EASTERN RAILWAY

WORK STUDY

ON

REVIEW OF WORKLOAD VIS-À-VIS STAFF STRENGTHOF EMU MOTOR COAH REPAIR SHOP (ELECTRICAL) AT KANCHRAPARA WORKSHOP

(STUDY NO. WSER – 08/2020-21)

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BY

GM'S EFFICIENCY CELL

EASTERN RAILWAY

KOLKATA

C O N T E N T S

ACKNOWLEDGEMENT

The study team is very much thankful to Dy.CEE(W)/Eastern Railway/KPA, for his guidance and advice. The study team is also thankful to SSEs of Shop No. 29 / KPA, concerned for their co-operation and support to conduct the subject Work Study.

AUTHORITY

As approved by the competent authority, the subject work-study has been undertaken by the GM's Efficiency Cell during the current financial year.

TERMS OF REFERENCE

The subject work-study has been conducted with the following terms of references-

1. Evaluate the existing workload vis-a-vis manpower concerned.
2. Rationalisation of manpowerwith respect to work load.

METHODOLOGY:

During work study, the study team adopted the following methodology to ascertain the requirement of staff at different Power Shed based on their existing workload.

1. Consideration of section-wise workload.
2. Consideration of section-wise deployment of workforce (Skilled, semi-skilled & un-skilled).
3. Consideration of Month-wise output i.e. outturn of Motor coaches after POH.
4. Discussion with respective Technical personnel regarding concerned study.

SUMMARY OF RECOMMENDATION

Sl. No.	Recommendation	Para ref.
1	**it is recommended by the study team that the Revised Sanctioned Strength of Shop No. 29 of Kanchrapara Workshop / Eastern Railway would be 864 Posts as against the Present Sanctioned Strength of 918 Posts. Thus, the resulting (918 – 864) i.e. 54 Posts are identified as Surplus and hence recommended for surrender.**	2.29.0.

CHAPTER-I

1.0.0. INTRODUCTION:

1.1.0. Indian Railway is the life-line of nation for providing Transportation facility over the length and breadth of country. Its vision is to provide efficient, affordable, customer-focused and environmentally sustainable integrated transportation solutions and to be the vehicle of inclusive growth, connecting regions, communities, ports and centres of industry, commerce, tourism and pilgrimage across the country.

1.2.0. India's railway network is recognised as one of the largest railway systems in the world under single management and moreover, it is among the world's largest rail networks.

1.3.0. Indian Railway is not a mere operation. It is an industry. It is a prime mover of India's Infrastructure. Railway men have to reorient and perform at all times in every conceivable situation. The commitment, dedication and application to the job is the fabric that binds Indian Railway men concern for safety and well-being at all levels and operations of Railways.

1.4.0. The Railway organisation has gradually changed its policy according to its needs and availability of resources. It has transmitted its power from Steam to Diesel and then to Electric for moving vehicle. Diesel Power Sheds are located at various locations to provide the Loco Pilot (Goods & Passenger), shunting staff, other maintenance staff and supporting staff for movement/maintenance of vehicle/loco.

1.5.0. Eastern Railway comprises 04 divisions viz. Sealdah, Howrah, Asansol &Malda Division. Moreover, there are 03 Workshops viz. Kanchrapara Workshop, Liluah workshop & Jamalpur Workshop within the purview of Eastern Railway.

1.6.0. The said 3 Workshops are entrusted to perform Periodic Overhauling (POH) of various types of Rolling Stock.

1.7.0. Accordingly, Kanchrapara Workshop conducts POH of Conventional Coaches, Electric Locomotives, EMU Trailer Coaches, EMU Motor Coaches, Tower Van, etc.

1.8.0. Eastern Railway has recently completed several electrification projects and by this year end, more than 90% Electrification is going to be completed. Thus, utilization of Diesel Power will be gradually diminished in several sections over Eastern Railway. At the same time, updated version of Electric Locomotives is gradually introduced in place of Diesel Locomotives. Thus, workload pertaining to POH of Electric Locomotives becomes more significant gradually.

1.9.0. Keeping in mind of the above, GM's Efficiency Cell has been engaged to conduct the subject work study to find out the actual requirement of staff pertaining to different kinds of Electric Motor Coaches.

CHAPTER-II

2.0.0. Existing Scenario & Critical Analysis

2.1.0. Kanchrapara C&W Workshop is designed for POH of Non-AC Conventional Coaches (both PCV & OCV), EMU / MEMU / DEMU Trailer Coaches & Motor Coaches, Tower Van, etc.

2.2.0. Shop No. 29 of Kanchrapara C&W Workshop carries out Periodic Overhauling (POH) work of EMU, DEMU, MEMU Motor Coaches, Tower Van. The complete POH work is distributed among 5 (five) Shops under the head of Shop No. 29 /KPA, viz. 1. Shop No. 29 (Mechanical), 2. Shop No. 29C (Mechanical), 3. Shop No. 29B (Electrical), 4. Shop No. 29B/Apparatus-I (Electrical), 5. Shop No. 29B/Apparatus-II (Electrical).

2.3.0. As per Book of Sanction of Kanchrapara Railway Workshop / E. Rly., Sanctioned Staff Strength of Shop No. 29 is indicated as the sum total of Sanctioned Staff Strength of the aforesaid 5 (five) Shops.There is no break-up / pin-pointing of the said combined Sanctioned Staff Strength among the said 5 (five) Shops.

2.4.0. Dy. CPO/W/E.Rly./KPA vide his office letter no. PB/Misc./OS(P)/Pt. V, dated 04/09/2020 stated the Staff position of Shop No. 29, as per Book of Sanction. The Staff position, as furnished so, is tabulated below –

Category	**Sanctioned strength (S/S)**	**Men On Roll (MOR)**	**Vacancy (Vac)**
Mech. Fitter	234	190	44
Elect. Fitter	331	244	87
Welder	137	108	29
Rigger Cum Gunner	59	19	40
Motor Driver Mech.	10	9	1
Crane Driver	3	2	1
Helper	144	165	-21
Total	**918**	**737**	**181**

2.5.0. The shop-wise functional break-up of EMU, DEMU, MEMU Motor Coaches, Tower Van POH work, performed by said 5 (five) Shops, along with respective Men-On-Roll (MOR) is tabulated below –

Sl. No.	Shop No.	MOR	Function
1.	Shop No. 29 (Mechanical)	229	Body Repair i.e. Corrosion Repair & associated Furnishing work of all kinds of aforesaid Motor Coaches. In addition to the above, the Shop also performs Stripping & Fitting of Main Compressor, POH of Radiator, outside cleaning of Inter-cooler & after-cooler of Motor Coaches.
2.	Shop No. 29C (Mechanical)	67	Bogie &SchakuCoupler Repair of Motor Coaches.
3.	Shop No. 29B (Electrical)	199	Stripping & Equipping of Electrical Apparatus associated to Motor coaches, Testing of Electrical Apparatus after equipping the same in Motor coaches.
4.	Shop No. 29B/Apparatus-I (Electrical)	137	POH of all kinds of Electrical Apparatus associated with Motor coaches.
5.	Shop No. 29B/Apparatus-II (Electrical)	85	
Total		717	

2.6.0. In each of the above 5 nos. shops, there are a good nos. of Artisan Staff, who were surplus and transferred from other shops and deputed thereof after imparting suitable on-job training. They are not at all holding the sanctioned posts of Shop No. 29. Rather, their Lien and seniority are still maintained at their respective mother shops. As of now, these migrated staff are 30 in nos.

2.7.0. Moreover, each of the above shop there are some ‘Trainee’ who are presently undergoing on-job training. In due course, they will be posted in any of the aforesaid said shops.

2.8.0. Among the above 05 shops, work study is taken over for Shop No. 29B (Electrical).

2.9.0. To conduct any work study, data pertaining to ‘Staff position as per the latest Book of Sanction’ are considered as prime data. In the present work study,the staff position of Shop No. 29B (Electrical) was not pin-pointed, rather amalgamated with the above mentioned other four shops and published as the Staff position of Shop No. 29 / KPA as a whole.

2.10.0. To compute the pin-pointed staff position of Shop No. 29B (Electrical), the overall sanctioned strength of 918 post (As per Dy. CPO/W/E. Rly. /KPA vide his office letter no. PB/Misc./OS(P)/Pt. V, dated 04/09/2020) is distributed among the above 05 (Five) shops on the pro-rata basis of their respective present Men-On-Roll. In this way proportionate sanctioned strength vis-a-visResulting proportionate vacancy of each of above five shops is evaluated and tabulated hereunder -

Sl. No.	Shop No.	Present MOR	Proportionate Sanc. Strength	Resulted Vacancy
1	Shop No. 29 (Mechanical)	229	293	64
2	Shop No. 29C (Mechanical)	67	86	19
3	Shop No. 29B (Electrical)	199	255	56
4	Shop No. 29B/Apparatus-I (Electrical)	137	175	38
5	Shop No. 29B/Apparatus-II (Electrical)	85	109	24
Total		**717**	**918**	**201**

2.11.0. Accordingly, Study Team considers the staff position of Shop No. 29B (Electrical) /KPA and conducted the Work-Study

2.12.0. In Shop No. 29B (Electrical) /KPA, based on job allotment, there are 10 (Ten) sections / work points viz. -

1. General Repair (Gear Case) Section.
2. Testing Section
3. Train Lighting Section
4. Cable Section
5. General Erection Section.
6. Heavy Erection Section.

7. PPO Section.
8. Store Section.
9. Tool Room Section.
10. Transport section.

2.13.0. As available in office records, the section-wise Men on Roll of Shop No. 29B / KPA is tabulated below:

SL No.	Name of Section	Men on Roll
1.	Gear Case Section	08
2.	Testing Section	21
3.	Train Lighting Section	22
4.	Cable Section	27
5.	General Erection Section	59
6.	Heavy Erection Section	42
7.	PPO Section	08
8.	Store Section	04
9.	Tool Room Section	02
10.	Transport section	06
Total		**199**

2.14.0. The section-wise activities of Shop No. 29B / KPA:

1. **<u>General Repair (Gear Case) Section:</u>**

   A) Repair of Gear case.

   B) Reclamation of Drain Gate.

2. **<u>TESTING Section:</u>**

   A) Incoming testing of LT,HT and aux. circuit(from external LT sources and air supply if necessary) and deficiency checking and noting.

   B) Stripping & Equipping of Governors&MPH running for oil filtration of TFP.

   C) MCB stripping, cleaning, testing and equipping.

   D) (i) HOM stripping, cleaning, testing and equipping.
   (ii) P4- work disconnected for TFP meggering work and complete the job P4 reconnected with the help of necessary arrangement.
   (iii) CableMeggering: LT,Aux. & power cable are disconnected for all meggering work. After completing work & fault rectification cables are reconnected.
   (IV) HEFRP: Stripping, cleaning, testing,equipping and connection.

E) LT Testing :

(i) LT circuit.
(ii) Panto circuit.
(iii) Sequence proving all duct and pneumatic apparatus.
(iv) Indication circuit.
(v) Tripping circuit.
(vi) Observation on performance of MCB & Fuse panel.
(vii) Observation of functioning of elect. Motors and gauges.
(viii) Observation on battery voltage charging and performance of the same.
(ix) Observation of working of Relays.
(x) Observation on working of EM & EP contactors and connection.
(xi) Observation on performance of Governors and their setting.
(xii) Observation on performance of Panto valves and safety valve.
(xiii) Observation of condition of Jumpers & Receivers.
(xiv) Observation on LT,AUX and Power cable.
(xv) Attention of fault if any & ICO.
(xvi) Disconnection of all external connection done for LT test.

F) MOTOR COACH TESTING HT

(i) Rotation of auxiliaries and their performance proving.
(ii) Observation of working of auxiliaries: a) sound b) vibration and c) Temperature.
(iii) Current rating of auxiliaries.
(iv) Observation of working condition of Traction Motors 1,2,3,4 and sequence proving on different notches. Checking a) Sound b) Vibration c) Temperature.
(v) Movement of Motor coaches through Traction Motors 1,2,3,4 forward andreverse direction.
(vi) Testing of Brake in every step,in details.
(vii) Testing of cab light.
(viii) Observation on working condition of Pantograph: a) Raising time, b) Lowering time, c) contact tension, d) Pantograph insulators.
(ix) Observation on oil leakage from TFP,SL,MPH, Radiator, CT, CP, CPA and oil pipe lines etc.
(x) EFR testing.
(xi) Earthing connection.
(xii) Attention of fault if any (ICO).

G) Formation Testing (Jointly with shed staff)

(i) LT and HT test from both cabs.
(ii) Observation on working of cab lights,cab fans, Head Light., Tail light, Head code, Normal fan, Emergency light.
(iii) Attending with Division Inspector for testing and despatch.
(iv) Attention of fault, if any.
(v) Despatch.

3. **MOTOR COACH WIRING:**

Schedule “A”

(i) Disconnection of all TL cables from both ends.
(ii) Insulation test of TL cable.
(iii) Insulation test of Jumpers and Receivers.
(iv) Continuity test of all TL cables.
(v) Continuity of Jumper and Receiver.
(vi) Numbering of equipment wire.
(vii) Insulation test of normal light circuit.
(viii) Insulation test of Emergency light circuit.
(ix) Insulation test of Fan circuit wires.
(x) Continuity test of normal light circuit wires.
(xi) Continuity test of Emergency light circuit wires.
(xii) Continuity test of Fan circuit wires.
(xiii) Stripping of normal Board.
(xiv) Equipping of Terminal Board.
(xv) Cleaning of Jumper & Receivers and attention.
(xvi) Attention of Junction Box.
(xvii) Recondition of TL cable, Jumper and Receiver, Equipment wires on both ends & bunching.
(xviii) -Do - in Emergency cab.
(xix) Gasket making & fitting.
(xx) Final testing.

SCHEDULE “B"

I. Fan point with switch point repairing
II. Light point repairing
III. Emergency light circuit.
IV. Emergency light point wiring.
V. Replacement of wiring from junction box normal light and fan.
VI. Replacement of wiring from Junction box to junction box at E/cab ofmotor coach (normal light & fan)).
VII. Replacement of emergency light circuit wiring.
VIII. Attention to Head code.
IX. Stripping, overhauling & equipping of train light.
X. Bunching socket, bunching of TL cable, jumper, and receiver with numbering.
XI. Stripping of jumper, receiver.

XII. Jumper and Receiver loading.
XIII. Connection inside Junction box terminal for roof cable.
XIV. Changing of terminal board inside junction box cable.
XV. Stripping, cleaning, refitting, bunching of roof cable per section.
XVI. Extension of wire for light point and fan point.
XVII. Terminal board shorting.
XVIII. Train light wiring.

4. **Motor Coach Cable Changing and Repairing Section :**

I. Opening of all cable duct covers, air blower of LT & HT Cable and terminal board.
II. Meggering, Continuity Test, thorough condition check of Power, LT and Auxiliary cables.
III. Repairing of burnt and damaged cables.
IV. Final check of all cables.
V. Re-fixation of all Cable Duct Cover.
VI. Numbering of Power, LT and Auxiliary cables.
VII. Disconnection of same cables from control cabinet, essentially required for cleaning & checking.
VIII. Connection of all cables at control cabinet, after cleaning, refitting &connection.
IX. RMCP Cover opening, checking, cleaning & cover re-fitting.
X. BA fuse box cover opening and checking.

5. EMU ERECTION SECTION/ S-29B /C&W Complex/ Kanchrapara Workshop:

EMU/DEMU/MEMU Motor Coach Body Stripping Operation:

I. Stripping & Equipping of Tap Changer.
II. Stripping & Equipping of Switch Box (2 Nos.)
III. Stripping & Equipping of Battery.
IV. Stripping of Rectifier.
V. Stripping & Equipping of Blower motor (MVRH) 2 Nos.
VI. Stripping & Equipping of Main Compressor.
VII. Stripping & Equipping of Transition Resistance.
VIII. Stripping & Equipping of ABB/VCB.
IX. Stripping & Equipping of MCPA.
X. Stripping & Equipping of Battery Charger.

XI. Stripping & Equipping of DC Converter.

XII. Stripping & Equipping of Oil Pump (MPH)

XIII. Stripping of Main Transformer

XIV. Stripping of Cable Head Termination (CHT) with 2 nos. CT

XV. Stripping of BIR.

XVI. Stripping of Radiator.

XVII. Stripping of SL

XVIII. Stripping of battery Isolating Switch 1 no. and M.C.S. 2 nos.

XIX. Stripping of Field Diverter

XX. Stripping of A-21 Bushing

XXI. Stripping of 7 nos. Tap Changer Shorting Base.

XXII. Stripping of 5 Nos. oil Pipe Line

XXIII. Equipping of DJ Earthing Contact

XXIV. Equipping of TFP with relevant jogans.

XXV. Etc.

6. Heavy Erection Section (Motor Coach Bogie Stripping and Equipping):

Stripping and Equipping of Traction Motors, Brake Cylinders, Axle Cap, etc. pertaining to EMU, MEMU / DEMU Motor Coaches.

I. Disconnection of all Traction Motor cables, other accessories and all other relevant works complete in respect of Lifting of Body from Bogie.

II. Stripping of Brake Cylinders, stripping of all Traction Motors with all other relevant work complete in all respect.

III. Etc.

2.15.0. Besides the above sections of Shop No. 29B, which took part directly in the outturn, there are some more working groups who are associated with shop outturn. Those are PPO, Store, Tool Room & Transport Section.

2.16.0. In Workshop, all categories of Group C & D staff (except Ministerial staff & Sr. Section Engineers) are deployed to cater the day to day work as Direct Worker (DW) & Essential Indirect Worker (EIW) [Junior Engineers are also considered as EIW]. While, Sr. Section Engineers (SSE) perform overall supervision of each shop & Ministerial staff are deployed in Shop Time Office, Office of Sr. SSE for Bill Preparation& other Establishment associated work of respective shop.

2.17.0. All the POH & other associated activities which are performed by Workshop's Direct Worker (DW) are quantified in terms of Man-Hrs. through Time Study by 'Rate Fixer' of 'Planning Department'. While the activities of rest categories, i.e. Ministerial Staff, SSEs are supporting in nature, so, their job assignment could not be measured in that way.

2.18.0. Hence, to measure performance of each of the section of Shop No.29B, available monthly Man-Hrs., Section-wise Allowed Time in man-Hrs., etcare considered as a key tool.

2.19.0. The section-wise job details, as described in the previous paras, are may be considered as Ideal activities to perform during aforesaid POH work. In reality, the activities to be performed in the context of POH work is guided by the condition report of coaches. Additionally, activity components of POH, to be followed for a particular coach, are ascertained through actual inspection / checking after In-turn and before starting POH activities of each coach. Moreover, the activities associated with standing instruction pertaining to 'Must change Items' during POH are also followed.

2.20.0. In this way, POH of coaches is executed to regain its functional aspects completely. Study team noted that it is not always technically indispensable to follow all the ideal activities.Rather need based attention of coaches is sufficient enough for completion of work and regain all the functions of Motor Coaches before offering the coaches within targeted date of Out-turn and optimum expenditure for POH.

2.21.0. It is customary that full Allowed Time i.e. 'Block Time allowed for POH' (In Man-Hrs.) against each 'out-turned' / 'offered for out-turn' coach is to be taken into account for calculation of Incentive earning. ButStudy team observes that in every month and for almost all coachesmore than 25% of 'Block Time allowed for POH' is not considered during evaluation of Incentive percentage calculation. If, 100% of Allowed Time were considered than Earning percentage may be jumped uptomore than 200% higher. In CLW pattern of Incentive Scheme, it is mandatory to keep the Earning percentage as 50% (Maximum).

2.22.0. However, Study Team discussed about the said consideration of less Allowed Time with sectional supervisors to understand the reason behind it. Actually,it is not due to the fact thatjob involvement of different coaches isdifferent and 100% specified activities are not required to perform during POH. Rather, the Allowed Times are manipulated or reduced just to keep the squad Allowed Time within the limit of 50% Incentive earning. Official records showed that the Incentive earning of each section / squads of Shop No. 29B soars up to more than 200% if the said manipulation in Coach POH Allowed Time was not done. Actual monthly Incentive % of the sections of Shop No. 29B are always above 49% i.e. 49.93%, 49.96%,49.98%, etc.

2.23.0. The basic consideration of 'CLW pattern of Incentive Scheme' is that Incentive Earning should be limited to 50% (Maximum). But the present scenario of Man Power vis-a-vis workload of Shop No. 29B is continuing beyond the spirit of 'CLW pattern of Incentive Scheme'.

2.24.0. It is noticed that in the year 2010, 2014 & 2019 unit Allowed Time was reduced by 5%, 10% & 5% respectively. In spite of the said correction in Allowed Time, system flaw, pertaining to Man Power vis-a-vis workload of Shop No. 29B still persists and needs to be reviewed.

2.25.0. Keeping in mind of the above facts and fatigues, study team closely observes, analyse the section-wise activities and proposed Bare Man-power requirementaccordingly. The figures are tabulated below –

2.26.0. Section-Wise Proposed Bare Requirement of Man-Power:

SL No.	Name of Section	Proposed Bare Requirement
1.	Gear Case Section	06
2.	Testing Section	19
3.	Train Lighting Section	17
4.	Cable Section	22
5.	General Erection Section	55
6.	Heavy Erection Section	40
7.	PPO Section	07
8.	Store Section	04
9.	Tool Room Section	02
10.	Transport section	06
Total		**178**

2.27.0. Thus, Proposed Bare Man-Power requirement = 178 Posts
Leave Reserve Allowance = 12.5% of Bare Requirement i.e. 12.5% of 178 Posts.
Or, 22.25 Rounded off to 23 Posts

Thus, the Revised Man-Power of Shop No. 29B is evaluated as follows –

Proposed Revised Man-Power = Bare Man-Power + Leave Reserve Posts
= 178 Posts + 23 Post
= 201 Posts.

2.28.0. Based on the above facts and figures, analysis of Study team, Revised staff position of Shop No. 29B (Electrical) /KPA, is proposed below –

Sl. No.	**Shop No.**	**Sanc. Strength**	**Proposed Revised Sanc. Strength**	**Nos. of Posts to be declared as surplus**	**Recommended Surrender**
1.	Shop No. 29B (Electrical)	255 Posts	201 Posts	54 Posts	54 Posts

2.29.0. Recommendation:

Consequent upon the analysis made in the paras / tables above, it is recommended by the study team that the Revised Sanctioned Strength of Shop No. 29 of Kanchrapara Workshop / Eastern Railway would be 864 Posts as against the Present Sanctioned Strength of 918 Posts. Thus, the resulting (918 – 864) i.e. 54 Posts are identified as Surplus and hence recommended for surrender.

CHAPTER-III

3.0.0. FINANCIAL APPRAISAL

3.1.0. As per recommendation made in Para 2.29.0., 54 posts of Shop No. 29 / KPA Workshop to be made surplus and financial savings thus achieved would be as under:

(Figs. In Rupees)

Level	GP	Mean pay	DA @ 17 %	Total Pay/staff/ month	Proposed surplus	Monthly savings	Annual savings
1	1,800.00	20,750.00	3,527.50	24,278.00	54	13,11,012.00	1,57,32,144.00

3.2.0. Thus, the annual financial savings against the surplus of 54 (Fifty-four) posts of Shop No. 29 / KPA Workshop as per 'Level 1 & Grade Pay Rs. 1800.00', vide 7th CPC Pay Matrix is worked out as Rs. 1.57 Crore (Approx.)