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Ministry of Railways (Railway Board)



Hand Book On Restoration by Hydraulic Re-railing Equipments (HRE)

IRCAMTECH/MECH/GWL/RESTORATION/140T CRANE/1.0

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अभ्यास RDS
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Preface

During CMEs conference held in April-2013, various Railways were assigned the work of preparation of procedures for handling rescue, Relief and restoration at Accident sites. The Railways have submitted their draft procedures on 12.03.2015 at Railway Board for preparation of Hand Book on Restoration by Hydraulic Re-railing Equipments (HRE) by CAMTECH/GWL.

The draft hand book is prepared on the subject matter for assistance to Rescue and Restoration staff of ARTs/ARMEs on IR. The sample pattern is provide for each type of activities to be carried out at accident sites. It has been observed that new types of rolling stocks have been introduced in the recent past and challenges are being faced in handling them at accident sites. It is felt that all the Railways have sufficient knowledge and experience of handling our existing rolling stock hence handling procedure for old rolling stock has not been deliberated upon.

So, different methods of tackling by Hydraulic Re-railing Equipments (HRE) would be required for different stocks in different situations and it may not be possible to anticipate every condition thrown upon by the actual accidents/working sites and delineate the exact method of handling. Hence, in given chapters a humble effort has been made to cover the aspects to the extent possible with the inputs from ART in-charges on the basis of actual site experiences. Each accident site presents unique condition in itself and hence common sense must be applied apart from the proven methods of handling the stock ensuring safety to the human being and to the HRE as well as salvaging rolling stock to the extent possible.

A brief about preparation of the Hydraulic Re-railing Equipment (HRE) before leaving for accident site, arrangements to be made after reaching the site and also things to ensure before departure after restoration work has also been included for the benefit of the Hydraulic Re-railing Equipments (HRE) users.

As of now, primarily two makes of Hydraulic Re-railing Equipments (HREs) users operating over Indian Railways viz. MFD and LUKAS, each having their own variants also. Users are advised to check the applicability of the given instructions in regard to their model of the Hydraulic Re-railing Equipments (HREs). In this Hand Book, stock wise procedure has been given incorporating the guidelines specific to that stock for assistance in Restoration work of various rolling stocks by HREs.

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1. Technical description of HREs and its Equipments

Technical description of the HREs are given in this chapter for better understanding of functioning of equipments. The utilisation of equipment and technical details are also given for each equipment for safe application at accident sites.

a) Hydraulic Re-railing Equipment (HRE) LUKAS (530 bar Double Acting Petrol Engine Driven)

- **Application –**

The particular set of equipment is specifically required for various applications such as re-railing / lifting derailed rolling stock, toppling of vehicle & pulling the vehicle etc.

- **Make –** LUKAS Hydraulic GmbH Germany.

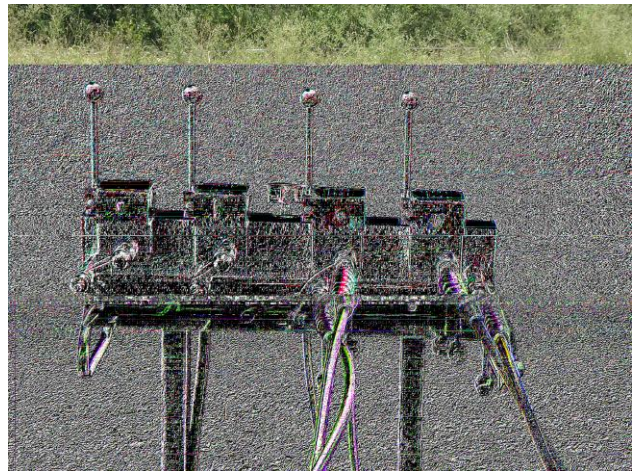


FIG 1 a(i) & 1 a(ii) General view of HRE

- **Description –**

Hydraulic re-railing equipment is the heart of ART. The equipment consisting of power pack (Hydraulic pump driven by petrol engine) provides the hydraulic power. The same power is controlled & distributed through control table to the hydraulic telescopic jacks. The same can be used for various applications such as re-railing/lifting of derailed rolling stock, toppling of vehicle and pulling the vehicle etc.

- **Specifications –** The H. R. E. Equipment is containing following sub units.

1. LUKAS 530 bar double acting Power pack Petrol Engine (GC-3) – 2 nos,
2. Control Table (CT 1F) – : 2 nos,
3. Foot for control table – : 2 nos,
4. Two way distributor valve – : 1 no,
5. Hose Pair (10 mtr. Long) Red & Blue, Hose Pair (10 mtr. Long) Yellow & Blue, Hose Pair (10 mtr. Long) BLACK – : 2 set each,

6. Claw Jack (50 t. / 850 mm) - : 2 nos,
7. Radius Plat,
8. Telescopic Jack (10 t. / 160 mm)
9. Telescopic Jack 25 t. / 185 mm,
10. Telescopic Jack 25 t. / 450 mm,
11. Tilting telescopic Jack 25 t. / 450 mm,
12. Telescopic Jack 50 t. / 175 mm,
13. Telescopic Jack 65 t. / 400 mm,
14. Pulling Jack 25 t. / 450 mm,
15. Gauge rod for pulling,
16. Portable hand pump,
17. Lifting belt Set for connecting elements,
18. Roller carriage without traversing Jack,
19. Roller carriage with traversing Jack,
20. Sliding plate,
21. Re-railing Bridge 4.40 Mtrs length / 140 mm. height,
22. Re-railing Bridge 3.25 Mtrs. length,
23. Re-railing Bridge 2.20 Mtrs. length / 140 mm. height,
24. Re-railing Bridge 1.10 Mtrs. length / 140 mm. height,
25. Adjustable distance bar,
26. Resetting device for Roller carriage,
27. Holding rope,
28. Base plate 10 t. / 250 mm,
29. Base plate 50 t. / 175 mm,
30. Base plate 65 t. / 400 mm,
31. Stacking set 50 t. 175 R / 165 R,
32. Axle pusher,
33. Piston guard,
34. Tool Box,
35. Pulling Device 20 t.,
36. Two way oil distributor,
37. Quick connect coupling.
38. Lukas hand pump, two stage ZPH 3/8 – 2D,



FIG 1 a(iii) & 1 a(iv)

b) Hydraulic Re-railing Equipment (HRE) LUKAS – Single acting
(450 bar Single Acting Diesel Engine Driven)

- **Application –**

The particular set of equipment is specifically required for various applications such as re-railing / lifting of derailed rolling stock, toppling of vehicle & pulling the vehicle etc.

- **Make – LUKAS Germany.**

- **Specifications –**

The H. R. E. Equipment is containing following sub units.

1. LUKAS 450 bar Power package Diesel Engine,
2. Control Table,
3. Two way distributor valve,
4. Oil return hose (10 mtr. Long) YELLOW,
5. High pressure hose (10 mtr. Long) RED,
6. High pressure hose (10 mtr. Long) GREEN,
7. High pressure working pipe (10 mtr. Long),
8. Claw Jack 40 t. / 720 mm,
9. Radius Plate,
10. Telescopic Jack 10 t. / 160 mm,
11. Telescopic Jack 10 t. / 600 mm,
12. Telescopic Jack 20 t. / 180 mm,
13. Telescopic Jack 60 t. / 300 mm,
14. Telescopic Jack 60 t. / 490 mm,
15. Step Jack 75 t. / 200 mm,
16. Pulling Jack 20 t. / 400 mm,
17. Gauge rod for pulling,
18. Portable hand pump,
19. Lifting belt,
20. Set for connecting elements,
21. Roller carriage without traversing Jack,
22. Roller carriage with traversing Jack,
23. Sliding plate,
24. Frame support 150mm x 130mm x 350mm,
25. Frame support 150mm x 90mm x 350mm,
26. Frame support 75mm x 130mm x 350mm,
27. Frame support 75mm x 90mm x 350mm,
28. Re-railing Bridge 4.40 Mtrs. length,
29. Re-railing Bridge 3.25 Mtrs. length,
30. Re-railing Bridge 2.20 Mtrs. length,
31. Re-railing Bridge 1.10 Mtrs. length,
32. LUKAS manual,
33. Pulling device 20 t.

2. RAIL SKATE/Dip Lorry:

- **Application** – Rail skate is important item and essential for clearing rolling stock involved in Hot Box / Journal breakage cases. Rail skate can be proved very useful in transportation of wagon/coaches disabled in mid section due to Hot Box / Journal breakage etc.
- These skates are available in open market. These may be procured on requirement basis in the ARTs and SPARTs. These skates may be fabricated & developed in workshops also. Locally manufactured rail skates are available in the ART of Diesel Shed Itarsi which were developed by Loco Workshop/Parel in CRLy.



FIG 2 General view of Rail Skate/Dip Lorry

3. GENERAL STEPS FOR PLANNING WORK AT SITE WITH HRE

3.1 PLANNING BEFORE DEPARTURE OF ART

- a. Ensure presence of all nominated staff and supervisors. If required, more Supervisors and Staff may be arranged from adjoining depots by judging the gravity of accident.
- b. Planning of restoration work and distribution of duties to be done during journey time of ART.
- c. Power packs, Control desk, gas cutting equipments, Inflatable lighting towers and other such items may be checked physically (by starting) well before reaching the accident site to avoid any delay in restoration work.
- d. Similarly all on-board supervisors & staff are advised to get ready (wearing uniform, Caps, gloves, protective glasses for welder, taking torch, VHF sets etc) while on run.
- e. Accident site to be inspected and earlier planning to be reviewed, if required, as per the requirement of site before commencement of work.

3.2 PLANNING AFTER REACHING AT SITE

- a. Critically evaluation of accident site to assess -
 - Requirement of equipments/materials to be unloaded from ART. Effort to be made to unload material nearest to site of use.
 - Requirement of manpower be assessed and arranged if required from other depots for restoration activities.
- b. If ART is unable to reach at site of accident, material shifting trolley may be used on free adjacent line for shifting and quick movement of material.
- c. Form restoration gangs/groups to tackle different type of works at site.
- d. If site is required to be covered, take help of RPF personal to put barricading poll and tape.
- e. Ensure proper illumination at accident site with the help of inflatable tower lights and other equipments of Elect. deptt.
- f. Ensure capturing the photographs/video clips of accident site, derailed stock, vital clues, preserve clues, any damages etc. in consultation with representatives from P.Way, Safety, S&T and other concerned departments.

3.3 PLANNING AFTER RESTORATION AT SITE

- a. Issue completion of restoration memo to proper authorities at accident site.
- b. Issue a written memo to TI/SS/CYM to place the ART at site for loading of the re-railing equipment and other allied material.
- c. Collect all the equipments, HRE wooden packing etc. for loading it back on ART.
- d. Special care to be taken while loading the hose pipes, power packs, hydraulic jacks, Re-railing bridges/beams etc.

- e. Relay all the restoration activities, timings etc. to Divisional control/disaster management cell.
- f. If demanded by senior officers at Division/Head quarter, Fax or e-mail the site sketch/photo graphs with the help of computer/laptop available in ART.

4. GENERAL STEPS FOR HANDLING OF EQUIPMENTS

4.1 PRECAUTIONS

Hydraulic Jacks:

- a. Assess requirement of jack to be used keeping in view space, load, purpose etc. at accident site.
- b. Judge the centre of the rolling stock to place the centre Jack vertically.
- c. Extreme care to be taken while working on the points and crossing or tracks having curve and specially when wagons are loaded.
- d. Ensure putting retainer bolt/check retainer jack while changing the position of traversing jack.
- e. Movement/lifting of jack should be free from any obstruction.
- f. Avoid over loading on hydraulic jacks.
- g. For toppling of capsized rolling stocks, tilting jacks may be used, but extreme care to be taken while using them. Proper size wooden packings to be used for support on the base of tilting jack .



FIG 4 (i) General view of putting HRE under derailed rolling stock

HRE (MFD/LUKAS):

- a. Extreme care to be taken while unloading hydraulic hoses, power packs, hydraulic jacks, Re-railing bridges/beams etc.
- b. Consumables for HRE and power pack should be available in sufficient quantity.

Hose pipes:

- a. Hose pipes to be protected from any sharp object which may damage it.
- b. Check connectors regularly for any dirt, sludge or any other obstruction. Keep them always clean by putting caps provided.

Re-railing bridges/Beams:

- a. Extreme care to be taken while putting the Re-railing bridges/Beams at Accident site. It should be on plane surface.
- b. Fill up the gap between the ballast and Re-railing Bridge/Beam with wooden packings to avoid any sagging of Beam while restoring.
- c. Check bearing capacity of soil for putting wooden packing particularly in rainy season.

5. TIPS FOR FAST BUT SAFE WORKING

- a. Proper pre-planning before reaching at Accident site.
- b. Quick and effective planning at accident site.
- c. All Safety precautions to be followed strictly.
- d. Regular practice exercise for Equipments & Tools and mock drills for ART, ARME 140 T BD Crane should be organized to assess the promptness, efficiency and quality restoration in time.
- e. Keep the equipments at all the times ready, in functioning, healthy and in sound condition.
- f. Ensure regular checking and schedule maintenance of equipments to avoid any failure at accident site.
- g. To counsel the staff, Way-boards having information regarding working procedure, deployment of staff, precautions to be taken while restoration, Do's & Don'ts etc shall be displayed in ARTs/Loco sheds. Pocket Books/ Pamphlets should also be prepared and distributed for counselling of all concerned staff.

6. (i) SAFETY PRECAUTIONS TO BE TAKEN FOR WORKMEN, TOOLS AND PASSENGERS.

- a. Use safety items for staff e.g. Hand gloves, glasses, fire extinguishers helmets at site etc.
- b. Use siren/Hooter while passing any train through adjacent line.
- c. Be alert during restoration work.
- d. Only authorised person to remain at accident site.
- e. Blow whistle before lifting the jacks etc.
- f. Proper securing of derailed stock, under gears, bogie etc. to be ensured with chains and wire rope slings.
- g. Check for no interference/entanglement with other rolling stock, any structural body nearby, platform etc. before lifting with jacks.
- h. Regular mock drills and practical exercises be done for efficient working at site.
- i. Ignore instructions from unauthorized/dubious persons.
- j. Avoid using uneven surface for putting wooden blocks/Packings.
- k. Depending upon the site condition, ensure shut down of OHE with written memo from OHE staff.
- l. Keeping OHE in mind, avoid over-lifting of jacks.
- m. Avoid over-loading of the jacks.
- n. Avoid over-crowding near work place.
- o. Before dumping/throwing away the rolling stock, ensure no staff or outsider is there.
- p. In case of coaching stock, advice to vacate the coach before starting the work.
- q. No staff should be allowed underneath derailed stock while lifting with jacks.
- r. Avoid metal to metal contact by putting rubber pad in between jack head and rolling stock to avoid slipping.

6. (ii) SAFETY PRECAUTIONS FOR OPERATION OF HYDRAULIC RERAILING EQUIPMENT (LUCAS/MFD)

Hydraulic re-railing equipment is a necessity in restoration work at accident site. Improper planning and careless working in use of this equipment can cause delay and affect safety in working. In order to expedite re-railing/removal work of rolling stock and to ensure full safety, some important points are given below: -

- Pressure pipe of the Lucas equipment should be covered with the end caps to avoid ingress of the dirt
- The base of the packing should be sufficiently wide to give proper support to the jacks under load and transfer load uniformly (over wider area).
- Preferably the jacks should be used below lifting pads of rolling stock. In case lifting pads are not accessible, the components which can bear the load e.g. Head stock, Sole bar etc., should only be used for lifting rolling stock.
- Fragile parts of rolling stock should not be used for lifting purpose.
- Jacking of Diesel/Electric locomotives should be done at the place ear marked with valid signs for lifting the vehicle otherwise frame structure may get damaged.
- The jacks must be installed on a solid base in such a way that the centre of the jack is in line with the centre of the lifting point i.e. centric load as far as possible.
- When two HRE jacks are used at one time on wooden packing, proper watch should be kept on vertical position of each ensuring that they are lifted parallel otherwise load will tilt causing problems.
- Before raising of derailed vehicles, the wheels of the other end must be protected by inserting wooden wedges on both sides so that there may not be any unwarranted movement in the course of re-railing operation.
- While operating the control desk, the whole attention should be kept on the movements. The field of vision of the operator must be absolutely free.
- Continuously clean the rams of the jacks with duster to avoid accumulation of dust particle.
- The trolley of rolling stock should be tied up with its under frame with the chain so that the same doesn't fall when coach/wagon is lifted and thus do not damage the hyd.re-railing equipments during lifting operation.

- Before off loadings jacks, it should be ensured that proper packing is provided below under frame of rolling stocks so that it rests properly and does not get lifted.
- If air is entered in the hydraulic system, it must be removed as fast as possible.
- Packing of hard wood is to be placed between the pressure pieces of the jacks and bottom edges of the lifting points in order to prevent the load sliding from the jacks due to metal-to-metal contact.
- For over throwing wagon/coach, the lifting jack should be used.
- While over turning coach/wagon the tilting jacks must be held with the help of ropes, so that it does not fall down & get damaged after completion of operation.
- System of using the lift belt with holding rope should be used for overturning the coach/wagon, as it is a quicker system for overturning.
- Jack of proper height/lift should only be selected while doing lifting and restoration operation.
- Stand-by control stand and generating set should be kept ready at the other end while doing restoration at one end to expedite the restoration operation.
- Keep the adequate number of wooden packings of different thickness to avoid delays.

7. HANDLING OF DIFFERNT TYPES OF STOCK UNDER DIFFERENT TYPE OF ACCIDENTS USING HYDRAULIC RE-RAILING EQUIPMENT

A. Restoration of locomotives entered in to Dead End Siding by MFD/LUKAS (HRE).



(I)- Preparation Chart :

S.N.	Item/Status	Action
01	MFD/LUKAS power pack and 120/60 T Jacks.	Min.02 Nos. 120/60T HC and 120/60 LC telescopic Jack with displacing Jacks.
02	Suitable size wooden packing and Iron Plates.	6'X12"X12" wooden packings in sufficient nos. and 6 Nos. Iron flat plates.
03	Action for Loco Cattle guards.	Both the cattle guards to be removed first. foot step should also be removed if required.
04	MFD/LUKAS Tool Box	Must be available at site.
05	Arrangement of Rails and CST-9 sleepers at site	PWI must arrange required rails with CST-9 sleepers.
06	Arrangement of multiple Locos and both side eye wire rope with D-Shackles.	MU Locos for pulling derailed Loco if required. 70T both side eye wire rope with 70T D-Shackles.
07	Wooden wedges with Handle.	6 Nos. wooden wedges with handle for Loco wheels.
08	Gas cutting equipment with cylinder.	Must be available at site.
09	Steel Cribs for packing	As per requirement by Engg. Deptt.
10	Illumination arrangement.	03 Nos. inflatable lighting towers with DG sets during night.
11	Identification of Jacking places in Loco.	CBC unit or bottom of yoke pin plate or lifting pads of Loco. Using Head pieces to avoid slipping of jack.
12	Communication or PA system	One staff with megaphone
13	Videography of the restoration process.	Videography of the all critical operations.
14	Average minimum. time in ideal condition	Min. 06 Hrs.

(II)- Restoration Plan :

General:

Whenever Locomotive enters into the dead end siding or falling into the deep areas away from the loop lines, these Locos are re-railed with the help of MFD/LUKAS HREs only. In general, when loco enters after breaking dead end, the rear trolley of Loco goes deep into the soil with traction motors and front trolley hangs in the open space. The wheels of front trolley remains free maintaining some height from ground level.

Before lifting operations of such locomotives, Loco must be held towards rear bogies with the help of 02 nos. higher capacity Tirfirs and wire ropes so that Loco will not fall into deep area during lifting operation. If application of Tirfir is not possible then 02 nos. multiple Locos(if possible with one BRN in facing) should be brought on dead end line safely and 70T wire rope with D-shackle should be provided with buffer plates of derailed Loco and tightened. This MU Loco then should be stopped applying SA9 Loco brakes properly.

(III)- Procedure in Practice :

Now below the over hanged front trolley of Locomotive, foundation is prepared with the help of available Steel cribs, stone, debris and soil and levelled properly.



On this levelled foundation, Base of wooden packing size min. 6'X12"X12" is provided horizontally then vertically on it up to the level of CBC unit. During this preparation both Cattle guards should be removed so that wooden packings can be provided easily.

When the level of wooden packings reaches to provide 500 mm height Jacks below CBC unit or yoke pin plate, the 120/60 T capacity two Nos. hydraulic Jacks are

provided both the sides of CBC on the base of wooden packing and power pack is started by connecting hydraulic hoses and lifting operation is started. At this moment, wire rope provided between derailed Loco and MU Loco must be kept tight completely and wooden wedges to be provide below the wheels of soiled rear trolley for safety, if possible.

After completion of one lift of Jacks, wooden packings are inserted at both the ends of CBC unit away from Jack heads and Jacks are lowered. Now height of base packing is raised by doing propping and again both Jacks are lifted. The lifting operation step by step continues till maintaining sufficient space below first wheel of rear trolley for providing long pieces of rails. Now CST-9 sleepers are laid below both the rail pieces and wooden packing base is raised below over-hanged trolley up to the height of extended rail pieces. Now Jacks are lowered and over-hanged trolley is placed on the newly prepared rail gauge.



Now all the wooden wedges of rear trolley are removed and two nos. wooden wedges are provided below the front trolley-front (outer side) wheels to avoid dragging of Loco towards deep area.

Loco-pilot of MU Loco is now counselled for pulling derailed Loco towards MU Loco side notch by notch. The Derailed loco now starts movement towards MU Loco unit and on significant pulling towards level area, the MU Locos are stopped.

Finally, both the trolleys of Locomotive are re-railed properly with the help of MFD/LUKAS (See restoration photographs).

B. Toppling of Loaded/Empty BCN/BOXN Wagon outside the track by MFD/LUKAS (HRE).



(I) Preparation Chart :

S.N.	Item/Status	Action
01	MFD/LUKAS power pack with 120/60T hydraulic Jacks.	Min. 02 Nos. 120/60T cap jacks and 02 Nos. 35 T capacity Step/toppling Jacks/03 nos. claw jacks & tilting belt.
02	Suitable size wooden packings and Iron Plates.	Wooden packing of 3'X20"X6" and 2.5'X1'X6" and 6 Nos. Iron flat plates.
03	Tirfirs and steel bars.	Two tirfirs and 02 steel bars.
04	Availability of hauling device.	25 T capacity hauling device
05	MFD/LUKAS Tool Box	Must be available at site.
06	Gas cutting equipment with cylinder.	Must be available at site.
07	Illumination facilities.	03 Nos. inflatable lighting towers with DG sets during night.
08	Identification of toppling spot and provision of step jacks.	After observations, provide Jacks suitably.
09	Communication or PA system	One staff with megaphone
10	Videography of the toppling process.	Videography of the all critical operations.
11	Average minimum. time in ideal condition	Min. 1.5 hrs.

(II)- Restoration Plan :

General: In case of derailment of wagon stock where restoration by 140T crane is not possible or 140T crane is not ordered/Not available but wagon damaged badly, such wagons are toppled by Step jacks of MFD or LUKAS. As the process takes approx. 1.5 Hrs. in toppling, only restricted nos. of wagons be tackled by toppling/step jacks.

(III)- Procedure in Practice :

For this process, 02 nos. 35 T capacity step jacks and 02 nos. 120/60T jacks are used. First of all, 02 nos. 120/60T jacks are applied in the middle of wagon to lift wagon in apposite direction of toppling. After completion of full lift of jack, 35 T 2 nos. step jacks are placed in the sole bar of under frame and base of the jack is supported with inclined packing base and tightened. The earlier provided 120/60T jacks are now released and

removed and step jacks are lifted slowly. In this operation, Wagon trolleys are not secured with lashing chains but allowed to drop on track for dealing it separately.

Simultaneously, according to requirement, 25 T haulage device with 2 nos. tiffirs are also provided in the direction of toppling of wagon with the base of any solid object like tree or any other available foundation and tightened properly.

If step jack lift is completed but wagon could not be toppled, the wooden packing solid base is prepared for both trolley areas, step jacks released and job is rested on packings. If tilting belt is used, one by one jacks can be released & reset.



Now again packing base is strengthened by providing more packings in the base of step jack at required angle and step jacks are lifted. In this process, 02 nos. manila ropes should also be provided in the middle body of step jacks and two staff should monitor the securing of these jacks by holding manila rope so that in case of reversal of wagon or slipping the wagon from step jack head, the jacks can be pulled out immediately to avoid damage to the jacks.

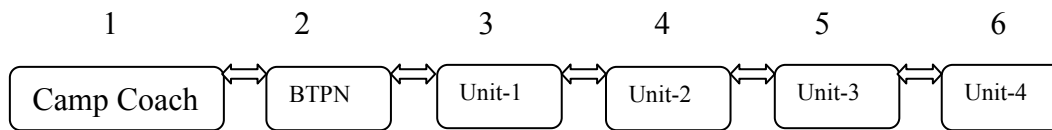
The wagon is now again lifted with step jacks till complete toppling of the wagon. If the toppled wagon is still infringing track, the jacks are provided at both the bottom ends of wagon one by one and wagon is pushed out of track and thus, wagon is removed from track.

At the end of the operation, both tiffirs are released and removed from wagon.

Note: Wagon should be emptied as the wagon base may get punctured, jack may sink causing accident if handled with load. In case of emergency, 25% load can be handled.

C. Restoration of RGM (RAIL GRINDING MACHINE)

It is a sophisticated imported machine used to grind the deformed Rail Track head. Normally it consists of 06 units as shown below.



RGM Units are coupled with each other with slackless draw bar, hydraulic pipes and electrical coupler. Detachment of units is a very complicated work.

PROBLEMS:

- a. Less under frame clearance for putting Jacks.
- b. Uncoupling and providing gap between the coupled wagons/coaches due to slackless draw bar, hydraulic pipes and electrical coupler connections etc, is a tedious and time consuming activity at accident site.

STEPS FOR RESTORATION:

- a. Water pipe line fitted in water tank (BTPN) must be removed to provide re-railing girder, if required.
- b. Presence of RGM supervisor and his guidance is must during restoration period for stripping of under slung parts to avoid any damage.
- c. Before starting uncoupling of Hydraulic and electrical connections fitted between the stocks, fire extinguishers must be kept ready at site to immediately extinguish in case of any fire.
- d. Avoid using gas cutting since it may cause fire due to presence of number of hydraulic pipe connections.
- e. If it is necessary to disconnect large no of hydraulic connections or feasibility of providing gap between the stocks is almost negligible and much effort & time is required, Re railing should be suggested with the help of 140T BD crane. For this, hooks on either end of both the trolleys are provided.



FIG C.(i) Less under frame space of RGM to place hydraulic jacks for re-railing

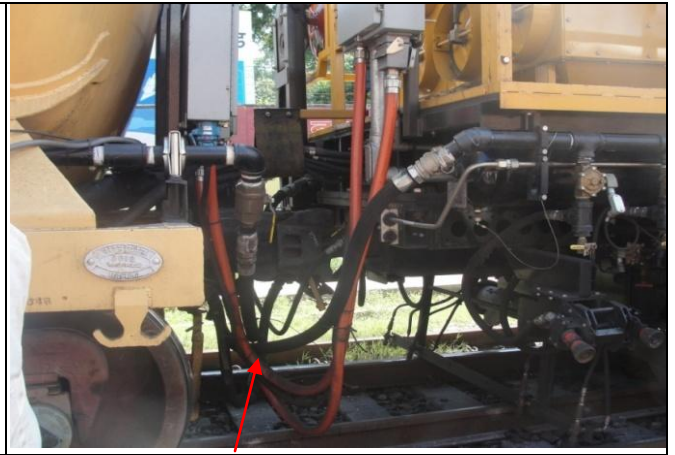


FIG C. (ii) Hydraulic connections create hindrance in creating gap between stocks



FIG C.(iii) Hooks on either end of the RGM for lifting



FIG C. (iv) Placing girder and hydraulic Jacks for re-railment

D. Restoration of LHB Coaches:

Recently LHB coaches with FIAT bogies having better riding comfort and higher speed potential have been introduced in Indian Railways. Population of this rolling stock is increasing day by day. Before starting the work check for following -

- a. Check for any breakage particularly in trolley portion.
- b. Stripping of CDTS and other components, if required.
- c. Ensure availability of fixtures, tools and equipments, spanner particularly in case of spring breakage.
- d. Take care of OHE wire and its earthing, particularly in case of spring change where excessive lifting is required, fix spring clamp (if wire rope damaged).

PROBLEMS

In the old design lifting pads, jacks used to infringe with trolley while lifting. This problem has been sorted out by relocation of the lifting pads by RCF. Depending upon the condition of derailment, LHB coach may be restored either by putting the single jack under the yoke supporting plate or two jacks under the modified lifting pads.

SINGLE POINT LIFTING

- a. Ensure space or gap between coaches for safe working.
- b. Place the Traversing Beam over the Track under Lifting Location ensures proper packing, securing & leveling of traversing beam.
- c. Ensure Proper protection by using anti-skid device/ Wedges on each wheel.
- d. Provide the Jack under yoke support plate as shown in figure.
- e. Lift the coach with Trolley as per requirement to avoid the infringement of wheel flange with track.
- f. Move the Bogie in Lifting position with the help of push jack on.
- g. After ensuring the proper alignment of trolley on track, lower the Jack.
- h. Remove All Re-railing equipments and clear the track.



FIG D (i) Single point lifting by placing Jack under yoke support plate

TWO POINT LIFTING

- a. Place the Traversing Beam over the Track under Lifting location. Ensure proper packing, securing & leveling of Traversing Beam.
- b. Provide two Jacks under lifting pad as shown.
- c. Lift the coach with Trolley by operating both the jacks as per requirement to avoid the infringement of wheel flange to track.
- d. Move the Bogie in Lifting position with the help of push jack on traverse beam towards track and align with the track with wheel flange.
- e. After ensuring proper alignment of wheels and track, lower the bogie on track.
- f. Lower the Jack.
- g. Remove all Re-railing equipments and clear the track.



Old Lifting Pad Location

Modified Lifting Pad Location

FIG D (ii) Two point lifting using Modified Lifting Pad



FIG D.(iii) Putting single jack on outer side of trolley for re-railment

E. Restoration of Coaches Fitted With CDTS & BIO TOILETS

With a commitment to provide hygienic environment to its passengers and staff, Indian Railways (IR), along with Defence Research & Development Organization (DRDO) have developed Environment Friendly Bio-toilets & CDTS for its passenger coaches.

Due to fitment of bio- toilets & CDTS, there is no place on either side of coach for placing HRE creating problem in restoration. The wire ropes provided to secure the bio- toilets & CDTS may be opened to make space for providing the Jacks. In some cases dismantling of these tanks may also be required for provision of Jacks. Other steps for restoration are same as described for LHB coaches.



FIG D.(i) General view of the coaches fitted with CDTS



FIG D(ii) General view of the coaches fitted with Bio-toilets

F. Restoration of TRACK MACHINE

Track machines were introduced on Indian Railways during the early sixties for both maintenance and laying of tracks. Population of such machines is increasing day by day. Mainly, there are two types of machines in use i.e. track tightening machine (TTM) and ballast clearing machine (BCM).

PROBLEMS

- a. Each wheel is fitted with Traction motor.
- b. There are many hydraulic pipe fitted in under frame.
- c. Under frame clearance is very less for placing girder and hydraulic jacks.

STEPS FOR RE-RAILMENT

In case of derailment following steps may be followed for quick restoration.

- a. Before lifting the stock, Hydraulic system should be in released condition.
- b. Put the jack in extreme end, care should be taken that no hydraulic pipe is damaged.
- c. Lift the stock only for clearance between Rail line and wheel flange by putting the jacks from sideways of some suitable location after consultation at site with the field supervisor /In charge of TTM/BCM.
- d. Other steps for restoration are same as that for RGM.



FIG F.(i) General view of Track Machine

G. Restoration of BCN WAGONS



H. Restoration of BCNHL WAGONS

To enhance the productivity and loading, BCNHL wagons were introduced with the higher loading capacity. Its population over Indian railway is increasing day by day.

PROBLEMS

Construction of BCNHL wagon is almost same of BCN wagons from re-railment point of view except projection of outside wheels beyond its head stock on either end. Which normally creates problem in traditionally putting re-railing girder, roller, hydraulic jacks etc. centrally under the head stock.

STEPS FOR RE-RAILMENT

- Lift the body by putting the centre jack under CBC Housing as shown in figure.
- Lift enough so that girder along with roller carriage on both sides may be slide under lower spring plank of the bogie as shown. Lower the centre jack.

- c. By putting traversing jack on rollers, trolley may be shifted on track.
- d. Again lift the centre jack to pull out the girder and rollers from trolley.
- e. Keeping the alignment of centre jack and wheels, centre jacks may be put down.
- f. Other steps for restoration are same as for BCN/BOXN Wagons.



Girder

Hydraulic Jack

FIG H.(i) Lifting of BCNHL Wagon by putting centre jack under CBC Housing .

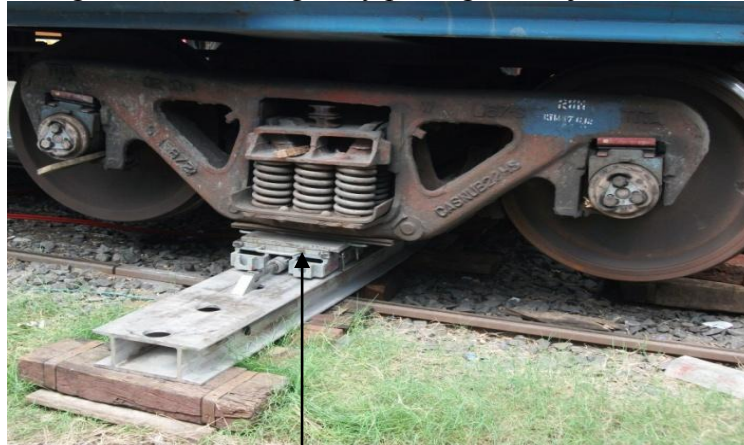


FIG H.(ii) Placing of girder and roller carriage under bogie lower spring plank

I. Restoration of BLC WAGON –

To increase the productivity and transportation of high capacity container, higher speed BLC container flat wagon were introduced. Each unit consists of 5 wagons, BLCA on Either end and 3 BLCB in middle, Outer end of A car are fitted with standard centre buffer coupler and inner end of A car & both ends of B car are fitted with slack less draw bar.

PROBLEMS

- a. Main problem is projection of outside wheels beyond its head stock on either end. It normally creates problem in traditional method of placing re-railing girder, roller, hydraulic jacks etc centrally under the head stock.
- b. Design of Head stock of A car restricts putting hydraulic jacks and girder at either end.

STEPS FOR RE-RAILMENT

- a. Put girder and hydraulic jacks under lifting pad area provided on both end.
- b. Lift the body by putting the sideways jacks on lifting pads.
- c. By putting traversing jack on rollers, trolley may be shifted on track.
- d. Keeping the alignment of centre jack and wheels, centre jacks may be put down.
- e. Other steps for restoration are same as for BCN/BOXN Wagons.



FIG I.(i) Placing of Hydraulic jacks under headstock



FIG I.(ii) Head stock design on CBC end of A car restricts placing of Hydraulic jacks under headstock



Lifting Pad

Hydraulic Jack

FIG I (iii) Placing of hydraulic jacks on lifting pad on both side

J. Restoration of BTPN Wagons

Extreme care should be taken while re-railing the loaded BTPN wagons as inertia of the consignment itself which makes the wagon unstable.

PROBLEMS

- a. Total weight of loaded BTPN may be 85 T approximately.
- b. Inertia of the consignment itself which makes the wagon unstable.
- c. Non availability of proper space for placing the re-railing bridge under buffer side
- d. Potential fire hazard.

STEPS FOR RE- RAILMENT.

- a. Detach the wagon from adjacent wagon before re-railing.
- b. Place jacks under both side lifting pad due to non availability of space for placing the re-railing bridge under buffer side.
- c. Avoid metal to metal contact. Rubber pad should be used between jack and lifting pad.
- d. Ensure no oil leakage from tank wagon. Use non sparking tools during restoration.
- e. Avoid jerk and load shifting as inertia of the consignment may make it unstable.
- f. Always keep fire fighting equipments in ready condition during restoration work.
- g. Avoid oxy-cutting and hammering work.



Two jacks on roller carriage to be applied simultaneously
FIG J.(i) Putting of Two side jacks simultaneously to lifting of BTPN wagon



FIG J.(ii) lifting of BTPN loaded wagon using two jacks simultaneously

K. Restoration of TOWER WAGONS : 4 & 8 WHEELERS

While re-railing the derailed tower car both 4-wheeler and 8-wheeler, the cattle guard shall be stripped-off before starting restoration on the derailed end. Sometimes additional stripping of some pneumatic pipes are also required for placing of the girder, roller and hydraulic jacks. Rest activities are same as in other types of conventional wagons.



FIG K (i) General view of Four Wheeler Tower Car



FIG K (ii) General view of Eight wheeler tower car

L. Restoration of DMU

A Diesel multiple unit or DMU is a multiple unit train powered by on-board diesel engine. A DMU requires no separate locomotive, as the diesel engines are incorporated into one or more of the carriages.

PROBLEMS

- a) There is no space for placing the re-railing bridge under Schaku coupler.

STEPS FOR RESTORATION

- a) Before working of HRE, ensure no passenger are in the coach.
- b) Uncouple the Schaku coupler to make space between the rolling stock.
- c) To re-rail DPC, place jacks under both side lifting pad inside to bogie.
- d) Wooden wedges must be provided to avoid rolling of DPC/TC.
- e) Uncouple brake hanger and truss bar near lifting pad before re-railing of front bogie of DPC.
- f) Before re-railing of front bogie of DPC, it should be secured with coach body by chain sling/wire rope.
- g) To lift TC, two jacks are to be applied, one on either side of the Schaku coupler.
- h) Traversing of rolling stock should be done after removing of all infringements.
- i) Ensure safety of fuel tank pipe line, air pipes and cables during restoration.



FIG L (i) Jack to be applied below the under frame of D

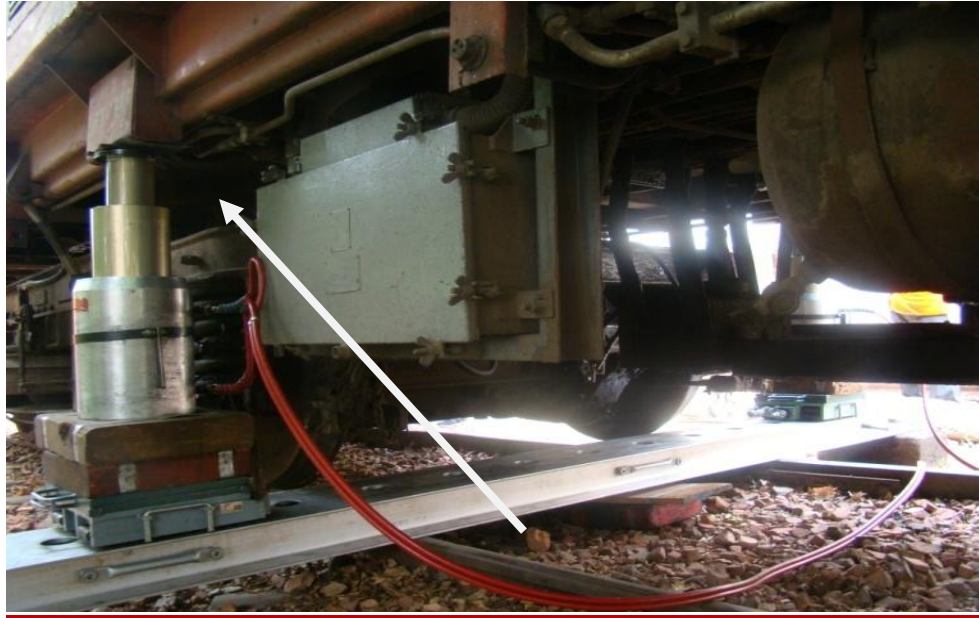


FIG L ii) Jacks to be applied under Lifting pad of DPC

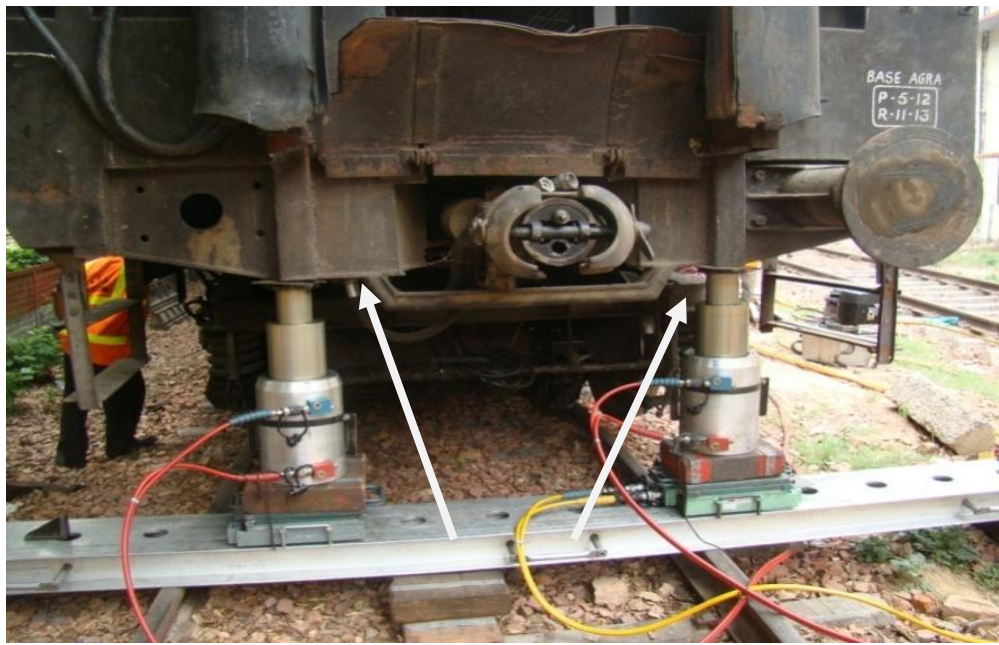


FIG L (iii) Jacks to be applied on both side of Schaku coupler
in TC and other end of DPC

M. USE OF HRE FOR UNUSUAL WORKING

HRE may be used for several types of works depending on the requirement of accident site. Some of the commons utilization of HRE are given below –

a. FOR TOPPLING OF ROLLING STOCK

Claw jacks of HRE may be used to overturn the capsized and difficult to restore stock as shown in fig. given below –



FIG M(i) Toppling of ICF coach by using Claw jacks



FIG M (ii) Toppling of main line coach by using Claw jacks

b. LIFTING OF ROLLING STOCK

Some time in case of trapped trolley, wheels, changing damaged trolley with new one for restoration from section may require lifting of rolling stock. Same may be done by using HRE as shown below-



FIG M (iii) Lifting of loco from trench by using 02 no's Telescopic jack



FIG M.(iv) Putting single jack behind cattle guard for re-railment

c. PUSHING OF ROLLING STOCK

In case of heavy accident, accident at dead end etc, the rolling stock units get critically entangled due to which it becomes very difficult to create gap between them with the help of loco. HRE can be utilised for this purpose. Illustration is as under-



FIG M (v) Pushing of rolling stock with the claw jack

d. RE-RAILING ON SPREAD RAIL GAUGE

In case of derailment due to spread gauge, it is very difficult for Engg. Staff to attend it. Re-railment of wheels on spread gauge is even more difficult. The spread gauge may be attended by horizontal application of HRE as shown below-

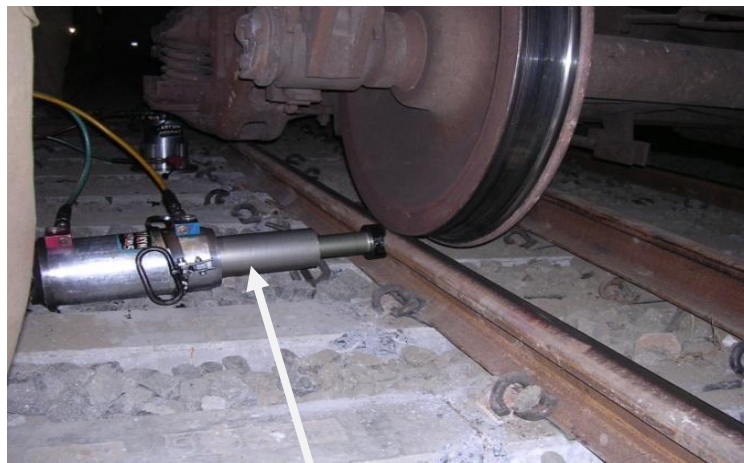


FIG M (vi) Spread Gauge is being horizontally pressed by Hydraulic Jack



FIG M (vii) Wheel is being horizontally pressed by Hydraulic Jack

e. CLEARING BLOCK SECTION IN CASE OF HOT AXLE

In hot axle/axle seizure cases, HRE may be used to lift the rolling stock to slide dip lorry under the seized wheel for clearance of block section immediately.



Hydraulic Jack

Dip lorry

FIG M (viii) Clearance of block section for hot axle/axle seizure cases

N. APPLICATION OF INFLATABLE AIR BAG:

Normally this is used where putting hydraulic jack is not feasible due to space constraint. It may be put in the cavity; rolling stock may be lifted up by blowing it and making space for putting jacks. Before putting it in cavity care should be taken for sharp edges or any other object which may damage inflatable air bag.



INFLATABLE AIR BAG

COMPRESSOR

CONTROL

FIG (N) Making space for placing HRE with inflatable air bag

8. SOME UNUSUAL RESTORATION BEING ATTENDED BY HRE

A. RESTORATION OF OVER HUNG ROLLING STOCK

An electric loco broke a dead end and came to rest with one truck hanging over a road under bridge at GMC yard /CNB. Restoration of such unusual accident is a cumbersome job and may take considerable time.

PROBLEMS

- The loco was hanging over the bridge having heavy road traffic.
- Over hung loco was gravitationally unstable as about half of its length was in hanging position and partially rested on bridge girders.
- 140 Ton crane could not be used due to space constraint.

STEPS FOR RE- RAILMENT

- Road Traffic was blocked with help of local administration.
- Electric loco was secured to restrict instability by pulling it by another loco on other side.
- Platform of trusses was made on the road to provide support.
- During the entire operation, 140 Ton crane was used to support it from hanging portion.
- After providing support made up of trusses from road level, loco was lifted slightly with the help of 140 Ton crane for providing track linking up to outer most wheels of hanging trolley.
- After ensuring proper track linking, physical stability, safety and other factors, pulling with help of multi loco was started very slowly up to the clearance of damaged track.
- The accident site was very tough, required lot of planning; inter departmental co-ordination and considerable restoration time.



Over-hung loco

Platform being built for providing stability

FIG (i) Restoration of over hung rolling stock

B. RESTORATION OF DERAILED/CAPSIZED WAGON ON TIPPLER

Tipplers are used normally in power house to unload the Coal wagons quickly. Various type of tippler designed by various Countries and same used in power houses in India also such as NTPC and other coal loading sidings etc. .

PROBLEMS:

- a. Normally approaches to such sites are very poor.
- b. Heavy heap Coal/ore, dust on both side of track near tippler restricts smooth and prompt restoration.
- c. Co-operation of power house authority /tippler in charge is highly required.
- d. Normally derailment/capsizing of wagon on tippler damages the stock badly.
- e. These type of tipplers are pneumatically controlled, hence chances of pressure leakage may cause derailment of wagons.
- f. 140 Crane also cannot work due to space constraint for moving JIB etc.
- g. Working of HRE is also very tough in this situation, and prone to damage of jacks, power pack, pressure hoses, etc.

PRECAUTIONS :

- a. Very careful working is required derailment/capsizing is occurred in deep pit.
- b. Staff should be highly alert in this situation.
- c. At site staff should be very careful as any pneumatic leakage make the Tippler highly unstable .Arms of tippler can come down any time and can hamper the safety of both staff and equipments .
- d. Staff should be properly geared with safety equipment e.g., mouth mask, eye glasses, helmet, hand gloves etc.
- e. Advice to allow only that front line staffs to work at site who have pre experience to deal with such type of accident/derailment.
- f. Technical officer staff and other supporting staff of Tipplers are must to be all time available at site for any type of support/assistance required.
- g. Sometimes mid capacity TIRFORS (5 to 10 T capacity) can be highly supportive to pull the fallen parts of wagon from deep pit.



FIG (ii).Derailed BOXNHL Wagon on Tippler at HJG power plant /ALD division



FIG (iii) Wagon wheel trapped inside tippler



FIG (iv) Trolley and it's parts trapped inside the Tippler

C. WHEEL REPLACEMENT OF BLC LOADED RAKE INSITU.

1. Place the Wooden wedges between wheels & rails of affected wagon & adjacent wagons.
2. Remove the six Bolts and it's split pin of bottom support plate for "PIN" of Slackless Drawbar of affected wagon End.
3. Create a gap of at least six meter between affected wagon and adjacent wagon in rear with help of Shunting engine. Wooden wedges are to be removed before shunting.
4. Similar process to be adopted for uncoupling the Slackless Drawbar between affected wagon and adjacent wagon in front.
5. Create a gap of 6 meter between affected wagon & adjacent wagon in front. In this way the affected wagons are to be totally isolated.
6. If it is Refrigerated Container, the power supply cable connections are also to be disconnected from the affected wagon. The electrical disconnection should be done after arranging all material in-position at site, so that minimum damage takes place to the loaded perishable material.
7. Place the Hydraulic re-railing (HRE) jack for lifting the wagon to roll-out the affected trolley.
8. The refrigerated Container height is more than the normal container, so adequate safety margin from OHE must be ensured while lifting.
9. Uncouple the Brake Rigging to affected trolley from Brake Cylinder. Remove the locking pin from centre pivot pin before starting the lifting operation.
10. Roll out the trolley; uncouple the Brake Rigging connection from Affected Wheel set. Lift the Trolley Frame to Roll-out the affected Wheel set with help of Crane mounted on the Flat wagon placed on adjacent Track.
11. Lift the affected Wheel set & keep it separately on the Flat Wagon.
12. Place the Wheel set of correct size at proper location, Place the Wooden wedges on booth side of the wheel set.
13. Place the Trolley Frame properly over the Wheel sets. Ensure that there is no dislocation of Adopter.
14. Connect the Brake Rigging attachment of Trolley. Roll-in and place the trolley after properly locating the centre-pivot pin. Gradually lower the Wagon on Trolley carefully so that CP Pin sit in position properly guided over the CP bottom on Bogie Bolster. Properly secure the CP pin using CP washer & Locking Pin.
15. Connect the Brake Rigging from Bk. Cylinder to the trolley.
16. Couple the Affected wagon & adjacent wagon in Front by Slack-less Draw Bar. Place the Pin and support plate in position and tighten the Bolt. Put-in the Split pin on support plate Bolt.
17. Repeat the process of Sr. no.16 for Coupling the affected wagon & adjacent wagon in rear.
18. The shunting of the loaded wagons has to be done carefully to avoid any untoward incident.
19. Connect the Refrigerated Container for Power supply. Connect the BP air hose. Open the Isolating cock. Release the entire Rake manually. Before giving final fitness for movement.



**REMOVAL OF BOTTOM SUPPORT
PLATE**

AFFECTED WAGON



9. DO's AND DON'Ts

9.1 Do's-

- a. Check all vital equipments before despatch of ART.
- b. Take attendance of staff while on run to site and ask control for any back up support for men and material at site.
- c. Be in touch with divisional control to know the ground condition of accident site. It will help in further planning.
- d. Be ready and fully geared up well before reaching at site.
- e. Check all the equipments, power pack etc. by starting/physical check before reaching the site.
- f. Counsel the staff for their responsibilities.
- g. Analyse site critically. Assess the requirement of manpower, equipments and any other support. Estimate the time required for restoration after consultation with senior officers.
- h. Unload must required items at site. Also unload other material as per the site requirement.
- i. Arrange proper illumination at site.
- j. Ensure capturing photographs/video clip at site.
- k. Ensure deployment of staff at their respective position.
- l. Ensure availability of consumables in sufficient quantity.
- m. Ensure relaying the activities, timing to divisional control on time.
- n. Ensure safety of your staff and equipments on top priority.
- o. Keep encouraging the staff for good work.
- p. Maintain your temper and confidence at site.

9.2 DON'Ts –

- a. Don't allow new staff in critical or prime location during restoration work.
- b. Don't allow your staff and supervisors to leave site without permission.
- c. Don't follow the instruction given by unauthorized person.
- d. Don't ignore instructions from senior officers at site.
- e. Don't ignore safety of staff, equipments and passengers.
- f. Don't start work on derailed wagon until earthing of OHE is done.
- g. Don't adopt shortcuts.
- h. Avoid any scratches, indentation etc. on piston area.
- i. Never use hydraulic inlet/outlet connectors as a handle to lift with. These are delicate part of hydraulic jacks and even a small jerk may cause heavy damage.
- j. Avoid hammering on hydraulic jacks.

10. MFD PETROL PUMP SET

Technical Data:

1. Horse Power	: 10.6 HP
2. Out Put	: 8.1 kW
3. RPM	: 3000
4. Direction of Engine rotation	: Anti-clockwise.
5. Piston Displacement	: 337 cm ³
6. Ignition	: Transistorized-magneto
7. Spark advance	: 25 Deg. before TDC
8. Contact breaker gap	: 0.7 - 0.8 mm
9. Spark Plug	: NGK-R BPR 6EC JAPAN
10. Carburetor	: Horizontal Type Butterfly
11. Fuel Used	: Pure Unleaded Petrol
12. Engine Type	: Four Stroke

General:

1. Make	: HONDA JAPAN
2. Supplier	: Compair Equipments Co. Mumbai
3. Year of Manufacturing	: 2002
4. Date of Commissioning	: January-2003
5. Last Overhauling done	: Under Warranty
6. Capacity of Hydraulic oil Sump	: 65 Lts.
7. Maximum Operating Pressure	: 300 Bar

11. MFD DIESEL POWER PUMP SET

Technical Data:

1. Horse Power	: -10 HP
2. Out Put	: -7.46 kW
3. RPM	: -3000
4. Piston Stroke	: -90 mm
5. Engine Type	: -Single Cylinder Combustion type Four stroke
6. Type of pump	: -Axial Piston fixed Displacement Pump
7. Fuel Tank Capacity	: -5.5 Liters
8. Hydraulic Tank Capacity	: - 65 Liters
9. Complete Weight without Oil	: -59 Kg
10. Compression Ratio	: -17.5:1
11. Cylinder Bore	: -85 mm

General:

1. Make	: -GREAVES LTD.
2. Supplier	: -Francis Klein & Co.Pvt.Ltd. Bangalore
3. Year of Manufacturing	: -1986
4. Collected from COS.	: -31.12.1997
5. Date of Commissioning at ET	: -07.01.1998
6. Last Servicing done	: -28.10.2004
7. Capacity of Hydraulic oil Sump	: -65 Lts.
8. Weight of the complete set with oil	: -130 Kg
9. Maximum Operating Pressure	: -300 Bar

MAINTENANCE SCHEDULE OF HYDRAULIC RE-RAILING EQUIPMENT

SCHEDULE : WEEKLY

POWER PACK

NO.....DATE.....DEPOT.....RLY.....

The under mentioned parts to be examined with the procedure laid down in the maintenance schedule.

S.No.	Item	Condition	Action taken
1.	PETROL POWER PACK:		
1.1	Check Engine & Gear box oil level. If required, fill up the oil to the upper level		
1.2	Check the petrol level. If required, fill up to the upper level		
1.3	Check the Oil level of Hydraulic tank		
1.4	Starting and running of the unit daily for 15 minutes		
2.	CONTROL DESK [PETROL]:		
2.1	Check the operation of control levers		
2.2	Check oil leakage from control desk and clean it		
3.	DIESEL POWER PACK:		
3.1	Check Engine gear box oil level. If required fill up the oil to the upper level.		
3.2	Check the fuel level. If required, fill to the upper level		
3.3	Check the oil level of Hydraulic tank.		
3.4	Starting and running of the unit daily for 15 minutes		
4.	CONTROL DESK [DIESEL]:		
4.1	Check the operation of control lever.		
4.2	Check oil leakage from control desk and clean it.		
5.	HYDRAULIC JACK:		
5.1	Clean all Jacks with cloth.		
6.	HYDRAULIC ACCESSORIES:		
6.1	Clean all the hydraulic hoses, roller carriage & Re-railing bridges etc.		

ANY SPECIAL REPAIR OBSERVED:

Signature of Technician.

Token No.....

Signature of ART supervisor

MAINTENANCE SCHEDULE OF HYDRAULIC RE-RAILING EQUIPMENT

SCHEDULE : MONTHLY/ 20 RUNNING HRS OR AFTER EVERY BREAK
DOWN WORKING.

POWER PACK

NO.....DATE.....DEPOT.....RLY.....

The under mentioned parts to be examined with the procedure laid down in the maintenance schedule.

S.No.	Item	Condition	Action taken
1.	PETROL POWER PACK:		
1.1	Start the engine at full throttle.		
1.2	Check the pressure on control desk, it should be 300 bar		
1.3	Check Oil leakage from engine, Pump, Return line filter and fittings. Attend if required		
2.	CONTROL DESK [PETROL]:		
2.1	Check 300 bar pressure on control desk. Re-adjust if required		
2.2	Check oil leakage from control desk & its fittings. Attend if required.		
3.	DIESEL POWER PACK:		
3.1	Clean air cleaner		
3.2	Check oil level of air cleaner. Fill if necessary.		
3.3	Check oil level of Crank case. Fill if necessary.		
3.4	Check the pressure on control desk, it should be 300 bar.		
3.5	Check oil leakage from engine, pump, return line filter & fittings. Attend if required.		
4.	CONTROL DESK [DIESEL]:		
4.1	Check 300 bar pressure on control desk. Re-adjust if required.		
4.2	Check oil leakage from control desk & its fittings. Attend if required.		
5.	HYDRAULIC JACK:		
5.1	Check all Jacks with or without load on 300 bar pressure. If found oil leakage, check the rubber buckets and change it.		
5.2	Check oil leakage from control desk & its fittings. Attend if required.		
6.	HYDRAULIC ACCESSORIES:		
6.1	Check the roller carriage for any mechanical damage. If found damaged, repair or change it.		
6.2	Check oil leakage from hydraulic hose & end fitting couplers		

ANY SPECIAL REPAIR OBSERVED:

Signature of Technician.

Token No.....

Signature of ART supervisor

MAINTENANCE SCHEDULE OF HYDRAULIC RE-RAILING EQUIPMENT

SCHEDULE : QUARTERLY OR AFTER 50 RUNNING HRS

POWER PACK

NO.....DATE.....DEPOT.....RLY.....

The under mentioned parts to be examined with the procedure laid down in the maintenance schedule.

S.No.	Item	Condition	Action taken
1.	PETROL POWER PACK:		
1.1	Tighten all foundation bolts.		
1.2	Clean the return line filter of hydraulic oil tank		
1.3	Clean the fix half fittings of pump unit & check for leakage.		
1.4	Clean air cleaner properly.		
1.5	Clean the hydraulic return line filter of Pump set.		
2.	CONTROL DESK [PETROL]:		
2.1	Clean high pressure hydraulic filter		
2.2	Clean fix half fittings of control desk		
3.	DIESEL POWER PACK:		
3.1	Clean breather element		
3.2	Replace oil of Air cleaner		
3.3	Clean the return line filter of hydraulic oil tank.		
3.4	Clean the fix half fittings of pump unit & check for leakage		
3.5	Tighten all foundation bolts		
3.6	Clean the hydraulic return line filter of pump set.		
4.	CONTROL DESK [DIESEL]:		
4.1	Clean high pressure hydraulic filter		
4.2	Clean fix half fittings of control desk.		
5.	HYDRAULIC JACK:		
5.1	Check all Jacks with or without load on 300 bar pressure. If found oil leakage, check the rubber buckets and change it.		
6.	HYDRAULIC ACCESSORIES:		
6.1	Clean and lubricate the roller carriage shaft and rollers		
6.2	Clean all hydraulic hose end fitting couplers.		
6.3	Visual check of all hydraulic hoses for mechanical damage		
6.2	Clean the all Jacks fix half end fittings thoroughly		

ANY SPECIAL REPAIR OBSERVED:

Signature of Technician.

Token No.....

Signature of ART supervisor

MAINTENANCE SCHEDULE OF HYDRAULIC RE-RAILING EQUIPMENT

SCHEDULE : Half Yearly or after 100 Hrs. working.

POWER PACK

NO.....DATE.....DEPOT.....RLY.....

The under mentioned parts to be examined with the procedure laid down in the maintenance schedule.

S.No.	Item	Condition	Action taken
1.	PETROL POWER PACK:		
1.1	Check the spark plug.		
1.2	Check the fuel strainer.		
1.3	Change the crank case lube oil SAE 10W30 or equivalent.		
2	DIESEL POWER PACK:		
2.1	Clean head/cylinder fins.		
2.2	Clean Lube oil filter		
2.3	Clean injectors		
2.4	Replace oil 20W40 of crank case		

ANY SPECIAL REPAIR OBSERVED:

Signature of Technician.

Token No.....

Signature of ART Supervisor

MAINTENANCE SCHEDULE OF HYDRAULIC RE-RAILING EQUIPMENT

SCHEDULE : Yearly or after 300 Hrs. working.

POWER PACK NO.....DATE.....DEPOT.....RLY.....

The under mentioned parts to be examined with the procedure laid down in the maintenance schedule.

S.No.	Item	Condition	Action taken
1.	PETROL POWER PACK:		
1.1	Checked the valve clearance and readjust if require		
1.2	Clean the hydraulic oil tank		
1.3	Clean engine fuel oil tank		
1.4	Check hydraulic oil sample in lab if found unsatisfactory replace it.		
1.5	Examine pump drive coupler and change if necessary		
1.6	Change the return line filter of hydraulic oil tank.		
1.7	Change the fix half seal kit on pump unit		
1.8	Clean the engine fuel oil tank and change the fuel oil in second yearly or after 600 working hours.		
2.	CONTROL DESK [PETROL]:		
2.1	Change high pressure hydraulic filter.		
2.2	Check seal of fix half and changed if required.		
3.	DIESEL POWER PACK:		
3.1	Check tightness of delivery line union.		
3.2	Check rocker arm clearance.		
3.3	Replacement fuel filter cartridge.		
3.4	Clean the hydraulic oil tank.		
3.5	Check hydraulic oil sample in lab if found unsatisfactory replace it.		
3.6	Examine pump drive coupler and change if necessary		
3.7	Change the return line filter of hydraulic oil tank.		
3.8	Change the fix half seal kit on pump unit.		
3.9	Clean the engine fuel oil tank and change the fuel oil in second yearly or after 600 working hours.		
4.	CONTROL DESK [DIESEL]:		
4.1	Change high pressure hydraulic filter.		
4.2	Check seal of fix half and changed if required.		
5.	HYDRAULIC JACK:		
5.1	Check the cylinder of jack for scoring/scratching, if found scored remove the score by polish paper.		
5.2	Check the buckets. If found crack/perished, change it.		
5.3	Change the seal kit of all jacks fix half.		
6.	HYDRAULIC ACCESSORIES:		
6.1	Change the seal kit of all hose's loose half. (Hose fitting)		
6.2	Overhaul the roller carriage.		
6.3	Clean air breather cum filter of hand pump and check operation.		

ANY SPECIAL REPAIR OBSERVED:

Signature of Technician.

Token No.....

Signature of ART Supervisor