided on this spigot.
2. EMERGENCY SPRING – It is made by layers of metal and rubber. The coach rests on this spring when there is no air, i.e. deflated condition.
3. BELLOW – It is reservoir which creates the air column for suspension.
4. BASE PLATE – It is the lowest part of air spring and is fitted with Lower Spring Beam. Previously six bolts are used for fixation but now four bolts are used.

WORKING PRINCIPLE

Air from MR flows to air spring bellow through leveling valve when this valve is in charging position. As the pressure inside the bellow increases bellow height increases as well as bolster also lifts up and the link of leveling Valve approaching to horizontal position. When the Leveling valve enters within dead band zone no further air will flow to bellow. Now if the load on air spring increases, bolster goes down and leveling valve will be in charging condition admitting more air into the bellow. This causes bolster again lifts up to the preset level.

MAINTENANCE OF AIR SPRING

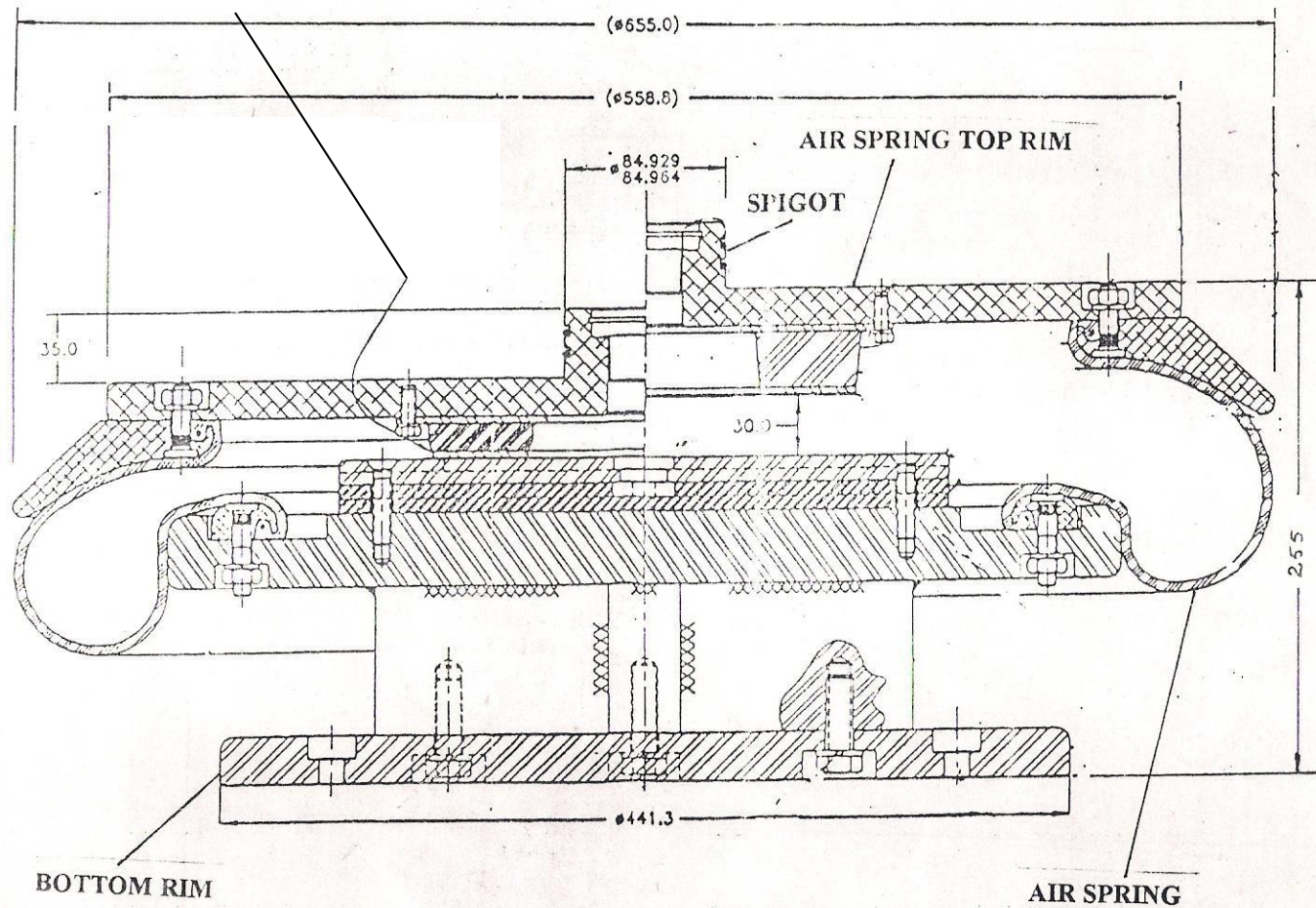
AS PER “MAINTENANCE INSTRUCTIONS ON AIR SUSPENSION FOR DC, AC & AC-DC EMU/HHP DMU COACHES” CMI 9802 (Rev. 2) FEB. 2008 BY RDSO/LKO’S

- REMOVING DUST MUD AND OIL DEPOSIT IF ANY, ON AIR SPRING IN 4 MONTHS INTERVAL.
- THOROUGH CHECKING OF AIR SPRING, BULGING OF BELLOW, AIR LEAKAGE IN EVERY 4 MONTHS.
- TIGHTENING OF AIR SPRING BOTTOM PLATE BOLTS AND NUTS IN EVERY 4 MONTHS.
- THOROUGH VISUAL CHECK OF AIR SPRING AFTER DISMANTLING (LOWRING FROM BOGIE).
- CODAL LIFE EXPECTED 16 YEARS.

DIFFERENCE

- The basic difference between these bellows are the location of Emergency spring.
- In case of M/S CONTITECH make the bellow is provided on emergency spring.
- But in case of M/S RESISTOFLEX the bellow is provided surrounding the emergency spring.

EMERGENCY SPRING
DEFLECTION UNDER
145 KN IS 13 mm AND
STIFFNESS TO 45000 N/mm



FIRESTONE MAKE AIR SPRING

FIRESTONE MAKE AIR SPRING BELLOW



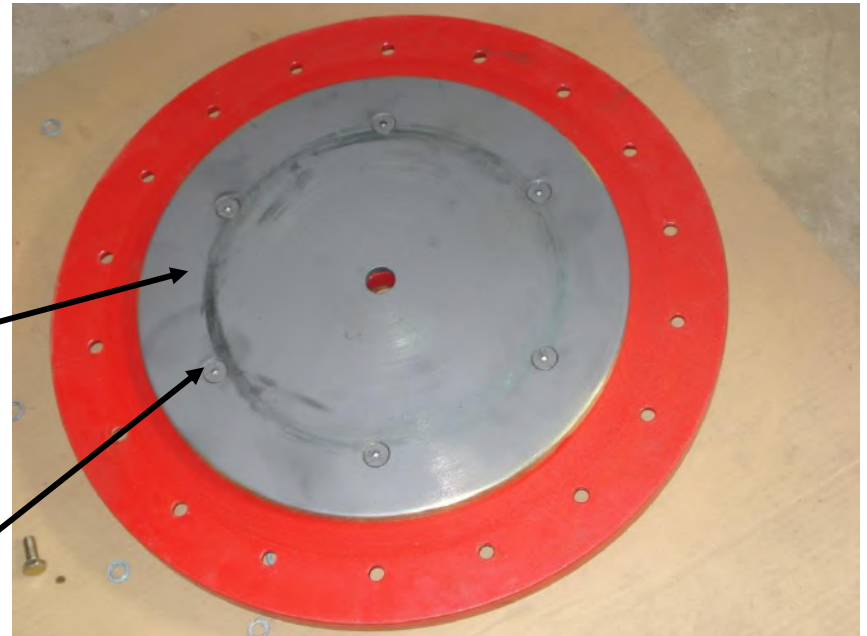
DETAILS OF FIRESTONE MAKE

AIR SPRING BELLOW

TOP PLATE – THIS IS THE TOP MOST PART OF AIR SPRING BELLOW ON WHICH SPIGOT IS PROVIDED. THIS IS FITTED BY 18 NOS. OF M-10 STUD AND NUT WITH 40 kg-m TORQUE. ONE DISTANCE PIECE OF ANTI RUST POWDER COATED IS FITTED WITH THIS BY THE HELP OF SIX NOS. SOCKET HEADED SCREWS WITH THREAD LOCK.

THIS DISTANCE PIECE IS RESTED ON EMERGENCY SPRING WHEN THE BELLOW IS IN DEFLATTED CONDITION.

DISTANCE PIECE



SOCKET HEADED SCREWS

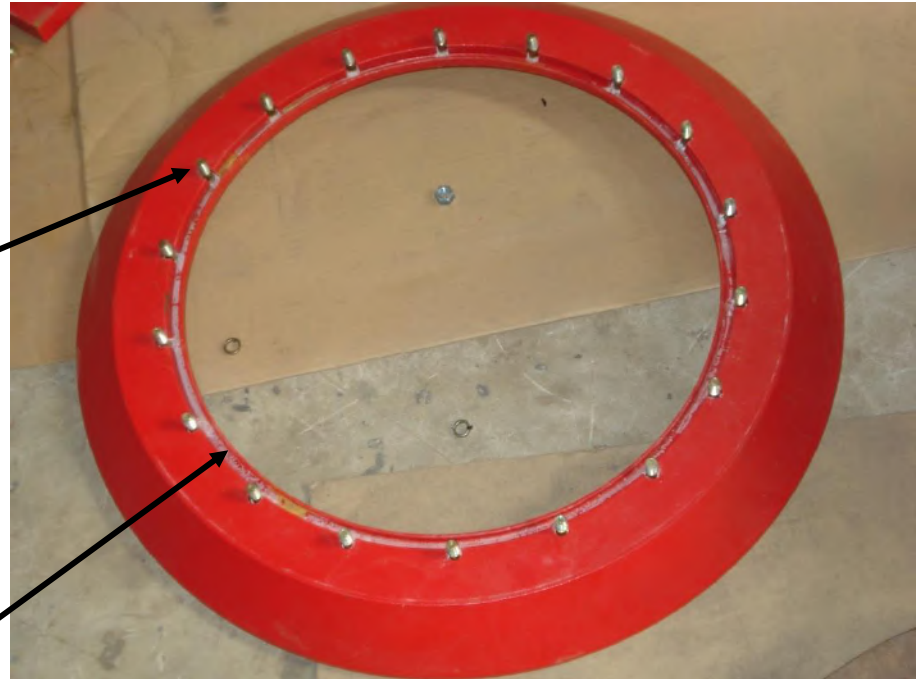
DETAILS OF FIRESTONE MAKE

AIR SPRING BELLOW

BID SKIRT- THIS IS THE SECOND PART FROM TOP OF BELLOW. THE TOP PLATE IS FITTED WITH THIS BY THE HELP OF 18 NOS. M-10 STUD AND NUT. THE RUBBER BELLOW IS FITTD ON THIS WITH THE HELP OF TWO BLUNT CHIESEL, JUST LIKE THE FITMENT OF TYRE FOR AUTOMIBILES.

STUDS FOR FIXING OF
TOP PLATE

BID FOR FITTING BELLOW

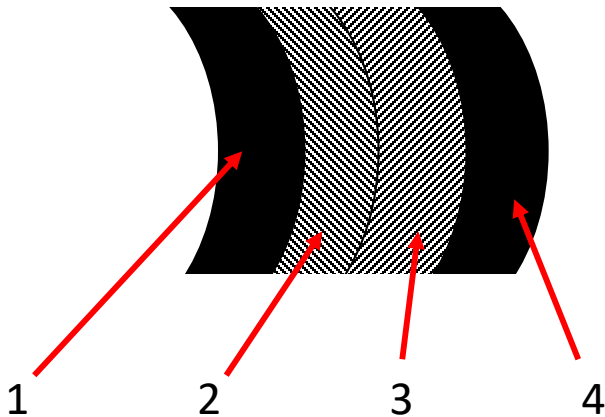


DETAILS OF FIRESTONE MAKE

AIR SPRING BELLOW

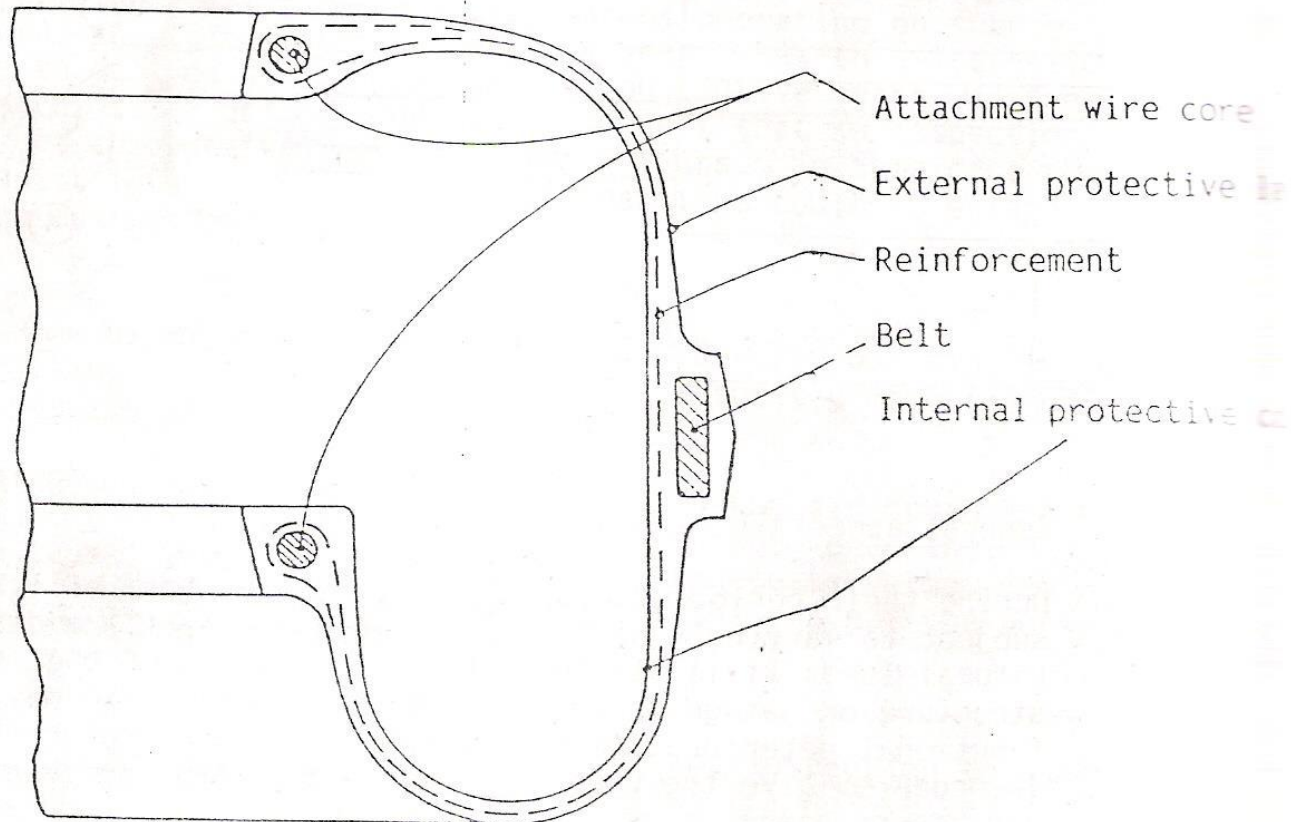
BELLOW- THIS IS MAIN ITEM OF THIS SYSTEM. THIS IS IMPORTED FROM FIRESTONE/USA. THERE ARE FOUR PLYES ON THE BELLOW.

1. OUTER PLY.
2. SECONDARY PLY.
3. SECONDARY PLY.
4. INNER PLY.



BELLOW STRUCTURE FOR M/S CONTITECH MAKE AIR SPRING

1.2.1. Basic structure of an air spring



DETAILS OF FIRESTONE MAKE AIR SPRING BELLOW



DETAILS OF FIRESTONE MAKE

AIR SPRING BELLOW

THE YEAR OF MANUFACTURING OF THE BELLOW IS EMBOSSED ON THE BELLOW. THERE IS **TWO CONCENTRIC CIRCLES** ON THE SURFACE OF BELLOW. THE **LETTER** IN THE SMALL CIRCLE IS REPRESENT THE YEAR OF MANUFACTURING AND THE NUMBER **DOTS** REPRESENT THE MONTH OF MANUFACTURING.

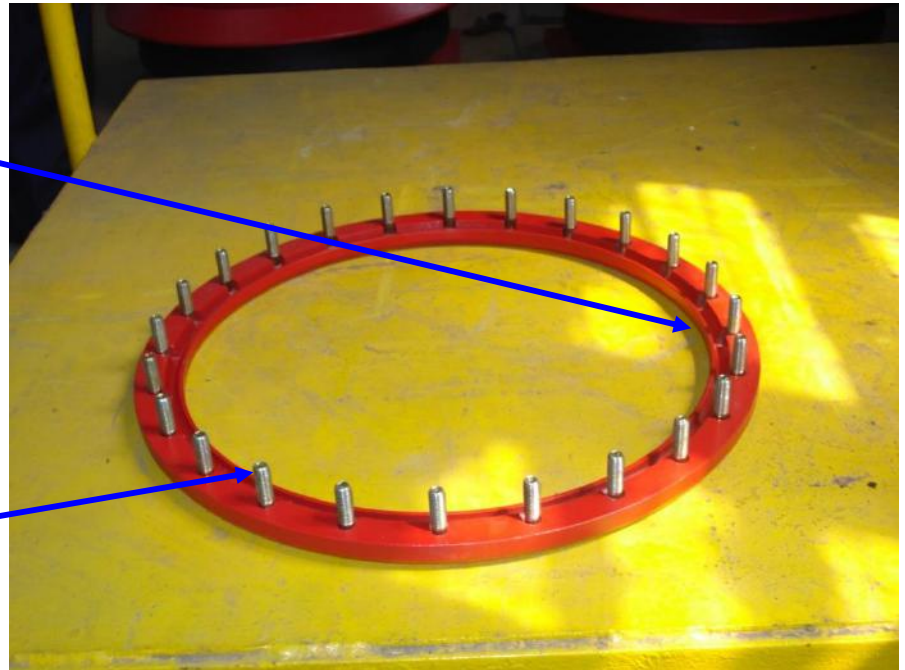


DETAILS OF FIRESTONE MAKE AIR SPRING BELLOW

BID RING- THIS IS THE PART WITH WHICH THE OTHER PART OF RUBBER BELLOW IS FITTED BY THS SAME PROCEDURE. THIS IS FITTED WITH PADESTAL ASSEMBLY BY THE HELP OF 24 NOS. M-10 STUD AND NUTS WITH 40 kg-m TORQUE.

BID FOR FITTING RUBBER
BELLOW

STUD FOR FITTING WITH
PADESTAL ASSEMBLY



DETAILS OF FIRESTONE MAKE

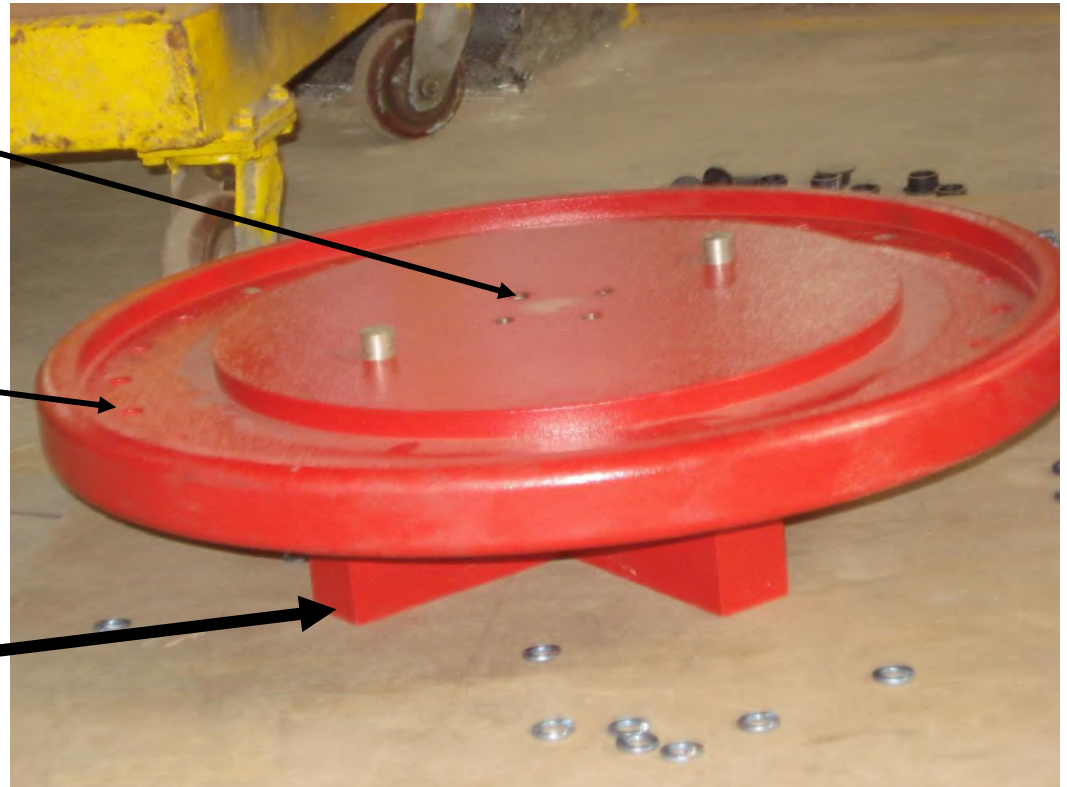
AIR SPRING BELLOW

PADESTAL ASSEMBLY- AT THE BOTTOM OF THIS BASE PLATE IS PROVIDED AND AT THE TOP EMERGENCY SPRING AND BID RING ARE FITTED. THERE ARE TWO DOWEL PINS FOR CENTERING OF EMERGENCY SPRING.

EMERGENCY
SPRING IS FITTED
HERE

BID RING IS
FITTED HERE

BASE PLATE IS
FITTED HERE



DETAILS OF FIRESTONE MAKE AIR SPRING BELLOW

EMERGENCY SPRING- THIS FITTED ON PADESTAL ASSEMBLY BY THE HELP OF FOUR NOS. M-10 BOLT WITH 40 kg-m TORQUE. THIS IS MADE OF RUBBER COVERED WITH METAL PLATE AT BOTH ENDS.



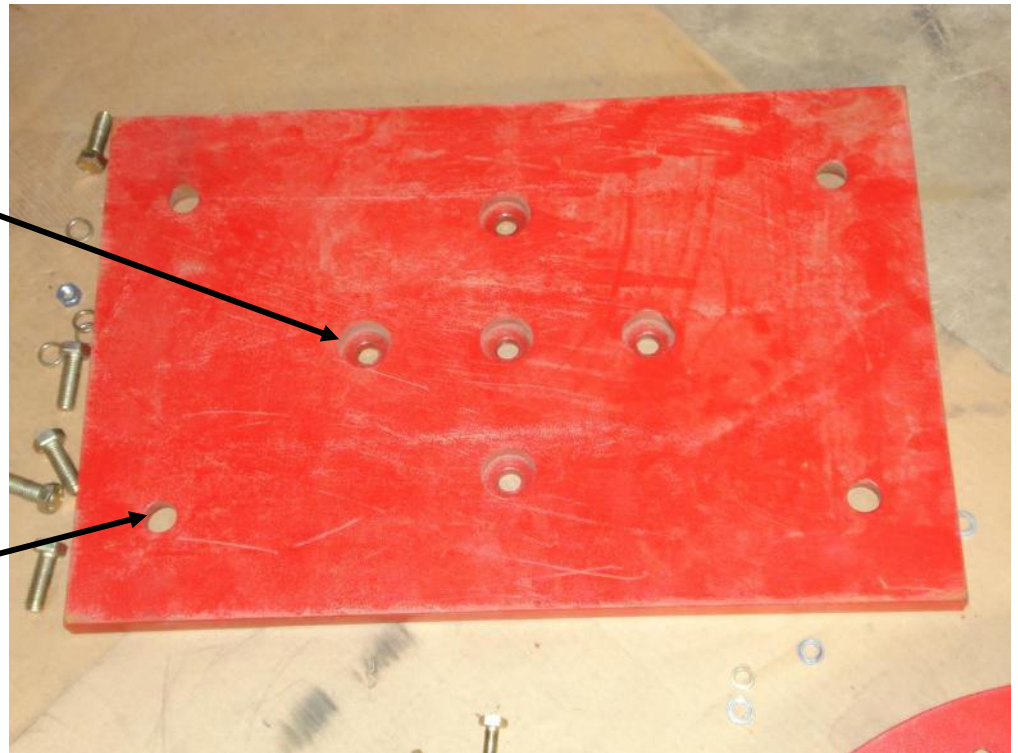
DETAILS OF FIRESTONE MAKE

AIR SPRING BELLOW

BASE PLATE- THIS IS THE LOWEST PART OF SPRING. THIS IS FITTED WITH PADESTAL ASSEMBLY BY THE HELP OF FIVE NOS. OF M-14 BOLTS AT 60 kg-m TORQUE. PREVIOUSLY THIS WAS OF CIRCULAR SHAPE WITH SIX FIXING HOLES. BUT NOW IT IS OF RECTANGULAR SHAPE WITH FOUR FIXING HOLES.

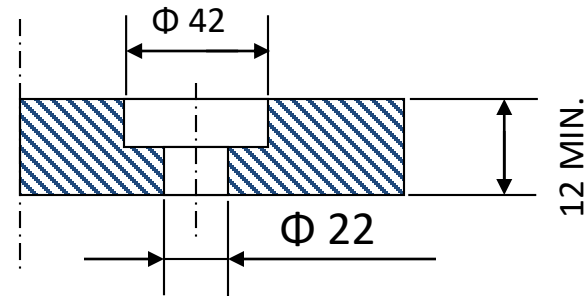
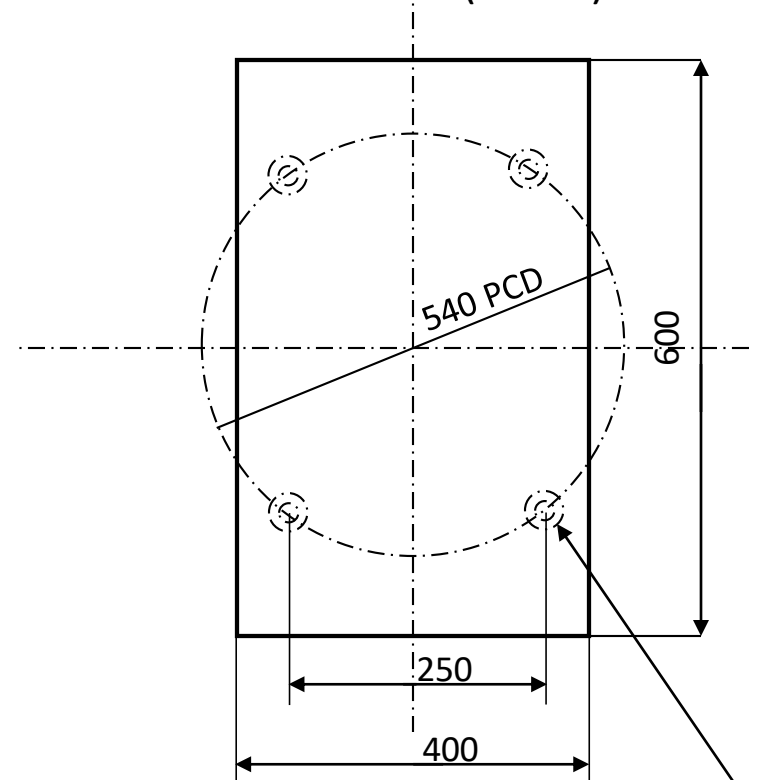
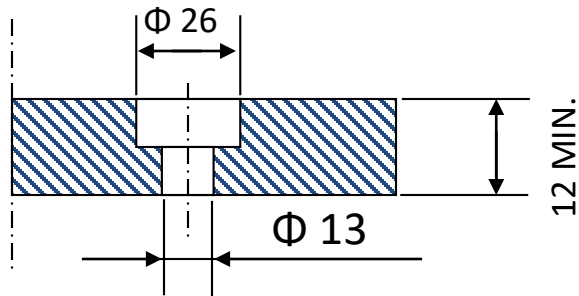
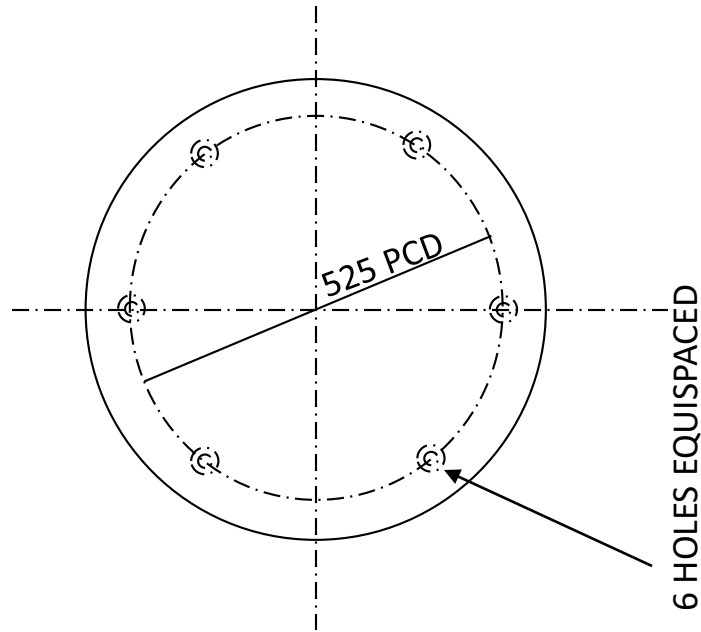
FIXING HOLES FOR FITTING
WITH PADESTAL ASSEMBLY

HOLES FOR FIXING AIR
SPRING ASSEMBLY



BASE PLATE

AS PER RDSO SKETCH –K1048 ALT. 4 IN MAINTENANCE INSTRUCTIONS ON AIR
SUSPENSION FOR DC, AC & AC-DC EMU/HHP DMU COACHES” CMI 9802 (Rev. 2) FEB.
2008 BY RDSO/LKO'S



4 HOLES FOR M20 COUNTERSUNK BOLT

DETAILS OF FIRESTONE MAKE AIR SPRING BELLOW

TOP PLATE

BID SKIRT

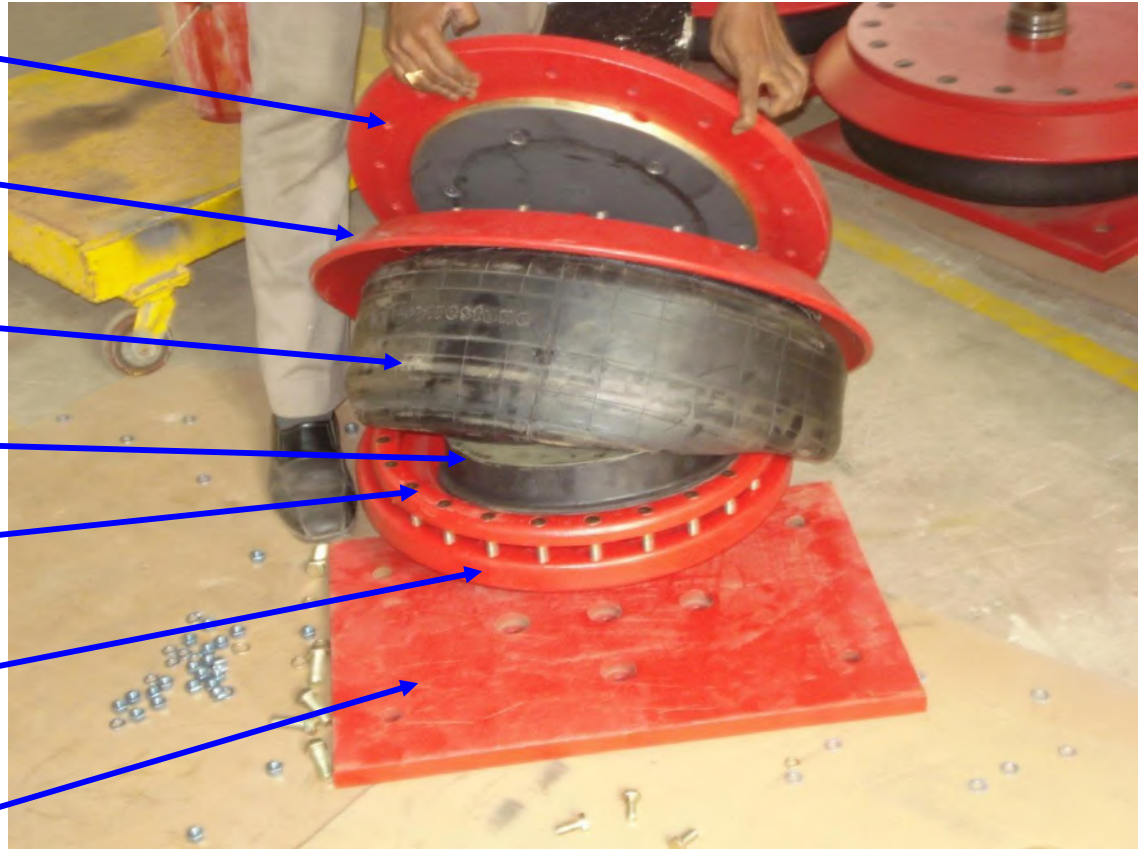
RUBBER
BELLOW

EMERGENCY SPRING

BID RING

PADESTAL
ASSEMBLY

BASE PLATE



TESTING OF AIR SPRING

LOAD TESTING- THIS IS DONE AS PER RDSO/LKO'S SPECIFIED PROCEDURE AS MENTIONED IN STR-106.

TEST SET-UP



LOAD TEST PROCEDURE AS PER RDSO STR CK-106

1. PLACE THE AIR SPRING ASSEMBLY IN TEST RIG.
2. TEST HEIGHT OF AIR SPRING TO BE MAINTAINED AT 255 \pm 5 mm.
3. CONNECT AIR SUPPLY TO AIR SPRING.
4. RAISE AIR PRESSURE TO 2.0 kg/cm².
5. CLOSE AIR SUPPLY SOURCE.
6. TAKE LOAD READING IN kgs AT 2.0 kg/cm².
7. RAISE AIR PRESSURE TO 3.4 kg/cm².
8. CLOSE AIR SUPPLY SOURCE.
9. TAKE LOAD READING IN kgs AT 3.4 kg/cm².
10. RAISE AIR PRESSURE TO 4.8 kg/cm².
11. CLOSE AIR SUPPLY SOURCE.
12. TAKE LOAD READING IN kgs AT 4.8 kg/cm².
13. RAISE AIR PRESSURE TO 6.0 kg/cm².
14. CLOSE AIR SUPPLY SOURCE.
15. TAKE LOAD READING IN kgs AT 6.0 kg/cm².
16. RAISE AIR PRESSURE TO 6.4 kg/cm².
17. CLOSE AIR SUPPLY SOURCE.
18. TAKE LOAD READING IN kgs AT 6.4 kg/cm².

If readings in steps 6,9,12,15 & 18 are within \pm 15% of the value as specified below, then the air spring has successfully been tested.

TEST RESULT

SL. NO.	LOAD	PRESSURE
1	4878 kg. (4.88 MT).	2.0 kg/cm ²
2	8450 kg. (8.45 MT).	3.4 kg/cm ²
3	11,743 kg. (11.74 MT).	4.8 kg/cm ²
4	15,000 kgs. (15 MT).	6.0 kg/cm ²
5	16,677 kgs. (16.68 MT).	6.4 kg/cm ²

LEAKAGE TESTING

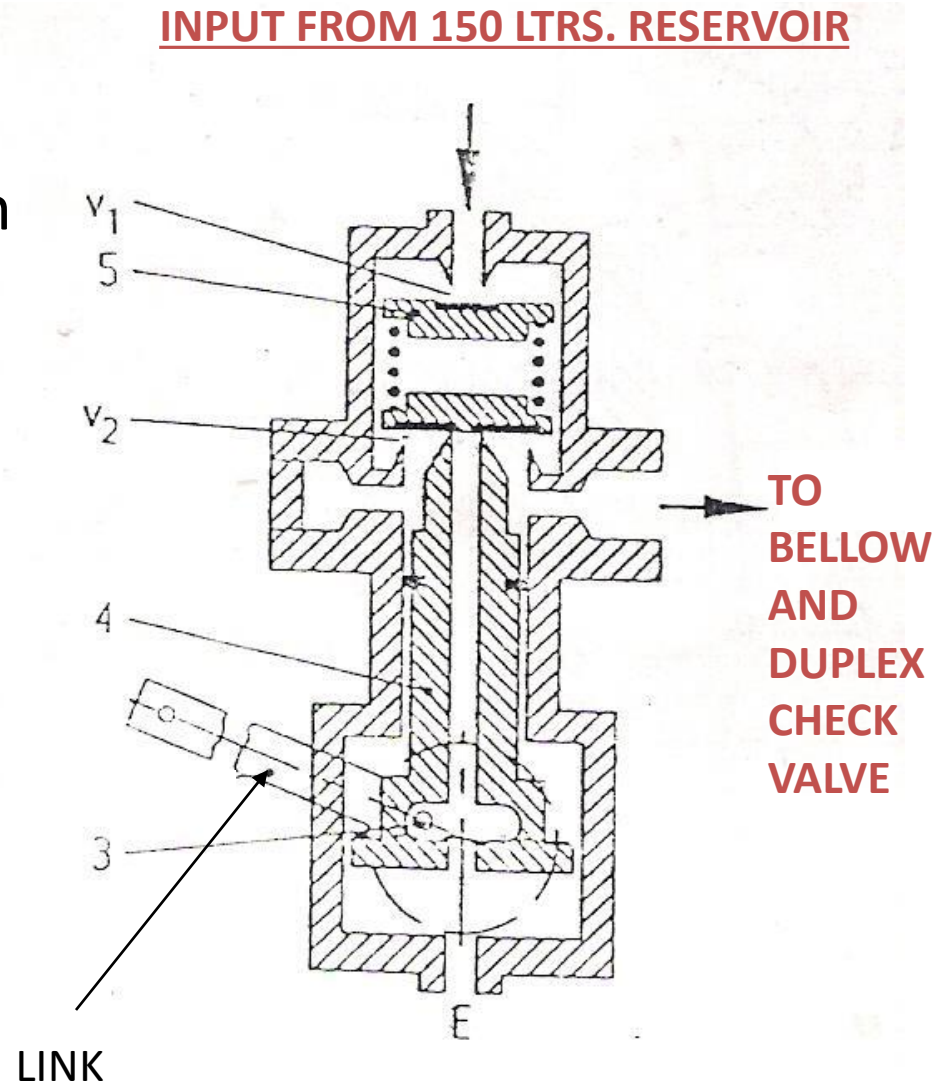
THIS TEST IS DONE BY ALLOWING AIR PRESSURE OF 9 kg/cm^2 IN AIR SPRING. THE PERMISSIBLE LEAKAGE IS 0.1 kg/cm^2 IN ONE HOUR.



LEVELING VALVE

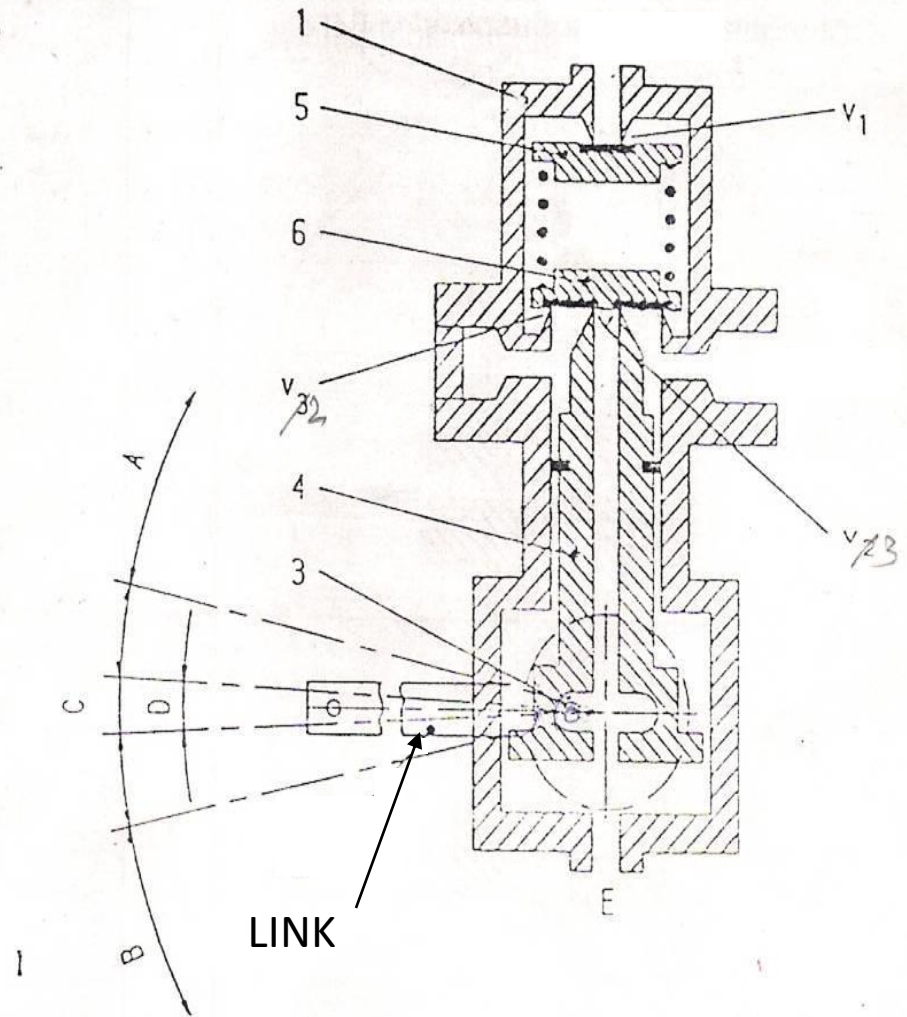
This is the heart of this system. Leveling valve is mounted on bolster and its link is fitted with installation lever. There are three positions of this valve.

1. Charging Mode – In this position of leveling air from MR flows to air spring bellow through this valve.



LEVELING VALVE

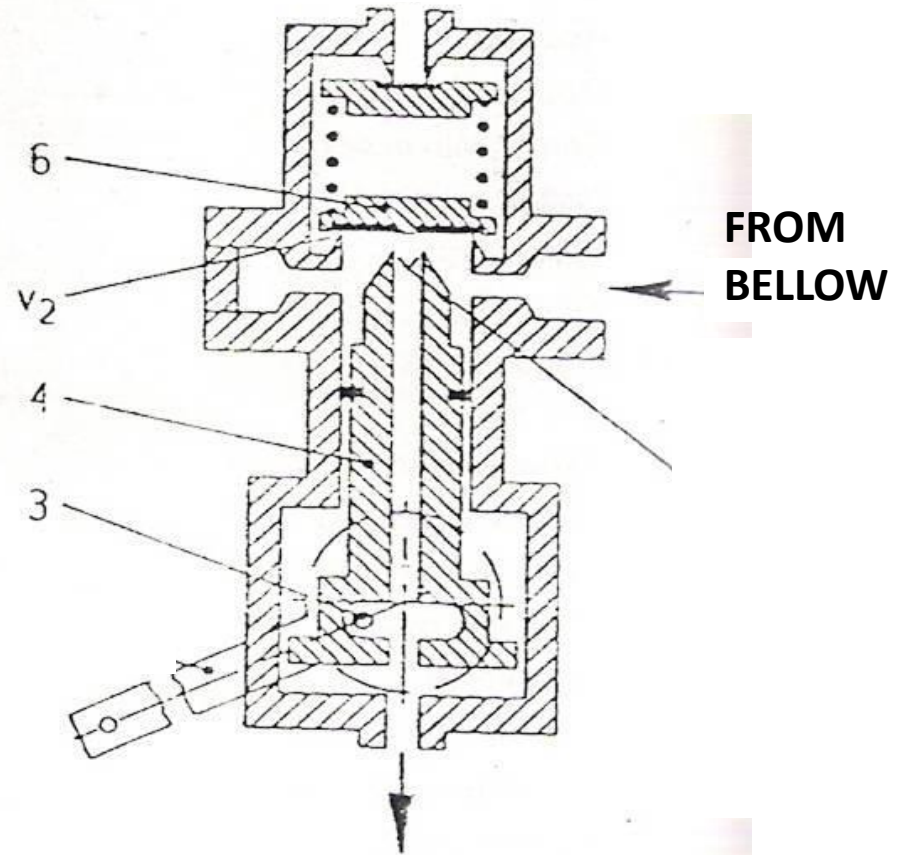
2. Dead Band Zone – The band width is $\pm 40'$ to $1^\circ 20'$. In this zone all the ports are isolated from each other.



LEVELING VALVE

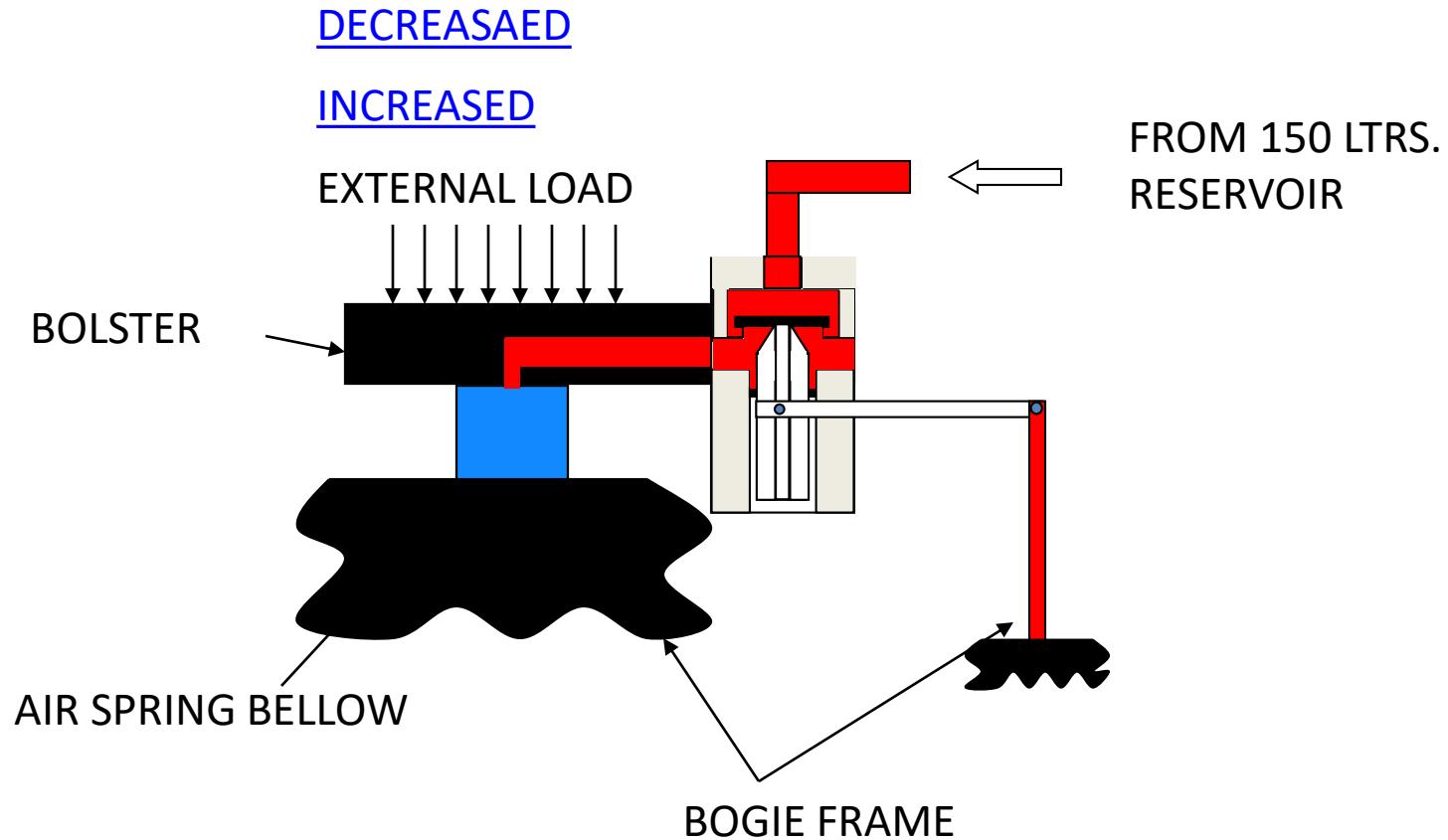
3. Discharging Mode –

In this position of Leveling valve air from air spring bellow destroys to atmosphere through this valve.



EXHAUST TO ATM.

DETAILS WORKING OF LEVELING VALVE



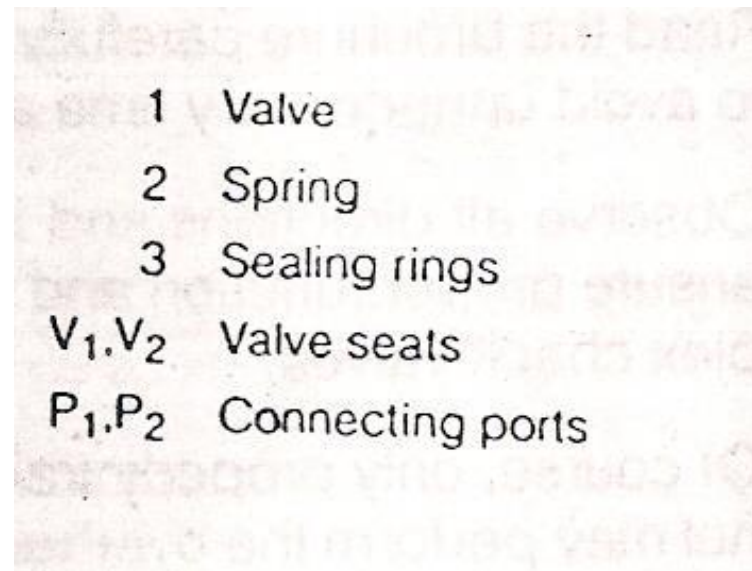
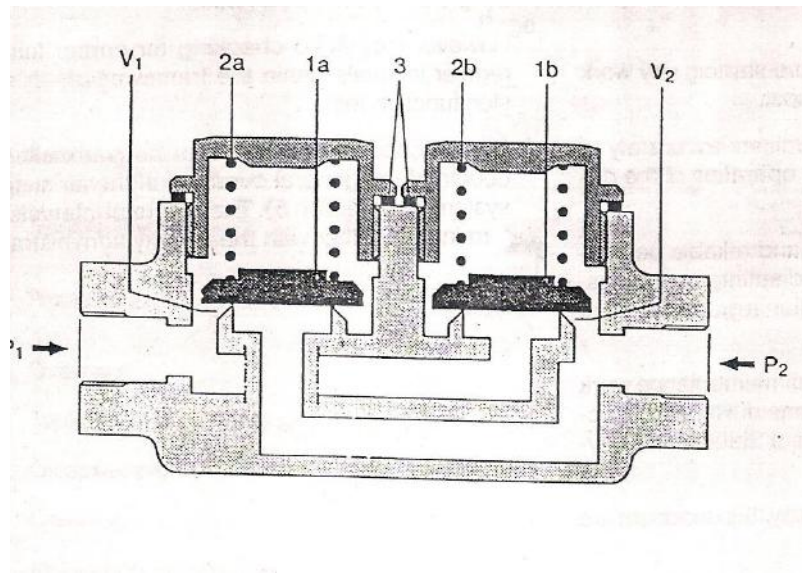
The leveling valves are of two make

1.M/S KNORR-BREMSE.

2.M/S FAVELY TRANSPORT INDIA LTD.

DUPLEX CHECK VALVE

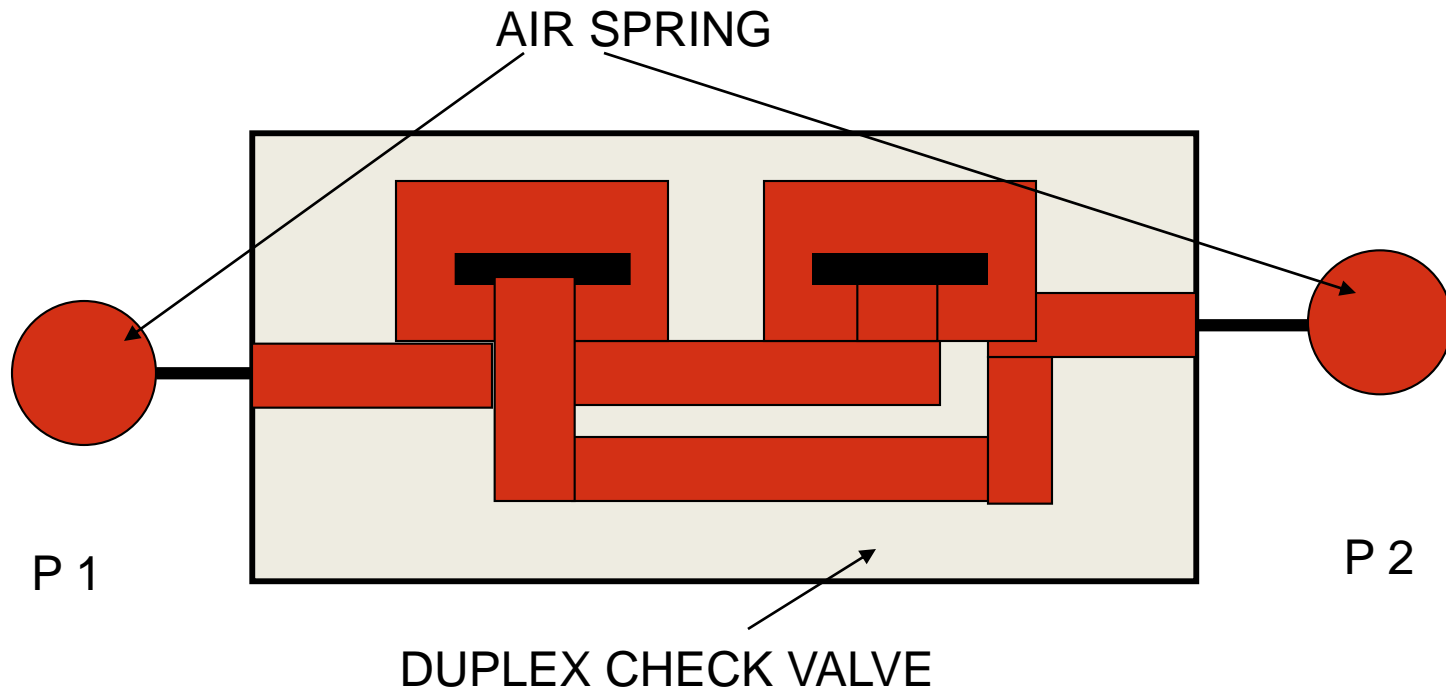
This is provided between two air spring bellow of a bogie. If the pressure difference between these bellows exceeds 1.5 ± 0.15 kg/cm² this valve allows to flow air from one bellow to other. These are also of two make.



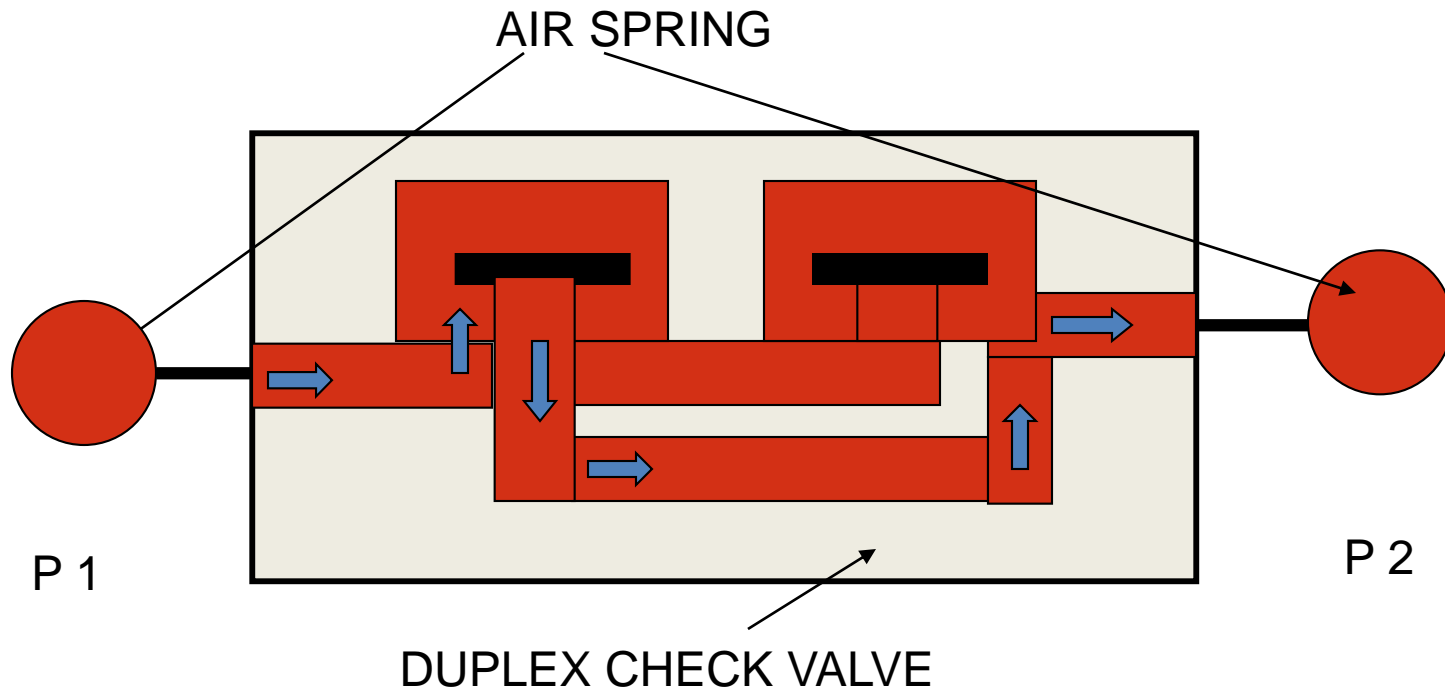
1. M/S KNORR-BREMSE

2. M/S FTIL

DETAILS OPERATION OF DUPLEX CHECK VALVE

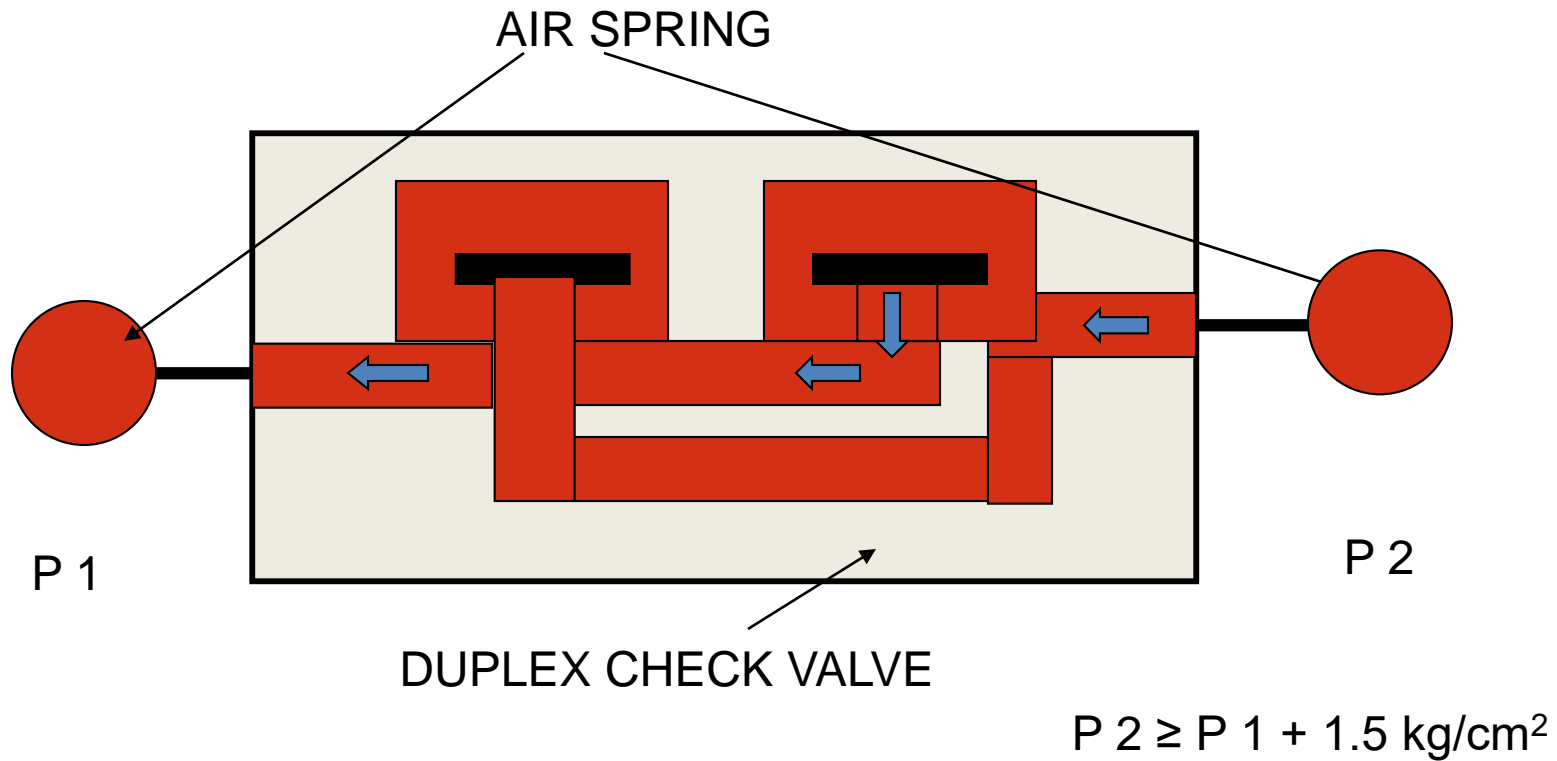


DETAILS OPERATION OF DUPLEX CHECK VALVE



$$P 1 \geq P 2 + 1.5 \text{ kg/cm}^2$$

DETAILS OPERATION OF DUPLEX CHECK VALVE



PERIODICAL INSPECTION OF AIR SPRINGS SYSTEM ON EMU / DMU COACHES

EXISTING SCHEDULE OF INSPECTION	PERIODICITY	INSPECTION ON AIR SPRING SYSTEM	INSPECTION SITE
Daily	Every day	<ul style="list-style-type: none"> Visual check: General conditions which includes any external damages, air leakage, infringement of any fittings, etc. Draining of 150 ltr. Reservoir. 	Yard / Pit line
I-A	Weekly	<ul style="list-style-type: none"> As in daily schedule and draining of 20 ltr. Reservoir. 	CS
I-B	15 days	<ul style="list-style-type: none"> As in I-A schedule and checking of installation lever with inflated air spring for normal function, tightening of installation lever nuts, protection screen nuts & tightening of bracket of all flexible hoses. Cleaning of air filter of 150 ltr. Reservoir. Cleaning of leveling valve filter after 1 month (alternate IB). 	CS
I-C	4 months	<ul style="list-style-type: none"> As in IB schedule and Thorough checking of air spring, bulging of bellow and air leakage. Air suspension pipe leakage check by using soap water. Removing dust, mud and oil deposit if any on air spring and control equipments. Thorough checking of Lower Spring beam for any crack and deformation. Tightening of air spring bottom plate bolts and nuts. Measurement of bogie clearances related to air spring. 	CS
AOH /POH	1 / 1.5 / 2 year	<ul style="list-style-type: none"> As in IC schedule and Thorough visual checking of air spring as per annexure C or D after dismantling as in clause 10. Removal of all valves the external cleaning and function test should be done as given in maintenance manual supplied by respective vendors. Checking securing arrangement of steel pipe kline. Leakage test as per clauses 15. Installation lever adjustment as per clause 18. 	Workshop

PROCEDURE FOR CHECKING BOGIE CLEARANCES ON EMU'S PROVIDED WITH AIR SPRINGS AS "MAINTENANCE INSTRUCTIONS ON AIR SUSPENSION FOR DC, AC & AC-DC EMU/HHP DMU COACHES" NO. CMI 9802 (REV. 2) February 2008.

•Firstly find out the type of bogie as TC ("I" section), MC or HCC. List of relevant drawings:

Type of coach	ICF Drawing No.
Trailer coach (TC "I" section)	ACEMU/C/ASR-0-0-001, as per annexure –C
Motor coach or HCC bogie	AC/DC EMU/M2-0-0-201, as per annexure –D
DMU Trailer coach	DMU/TC₄ -0-0-401 alt 'b' as per annexure –E
DMU DPC (power car)	DMU/dpc5 -0-0-501 as per annexure –F

- Then the coach should be placed at leveled track.
- The primary springs should be grouped as per ICF drawing no. ICF/STD-9-0-003 placed at Annexure – G in which the different type of primary springs are grouped for air spring bogie and other type of bogie.
- The primary springs are used for the air spring bogies as follows:

Type of coach	ICF Drawing No.
DTC and TC (“I” section)	DC/EMU2-0-1-203
Motor coach or HCC	DC/EMU/M2-0-1-203
DMU Trailer coach	DC/EMU-0-1-002
DMU DPC (power car)	DMU/DPC5 -0-0-501 ITEM-2 & ITEM-1.

As per DC/EMU/M2-0-1-203 the following are the dimensions:

- Place the proper primary springs and compensating ring in EMU/DMU coaches with air spring bogie as per following suspension diagram:

Nominal load (kgs)	Nominal height (mm)	Varies		One ring Yellow	Two rings Oxford Blue	Three rings Green
		Fr	to			
3005	213 ₁ ⁺³	212	216	212- 213.3	>212.3- 214.7	>214.7- 216

- Then maintain the bogie corner heights as per relevant suspension diagram.
- After bogie corner height is maintained, adjust the air spring height as per relevant suspension diagram with the help of installation lever.

Type of coach	ICF Drawing No.
Trailer coach (TC “I” section) bogie suspension diagram	ACEMU/C/ASR-9-0-003 as per annexure –H
Motor coach and HCC bogie suspension diagram	AC/DCEMU/M2-9-0-203 alt ‘c’ as per annexure –I and AC/DCEMU/C2-9-0-203 alt ‘g’ (for HCC trailer coach) as per annexure –J
DMU Trailer coach suspension diagram	DMU/TC ₄ -9-0-403 alt. ‘b’ as per annexure –K
DMU DPC (power car) suspension diagram	DMU/DPC ₅ -0-0-501 alt. ‘d’ as per annexure –L

PROCEDURE FOR CENTRE BUFFER COUPLER HEIGHT ADJUSTMENT IN WORKSHOP AS “MAINTENANCE INSTRUCTIONS ON AIR SUSPENSION FOR DC, AC & AC-DC EMU/HHP DMU COACHES” NO. CMI 9802 (REV. 2) February 2008.

- After POH and before assembling the bogie measure the wheel diameter.
- Depending upon the wheel diameter, place wooden packing of required thickness under the flange of lower spring seat as indicated in the following table:

Average wheel diameter between the two wheels of the same bogie	Thickness of wooden packing ring (mm)		
	M/C	HCC	TC
Above 885 mm to 912 mm	20	20	20
Above 865 mm to 885 mm	-	-	32
Above 873 mm to 885 mm	-	28	-

MAINTENANCE OF LEVELING VALVE

AS PER MAINTENANCE MANUAL NO. CMI 9802 (Rev. 1) MAY 2001 RDSO/LKO'S

- CLEANING OF FILTER IN EVERY IA.
- FOR M/S FTIL MAKE –
 - FUNCTIONAL TESTING DURING POH.
 - OVERHAULING AFTER 03 YEARS.
- FOR M/S KNORR-BREMSE –
 - FUNCTIONAL TESTING DURING POH.
 - FOR OVERHAULING NO CLEAR GUIDE LINE.

01-1-2010 TO 31-12.2010

Name of equipment: Air spring (Secondary suspension)

Make :Resistoflex
TMT china#

SUMMARY OF FAILURE

Sno	Particulars	CR	WR*	ER	NR	SR	SER	SCR	SCR MEMU	WR* MEMU	SECR MEMU	ECR* MEMU	ER MEMU	TOTAL
1	No. of equipment in service	-	2872	867 8#	214 54#	1022	100	240	-	2	-	0	-	2443 8#
2	No. of equipment failed with in warranty	-	0	1 0#	0 0#	1	0	0	-	0	-	0	-	2 0#
3	No. of equipment failed after warranty	-	15	6 0#	1 0#	0	0	0	-	0	-	0	-	7 0#
4	No. of equipment failed	-	15	7 0#	1 0#	1	0	0	-	0	-	0	-	9 0#
5	Failure rate (FRPCPY)	-	0.52	0.81 0#	0.5 0#	0.10	0	0	-	0	-	0	-	0.36 0#

DETAILS OF FAILURE

SNo	Nature of failure	CR	WR	ER	NR	SR	SER	SCR	SCR MEMU	WR MEMU	SECR MEMU	ECR MEMU	ER MEMU	TOTAL
1	Air leakage from bellow	-	8	0	0	1	0	0	-	0	-	0	-	1
2	Bursting/damage of air spring	-	5	1	0	0	0	0	-	0	-	0	-	1
3	Defect in leveling valve	-	0	6	0	0	0	0	-	0	-	0	-	6
4	Others	-	2		1	0	0	0	-	0	-	0	-	1

SUMMARY OF FAILURE

Sno	Particulars	CR	WR	ER	NR	SR	SER	SCR	SCR MEMU	WR MEMU	SECR MEMU	ECR MEMU	ER MEMU	TOTAL
1	No. of equipment in service	-	-	8 45# 36@	-	4 8#	-	-	-	-	-	-	-	12 53# 36@
2	No. of equipment failed with in warranty	-	-	0 0# 0@	-	0 0#	-	-	-	-	-	-	-	0 0# 0@
3	No. of equipment failed after warranty	-	-	0 0# 0@	-	0 0#	-	-	-	-	-	-	-	0 0# 0@
4	No. of equipment failed	-	-	0 0# 0@	-	0 0#	-	-	-	-	-	-	-	0 0# 0@
5	Failure rate (FRPCPY)	-	-	0 0# 0@	-	0 0#	-	-	-	-	-	-	-	0 0# 0@

DETAILS OF FAILURE

SNo	Nature of failure	CR	WR	ER	NR	SR	SER	SCR	SCR MEMU	WR MEMU	SECR MEMU	ECR MEMU	ER MEMU	TOTAL
1	Air leakage from bellow	-	-	0	-		-	-	-	-	-	-	-	0
2	Bursting/damage of air spring	-	-	0	-		-	-	-	-	-	-	-	0
3	Defect in leveling valve	-	-	0	-		-	-	-	-	-	-	-	0
4	Others	-	-	0	-		-	-	-	-	-	-	-	0

01-1-2010 TO 31-12.2010

Name of equipment : Air spring (Secondary suspension)

Make :Fire Stone
ACFL/Awadh#

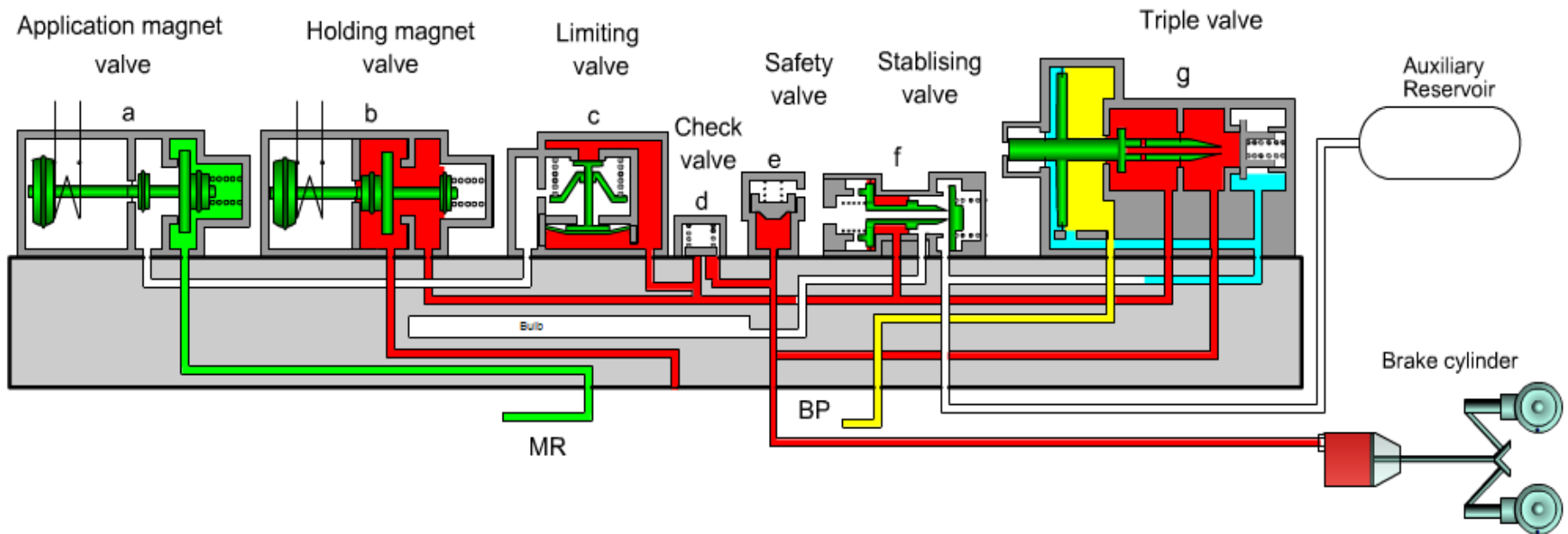
SUMMARY OF FAILURE

Sno	Particulars	CR	WR	ER	NR	SR	SER	SCR	SCR MEMU	WR MEMU	SECR MEMU	ECR MEMU	ER MEMU	TOTAL
1	No. of equipment in service	-	-	550 224#	100	614 24#	80	-	-	-	-	-	-	1344 248#
2	No. of equipment failed with in warranty	-	-	0 0#	0	0 0#	0	-	-	-	-	-	-	0 0#
3	No. of equipment failed after warranty	-	-	0 0#	0	0 0#	0	-	-	-	-	-	-	0 0#
4	No. of equipment failed	-	-	0 0#	0	0 0#	0	-	-	-	-	-	-	0 0#
5	Failure rate (FRPCPY)	-	-	0 0#	0	0 0#	0	-	-	-	-	-	-	0 0#

DETAILS OF FAILURE

SNo	Nature of failure	CR	WR	ER	NR	SR	SER	SCR	SCR# MEMU	WR MEMU	SECR MEMU	ECR MEMU	ER MEMU	TOTAL
1	Air leakage from bellow	-	-	0	0	0	0	-	-	-	-	-	-	0
2	Bursting/damage of air spring	-	-	0	0	0	0	-	-	-	-	-	-	0
3	Defect in leveling valve	-	-	0	0	0	0	-	-	-	-	-	-	0
4	Others	-	-	0	0	0	0	-	-	-	-	-	-	0

EMU/MEMU EP AND AUTO BRAKE APPLICATION AND RELEASE ESCORT'S KNORR KBR VIIIC BRAKE UNIT



**THANKS
FOR
U R
KIND ATTENTION**