

# CONTENTS

|                         |     |
|-------------------------|-----|
| FOREWORD                | ii  |
| JOINT NOTE              | iii |
| CONTENTS                | v   |
| LIST OF FIGURES         | xi  |
| LIST OF TABLES          | xiv |
| CORRECTION SLIPS ISSUED | xv  |

## **CHAPTER 1**

|  |                  |
|--|------------------|
| <b>INTRODUCTION</b>                                | <b>Page 1-12</b> |
| 101. General                                       | 1                |
| 102. Important Dimensions of Wagon                 | 2                |
| 103. Important Rule Books and References           | 10               |
| 104. Existing Wagon Fleet                          | 11               |
| 105. Standard Infrastructure for Wagon Depot       | 12               |
| 106. Important Wagon Modifications                 | 12               |
| 107. Page Numbering Convention in the Manual       | 12               |
| 108. Numbering of Figures and Tables in the Manual | 12               |

## **CHAPTER 2**

|  |                  |
|--|------------------|
| <b>WARRANTY MAINTENANCE AND CONDEMNATION</b>   | <b>Page 1-23</b> |
| 201. Warranty Inspection of newly built wagons | 1                |
| 202. Examination and Maintenance Periodicity   | 6                |
| 203. Interchanges Examination                  | 8                |
| 204. ROH of Wagon with UIC Bogie               | 8                |
| 205. ROH of Wagon with CASNUB Bogie            | 9                |
| 206. ROH of CRT Wagons                         | 10               |
| 207. NPOH of Goods Stock                       | 11               |
| 208. Condemnation of Wagons                    | 12               |
| 209. ROH and POH Interval                      | 13               |
| 210. Work Areas where attention is to be given | 14               |
| 211. Table 2.4                                 | 15-23            |

## **CHAPTER 3**

|   |                  |
|---|------------------|
| <b>YARD MAINTENANCE</b>   | <b>Page 1-28</b> |
| 301. Pattern of Freight Train Examination                                 | 1                |
| 302. Notification of Examination Points                                   | 1                |
| 303. Frequency of Intensive Examination for different Stock               | 1                |
| 304. Steps of Intensive Examination                                       | 3                |
| 305. Details of Intensive Examination                                     | 3                |
| 306. Air Brake Testing  | 8                |
| 307. Important Parameters to be Ensured During Intensive Examination      | 9                |
| 308. Important Parameters to be Ensured During Sick Line/ Depot Attention | 10               |

|      |  |    |
|------|--|----|
| 309. | Common Problems in Brake System and Remedy         | 13 |
| 310. | Infrastructure & Facilities required in the yard   | 14 |
| 311. | Machinery & Plant items                            | 15 |
| 312. | Tools  | 15 |
| 313. | Man Hours for various type of examinations         | 16 |
| 314. | Joint Procedure order for Goods Trains Examination | 16 |

#### **CHAPTER 4**

##### **WAGON BODY**

**Page 1-15**

|      |  |    |
|------|--|----|
| 401. | Introduction   | 1  |
| 402. | General Construction of Open Wagon                         | 1  |
| 403. | General Construction of Covered Wagon                      | 2  |
| 404. | General Construction of Flat Wagon & Well Wagon            | 2  |
| 405. | General Construction of Hopper Wagon                       | 2  |
| 406. | Nature of Repairs required in Wagon body                   | 3  |
| 407. | Corrosion in Wagon Body                                    | 3  |
| 408. | Anticorrosive Measures                                     | 4  |
| 409. | Rejectable Defects   | 4  |
| 410. | Repairs in Sickline and ROH Depot                          | 4  |
| 411. | Repair and Maintenance in Workshops during POH and NPOH    | 14 |
| 412. | Important Precautions to be taken while taking out welding | 14 |
| 413. | Important Do's and Don'ts                                  | 15 |
| 414. | Important Modifications                                    | 15 |

#### **CHAPTER 5**

##### **UNDERFRAME**

**Page 1-31**

|      |  |    |
|------|--|----|
| 501. | General  | 1  |
| 502. | General Construction of BG Wagon Underframe        | 1  |
| 503. | BG Four wheeler Underframe                         | 4  |
| 504. | Repair Procedure                                   | 4  |
| 505. | Cleaning and De-rusting of the Underframe          | 6  |
| 506. | Repairs to Head Stock                              | 6  |
| 507. | Repairs to Diagonals and Cross Bars                | 6  |
| 508. | Repairs to Sole Bars                               | 7  |
| 509. | Repairs to Floor Plate                             | 8  |
| 510. | Underframe of Brake Van                            | 8  |
| 511. | Bogie Wagon Underframe                             | 8  |
| 512. | MG Fourwheeler Wagon Underframe                    | 10 |
| 513. | MG Bogie Underframe                                | 11 |
| 514. | List of Modifications                              | 13 |
| 515. | Repair and Maintenance in Sickline and ROH Depot   | 30 |
| 516. | Repair and Maintenance in Workshop during POH/NPOH | 31 |

## **CHAPTER 6**

### **BOGIES AND SUSPENSIONS**

**Page 1-121**

|   |    |
|---|----|
| <b>601. CASNUB Bogie</b>                              |    |
| A) General Description                                | 1  |
| B) Constructional Details                             | 2  |
| C) Repair and Maintenance in Sickline                 | 11 |
| D) Repair and Maintenance during ROH and POH          | 12 |
| E) Nominal Clearances                                 | 13 |
| F) Reference Drawing Nos. for Components              | 16 |
| <b>602. Fabricated BOX Bogie (UIC Bogie)</b>          |    |
| A) General Description                                | 17 |
| B) Constructional Details                             | 17 |
| C) Maintenance of Sub Assemblies                      | 28 |
| D) Repair and Maintenance in Sickline                 | 32 |
| E) Repair and Maintenance during ROH and POH          | 33 |
| F) Material Specification of BOX (UIC Bogie)          | 34 |
| <b>603. Cast Steel Bogie</b>                          |    |
| A) General Description                                | 35 |
| B) Constructional Details                             | 35 |
| C) Maintenance of Sub-assemblies                      | 40 |
| D) Repair and Maintenance in Sickline                 | 43 |
| E) Repair and Maintenance during ROH/POH              | 44 |
| F) Material Specification for Bogie Items             | 44 |
| <b>604. Diamond Frame Bogie</b>                       |    |
| A) Constructional Details                             | 45 |
| B) Repair and Maintenance in Sickline                 | 48 |
| C) Repair and Maintenance during ROH and POH          | 48 |
| D) Material Specifications (Diamond Frame Bogie)      | 49 |
| <b>605. Suspension</b>                                |    |
| A) General  | 49 |
| B) Four Wheeler Suspension                            | 50 |
| C) Procedure for repair & testing in Workshop         | 57 |
| D) Causes for Failures of Springs                     | 59 |
| E) Causes of Failures to Buckles                      | 60 |
| F) Important Do's and Don'ts during Repair of Springs | 61 |
| G) Axle Box Crown Packing Plate (Spring Sheet)        | 61 |
| H) Axle Guard Horn Cheek Assembly                     | 62 |
| I) Clearances and Repairs of Axle Guard Assembly      | 65 |
| J) Roller Bearing Axle Boxes                          | 71 |
| K) Important Do's and Don'ts during POH               | 73 |
| L) Repair and Maintenance in Sickline                 | 74 |

|  |     |
|--|-----|
| M) Repair and Maintenance during ROH and POH                       | 75  |
| N) Axle Box Assembly with Plain Bearing                            | 75  |
| O) Periodicity of Repacking and Oiling                             | 92  |
| P) Procedure for Repacking and Axle Boxes                          | 93  |
| Q) Axle Box Sealing  | 95  |
| R) Important Do's and Don'ts during Repacking                      | 95  |
| S) White Metallizing Procedure                                     | 96  |
| T) Maintenance Instructions for FRLP                               | 99  |
| <b>606. Wheel Assembly</b>   |     |
| A) Axle  | 109 |
| B) Wheel   | 109 |
| C) Diameters of wheels used on BG and MG with<br>Condemning limits | 110 |
| D) Wheel Centre  | 111 |
| E) Tyre Profile  | 111 |
| F) Re-axling   | 114 |
| G) Retyring  | 115 |
| H) Tyre Turning  | 115 |
| I) Paring of Wheels  | 116 |
| J) Wheel Defects   | 117 |
| K) Repair and Maintenance in Sickline                              | 118 |
| L) Repair and Maintenance during ROH and POH                       | 118 |
| <b>607 Important dimensions related to Suspension</b>              | 119 |

## **CHAPTER 7**

### **VACUUM BRAKE SYSTEM**

**Page 1-20**

|   |    |
|---|----|
| 701. General                            | 1  |
| 702. Constructional Details             | 1  |
| 703. "F" Type cylinder                  | 2  |
| 704. Principle of Operation             | 6  |
| 705. Limitation of Vacuum Brake         | 7  |
| 706. Modifications                      | 9  |
| 707. Maintenance and Repair             | 11 |
| 708. Repair and Maintenance in Sickline | 15 |
| 709. Repair and Maintenance during ROH  | 16 |
| 710. Repair and Maintenance during POH  | 17 |
| 711. Storage of Rubber Fitting          | 18 |
| 712. Special Tools, Jigs and Fixtures   | 19 |
| 713. Brake power calculations BOX wagon | 19 |

## **CHAPTER 8**

### **AIR BRAKE SYSTEM**

**Page 1-109**

|  |   |
|--|---|
| 801. Classification of Air Brake System  | 1 |
| 802. Principle of Operation of Single Pipe Graduated Release Air<br>Brake System | 1 |

|      |   |     |
|------|---|-----|
| 803. | Common Pipe Bracket                               | 4   |
| 804. | Intermediate Piece (Sandwich piece)               | 5   |
| 805. | Brake Pipe Hose                                   | 5   |
| 806. | Brake Pipe Coupling                               | 5   |
| 807. | Cut Off Angle Cock                                | 8   |
| 808. | Brake Cylinder                                    | 12  |
| 809. | Dirt Collector                                    | 17  |
| 810. | Auxiliary Reservoir                               | 21  |
| 811. | Guard's Emergency Brake Valve                     | 22  |
| 812. | Slack Adjuster                                    | 25  |
| 813. | Distributor Valve                                 | 39  |
| 814. | C3W Distributor Valve                             | 39  |
| 815. | Testing of Distributor Valve                      | 54  |
| 816. | Testing of C3W Distributor Valve                  | 58  |
| 817. | KE Distributor Valve                              | 64  |
| 818. | Testing of KE Distributor Valve                   | 73  |
| 819. | Test Report Proforma for C3W/KE Distributor Valve | 81  |
| 820. | Single Wagon Test                                 | 84  |
| 821. | Rake Test   | 88  |
| 822. | Repair and Maintenance in Sickline                | 90  |
| 823. | Repair and Maintenance in ROH                     | 92  |
| 824. | Periodical Overhaul of Air Brake System           | 95  |
| 825. | Details of Tools, Fixtures and Equipment          | 98  |
| 826. | Brake power calculations for BOXN wagon           | 101 |
| 827. | Brake Rigging                                     | 102 |
| 828. | Composition brake block                           | 108 |

## **CHAPTER 9**

### **DRAW AND BUFFING GEAR**

**Page 1-46**

|      |   |    |
|------|---|----|
| 901. | General   | 1  |
| 902. | Conventional Buffing Gear   | 1  |
| 903. | Buffing Gear Repairs  | 2  |
| 904. | Buffer Projection   | 2  |
| 905. | Buffer Height   | 3  |
| 906. | BG Draw Gear  | 3  |
| 907. | Procedure for Reclamation of BG Draw Bars in Workshops                          | 4  |
| 908. | Procedure for Reclamation of BG Screw Coupling in Workshops                     | 6  |
| 909. | Maintenance of Draw Gears during repacking and normal repairs in Sickline       | 7  |
| 910. | Repair and Rejection Rules  | 7  |
| 911. | Centre Buffer Couple and Draft Gear   | 8  |
| 912. | Parts of Centre Buffer Coupler Assembly   | 8  |
| 913. | Inspection of CBC   | 10 |
| 914. | Inspection of Draft Gear(HR-40-I & MF-400-IR)                                   | 11 |
| 915. | Removal of Couple and Draft Gear from Wagons                                    | 11 |
| 916. | Coupler Reclamation Practices   | 12 |
| 917. | Draft Gear Reclamation Practices for Cardwell Westinghouse (HR-40-1 Draft Gear) | 16 |

|      |   |    |
|------|---|----|
| 918. | Reclamation Practices for National Rubber Type (MF 400-I-IR Draft Gear) | 17 |
| 919. | Development of High Tensile Coupler                                     | 19 |
| 920. | RF-361 Draft Gear   | 20 |
| 921. | Maintenance of Mark-50 Draft Gear                                       | 29 |
| 922. | MG Buffing and Draw Gear  | 34 |
| 923. | Repair and Maintenance in Sickline and ROH Depot                        | 38 |
| 924. | Repair and Maintenance in Workshop During POH                           | 39 |

## **CHAPTER 10**

### **TANK WAGON**

**Page 1-27**

|       |  |    |
|-------|--|----|
| 1001. | Constructional Details   | 1  |
| 1002. | Periodicity of Overhauling of Tank Wagon   | 6  |
| 1003. | Steam Cleaning of Bitumen and Molasses Wagons  | 8  |
| 1004. | Cleaning of Tank for Corrosive Liquids   | 8  |
| 1005. | Inspection of Tank Barrels   | 9  |
| 1006. | Testing of Barrel  | 9  |
| 1007. | Barrel Test Pressure   | 10 |
| 1008. | Testing of Tanks Used for Corrosive Liquids  | 10 |
| 1009. | Test of Tank Wagons used for Petrol and Middle Distillates of Petroleum and Vegetable Oils | 11 |
| 1010. | Repairs of Tank Barrels by Welding   | 11 |
| 1011. | Repairs of Tank Barrel Mounting Fittings   | 14 |
| 1012. | Fittings of Tanks for Corrosive Liquids  | 15 |
| 1013. | Fittings of Tank Wagons of Petrol, other inflammable products vegetable oils, etc.         | 15 |
| 1014. | Heating Arrangement on TOH Tank Wagons   | 16 |
| 1015. | Test Reports and Records of Inspection   | 16 |
| 1016. | Important Modifications  | 16 |
| 1017. | Painting and Lettering   | 16 |
| 1018. | Examination and Repair of Tank Wagons  | 17 |
| 1019. | Precaution with leaky Tank Wagons  | 18 |
| 1020. | Precautions to be taken at Loading and Unloading Points (Tanks as Pressure Vessels)        | 20 |
| 1021. | Loading and Unloading Corrosive Liquids  | 21 |
| 1022. | Loading and Unloading Tank Wagons  | 22 |
| 1023. | Precautions for Tanks for Petroleum and other inflammable products                         | 23 |
| 1024. | Precaution for Bitumen Tanks   | 24 |
| 1025. | Maintenance and Repair in Sickline   | 25 |
| 1026. | Maintenance and Repair in Workshop during POH  | 26 |

## **CHAPTER 11 SPECIAL TYPE OF WAGONS**

**Page 1-9**

### **1101 BOXNHA Wagons**

|    |                                  |   |
|----|----------------------------------|---|
| a) | Salient Features                 | 1 |
| b) | Wagon Superstructure             | 1 |
| c) | Nature of Repairs in BOXNHA      | 3 |
| d) | Maintenance and Repair Procedure | 3 |

|   |   |
|---|---|
| <b>1102. BOXNCR Wagons</b>                            |   |
| a) Salient Features                                   | 5 |
| b) Maintenance and Repairs                            | 5 |
| c) Precautions for Welding Stainless Steel            | 6 |
| d) Surface Preparation and Painting                   | 6 |
| <b>1103. BOGIE LOW PLATFORM CONTAINER FLATS (BLC)</b> | 7 |

## **LIST OF APPENDICES**

|               |                                       |        |
|---------------|---------------------------------------|--------|
| APPENDIX-I    | EXISTING STRENGTH OF WAGON FLEET      | 1 to 4 |
| APPENDIX-II   | STANDARDISATION OF INFRASTRUCTURAL    | 1 to 7 |
| FACILITIES IN | AIR BRAKE ROH DEPOTS                  |        |
| APPENDIX-III  | LIST OF IMPORTANT MODIFICATIONS TO BE | 1 to 3 |
|               | CARRIED OUT ON FREIGHT STOCK          |        |
| APPENDIX-IV   | REPAIR OF TANK WAGON PRESSURE VESSELS | 1 to 3 |
| APPENDIX-V    | WAGON MANUFACTURERS AND WORKSHOPS     | 1 to 3 |
| APPENDIX-VI   | BRANDING DETAILS ON WHEEL AND AXLE    |        |

## **INDEX**