

RAIL CANVAZ

A TrainTrackers' Initiative

August 2022



SAMBHAR SALTS

CELEBRATING INDEPENDENCE



Photo Credit: SCR Railfans



Photo Credit: Sourav Dutta



Photo Credit: Anish Banerjee



Photo Credit: Anamitra Bose



Photo Credit: Babai Dey



Photo Credit: Rahul Nivascor



Photo Credit: Rahul Nivascor



Photo Credit: Babai Dey



August 2022

RAIL CANVAZ

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TRAINTRACKERS

Publisher

SOMSUBHRA DAS

Editor

SUBHADYOUTI BOSE

Managing Editor

RUDRANIL ROY CHOWDHURY

Concept & Design

ARKOPAL SARKAR

Distribution & PR

ANAMITRA BOSE, SOURAV DUTTA

Contributing Editor

SHREYA CHAKRABORTY

Proof Reader

TEAM TRAINTRACKERS

SOMSUBHRA DAS

President

RUDRANIL ROY CHOWDHURY

General Secretary

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Public Relations

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Members

SOURAV DUTTA, SAGNIK GUPTA, SHOURYA BASU

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SUMANTA CHOWDHURY

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In our struggle for freedom from the clutches of the Colonial Raj, in our stride for achieving *Purna Swaraj*, the Salt Satyagraha undertaken by Mahatma Gandhi was a landmark protest which has a definite bearing on the cause as it turned out to be a major Civil Disobedience Movement to protest the salt tax imposed by the then British administration. Gandhiji's strategy of making the British realise that they were not above the salt did sow the seeds of success which bore the fruits of freedom in years to come. The father of the nation made a statement which underlay the foundation of a conviction for a fundamental cause which revolved around an essential commodity like salt. On this auspicious occasion of celebrating the 75 years of Azadi Ka Amrit Mahotsav, our Second Anniversary issue focuses on such a railway system that holds the key to salt production and transportation, right from the brines to our dining tables. Yes, it's none other than the Sambhar Salts Limited which is at the cynosure of our August 2022 publication. This Public Sector Undertaking Enterprise produces nine percent of India's salt and its self-sustained railway system encompasses an extensive Meter Gauge and Narrow Gauge (2'6") network spanning a good 70 Km across the holy Sambhar Lake with a Broad Gauge siding of Indian Railways in the vicinity of the Sambhar Lake station.

Our Cover Story *Sambhar Salts Story* is an endeavour to cover the different aspects of this unique railway system comprising of wooden carriages driven by puny industrial shunters over gauntleted track and a host of workers who keeps the system alive. Being a Ramsar site for the vast wetland areas around the lake, Sambhar also happens to be the hotspot for twitchers or bird watchers who assembles every season to witness the spectacle of the migratory birds in flamingos, pelicans among others. We have two Photo Stories on Sambhar as well - *Sambhar Diary* by **Sourav Dutta** canvasses the varying moods of the lake over the winter and summer seasons and *The Salt Train* by **Anamitra Bose** is an illustration of the detailed process about what goes into the production and transportation of salt. While witnessing the striking spectacle of the diverse colourful brines of Sambhar, have you ever wandered about the factors behind such unique phenomenon, have you ever reckoned about the existence of 'life' in those salt brines of the lake!! **Dr. Nilanjan Chakraborty**, Assistant Professor with the Department of Botany of the Scottish Church College, Kolkata explains & decodes the different colour codes of the salt lake through his highly engrossing article *Sambhar Salt Lake : A treasure island of haloalkaliphilic bacteria and algae* in an eloquent manner thereby depicting a completely different orientation.

As we celebrate the 76th Independence Day, **Transport hObO** writes home about the celebrations that took place in Eastern Railway on this D-Day in 2018 as he continues with his series *Close Encounters of The Rail Kind*. This

occasion has also been celebrated by the railways in the ongoing year by flagging off some fully decorated epochal trains and putting Tricolour and other significant liveries on some of the locomotives. Two Photo Stories regarding these events light up our issue – first *Azadi Ka Railgadi* by **Arkopal Sarkar** and other railfans on the programme as organised by ER and SER for observing the occasion and secondly *Celebrating Independence* by **Anamitra Bose, Sourav Dutta** and other railfans who spotted different locomotives from different sheds across the nation in ravishing liveries commemorating the momentous day.

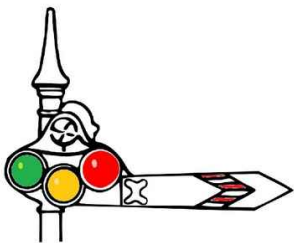
Team TrainTrackers has been associated with the revival of trams in Kolkata with CTUA which had arranged a rally on the 17th July, 2022 demanding revival of closed routes and lines. **Dr. Debasish Bhattacharyya** writes the report *Rally for a Cause* on the said event. In our second article on trams, **Roberto De'Andrea** aptly narrates the gala event and celebrations of the Calbourne Fest in *Tramjatra 2001*.

Our issue also hosts twin articles from **PK Mishra**, the AGM of SWR – *What is in Time* about the Asansol Station Clock restoration and *EIR Early Days : 1848 (Part-V)* on the journey of the East Indian Railway. Then we have **Sanjoy Mookerjee** penning about his thoughts on the prospects of promoting Siliguri Town as a World Heritage Site for the rich history and legacy it embodies and the association of the small town with DHR in *Siliguri Town Railway Station, A World Heritage Site?* The 'Technical Insight' section has **Anamitra Bose** with his write-up *India – The Nation with Growing Metro Systems* elaborating on the Rakes and Years of built of the Delhi and Kolkata metros in a first part of the series. Then we have **Arkopal Sarkar** reporting about the *Siuri-Sealdah MEMU Inauguration* from Siuri and taking ride in the inaugural special all the way.

To round things off for this issue, we have three more articles of completely different dimensions – **Paul Whittle** scripts the story of his journey onboard the timeless and glamorous international train aka the *Orient Express – Europe's Most Famous Train*; **Arkopal Sarkar** expresses his exaltation as being a part of a dedicated group of railfans who not only decorated the rake and the locomotive-in-charge of the first LHB run of the famed Coromandel Express but also designed the Train Boards for the occasion through his write-up *Coromandel LHBfication* and last but not least, we have a report *Sealdah Metro* by **Rudranil Roy Chowdhury** on the Sealdah Metro Station & Carshed Visit of the EW Metro as arranged by the Kolkata Chapter of the Rail Enthusiasts' Society (RES).

Our regular sections are also there – 'Railway Sketches' featuring drawings from **Dr. Sudakshina Kundu Mookerjee** and **Sambit Chatterjee**; 'Photo Junction' on the lens-art by rail enthusiasts across the nation and the 'News Station' highlighting some of the notable developments in IR.

As a special occasion calls for a special celebration, we celebrate this Independence Day with the lesser heard smaller gauges network of the Sambhar Salts Limited which produces nearly 1,96,000 tonnes of salt every year which adores our everyday platter along with salts possessing therapeutic importance. This issue is an endeavour to throw some light on the various facets of the blessed Sambhar Lake which includes diverse points of interest other than its salt producing aspect. We sign off with high hopes and beliefs of getting your unconditional support in times to come.... Jai Hind.



RAIL CANVAZ

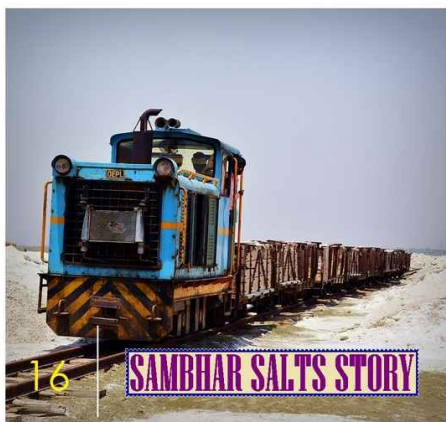
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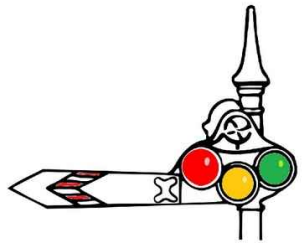
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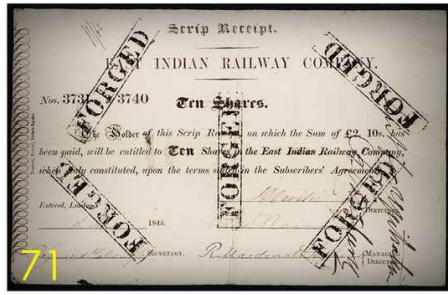
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Anamitra Bose starts off a new series on the metro rakes around the nation with their detailed specifications. The inaugural part hosts details from the metro systems of the present and past capital of the nation.

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WHAT IS IN TIME

P K Mishra

Time is a brisk wind, for each hour it brings something new... but who can understand and measure its sharp breath, its mystery and its design?

Standardisation of time has been a unique contribution of Railways in modern world. Regions, which were majestically isolated earlier, lost their temporal identity after the advent of railways. Time was a local matter set to the position of sun and each town set its clock accordingly.

Railroads began to annihilate space and time by shrinking the travel time between cities from days or months to mere hours. However, these local times, which would change by one minute every twelve miles, became a scheduling nightmare due to multiplicity of time standards throughout the country. Railroad timetables in major cities listed dozens of different arrival and departure times for the same train, each linked to a different local time zone. Mistakes and errors were frequent and sometimes disastrous leading to frequent accidents.

As soon as more than one train needed to run over a single line of track, a means had to be developed to prevent collisions. A "time interval system" before the advent of modern communication network was developed. The rule was that a ruling train had right of one hour against the opposing train of the same class. As railroads grew bigger,

the hour interval fell by the wayside, and shorter headways of 5 minutes became an industry wide practice in US.

Timetable operation required that all moving trains use a consistent standardized time and possible cumulative errors of clocks and watches involved in the movement of opposing trains would not exceed 3 minutes.

Railroad time was first introduced on the Great Western Railway in England in 1840, when a number of different local times were synchronised and a single standard time applied.

A **Standard Time System**, proposed by William F. Allen, established five equal time zones in the U.S. and Canada, each time zone exactly one hour ahead of the zone to its west, allowing the railroads to standardize railroad schedules. On October 11, 1883, the new Standard Time System was adopted, superseding some 49 operating times.

The railroads started installing a **Standard Clock** in major stations. These were high quality pendulum regulators maintained to strict standards. In order to ensure these standard clocks were always correct, a **time signal** was transmitted by telegraph once every 24 hours, using the



resources of the national observatory. The correction signal took the form of a string of dots at one second on, one second off intervals and was transmitted via Morse telegraphy for three minutes prior to the hour. This was followed by a 10 second silent period, then a dash at precisely 12:00 p.m. Station agents were thus given a way to spike (correctly set) the clocks at their location.

Guards and drivers were always to compare their watches before starting on a run or before commencing work each day, other members of the train crew were to compare their watches with the guard's or driver's watch at the first opportunity.

The railroad industry was called upon to create standards for watches which all railroads would eventually follow. By 1893 the **General Railroad Timepiece Standards Commission** presented new guidelines, referred to as the **General Railroad Timepiece Standards**.

In the very early days of railways in India, local time was observed at each large city, in common with practice in most other countries at the time. Bombay and Poona, for instance, had their own local times differing by about 7 minutes. There were anomalies too, such as Ahmedabad which strangely observed Madras local time. Because of their importance as

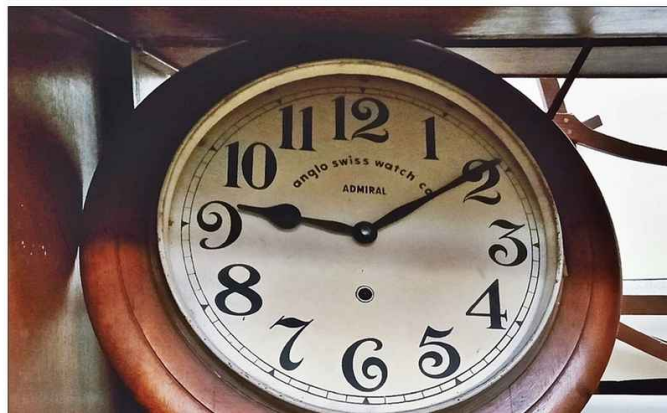
administrative as well as commercial and economic centres, Bombay Time and Calcutta Time assumed special importance and were followed for many official purposes in the late 19th century (Bombay Time from 1884), effectively forming two time zones for British India. Calcutta was the administrative capital of India until 1912. Calcutta Time was 5 hours, 30 minutes, and 21 seconds in advance of GMT, while Bombay Time was 4 hours and 51 minutes ahead of GMT. However, over time, many railway companies standardized on using Madras Time which was in between Bombay and Calcutta times, and often this, rather than Bombay time, was what was used in Indian timetables from the late 1880s onward, including the Newman's Indian Bradshaw, although this was far from universal.

The East Indian Railway, for instance, for a long while used Jabalpur local time, 34 minutes and 6 seconds behind Calcutta Time. Madras Time, or 'Indian Standard Railway Time', or 'Railway Time' as it was often known, was 32 minutes and 49 seconds behind Calcutta Time, i.e., 4 hours 57 minutes and 32 seconds in advance of GMT. Madras Time was, by the late 19th century, effectively used for railway timetables over the whole subcontinent, across Lahore, Bombay, Calcutta, and Madras. Timetables for Bombay trains usually had the local times for trains printed alongside the Madras Time schedule, and trains arrived and departed according to the Madras Time schedule.

In order to ensure continuing accuracy and facilitate safe railroad operation almost all railroads required periodic watch inspection and time service rules were issued which required constant checking, comparison with standard clock and confirmation. You can trust railroad companies to issue elaborate check sheets and schedule forms to make it fail safe.

Sample of the guidelines:

"it is suggested and recommended that employees when purchasing new watches for use in railroad service, should select 17 or 19 jewelled grades, which have steel escape wheels, sapphire pallets, double roller escapements, Breguet hairsprings, patent regulators, adjusted to temperature, isochronism and five positions. Besides the regular standard, 17 jewels, the 19 jewelled watches must have two bearings jewelled in the going parts of the mainspring barrel, to fill all the requirements."



In the care of the watch, the following points are important, especially in railroad service:

a) - The movement must be clean and the oil fresh. If the oil becomes 'sticky' or 'gummy' from any cause, it must be removed and fresh oil put on. Frequently fine watches, after being put in order and regulated, will begin to change their rate at the end of six or eight months, caused by the chemical changes taking place in the oil.

b) - Be careful to note that none of the pivots is running dry, especially the balance pivots, which require close attention, as their running dry causes irregular rating and injury to the pivots by their cutting from lack of oil.

c) - The hairspring is a very important item; it must be true, not warped or bent. The regulator pins should be straight so that the hairspring will strike flat and equal. The pins should not be too tight or too loose, but should be just close enough to allow a slight vibration of the hairspring between them; this vibration should allow a clear space to be seen (by the aid of the glass) between the hairspring and pins, and the vibration must be equal between the two pins. The regulation should stand as near the centre of the index as practical.

d) - The balance wheel must be true and perfectly poised—this should have constant attention, as the severe usage of railroad service may jar the balance out of poise or spring the pivots slightly—especially the heavy balances.

e) - The mainspring should be taken out every time the watch is cleaned, and tested to see if it fits the barrel properly, and if its movement is perfectly free and its strength fully developed to the end that the motion of the balance will not 'fall off' during the last half of the day. The mainspring must be free from gummy oil or rust spots, and slightly fresh oiled. But if found lacking in any of the above points, must be replaced by one of the best qualities, as the finest watch made will not keep correct time having a cheap, poor mainspring.

f) - The dial wheels must be free—care should be taken that they do not come in contact with the dial. The second-hand many set too close to the dial without being noticed. There must be no friction between the minute and the hour-hand, and the hour-hand must not come in contact with the dial at the hub.

g) - The stem wind must be free and easily worked — not binding or 'grinding' at any point. Lever set watches are considered safer and are recommended for railroad service.

A significant development in the 1940s, especially after 1947, was the use of radio by the government and by commercial concerns, to broadcast time signals for various purposes. In the second half of the 20th century, the use of the time signal at 1600 hours generally fell into disuse and stationmasters and other staff were generally free to set their clocks according to the widely available radio time signals from broadcast stations.

Today the use of radios, automatic block signals, and central

computer tracking of trains has lessened the role of the railroad watch on many railroads, yet watch requirements still remain important to safe railroad operation.

EIR had entered an agreement with M/S John Walker, the legendary watch & clock maker of London and ordered the bulk requirements on them. The company proudly displayed its exclusive arrangement with EIR and advertisement by the company in London papers mentioned: "By appointment to the East Indian Railways."

Advertisement by John Walker:

"WALKER'S CRYSTAL CASE WATCHES."

JOHN WALKER,
CHRONOMETER, WATCH, AND CLOCK MAKER

By Appointment to the East Indian Railways,
68, CORNHILL, 280, REGENT-STREET, AND 76, STRAND, LONDON.

J. W. respectfully invites the attention of Military Officers and the Public of India to the above WATCHES, as from their great strength they entirely obviate the necessity of the Hauling-cased Watch. During the Crimean War they were acknowledged to be the only Watches suitable for a campaign. Gold, from £14. 15s. Silver, from 8s. 6s.



PRIZE MEDALS—LONDON, 1862. PARIS, 1867.

Orders may be transmitted through Messrs. Wm. H. Allen and Co., 13, Waterloo-place, London, S.W.

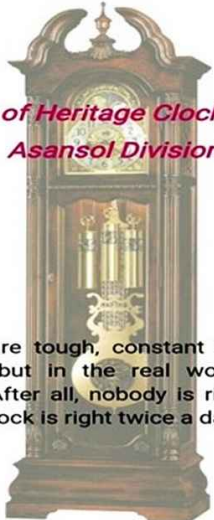
Revival of Heritage Clocks in Asansol Division

In Asansol division, I spotted six such vintage clocks majestically ticking away. These six clocks were kept in DRM chamber, meeting hall, official residence of DRM, in chambers of Sr DFM, Sr. DSTE and in Control Office respectively. We launched a drive all over divisions for tracing, cataloguing and preserving these priceless heritage relics. Most of the mechanical clocks had been replaced decades earlier when quartz clocks were introduced in railways. Still, five priceless relics lying in broken shape and dysfunctional for last fifty years were discovered, these had been condemned and scrapped, lying in stores. These clocks were having Mahogany frame-12-13" dia drum space type bezel, shrew printed dials.

Their discovery was a mixed feeling. It was a sense of elation

**Revival of Heritage Clocks in
Asansol Division**



"When times are tough, constant conflict may be good politics but in the real world, cooperation works better. After all, nobody is right all the time, and a broken clock is right twice a day."



to discover these rare clocks, which had proudly displayed time in the bygone era, but their distressed condition was a reality check over our euphoria.

It was quite a challenge to repair these clocks. Spare parts were no longer available, expert clock makers had retired and repair skill was sadly lost. Most of the components had

Clocks displayed in DRM's Chamber.



worn out, certain parts were missing and some of the items were in the broken state. Gears had developed backlash & ovality, gear teeth had worn out completely, some of gear teeth & linkages were found cut. It was truly a daunting task due to non-availability of spares and lack of trained manpower in repairing vintage clock.

A core team under the leadership of Sr DSTE M. K. Mishra was formed for restoration and repairs of the Antique clock. The team examined all the clocks and studied the nature of repairs to be done. The defective/broken/missing parts of the old clocks were collected and brought to the workshop. Some of these parts were repaired by different reclamation processes viz, Gas welding/Arc welding, precision machining, filling and fitting etc. and missing components like counterweights, pins and arms were either manufactured in house or cannibalised. After completion of reclamation and repairs, the clocks were assembled and kept under observation for a few days. The perseverance and never say die attitude of Railway men finally prevailed and clocks started ticking.

It was extremely heartening to see that these vintage clocks were finally restored to their former glory in 2018-19 and proudly displayed all over the division.

Clock in left was proudly displayed after restoration.



Orient Express

Paul Whittle

the Vice Chairman of the Darjeeling Himalayan Railway Society (DHRS) and also, he is a member of several UK steam railways and the Wey and Arun Canal trust. Started his professional career in banking, latterly became a human resources manager. He served the Territorial Army, Royal Signals for 34 years. He has written and published the history of his regiment and is a keen military historian apart from having a great interest in heritage transport as well.

Mr Whittle & his partner Sue



We don't normally take a boat to catch a train, but that's what happened to me and my partner Sue at the end of May 2022. After two postponements due to the Covid, we had finally enjoyed a short break in that most wonderful of cities, Venice. However, in contrast to the outward journey, a mere 90-minute hop by plane, we had decided to fulfil a long-cherished dream and to return in luxury on the Venice Simplon Orient Express (VSOE).

Operated by the Belmond Group, the VSOE is the modern-day successor to the original Orient Express created in 1883 by the Belgian company Compagnie Internationale des Wagons-Lits (CIWL). The company's founder, George Nagelmackers, was a Belgian civil engineer and businessman; he had travelled extensively in the USA where he had experienced the comfort and popularity of George Pullman's luxurious carriages.

The original Paris-Vienna route was gradually extended eastwards





The Start of the Journey – by water taxi along the Grand Canal in Venice

eastwards across Europe. In 1889 the first direct service ran from Paris to Constantinople (now Istanbul) and in 1919 the opening of the Simplon Tunnel in Switzerland inaugurated a more southerly route via Milan, Venice and Trieste.

The 1930s saw the Orient Express trains at their most popular with three parallel services, all with fine dining/sleeping cars and frequented by Royalty, the nobility, diplomats, business people and well-heeled tourists. One of the most frequent travellers was King Ferdinand of Bulgaria who, in return for allowing the trains to transit his country, insisted on the right to drive the locomotive whenever he chose. (Apparently, he willingly submitted to the instructions of the loco drivers and became quite proficient!)

Each authentic art deco carriage has its own story, described in panels which reveal all. Sleeping Car No. 3309 was marooned in a snow drift for 10 days in 1929, whilst Car No. 3544's varied fortunes ranged from carrying the rich and famous on the Train Bleu to being used as a wartime brothel for German troops.

After being suspended during WW-II, the various services were cut back and in 1971 the CIWL stopped running the carriages and leased them to the various national railway companies, whilst still providing the staff. The last Paris-Istanbul 'Direct Orient' train ran in May 1977 -the service I had used just five years earlier when I travelled on across Turkey to Tehran, (then Persia, now Iran) on the Vangolu Express. Further rationalisation followed until the sole

Departure Point – Santa Lucia Station



Embarkation – The smartly uniformed attendants waiting to greet guests

remaining route was Strasbourg-Vienna, these services ending in December 2009.

The present VSOE dates from 1982, a private venture by Belmond, running beautifully restored carriages from the 1920s and 1930s between London and Venice, the link between Calais (northern France) and London being via a coach transfer through the Channel Tunnel and the British Pullman service between Folkestone and London (Victoria). VSOE now offers a variety of routes in Europe, normally runs March-November and is occasionally extended to Istanbul.

Our own journey started with a transfer by sleek water taxi from our city centre hotel along the Grand Canal to Venice's waterside Santa Lucia station, where the immaculate blue carriages and their smartly uniformed attendants were waiting. Our carriage No 3525 was built in 1929 and our small but beautifully appointed cabin was improved further by two promptly offered chilled glasses of champagne. The whole essence of VSOE is to recreate the 1920/1930s experience and part of that is that, aside from a very few highly priced suites, cabins are not ensuite. No showers (admittedly for only a single night on board) and only one toilet per carriage, although slippers and kimonos are provided in case the call of nature demands a nocturnal visit along the corridor! And each carriage is still heated by a coal-fired boiler.

Departure at 1130 hrs was smooth and punctual and we were soon enjoying views of the Venetian Lagoon as the train

In First Class Luxe Sleeping Car No. 3525 built in 1931 at La Rochelle, France





*Drinks and Music – First Class Restaurant Car No. 3674 built in 1931.
Note the bar and the grand piano!*

the causeway linking Venice with the Italian mainland. However, it was not long before the timetable went awry by an enforced and unexplained two-hour delay at the Italo/Swiss frontier, losing us our scheduled 'path' onward through Switzerland and France. The result was that we traversed some of the best mountain scenery in darkness, whilst the train's efforts to regain lost time made for overnight running that was more 'lively' than sedate, with the obvious ill-effect on sleeping comfort.

Leaving Paris Gare de l'Est the following morning after a short stop to disembark passengers and take on catering provisions, there was a further one hour 'pathing' delay just outside the station, before continuing at a very leisurely pace northwards towards our planned destination at Calais. However, the accumulated delays made this impossible, so the train was terminated at Lens with a short coach transfer to Lille for an onward journey with Eurostar to a late afternoon arrival at London St Pancras.

Yet, despite these problems, our trip was an amazing experience, made all the more memorable by the warm-hearted and totally professional train staff, from those cooking and serving such splendid cuisine in the three restaurant cars, the pianist in the beautifully appointed bar car, to our young cabin steward who transformed our sofa cabin into twin-bunk night mode whilst we were enjoying a delicious four course dinner.

Fine Dining – One of the three top quality restaurants



VSOE Through the Mountains of Italy and Switzerland

Incidentally, if you plan to follow in our footsteps, do take careful note of the dress regulations. Basically, you can never be 'overdressed' on the VSOE – typically dinner jacket and ladies smart dress equivalent. Travel with only jeans, T-shirt and trainers (as if anyone would) and you will be required to take your meals isolated in your cabin! And if you have a heart condition, do get your companion to peruse the prices on the wine list - also very memorable!

Was it worth the high price (per person) of about £2,500 (around ₹240,000)? Well, naturally not as a normal way to travel, but as a luxurious and forever memorable experience -most definitely. And as compensation for missing out on the British Pullman leg of the journey, we are promised a complimentary day excursion with fine dining around south-east England. Something else to look forward to!

All photographs used in this article were provided by the author.

Tramjatra - 2001

Roberto D'Andrea



“It is unbelievable but true that a Tram Conductor of Melbourne Tramways has visited Calcutta a number of times since 1994 singly or in a group – all the way from Australia at his own cost – only to save Calcutta Tramways from abolition. He spoke his pro-tram views through cultural activities and exchange programs like *Tramjatra* maintaining diplomatic ties. His altruistic love for CTC is unparalleled and unimaginable. Sitting in Melbourne, he can see every inch of Calcutta tram network on the surface and below the surface. Justifiably, he is an active member of Calcutta Tram User's Association.”

- Dr. Debasish Bhattacharyya

Kolkata and Melbourne are two rare surviving tramway systems of continuous use outside of Europe. Both cities are a part of a prestigious global tram family along with other historic cities like Amsterdam, Vienna, Budapest, Prague, Kyiv, Toronto, San Francisco and Hong Kong.

The 2001 Kolkata-Melbourne Tramjatra was staged over 3 months - from January the 23rd until April the 24th. It was truly a wonderful pro-tram event which had many elements - from a comprehensive tram track 'technical exchange' (covered in the previous edition) to the beautification of tram terminuses with artwork and the high profile decoration of 4 tramcars, 'Tramjatra', 'Sundari', 'Transport-Cricket' and the 'Baccha Childrens' tram. This edition covers the first 2 trams - the Tramjatra and Sundari trams.



Sundari & Tramjatra Tram at Maidan near Royal Calcutta Turf Club (Race Course)



Launch of Tramjatra 2001 @ Esplanade

Trust and friendship were strong off the back of the previous Tramjatra Festivals staged in Calcutta in 1996, Melbourne and Calcutta in 1997 and 2000 in Melbourne (articles published in previous editions of *Rail Canvaz*). By the time the 2001 Tramjatra was ready to start in Kolkata, we had the Calcutta Tramways Company (CTC), the MET and Yarra Trams, the Victorian State Government and the Government of West Bengal in partnership with official support sanctioned by all parties. One of Tramjatra's founding members, Michael Douglas, applied for a received funding from bodies like the Australia Council, the Australia-India Council and Arts Victoria, giving us the opportunity to stage a Tramjatra in both Kolkata and Melbourne in 2001.

Across the three-month-long Kolkata Tramjatra, over 100 newspaper articles were written in the English, Bengali, Hindi and Urdu language media, covered by all television channels and wide radio coverage. Tramjatron Susie Attwell had a daily column in the Statesman Newspaper. A public tram debate about the future of the CTC and Calcutta's Tramways was staged in the media and in and around the decorated terminuses and 4 Tramjatra trams. Following on from the tram track technical exchange, it was time to decorate trams and prepare for a major tram festival.



Tramjatra tram at Moidan

::IMAGINING KOLKATA AND MELBOURNE BY TRAMWAYS::

Tramjatra Tram (1st Tram)

In early February, Tramjatron Mick Douglas joined me in Kolkata with a band of students, teachers, artists and an architect from RMIT University. We joined Tramjatrans Mahadeb Shi, Dr Debasish Bhattacharyya, Jayanta Basu and a collection of trammies, artists and activists. We had two weeks to prepare the first tram and decorate the Esplanade Tram Goomty and Howrah Bridge Tram Terminus precincts. The Tramjatra Tram was launched by Transport Minister Subhas Chakraborty; CMD of the CTC – Mr. Sudhir K Dey and Roberto and Michael from Melbourne in front of a huge crowd which filled the Esplanade area on Wednesday February 21, 2001.

Tramjatra's Susie Attwell wrote a daily column for the Statesman Newspaper and describes the tram and theme. *"Throughout March, the Tramjatra tram will travel the streets of Kolkata on all tram routes. Imagining Kolkata and Melbourne by Tramways is the theme. Tramjatra will collect events and stories as it moves. The Melbourne Tram (MT) and Calcutta Tramway Company (CTC) symbols surround 628, the tram's original number. The tram's cream and green colours are inspired by Melbourne's W-Class trams. White canvas sheets on the side of the tram invite Kolkatans to participate and imagine a future with trams by drawing and painting on the tram. Inside the tram you're greeted by performing tram conductors from Melbourne and Kolkata. The Melbourne Conductor, Mr. Roberto, loves trams and tram people. He greets passengers and gives them special tram cards and tickets and brings a conductor's storytelling tradition from Melbourne. He tells tram stories and people enjoy traveling in the pollution free tramcar. The Tramjatra team have decorated the Esplanade tram precinct and Howrah Bridge tram terminus and we have invited local school children to help decorate the tram."*

Transport Minister Subhas Chakraborty Support for Trams

The campaign to save and modernize the CTC had a great win in 2001 when Transport Minister Subhas Chakraborty publicly announced support for the CTC in his speech at the launch of the Tramjatra Tram. Ronojoy Sen and the Times of



Mr. S K Mitra head of Nonapukur Workshops with the author

India reported, "It was probably Subhas Chakraborty's longest tram ride since his college days. The Transport Minister, in his trademark floppy hat, shrugged off the political blues and boarded the Tramjatra special on Wednesday. The green and yellow tram took a round of the Esplanade depot and set off for Kidderpore, dropping Chakraborty off at Maidan. If nothing else, Chakraborty's presence gave a symbolic lease of life to the beleaguered tramways. He publicly declared his support for trams. "We want to modernize the tram and take it to other places", he said."

Kids decorating Tram at Gariahat Depot & Children with Tramjatra Tickets (below)



Sundari Tram at Kalighat Depot

Sundari Tram

Both Melbourne & Kolkata have decorative tram-painting traditions. At the Nonapukur Tram Workshop in 1997, Workshop Manager Mr. S. K. Mitra and senior workshop officials and engineers commissioned a friendship tram. Tollygunge tram #649 was reshaped & painted with the same sunrise artwork to look just like a Melbourne Z-Class tram, the pride of the tram fleet, complete with a new beginning sunrise theme. The design of Sundari was taken from a book I gifted the CTC called 'Destination City', which had a picture of a Melbourne Z-Class Tram painted with the same sunrise theme. Sundari is a symbol of the desire amongst C.T.C trammies to make Calcutta's tramways strong again.

After the launch of the Tramjatra Tram, I was called to a meeting with the CMD of the CTC, Mr. Sudhir K Dey at the Head Office near BBD Bag. He told me that the CTC would like to continue the Tramjatra Festival and together we went to the Writers' Building to meet the Transport Minister. They had invited the legendary Usha Uthup to come and sing onboard the tram and prepared our friendship tram with the sunrise artwork at the Kalighat Depot - a tram we affectionately call Sundari (beautiful in Bengali and Hindi).

On February 27, Tollygunge Tram 649 Sundari Sunrise was decorated with garlands of flowers at Kalighat Depot where I

Sundari Tram launch @ Esplanade in presence of Usha Uthup & other dignitaries





Sundari & Tramjatra Tram at Maidan

went to meet the tram before the launch. We took Sundari via Kidderpore and the Maidan and when we arrived in the Esplanade, I was surprised by the huge crowd that had gathered. Legendary singer Usha Uthup and her Jazza Band, Transport Minister Shri Subhas Chakraborty, CMD Mr. Sudhir K Dey, the Works Manager from the Nonapukur Tram Workshops Mr. SK Mitra and many well-dressed people including my friend, Dr. Debasish Bhattacharyya were in the audience. Mahadeb Shi was filming the event for a future Tramjatra Documentary. Follow the link for some video footage of the launch.

A huge crowd had gathered for the launch where Usha Uthup expressed her love in her speech for trams, their traditional place as a cultural symbol of the city and their pollution-free standing. She went on to say, *"I hope no-one every comes along and says, get rid of the trams"*. When our tram departed, we were followed by the Tramjatra Tram. Both trams were packed and everyone was excited by Usha's presence in Sundari. She broke into a song and started singing *"Kolkata, Kolkata don't you worry Kolkata, which was a crowd favourite"*. One of my grandest days ever as a Tram Conductor was playing out as crowds of people were singing and dancing around the Sundari tram. The Hindustan Times Newspaper wrote about the event, *"Even if the future of trams hang in the balance, it did not deter the Calcutta Tramways Company from organizing a day-long extravaganza from the Esplanade to Tollygunge Tram Depot."*

Sundari Tram at Hazra crossing



Sundari Tram at Tollygunge Depot

A representative of an environment group associated with the event said, *"This festival should dispel wrong notions regarding the viability of trams."* He said that as a most eco-friendly mode of transport, trams should be expanded. The NGO also demanded that only trams be allowed to ply on some important roads.

I have had many beautiful days working and performing as a 'trammie' on trams in both Melbourne and Kolkata. This day, with Usha Uthup onboard Sundari, as we tracked our way from Esplanade to Tollygunge, was one of my best tram days. After the launch, the Sundari tram was housed at Kalighat Depot and with the Tramjatra tram we tracked through north Kolkata the following day with Kalighat Depot in the destination box. Two beautiful Tramjatra trams tracking on all tram routes for Kolkata's to see as a part of the Kolkata-Melbourne Tram Festival.

Next up we'll look at the Cricket and Baccha Childrens Trams.

All photos provided by the author from Tramjatra archive

Sundari tram at Belgatchia Depot



SAMBHAR SALTS STORY

The Tiny Tot Salt Trains of the Blessed Land

Somsubhra Das

Railways and Industries have always gone hand in hand since time immemorial. Be it for the Sugar Mills, Cotton, Tea and Coffee Plantations, Cement Plants, Power Plants, Mining - major or minor, railways have stood out as the most able and trusted partner to ferry products, raw or finished, to the different corners of the nation. We have come across stories telling us the reason behind building the Darjeeling Himalayan Railway; we have learned about the actual purpose of the erstwhile Shakuntala Railway and we know why the Tipong Colliery railway was constructed – all connected with transportation of local products into major markets connecting the main lines. Also, most of the heavy industries including Steel Plants have their own setup of railway logistics which include locomotives, rolling stocks etc. which are unique in their own way. The same can be said about the Salt Industry and their different production firms but the uniqueness of rolling stocks especially, surpasses the ones from the other industrial sectors. Our focus in this Second Anniversary Issue is on one such salt producing company – the Sambhar Salts Limited (SSL).



The Legacy of SSL and Holy Lake Sambhar:

Our foray into less explored railway systems led us to SSL and their self-sustained railway system. SSL has been incorporated since 30th September, 1964 under the aegis of the Hindustan Salts Limited which is the solo Central Government Public Sector Undertaking engaged in the manufacture of salt. Earlier, the Mughals and the British in their heydays had set up means to extract salt from the lake. SSL undertakes extraction of salt from the Sambhar Lake which involves salt production



by solar evaporation of the natural lake brine. Sambhar Lake happens to be the largest inland salt water lake of India harbouring the highest water salinity and is fed by some transient rivulets and streams like Mendha, Kharian, Khandel and Rupangarh of which Mendha and Rupangarh are the chief sources of the brine. This shallow and elliptical lake encompasses an extensive saline wetland, 240 sq. km approx, thereby getting it on the list of the Ramsar sites of the country on 23rd March, 1990.

SSL accounts for about 9% of total salt production of the country spanning the Sambhar and Nawa areas. The lion's share of salt precipitation happens around Gudha and Jhapok regions on the eastern-most fringe of the lake. Evaporation of brines leads to accumulation of salt on the edges of the salt beds as hard crystals depending on the contrasting conditions like water depth and pH. The halite formed at Gudha differs from those at Jhapok area not only in shape, size but also in pH. Those from Gudha has brine pH of 8.5 to 9.5 while Jhapok halite has pH range from 9.5 to 10. The crystals hailing from Jhapok are brownish-black and less transparent but larger in size than those occurring at Gudha.



The playa lake also is the source of Bitten Salt – the type of salt with high NaSO_4 (Sodium Phosphate) content and is insoluble in water. Apart from the common salt, a host of high-quality salts are also produced by SSL which include Kala Namak and Kshaar. Kala Namak is produced by treatment of raw Kshaar salt with various herbs under certain conditions. It works as a natural laxative and has several other health benefits. Raw Kshaar is the only salt in the world with a high pH value from 9 to 10. SSL is the sole producer of this 'alkaline' salt in the country. This salt with more than 99% NaCl (Sodium Chloride) content and low sulphur content possess high therapeutic value. It is a natural iodised salt at 8 to 15 ppm and is fully organic. The pink colour of lakes and brines of SSL is attributed to the presence of a special type of algae which helps in natural iodisation of Kshaar salts.



Closing in about the name of the lake 'Sambhar', one can find historical facts and mythological interpretations entwined together presenting a story of facts that keeps the locals going. As the legend goes, the holy Sambhar Lake used to be a part of Brishparva – the demon king. Brishparva's priest Shukracharya used to reside by the lake. With some twists and turns in the tale, both Shukracharya's daughter Sharmishtha and Brishparva's daughter, Devayani was married to King Yayāti. Some say that the temple of Goddess Shakambari Devi is dedicated to Devyani. This story finds reference in the Mahabharata-Adi Parva, Bhagavata Purana and in Matsya Purana. Some oral stories brought down across generations also suggest that being satisfied with the prayers of the then king, Goddess Shakambari Devi blessed him with miles of silver stretches. Realising the consequences, the king further persuaded the Goddess to transform it into salt. Another story which goes around as told by our guide Pratap Ji (name changed) that the king had a boon from Goddess Shakambari Devi to transform the entire area from where his horse would pass into a silver landscape with a condition to 'never look back' while riding the horse. If the

king ever looked back, then silver would be transformed into salt. After riding the horse for a considerable distance, the king tried to look back only to find reservoirs of salt instead of silver. Moving on to the historical aspect, the Chauhan Rajput clans had Goddess Shakambari Devi as their penates who turned the plains into a mine of precious metal. However, a temple was built after the name of the Goddess and the lake was named after Her during that time. Looking beyond all these beliefs and stories, the word 'sambhar' simply means 'salt' and the significance of the name of lake comes from the fact that the lake and its adjoining areas have high concentrations of salt. Geologically speaking, the lake is a result of a depression in the foothills of the Aravallis having rock formations of early and middle Proterozoic age. Excavations undertaken during



various times led to discovery of terracotta figures and structures, coins, seals, clay stupas etc.



The First Visit – A Recce by the Rookies:

A visit to the salt pans of the Sambhar Lake was always in our bucket list. Though our visit (with my fellow friend and ferroequinologist Sourav Dutta) just before the onset of winters was meant to be 'a visit for the lifetime', yet it turned out to our *First and not the Last Visit* as all actions of the famed industry was grossly missing and the place looked like a city of the dead.

Phulera had been our base for obvious reasons. We hired a car to explore the kingdom of the SSL. The man at the wheels, Mohit Ji (name changed), was both curious and excited after learning about our intentions. He took us to the office to fulfil our purpose. There we met Pratap Ji – a person more than a guide who understood our passion and took us to the Unit Office of the General Manager (Works), some 10-12 Km. away. Passing through the riddle of the dusty lanes and bylanes, we had finally arrived. Pratap Ji introduced us

to the concerned person and after bare minimum formalities we were shown the green flag to go ahead with our mission! As we were into photography for non-commercial purpose, we didn't have to bear anything but for the warm welcome and the unprecedented hospitality. We thank the authorities concerned and Pratap Ji for all the initiatives he took on our behalf. The office premises had a 'Sambhar Lake Layout' made of stone following intricate details of the entire salt pans, temples, refineries etc. One can also find the Sambhar Salt Museum – a structure resembling the dome of the Gol Gumbaz which was set to be inaugurated later in the year. The luxurious Sambhar Heritage Resort also lies within the office compound. The entire campus wore a solemn and tranquil look keeping with the high standards of international tourism.

After the grant of our wish of photography, we were free birds now with no barriers! The not-so-smooth pathways reverted back to where we had begun. In between, we touched down to the 'Sambhar Salt' tourist station, not to be confused with the Sambhar Lake station of Indian Railways. It is not a station but a stopover on the meter gauge tourist train route that run inside the precincts of the lake. As we re-entered the office area, a board which we had overlooked earlier, greeted us declaring 1901 as the formative year of SSL which has a tally of a 45 Km. of Meter Gauge (MG) and 25 Km. of Narrow Gauge (NG) tracks – amazing enough to whet our appetite for smaller gauge trains and their legacy. But as I said earlier, unfortunately we were out of season. So, we decided to do the groundwork for our *Second Invasion*.

After some conviviality at the local office, we were off into the



heart of SSL with Pratap Ji as our guiding light. The office sits atop a two-storied structure primarily made of stone – a typical Rajasthani framework. Dual gauge (MG & NG) elevated lines laid on wooden sleepers circumnavigate the office with an occasional formation of lofty viaduct like arches. A definite pattern can be observed as salt deposits from the earlier season form slopes on either side of the tracks. The idiosyncrasy about SSL holds true in every aspect of its operation for producing and transporting salts in

wooden carriers or wagons to help beat corrosion from salts. These wagons unload the salt collected from the salt pans by the trackside. Most of the salt heaps have turned grey due to the dust bowl around. A bird's eye view from the office sets things rolling as the industrial shunters and the rolling stocks along with the salt piles presents a topography one seldom comes across.

Besides hosting the office, the building also hosts an erstwhile Steam Shed when NG steams used to be the motive power here. We were guided to the decrepit, abandoned structure which has now become a shelter of pigeons and other birds with piles of worn-out machineries and iron casts lying littered everywhere. The shed looked to carry the testimony of the bygone steam era. While moving to the other end of the premises, we spotted a Salt Processing Unit on the other side of the tracks for crushing and screening of the salt collected from the beds thus implying completion of the cycle starting from production of raw materials and ending with packaging of the finished product.



Up next was the Dual gauge iron bridge which still looked to be in good stead as it glides over the Phulera-Makrana line, just meters away from the Sambhar Lake station. Looking from the Phulera side, one can easily distinguish that iron structure looming large over the tracks which once enabled the salt trains to get to either side of the salt collection centres. Stepping on the bridge though was a bit nerve-wrecking experience as the causeway had missing iron sheets and the entire span was rusted to the hilt. It's no wonder that the dilapidated condition of the bridge forced suspension of movement of salt trains over it.

The moderate pre-winter temperatures meant nearly 'non-business days' for salt production but that didn't deter us from undertaking a weird chase of a train through the fields

for a perfect click. It's madness redefined! Meanwhile, Pratap Ji took us to one of the many pump rooms which is decades old. Inside the room, we found pump with huge conveyor belt which when turned on, moves a turbine to transfer salt water to dry salt pan facilitating salt production. Pratap Ji informed that he himself is in charge of some of these pump houses. Salt pans lay all over the place but with negligible salt deposits on their ridges. The slow evaporation rate during the winters entails a prolonged period of 4 to 6 months for salt precipitation but that also ensures much purer halite crystal formation owing to lesser contamination from dust. The sights of the scattered salt crystals may not have induced any intrigue of highest order but a flock of flying flamingos surely did captivate us.





Sambhar Lake is not about salts only – it has also earned the distinction of being the most favourable site for flamingo spotting, second only to Rann of Kutch in the country. The delightful site surely takes one's breath away. This absolutely stunning milky white landscape is a destination for avid bird watchers who flock the lake during the season to lens the migratory birds ranging from the greater and lesser Flamingos, Black-tailed godwit, Eurasian curlew, Northern shoveler, River tern, Kentish plover, Black-winged stilt to Pelicans among others. After spending some quality time amidst nature, we returned to the office to get ourselves engaged about the make and makers of the locomotives and rolling stocks in business.



The two MG locomotives with contrasting colours – yellow and blue, hailed from the TELCO while another couple of NGs had one from OEPL and another from Ventra. The MG wooden rolling stocks equipped with unique couplers were produced by



produced by the Braithwaite & Co. Ltd. but the makers of the NG wagons with a different set of couplers could not quite be determined. The now defunct mechanical point setting levers, worn out wooden sleepers and wobbly alignments defined the SSL railway system and their century old existence. Having nearly covered everything except the vibrance of a workforce in action and the hustling of salt trains driven by the diminutive engines, we left Sambhar only to come back again after seven months in May 2022 to complete our mission in the truest sense as Pratap Ji said, "Kripaya sawan aane ke pehle aiyee, tab dekhna alsii cheez...." (Please come before the advent of the monsoons to witness the real activities).

The Second Invasion – Viva Forever:

In our pursuit to fulfil our quest to accomplish our unfinished job, we chose to come back amidst the blazing May temperatures when salt production hits prime. Our duo became trio as Anamitra Bose, the other member from Team TrainTrackers had joined us. We were anticipating sweltering heat and were gathering courage to get the job done. Pratap Ji and Mohit Ji were at it again – it was a reunion of sorts. I could see the glitter in their eyes as we meet again. The simplicity and honesty of the small-town dwellers always strikes a chord with complicated and adulterated big city denizens like us. Just like the previous occasion, we set off after having breakfast with adequate water and food in our repertoire. It is always advisable to take enough food and water alongside as once one leaves Phulera, there are nearly no vendors to procure these inside the SSL. With all the homework done, we proceeded straight to the salt pans as Pratap Ji had already done all the liaison on our behalf so that we could spend the best part of the day for what we had come for.

Pratap Ji perhaps was more excited than us as he was just itching to make us see what his 'backyard' had in store for us and for what we had longed for in our last or first visit. A completely different scenario greeted us. The dry, barren whitish beds from the last winter have been completely transformed into brines of varying shades with mounds of salt everywhere. It seemed that someone had waved a magic wand to change everything around! A plethora of colourful brines just set the tone for us. Red, straw yellow, orange, purple and their varying shades got us to a wonder land and it's colours everywhere.... We could not quite believe what we were actually witnessing.





The heat of the land was flown and blown away by the very strong and consistent south-westerlies, aggressive enough to flutter the caps away. As we began to get closer, we saw the yellow liveried TELCO MG locomotive which we had found shut down during our last visit standing in the middle of the field. Our joy knew no bounds as we began to walk briskly after getting off the car to lay our hands on the age-old machine. We crawled our way onto the locomotive. The machine has gracefully aged with its master who has been driving it for the past 30 years! Amazing stats indeed. Pots of drinking water covered with wet clothes were in store inside to beat the heat. The pilot seemed to be obsessed with his pet and why not, it's been an association of decades. He knows every bit of the machine with in-depth knowledge of troubleshooting. The meagre sum of remuneration doesn't seem to bother him as he is in a world where only two species reside – he and his loco.



After all the insane photo sessions with the locomotive and his 'master', we took a closer look at the process of salt collection. Workers, both male and female were equal to the task. Women workers in traditional Rajasthani attire added to the vibes. Some wore gloves to spare their hands from the continual exposure to salt. They were all work and no rest as they got to rake up the moolah during the 'season' to last them the year. Salt loading in the wooden wagons under the open skies and a flaring sun is a hazardous job which they chose to execute with perfection. Pratap Ji helped us with the fact that the



salt loaded in this area is the one which takes weeks to form and contains naturally occurring iodine in it thus doing away with the provision of iodising the product – the Kshaar salt. After a while, the engine started to roar and it was showtime. It pushed back the wagons which lay scattered on the line (to facilitate loading) and staff connected each of the isolated ones to



form a rake loaded with salt. The moment had finally arrived when the 'MG Salt Train' was all ready to set off to the processing unit. Off it went and so did we. Mohit Ji ran our car behind the train to ultimately overtake it and to crossover to the other side of the pans where the 'NG Salt Train' was working.

We rode for another 5-6 Km. to get to the spot where we could see the OEPL made blue coloured puny NG locomotive doing all the hard work. The frame gave an impression of a poor locomotive getting stuck amidst clumps of snow. Imagination perhaps got the better of us but it wasn't that hard to imagine in this fairyland. We observed many new alignments where





temporary tracks have been laid to expedite salt collection. A different set of workers were found doing the same thing except that these are smaller wooden containers to pile the salt on. Little pyramids of salt lay scattered all over the ground. Pratap Ji identified these as salts of inferior quality which are produced within days' time and need to be iodised.



The spectacle of a salt train waving its way through the salt mounds and brines of varying shades was fascinating enough. We indulged in taking as much shots as possible when Pratap Ji recommended to play the 'catch-up game' with the train for some more scintillating angles. He insisted that we better follow the train as this one was going all the way upto the office premises to deposit the accruals. A small railway gate exists to let vehicles and passer-by cross the gauntleted tracks just before the incline. As we were preparing to witness the steep climb by the salt train over the elevated tracks, we discovered that the rake would be split into two to suit the loco haulage capacity. But we soon figured out from the track reshuffling activities that the loco wouldn't pull the 3 wagons uphill at all; it would rather push them up the slope employing great efforts. So, the entire rake would be finally ready to unload their elements after two attempts. Soon the to-and-fro movements of the truncated rake began with sweet honks from the iron horse. Some guys were amazed about what so amazing in this 'roz ki baat' (daily exercise) as we engrossed ourselves in another photo session. We are not sure if the MG counterpart also follows the same pattern as none could verify the actual HP of these industrial shunters. A handful of workers were already working on the supplies of the earlier rake and some others were also ready to take on the task of dislodging salt from the wagon at frantic pace. It was truly a wonderful sight as to how mounds of salt soon became large hillocks of deposits by the trackside.







With the sun still going strong, we entered the last lap of our journey along the lake to get a glimpse of the Sambhar Tourist Train. Meanwhile, Mohit Ji's mischievous cousin Arush, aged between 7-8 years, was exhausted and went into deep slumber after all the acts of over-enthusiasm and hyper activity throughout the day. He has been with us all day long bunking his school for a day out. But as we reached the spot from where the tourist train operates, after travelling a good 10 Km., he sprung back into action. Children and the 'child in us' are always madly in love for trains, especially toy trains. The moment we saw the train, a 3-coacher one with an OEPL built locomotive, we felt like jumping at our feet just like Arush. The first expression that came to mind about the train was – "cuteness overloaded". The absolutely stunning livery looked more than adorable. On another track, we discovered a pint-sized 'Railbus' kind of carriage, also meant for the tourists whose livery seemed to have been inspired from the flamingos. After spending some time with tourist train, not in operation then, we headed back.





Having fulfilled all our desires, it was time to bid adieu. We didn't realise how a good 4-5 hours just flew away with the strong winds which still caressed the Sambhar. Pratap Ji had skipped his duties for half a day for us and he was very late for his lunch as well. Absence of any suitable eateries spoiled our plan to make him have lunch with us. However, we dropped him near the vicinity of his place. Even we couldn't afford to indulge in the offer for lunch at his backyard as we had a train to catch in the next few hours. We promised to keep his request as a future commitment. After lunch, Pratap Ji would rush back to operate some of the pumps at SSL under his jurisdiction. As we drove into Phulera, it was time to part ways with Mohit Ji and a loving Arush. We checked into our room to replenish the 'salt' that we have lost under a treacherous sun and to reminisce the 'salt' that we gained from a successful safari through the 'silver land'.

Recalling the eventful day, we could relate that if it were the migratory birds last time, it's the camels this time which added to our delight and jubilation. As we sped past Sambhar, we suddenly found a caravan of camels patrolling our way. These beasts of burden are mostly domesticated for their milk. A sudden encounter with these ships of desert was a completely different experience all together. That's why Sambhar never disappoints you. In fact, it keeps popping up surprises which

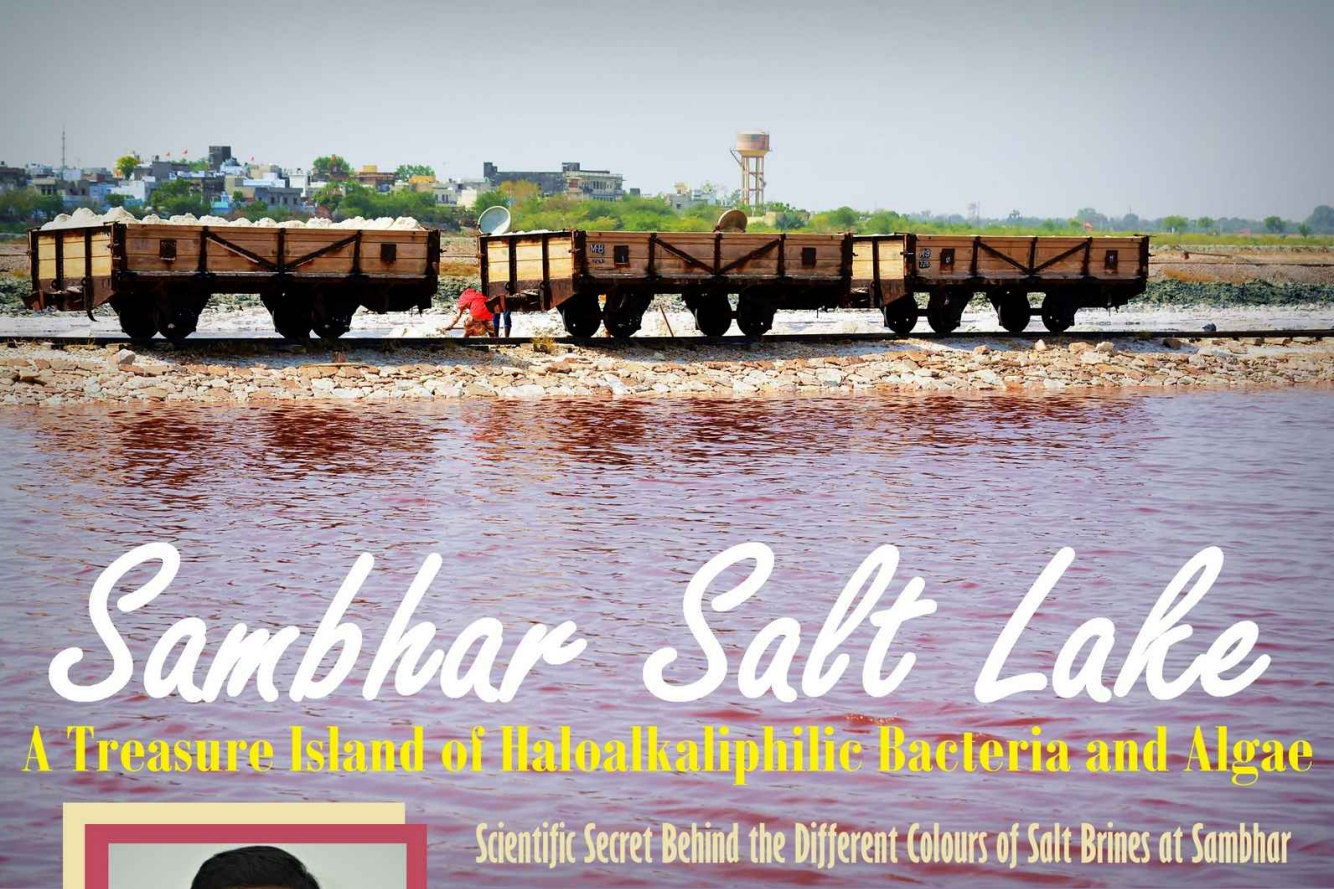


makes you come back here. Train spotting along with bird watching with the silver white landscape completing the backdrop makes Sambhar a photographer's delight - a unique combination indeed that one rarely comes across! We promised ourselves to return to this Land of Shakambari Goddess to soak in the vibrance and ambience of the blessed land again....

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Acknowledgements :

- indiansalt.com
- Wikipedia
- timesofindia.indiatimes.com
- researchgate.net



Sambhar Salt Lake

A Treasure Island of Haloalkaliphilic Bacteria and Algae

Scientific Secret Behind the Different Colours of Salt Brines at Sambhar

Dr. Nilanjan Chakraborty



Author is an Assistant Professor in the Department of Botany of the Scottish Church College, Kolkata. He has written more than 40 research and review articles in various journals of national and international repute along with writing 7 book chapters. He specialises in Mycology and Plant Pathology.

India is a megadiverse country and this huge diversity is dependent on its various geographical paradigm. In this context, Sambhar Salt Lake existing in Rajasthan (specifically straddles Nagaur and Jaipur districts and borders on the Ajmer district), have gained huge importance due to both ecological and economical concerns. It is the largest Salt Lake in India fenced by the Aravali hills and surrounds the historical Sambhar Lake Town. It receives water from rivers like Rupangarh, Mendha, Kharian and Khandel. The Lake has a 5700 square km. area with a fluctuating water depth varying from 60 centimetres (during the dry season) to about 3 meters (at the end of the monsoon season). As per the report it occupies an area near about 190 to 230 square km. based on the season. Being the largest Inland Salt Lake of India, it produces 1,96,000 tonnes of salt. The employment opportunities of villagers of adjacent area are mostly dependent on the salt factory and pans of the Sambhar Lake. The lake has been designated as a Ramsar site because the wetland is a key spot for winter visit of the pink flamingos and other migratory birds from Siberia and other countries of northern Asia. It is a heaven for railway fanatics and bird followers as they can spot both native and migratory birds playing and dancing in the shallow water. Not only that, nilgai move freely along with deer and foxes in the nearby forests.



It has been reported that the brines of the Sambhar Salt Lake have pH values of 9.5 ± 0.2 and a total salt content ranging from 7% (w/v) to more than 30% (w/v). Sodium carbonate, sodium bicarbonate, sodium chloride and sodium sulphate are the principal salts present in the brine. However, it lacks divalent cations viz. calcium and magnesium. Previous studies on the biological organisms specifically haloalkaliphilic organisms present in the saline and alkaline brines of the Sambhar Salt Lake, both from the main lake and from the solar evaporation pans at Sambhar Salt Limited had confirmed the existence of six red, extremely haloalkaliphilic archaeobacteria. Isolated six strains were designated as SSL 1 to SSL 6. It was interesting to note that all the isolates showed obligate requirements for high pH (>9.0) and sodium chloride ($>15\%$, w/v). Very trace amount of Magnesium ion (Mg^{2+}) was required for maintaining their morphological structure and pigmentation. Structurally all those strains possessed the diether core lipids, bacterioruberins, phosphatidylglycerophosphate (PGP) and phosphatidylglycerol (PG) characteristic of halophilic archaeobacteria. Those strains were grouped to the newly proposed genus *Natronobacterium*.

Further studies on the lake water depicts the presence of specialized algae and bacteria growing





in the lake provide striking water colours and support the lake ecology that, in turn, sustains the migrating waterfowl. Various colours of the lake water are due to presence of those organisms. The brines of Sambhar Salt Lake appeared light green after the monsoons. The lake brine flows into the various condensers and crystallizer pans (kyars) located at Jhapog, Gudha, Nawa (New), Main Line and Deodani. The colour of the brines varied from yellow to green and red to pink, depending on their densities. It has been observed that the dark green colour of the lake water was found at the low-density brines (1.074-1.115) at Jhapog, Deodani and Gudha and contained dense cyanobacterial mats and abundant algal cells. The brines having density above 1.115, were brownish-red, and the red-pink colour became more intense from density 1.179 to saturation. The red brines (>1.16) showed the presence of numerous red oval algal cells (diameter, >16 μm), which were motile with two polar flagella, and possessed vacuoles. This alga resembled the green alga *Dunaliella salina*. Previous reports states that the release of organic substances by *Dunaliella* may negatively affect the size and quality of the NaCl crystals formed. However, to what extent accumulations of *Dunaliella* rather than of cyanobacteria are the true cause of the production of poor-quality salt remains still unclear. More recently other algae like *Euhalothece*, *Nitzschia*, etc. have also been isolated from the lake water. Besides the red coloured alga, short and long rod-shaped halobacteria, and motile spirilla, possibly *Ectothiorhodospira* spp., were present in these brines. In the concentrated brines the dominating organisms were the halobacteria and to a lesser extent the spirilla. The brines were devoid of life above the rank of unicellular protozoa.

All photographs provided by Somsubhra Das.



In the summer of 2022, three members of Team TrainTrackers viz Somsubhra Das, Sourav Dutta and yours truly went on a venture to explore the largest inland salt-water lake of India. We made our base at Phulera and explored the various salt reservoirs and the extensive railroad system in the Sambhar Lake or the Shakambari Jheel. The Sambhar Lake Railway system comprises of three of gauges – the Broad Gauge which is a siding of Indian Railways for loading of salt, Meter and Narrow gauges which help in the salt collection from the salt pans and transportation to the Salt Refinery Factory. We were guided by a very cordial 'Pratap Ji' who helped us in the exploration of the railroad and salt excavation installations. The meter and narrow-gauge systems have their unique carriage and diesel locomotives, which are attractions in their own rights. The workers in the entire Sambhar Lake work tirelessly through the unbearable dry heat of Rajasthan so that we get a pinch of salt in our daily platter.

The Salt Train

Anamitra Bose





◀ The loading process of unrefined salt from salt beds start from morning itself. The labourers are busy with their daily work of loading heaps of salt into the wooden wagons. The wagons used in the Sambhar Railway system are wooden to prevent the corrosion caused by acidic solutions of salts in the metallic wagons.



▶ The meter-gauge line runs through the embankments between two salt brines. We can spot the difference in hue of the water in two waterbodies which can be attributed to the difference in salt density and chemical composition.

▶ The beautiful tint of the waterbody exhibited due to different crystalline forms of salt. The array of varying colours creates a canvas full of colours painted by nature.



◀ The boundaries made out of rock structures pave out a canal which connects two salt pans, and the pump is used to create a waveguide to make water flow from a low-density salt water to a high density one.



◀ The wooden wagons fully loaded with crude salt, ready for being loose shunted and then transported to the refinery as a whole rake.

▶ The TELCO made meter gauge diesel locomotive of Sambar Salt Railway is humming with the full rake loaded with salt from the pans. The rake is going to be augmented with few more wagons from other salt brines where loading is completed and then will be taken to the workshop for final treatment.





▶ Another unique scene where water has almost dried up and salt is being extracted gradually.



◀ The narrow-gauge salt rake through the Sambhar Lake with the salt loaded wooden wagons through heaps of salt. The scene draws a simile to the mountain railways of Kashmir Valley with snow all around.



◀ The story of the real warriors who struggle every day to earn every penny and help people of the country to have salt in their daily meals. Their extreme dedication towards their job speaks for itself but the stories remain unheard.



▶ The picture depicts another real-life hero of the Sambhar Lake, a flagman skilfully directs the changing of tracks and loose shunting. In the extreme heats of Rajasthan, this is quite a tedious job but the man does that every day with a smile so that salt rakes reach the refinery seamlessly.

▶ An interesting section in the narrow gauge network of Sambhar Salt Railway where trains are parted into two halves. The locomotive pushes one half of the rake up the gradient upto the unloading zone and again detaches itself to come back and get attached with the other half.



◀ The second half of the rake being pushed through the gradient by the OEPL made narrow gauge diesel locomotive. The whole process is done as a single locomotive cannot pull the entire rake up this gradient. That's why they are pushed in two halves. The unloading process has started as soon as the full rake arrives.



Sambhar Diary

Sourav Dutta

Sambhar, the largest inland saltwater lake is often referred to as a 'Gift from Thar desert' has more to it than its salt producing phenomenon. It attracts tourists from all over the world and is a heaven for bird watchers and railfans alike. Situated in the Abode of the Rajas or Rajasthan, this designated Ramsar site hosts flamingos and pelicans among other migratory birds. The historical implications defining this holy lake seem to amalgamate with the flawless beauty of the place making it a must-see destination for all. The widely different colours of the salt brines coupled with the silver white landscape presents a beguiling scenery that makes this lake such an adorable destination. The salt deposits and the salt piles along with the hard-working workers engaged in salt production and its transportation presents a completely different world altogether which seldom other place of interest can offer! Sambhar is truly a site of pure bliss and ecstasy for those who come here for solace and also for those who identifies themselves as the creatures hailing from the world of photography.



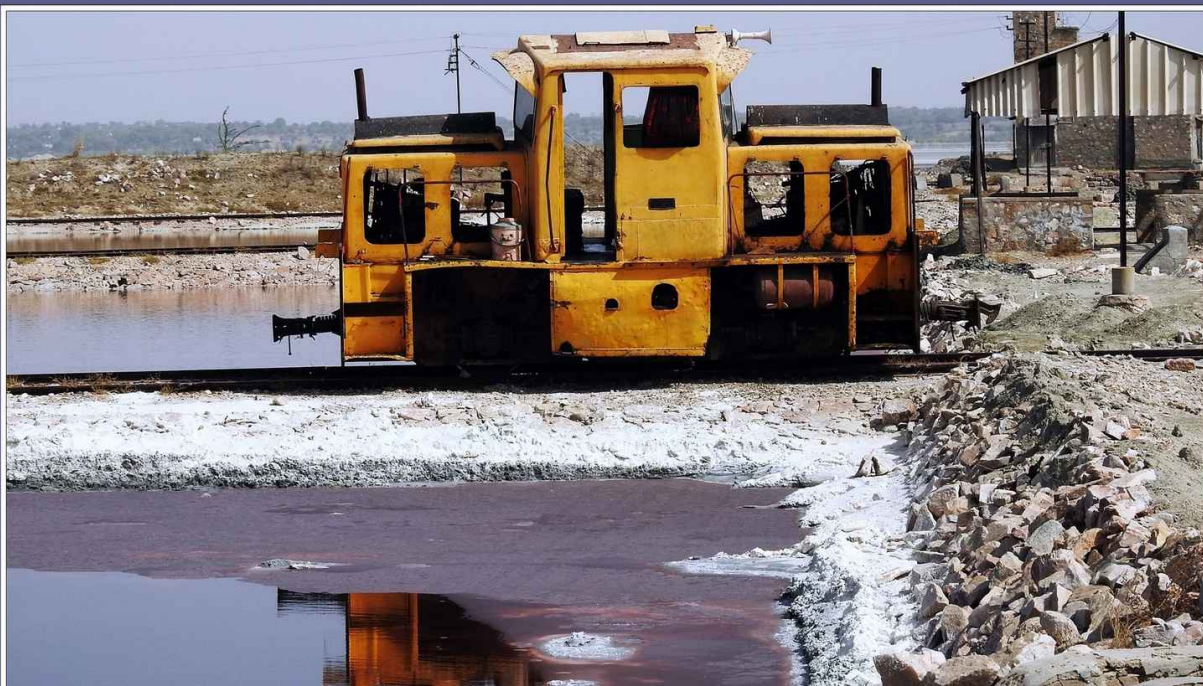
MG wagons scattered parallel to the salt bed. Raw-unfiltered salt is being collected in the wagons at different points to facilitate faster loading.



Salt bed workers loading unrefined salt into the wagons using bandhis or baand, which is often used at construction sites to mix concrete or carry other items.



A WDG 4D hauled BCNHL rake speeding past the salts beds & MG salt wagons of Sambhar Salts Ltd.



The MG (metre gauge) diesel locomotive of Sambhar Salts Ltd. manufactured by TELCO (Tata Engineering & Locomotive Company) taking a breather after bringing in an empty rake to collect salt from the salt beds.



A water filled sat bed & a BCNA rake in the backdrop. The water has a light reddish tinge which is an indication of lesser quantity of algae & henceforth, lesser amount of salt formation.



The MG loco all set to power the unrefined salt loaded MG wagons to the common unloading point.



Doom for one heyday for the other, time can be so intriguing! A very old NG (narrow gauge) locomotive manufactured by Ventra locomotive company, Hyderabad lies in a dilapidated state waiting to be scrapped. Ventra is one of the oldest industrial locomotive manufacturing companies established in the year 1975. Also seen in the frame is a much younger OEPL based NG locomotive which is still in service.



The NG locomotive manufactured by OEPL India. Ovis Equipments Private Limited, Hyderabad (OEPL), happens to be the only ISO 9001:2008 certified private sector rail equipment manufacturer.



A NG salt wagon numbered NG-01 from Sambhar Salts Ltd. Tare Weight or weight of the wagon in empty state is 2.39 T & Payload or weight of the wagon in loaded state is 3.5 T. These wagons have been manufactured by Braithwaite & Co. limited (Ministry of Railways) & relatively new.



Raw salt stacked up beside the salt beds with wagons ready to transport them for further processing.



Old NG wagons being used to transport unrefined salt from the salt beds. The red coloration of the salt bed is due to the presence of *Dunaliella Salina* algae & Red Halophilic bacteria which thrive in hypersaline conditions. The flamingos which visit Sambhar lake eventually turn red as they keep consuming the water along with the algae thriving in them.



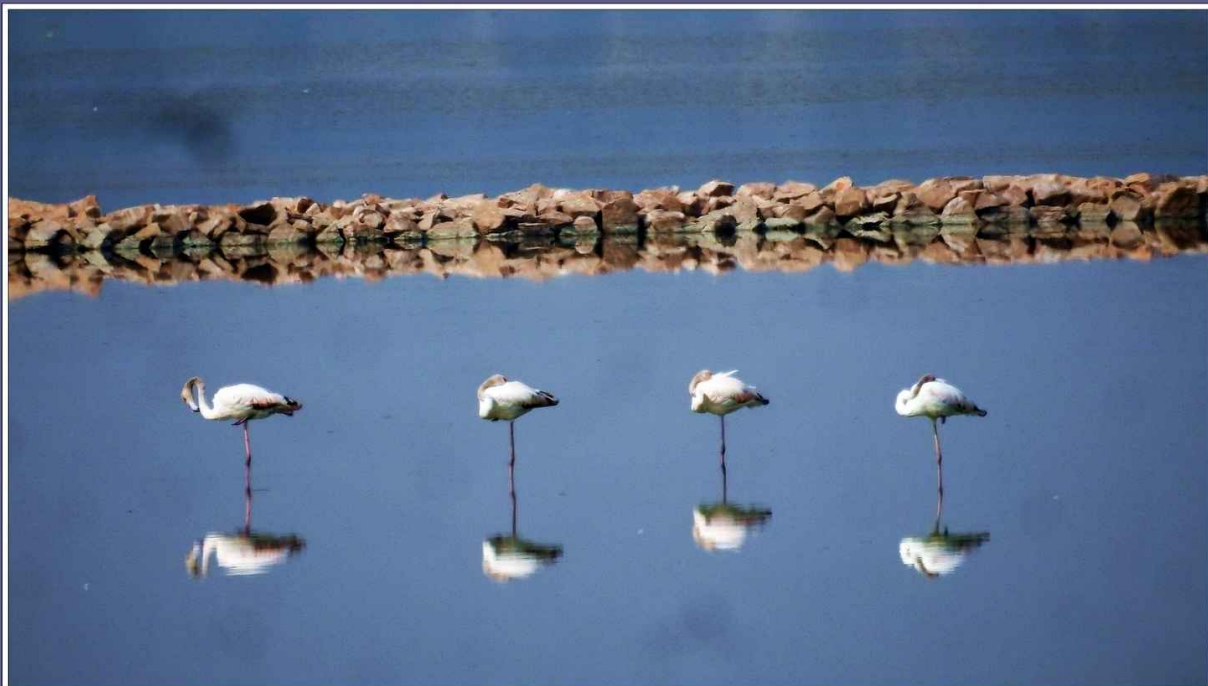
The OEPL based NG locomotive shunting the salt wagons.



A salt loaded NG rake consisting of old NG wagons waiting to get pushed up the slope towards the unloading point while the Varanasi bound Marudhar Express approaches Sambhar Lake railway station for a scheduled halt powered by a Bhagat Ki Kothi (BGKT) WDP 4B. Note the NG wagon nearest to the camera lens bearing the number 'N8'. This makes it evident that the newer wagons are denoted by NG-XX where XX starts from 1 whereas the old wagons are denoted by NX.



A bevy of empty wagons standing at one of the unloading points with deposits of raw salt below them.



A Flamingo Quartet at Sambhar Lake. These birds eventually turn red during their stay at Sambhar Lake.



Flamingoes flying over the Sambhar Lake.



Close Encounters of the Rail Kind

Second contact : 2018 - the Diary of a trAnspOrt hObO

A band of rail enthusiasts had been discreetly executing a rather diametrical plan of love for the railways during the years before the pandemic but were extremely shy of publicity or gimmick. This is their story...

RECAP : 2017

contact I: Scene I : Days of the Past

As most of us are already aware, the beginning of the railway system in the eastern part of the country has a very interesting twist. E.I.R. was all set to introduce Railways in India much before G.I.P.R., but the ship carrying the locomotives from England had a mind of its own and veered off the trajectory towards Australia instead of coming to Calcutta although this one has steered up a controversy of late. However, barring that controversy, for the time being, there were few other issues at hand - the ship which was carrying the coaches sunk at the sand heads near the mouth of river 'Hooghli' at a time when E.I.R.'s venture with railways was already complicated by land issues between Shrirampur and present day Baidyabati along with the area around the French settlement of "Chandernagor". The above three

reasons together got E.I.R.'s railway business delayed almost by a year and a half when compared to that of G.I.P.R.

However, after much dilly-dallying, the inaugural commercial run happened on 15th August 1854, a date, which, 93 years later, became enormously significant for the whole country owing to a completely different inference - the Independence Day. Naturally, for rail enthusiasts from the eastern part of the country, 15th August is a conspicuous date not just because it's the day on which India gained its freedom, but also for it being the day on which the first commercial service chugged out of Howrah for Hooghly, which was, for the ensuing fortnight, back in 1854, the northernmost terminal point out of Howrah.

contact I: Scene II: The New Millennia

Of late, in the early 2000s, on 15th August(s), E.R. organized

steam specials to commemorate the first run from Howrah to Hooghly. However, after 2009, owing to change in administration as well as priority, the scheme fell through, although the very existence of railways in the eastern part was all a gradual build up on what had happened on that very day, some 155+ years ago.

contact I: Scene III: The First Contact

Cut to early July of 2017 when this absenteeism from the railways on 15th August of every year since 2010 became too much of an aberration for a group of infatuated rail fans who decided to try their luck with the railway authorities to do something about it. Pat came the idea to decorate an E.M.U. rake; in they went with that and out they came - all victorious. The first contact was established; a tradition was set and it continued for the next few years.

The group was comprised of rail fans from all walks of life. Care was taken to include more of the industrious folks as heaps of work was to be done and as evident in some later editions, work was to be done within a very quick time. The team was made extremely flexible with an open door for anyone who was willing but with a stern unwritten rule that non-performers or trouble makers will not be entertained again and will be shown the same door through which they came in. The group had its fair share of ups and downs while rolling with such open policy, but eventually made it to the summit every year through sheer zeal and love for railways.

contact I: Scene IV: The Anamiks

The interesting thing about this band of rail fans was, they never had a name; never thought of giving one. Teamwork was paramount and everyone chipped in as and when needed. Naturally, the unity never needed to be named with anything specific. However, for our convenience, let's just call them the "Anamiks" for our benefit!

But the road for the "Anamiks" was not always smooth. There was a fair share of hurdles as a cocktail of appeasements, personal greed and egos often laid bare their claws on their path; but the longing to do something meaningful always won over lustful and envious hankering! And it is exactly this issue that plagued the second venture right from the beginning. Here's how it all laid out during the year of 2018.

NEW CHAPTER: 2018

contact II: Scene I: Prologue

2018's adventure will be etched forever in the minds of the "Anamiks" due to one man's stupendous asininity. The person, hailing from the railways, had a terrible fondness of being in the limelight and would try to attain that at any cost - even by stooping as low as spreading lies about folks who are half his age. An unrelated issue recoiling out of another set of lies that the person himself concocted during a previous event, made that railway person an obstacle of sorts during this year's event. He was so desperate to satisfy his own vicious ego that he went as far as fuming and fretting

lies about the "Anamiks" to certain official(s) at the DRM Office. He also led a band of blind disciples who made the lives of the "Anamiks" extremely painful for no fault of their own. There was one disciple who also publicly threatened the "Anamiks" with dire consequences. However, thankfully, even after multitude of efforts to curb every single effort put in by the "Anamiks" through a series of heebie-jeebies which almost amounted to tantrums by the whole bunch of uncouth, self-centred, blind zealots, truth prevailed and after a little push from the then D.E.E. of Howrah and the C.M.E. of E.R., "Anamiks" were all free to do what they do best.

contact II: Scene II: The Build-up

With all the issues kind of settled, the "Anamiks", although immensely disturbed and furious, decided to rack their brains for this year's event. They haven't had to cross multiple hurdles like last time as they had permission from the C.M.E., Eastern Railway; while the extremely helpful and friendly Sr. D.E.E. and D.E.E. of E.M.U., Howrah did all that they can do within their jurisdiction. Ideas poured out, plans chalked up, print outs taken and the "Anamiks" were ready to roll.

contact II: Scene III: The Schemes

Unlike the previous year, the plan was not to divide the 12 coaches according to themes and decorate them with synonymous designs depicting the evolution of certain rolling stocks across the years. Again, as a walk away from 2017's plans, more designs were done for external walls than internal. It was decided that to minimize deliberate damage to those designs on the outer walls of the coaches, the vinyl plates would be adorning fag ends of the coaches away from the doors. It was also decided that all the 12 coaches will have those designs and on both sides.

Initially, the plan was to use a brand-new 3-phase Medha rake for the event. But the "Anamiks" were a little uneasy after hearing that as they didn't want to paste vinyl plates on a brand-new rake. After a little discussion, the rake chosen turned out to be a B.E.M.L. one once again. But, this time round, it was the stainless steel one - the only one Howrah had at that point in time.

Image courtesy: Arkopal Sarkar First BEML made SS EMU of Howrah crashed



This particular rake was commissioned on 8th June 2015. It had the following composition of coaches (from Bandel end to Howrah end) during this event-

50057, 53095, 58041, 50061, 53093, 53096, 53097, 50058, 53092, 58040, 53091, 50059.

Each of the coaches was then taken up for the decoration by the "Anamikhs" with vinyls depicting the evolution of E.M.U. rakes and steam locos and had texts describing the significance of the date and the event.

contACT II: Scene IV: The Preparation

The chosen one – the stainless steel made B.E.M.L. rake was not in a good condition that is, appearance wise and needed some thorough cleaning. The most prominent stain was from the infamous 'gutkha' spits and since this rake was made with a paint free material, removing the red spit marks was pretty easy. The harder part was to remove certain unknown stain – possibly dirt and grease that had accumulated on the outer body over time.

The best part of this process was the involvement of one and all. Apart from few "Anamikhs" and the usual workforce from the car shed, the D.E.E. and other S.S.Es – all took part in cleaning the rake about 3 days before the D-Day.

contACT II: Scene V: The Yardmasters?

Just like 2017, it was decided that the "Anamikhs" would work on the rake from 14th afternoon and they took their turns every now and then to help in the process. However, all of them were awed by the amount of movement of rakes that happens inside the first E.M.U. car shed of Eastern Railway. To top it, there were both heavy and light maintenance work happening inside the shed while the lone E.M.U. shunter doing a lot of back-breaking work. It was a first time for many of the "Anamikhs" and a tremendous visual treat that often whisked them away from the actual work. In no time, they became the masters of that yard in their own imaginary world.

contACT II: Scene VI: A New Costume

As few of the "Anamikhs" were busy sorting things out, a truckload of packages arrived at the car shed. Thinking it to be something mundane, they showed least amount of interest till they realized that they are actually in for a surprise. The packages contained a new design of vinyl that will replace the existing red vinyl border along the sides of the E.M.U. rake. The new design also had silhouetted outlines of the major landmarks of Calcutta within the new slightly wider red border. This brilliant make over was the brainchild of the then D.E.E. of Howrah E.M.U. car shed, Mr. Sumit Kayal. Thus the B.E.M.L. stainless steel rake got a new costume of sorts that it still sports even today. Apart from that, a new IVRS system and display was installed during which, for a short period of time, the rake had both the old and the newly installed [the displays were installed at two different places] head display side by side. The front face



Red band with silhouetted outlines of major landmarks Courtesy: Somsubhra Das

also got a new coat of paint around the glass rim that made it dazzle even in the dimmed lights after dark.

contACT II: Scene VII: Hoots of the Night Owls

A quick makeover and a surprise later, a decision was taken that the "Anamikhs" would be the "night owls" once again as that is the best time when the best of the hands were available. However, since 2018 had a different game plan as far as vinyl designs were concerned, work was limited and at



Vinyl posters getting ready...

Courtesy: Somsubhra Das

the same time, identical for each of the coaches. Yet, it turned out to be tedious and with a day's sweat behind the "Anamikhs", it quickly drained their remaining energy out. A long night later, as the first few rakes were already heading back to another day of grinding on the rails, the work was

Dazzling beauty in the dark

Courtesy: Somsubhra Das





Dawn after a long night....

Courtesy: Somsubhra Das

mostly done with all the posters up in all the coaches. The hoots of the "night owls" were almost silent as by daybreak, they were almost running on reserve power. Hunger and thirst were slowly getting the best of them.

contACT II: Scene VIII: Dawn of the Hunger

With a tedious night that saw a multitude of work done, the "Anamiks" were extremely hungry by the break of dawn but it was impossible to get anything quickly as the location was rather remote. Help came in through one of the train managers who got lip smacking 'kachuris' for the whole team.

The rest of the team soon joined the "night owls" and in no time, flowers, extra vinyls and balloons were all ready to be put up on the face, in the first few coaches and on the sides tied to the grilled window. Again, putting up flowers on the face of the E.M.U. appeared to be an easy looking job, but soon turned out to be extremely cruel in the hands of the inexperienced. However, few hours and a few more toil later and with immense help from some of the hands from the shed, that was done and the rake looked all set for a celebratory run.

"Anamiks" at work....

Courtesy: Somsubhra Das



Ready for a celebratory run....

Courtesy: Somsubhra Das

contACT II: Scene IX: The Invasion

The person belonging to the railways who created all the ruckus initially for the "Anamiks" had a band of extremely mischievous lads who used to worship him in exchange of free cab rides and other goodies every now and then. One of his disciples knew about the programme thanks to a parasite within the "Anamiks" and encouraged couple of others to barge in at the car shed during the early hours of the D-Day. Now, there was a strict regulation followed with each of the member's photocopy of IDs were presented well in advance to give them unrestricted access to the shed. This particular unwanted invasion acted contrary to the process but the "Anamiks" had nothing to do. Soon, a few more barged in and although some of them did help in limited amount of decoration, their stories about their contribution were blown up to absurdity to gain maximum limelight. Like Guru, like disciples.

contACT II: Scene X: Departure

The departure had another set of uneasy surprises for the "Anamiks". But, before that, the group was on tenterhooks as the departure time was changed multiple Rake getting out of the shed....

Courtesy: Somsubhra Das



times. From the first proposal that it will depart at 9 something in the morning to 10 to 11 – the actual departure was switched several times. Finally, at around 11:30 in the morning, it was decided that the departure will happen at 13:25 after all the Independence Day functions at Howrah were over.

The rake was pulled in onto platform no. 8 which generally caters to VIP departures and arrivals. There was another set of activities on the platform as the railway officials, including the P.C.M.E., E.R., DRM HWH, Sr. DEE [EMU] HWH, DEE [EMU] HWH and other officers from the HWH EMU Car Shed among other railway officials were present to receive and inspect the work done by the rail nuts.

However, our dear antagonist from the railway family, in a last desperate attempt to retain his image in front of his disciples had another vile scheme up his sleeve and played the game that he plays best. He finally managed to change his usual duties to attach himself to the celebratory service

in spite of the fact that a lady train manager was already assigned for the same. This limelight hugging antagonist had a cruel smile on his face as if he has just conquered the world whereas in reality it was later revealed that on the day before the D-Day, he pleaded in front of some railway official(s) from the D.R.M.'s Office for said duty.

The "Anamiks" had to put on a mask and was forced to act as if nothing has ever happened and had to pretend that all was "change si". Obviously, Mr. Antagonist did started pelting verbal pinches every now and then towards the "Anamiks", but everyone knew who the real conquerors were on that day and remained silent.

Soon the honk announced the official departure and the rake rolled off at 13:25 hours for its journey from Howrah as the 37249 Up Bandel local arriving at Bandel at around 14:30 hours after calling at all stations.

Glimpses of the event at Howrah and in Bandel Jn.

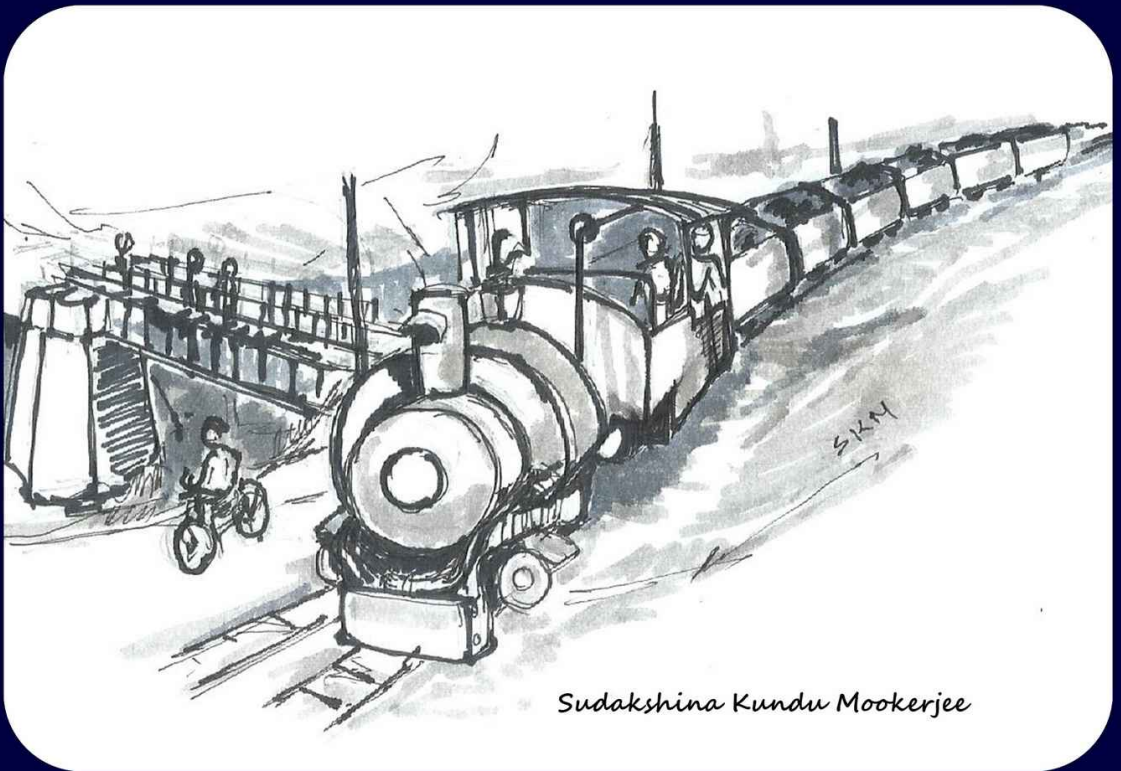




Railway Sketches



Sudakshina Kundu Mookerjee



Sudakshina Kundu Mookerjee



EXCLUSIVE

Siliguri Town Railway Station

A World Heritage Site?

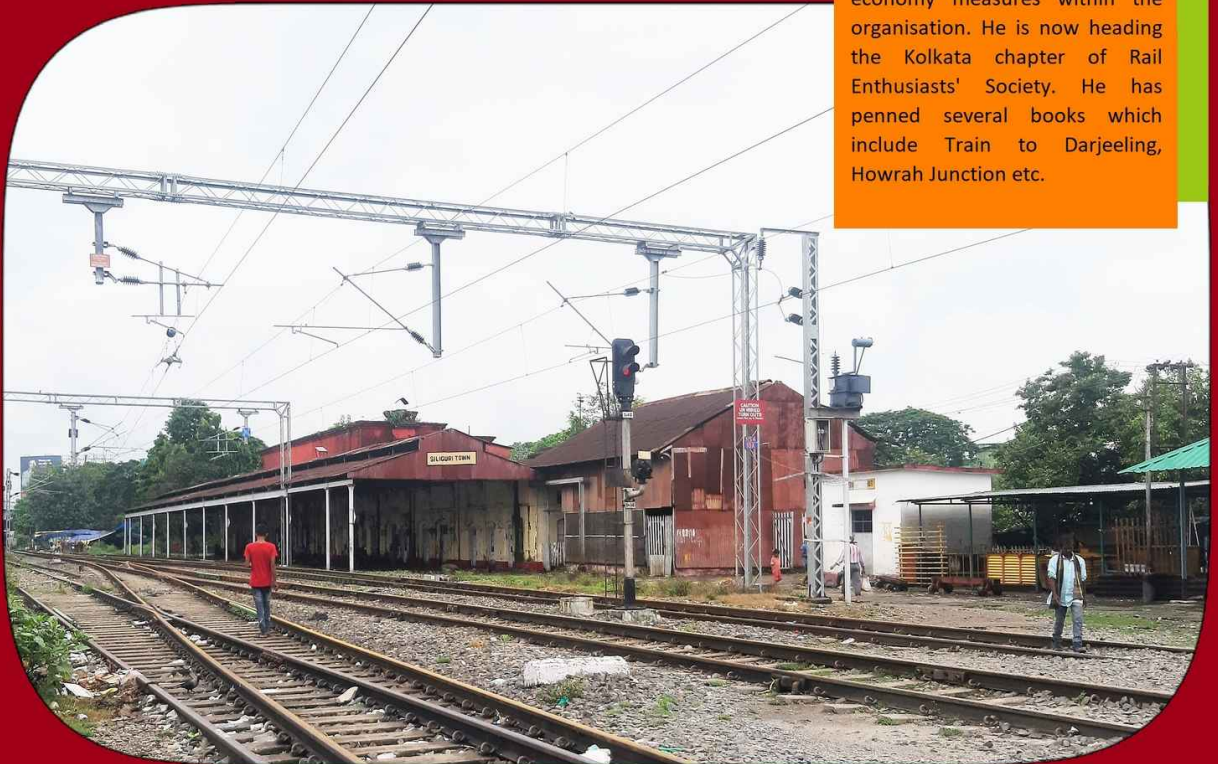
Recently I visited Siliguri Town Railway Station of DHR at Siliguri, West Bengal. Once upon a time this was the main railway station where bustling passenger and freight trains of the Darjeeling Himalayan Railway would feed this busy commercial town and the vast hinterland of tea gardens of Darjeeling, Dooars and the Terai.

Alas! Today it lies derelict and mournful. Super senior citizens of Siliguri still recall Sohrabji's famous railway canteen, reputed to be the best restaurant of the region, which functioned on the first floor of the station building. There used to be a manual elevator, pulled by coolies, to lift the rich and famous for their meals at this celebrated establishment! In the good old days, the station used to be the social hub of the entire populace of the town who would pass their leisure hours in chatting among the endearing



Sanjoy Mookerjee

a 1978-batch IRAS, former Financial Commissioner (Railways) and ex-officio secretary to Govt. of India. Earlier, he was posted as Director General of National Academy of Indian Railways in Vadodara. His tenure as Financial Commissioner is marked by Railways managing the burden of the VIIth Pay Commission, unprecedented external borrowings for infrastructure works, and economy measures within the organisation. He is now heading the Kolkata chapter of Rail Enthusiasts' Society. He has penned several books which include Train to Darjeeling, Howrah Junction etc.





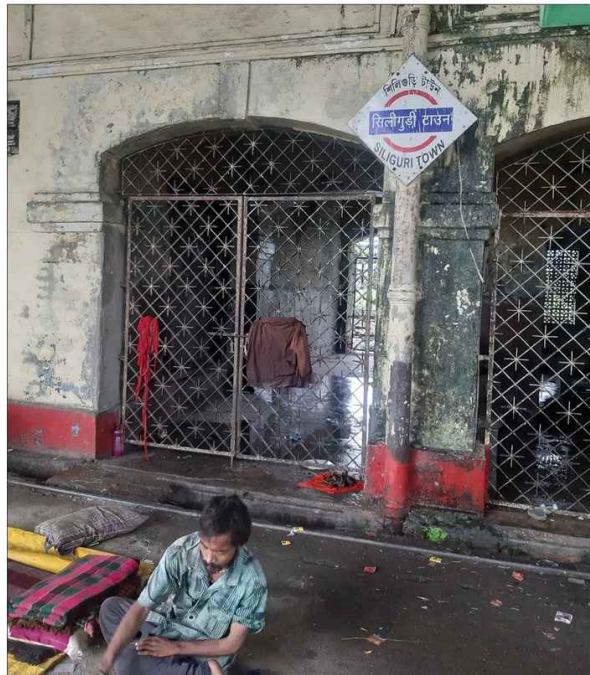
Siliguri Town NG Station

whistle and the sweet smell of burning anthracite of the B-Class locomotives.

Today, all that remains of the old station is a ghost of a building with only one NG line on its northern platform. A new station has been built next door, with electrified broad-gauge tracks running on the opposite side of the old narrow-gauge alignment. The present day iconic DHR 'toy train' merely rushes through once in a day from the more modern railway terminal at New Jalpaiguri towards the Queen of the Hill Stations, Darjeeling, without even stopping.

Nowadays this famous rail terminal of the yesteryears only serves the poor and the homeless, human and canine, who find space under the old station building and its platform shed for their night's rest! I was told by the local inhabitants that as the old station is part of the DHR, a UNESCO designated World Heritage Site, it has still not been demolished. But is this the way we look after our heritage? The structure is still robust and with a little effort can be made otherwise useful. Since it is located in the heart of this

Homeless & canines at Siliguri town NG platform



Utter dismay...

ever-growing city, I am sure it will have many takers. If an overbridge can be made above the NG-DHR track linking it with the road opposite, this building can be transformed into a commercial hub, generating revenue for the Indian Railways, at the same time paying for its upkeep.

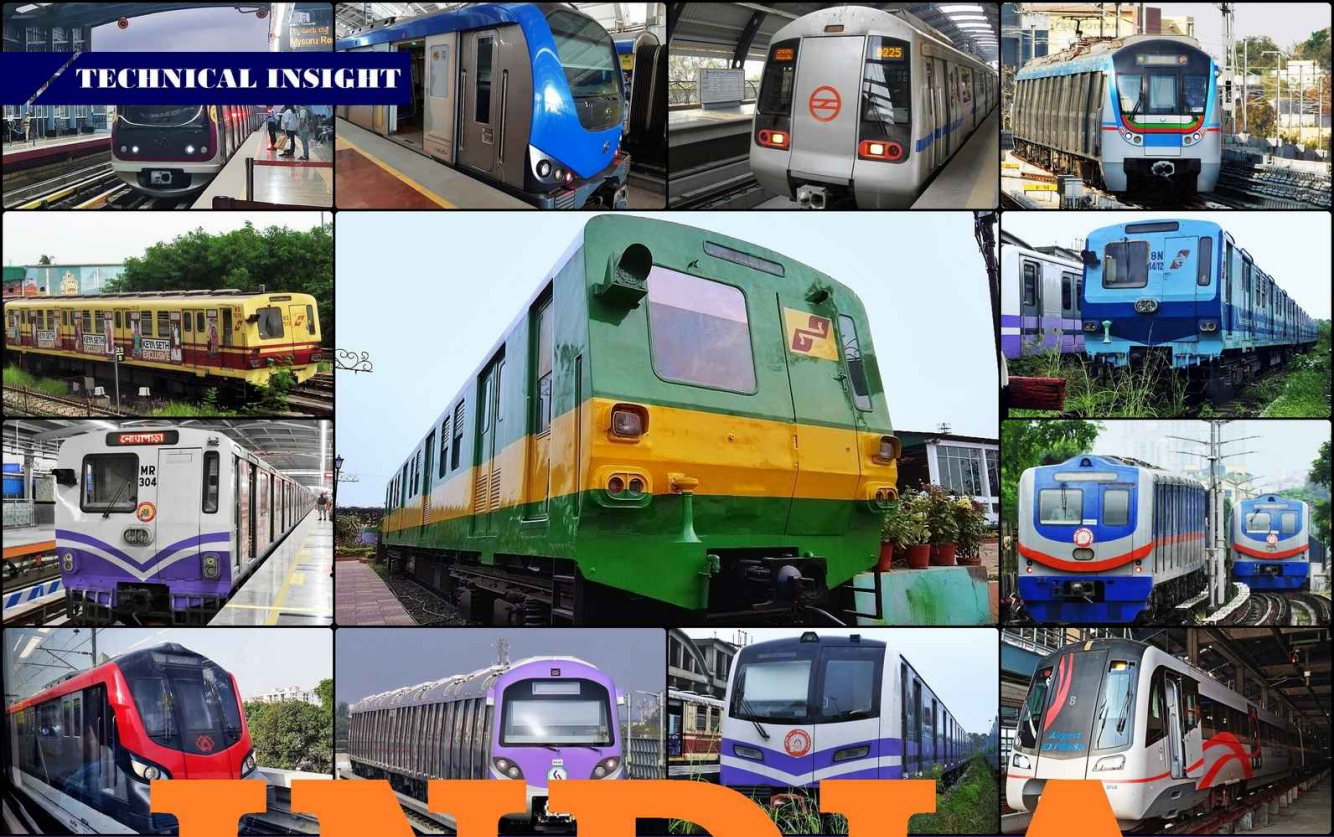
I have seen several examples of productive re-use of old railway buildings in Europe and even in Japan. Why can't the N. F. Railway and the Darjeeling Himalayan Railway think on those lines? Let the present shame of the condition of this iconic station building be restored to one of pride by the Indian Railways as part of AZADI KA AMRIT MAHOTSAV.

Amen!

All photographs provided by the author.



TECHNICAL INSIGHT



INDIA

THE NATION WITH GROWING METRO SYSTEMS

Part I : The Delhi and Kolkata Saga

Anamitra Bose

The Indian Railways is the lifeline of the nation that beats with rhythm of the country and flows with the spontaneous emotions across all strata of the society. This huge organisation alone works as a major organ which helps connect the different corners, class and culture to keep the nation alive and bustling. With the passage of time, the gap between urban agglomeration and rural clusters may have been bridged to a certain extent but the growing demands of city life as envisaged by a handful of upcoming metropolises called for a faster, seamless and reliable mode of public transport. The first four major metro cities already had a suburban railway network in place to cater to the jostling, clamorous movement of masses. But with the ever-expanding nature of the conurbations of the major towns, even the suburban network began to connote signs of supersaturation. Limits were pushed as a rising air pollution index coupled with never ending traffic snarls threatened to

choke the cities out of their lives. An obvious need for a separate rapid transit system was badly felt and that was the juncture when Metro Railway broke into the scheme of things where people would leave their personal cars and adopt this fast and hassle-free mode of 'public transport' in their daily routine. Thus, a new era of transportation emerged to change the face of a growing India.

The British had planned for a 'Tube Rail' in Calcutta in 1921 which didn't see the light of the day during their regime. Later on, post-independence, the Indian government set up the Metropolitan Transportation Project (MTP) in 1969. They collaborated with Russian experts and German engineers to take up the first metro project in India. On 24th October 1984, the first metro-railway of South East Asia - the Calcutta Metro got flagged off. Headlines were made as the squeaky clean and snugly rake made by our own Integral

Coach Factory (ICF) clattered through the underground tunnels. By September 1995, the entire 17 km stretch was opened for public operations. Buoyed by the success and popularity of Kolkata Metro, Delhi Metro Railway Corporation (DMRC) was set up in the same year with *India's Metro Man* E. Sreedharan as the MD to materialise the ambitious Delhi Metro Project. In 2002, the Delhi Metro was thrown open to public. By early 2010, Delhi Metro grew leaps and bounds in many aspects to become one of the largest systems in the globe. In this series, I will take the readers on a brief tour defining the various rakes operational in all the Metro systems in our country. Our spotlight for the inaugural part is on the rakes used by the Delhi and Kolkata metro systems.

:: DELHI METRO ::

At present, Delhi Metro is the world's 12th longest metro system and 16th largest in terms of daily footfall in the world. Delhi Metro is the answer to the rush hour congestion of the National Capital Region as well as Faridabad, Gurgaon and Noida which became part of the mass rapid transit system. The metro system has 10 color-coded lines with 255 stations spanning over 348 km and built through various phases.

The Different Phases of Built --

Phase-1: Three colour coded lines Red (Shahdara-Rithala), Yellow (Vishwa Vidyalaya- Central Secretariat) and Blue (Dwarka Sector 9 to Indraprastha) were built with route length of 64.75 km and 59 stations. Phase-1 was dedicated to the public on 11th November, 2006. These routes have Broad Gauge (5ft 6in) alignment with 25KV 50Hz AC overhead traction as the main traction equipment. The signalling systems used in these lines are Cab-signalling systems with centralised Automatic Train Control, Automatic Train Operation and Automatic Train Protection systems. For Red and Yellow lines, the signalling system is supplied by Alstom. For Blue line, the system is operated by Siemens interlocking system SICAS, the operational control system Vicos OC 500 and automatic train control system LZB 700M.

Delhi Metro (Blue line)

Image courtesy: Metro Mania Blog



Phase-2: This phase had a rollout of a total 123 kilometres network dotted with 86 stations and 10 new routes of which 7 were extension spurs of the existing Phase-1 network. While the Red Line was extended from Shahdara to Dilshad Garden, the Yellow Line and Blue Line extensions were cases of extensions from their either ends. The Yellow Line reached Jahangirpuri from Vishwa Vidyalaya at one end and Huda City centre from Central Secretariat on the other. The Blue Line touched Noida City Centre from Indraprastha and Sector 21 from Dwarka Sector 9. A Blue Line branch was also built from Yamuna Bank to Vaishali. Three new colour coded lines also came into being during this phase - Green Line was opened from Inderlok to Mundka with a branch from Ashok Park Main to Kirti Nagar; Violet Line was opened from Central Secretariat to Badarpur Border and the third one was a special line known as Orange Line or 'Airport Express Line' from New Delhi to Dwarka Sector 21 via Indira Gandhi International Airport (IGIA). All these three new colour-coded routes adopted the Standard Gauge (4ft 8.5 inch) with similar catenary arrangement. For the Green and Violet lines, Bombardier supplied its CITYFLO 350 signalling system.

Phase-3: This phase zeroed in on building ring lines to interconnect routes thereby aiming to reduce congestion along with expansion of the existing lines. Among extension, Red Line was extended from Dilshad Garden to New Bus Adda; Yellow line from Jahangirpuri to Samaypur Badli; Blue Line from Noida City Centre to Noida Electronic City; Green Line from Mundka to Brigadier Hoshiyar Singh; Violet Line from Central Secretariat to Kashmere Gate and from Badarpur Border to Raja Nahar Singh. The Airport Express line was also taken up for extension upto ECC Centre from Dwarka Sector 21. Construction of two ring routes included the Pink Line from Majlis Park to Shiv Vihar, Magenta Line from Janakpuri to Botanical Garden. Another new line, the Grey Line was built from Dwarka to Dhansa Bus Stand via Najafgarh. These three lines were again built on Standard Gauge and 25 KV OHE was adopted. The Phase-3 new lines adopted the Communication Based Train Control (CBTC)

Delhi Metro (Magenta line)

Image courtesy: Metro Mania Blog



signalling system to reduce the headway to 90 seconds.

Apart from the DMRC main network, there are two other metro systems which have interchange with DMRC – the Noida Metro and Gurgaon Rapid Metro. The Noida Metro is a joint venture by Government of India and Government of Uttar Pradesh and was constructed by the Noida Metro Rail Corporation (NMRC) while the operations are managed by DMRC. The line is 29.7 km long and has 21 stations connecting Noida with Greater Noida. The line has an interchange with DMRC's Blue Line at Sector 51 and the line then runs to Depot station via Knowledge Park II in Greater Noida. The line uses Standard Gauge, 25 KV OHE system and CBTC signalling system supplied by Ansaldo STS (now taken over by Hitachi). Rapid Metro of Gurgaon was built by the Rapid Metro Gurgaon Limited (RMGL) and was world's first fully privately financed light metro railway system. Infrastructure Leasing & Financial Services Limited (IL&FS) was operating the 12.85 km long stretch which was later taken over by the DMRC in 2019. Line 1 of the Metro serves from Sikanderpur to Phase 2 station in a double-line track and from there to Phase 3 station via Cyber City in a single line loop back to Phase 2 station. The Line 2 was constructed south of the Sikanderpur station to Sector 55-56 in Gurgaon via Cyber City. This metro system has an interchange with Yellow Line at Sikanderpur and adopted the Standard Gauge system with 750V DC third rail traction supply equipment.

The Rake Story –

The rakes of DMRC were procured in many phases and the contracts were named as RS-X. The main rolling stocks were procured in RS-1, RS-2, RS-3 and RS-10 contracts. Further augmentation and improvement of the rakes were done through RS-4, 5, 6, 7, 9, 11 and 13. DMRC network being the largest of all metro systems in India, its rolling stock is also enormous in count and variety.

► Mitsubishi Rakes

The first phase of rolling stock for DMRC's Red and Blue Line (1676mm Broad Gauge standards) was procured through a

DMRC Mitsubishi Rake

Image courtesy: Metro Mania Blog



contract RS-1. The contract was awarded to a consortium of Mitsubishi Corporation, Hyundai Rotem and MELCO (Mitsubishi Electric Corporation), Japan. The rakes were supplied in 4-car consists in the formation of two Driving Trailer Cars (DTC) at either end and two Motor Cars (MC) in the middle. The first lot of 74 coaches were manufactured in South Korea, and thereafter in India by BEML through a transfer-of-technology agreement. The rakes were ultra-modern at their time with three-phase propulsion system, regenerative braking equipped electro-pneumatic brake, air conditioning system, micro-processor-controlled braking system. The coaches are 3.2 metre wide stainless steel light weight carriages and can carry 50 seated and 330 standing passengers. The rakes can be extended upto 6-coach or 8-coach units. For this, subsequent RS-6 and RS-13 contracts were awarded to BEML for supplying additional coaches. These rakes have conventional H-frame bogie (Box transom).

Bogie: A bogie is an H-shaped structure that supports tractive system, braking system, motor, suspension system etc. Each bogie consists of two axles and four wheels. One car consists of two bogies while a combination of one motor car & one trailer car forms a unit. Bogie frame are of two types:

- **Motor bogie frame:** The transom area of the motor bogie frame incorporates driving gear mounting brackets, traction motor mounting brackets, mono-link mounting bracket & brake mounting brackets.
- **Trailer bogie frame:** The transom area of the trailer bogie frame incorporates area for brake equipment mounting bracket, the mono-link mounting bracket and ATC beacon
- antennae mounting bracket.

Suspension: The primary suspension consists of vertical coil springs and additional vertical rubber springs. The secondary suspension is provided by air springs and anti-roll bar which facilitates a jerk-free ride.

Brakes: There are two types of brakes which are primarily used in regular operations: Service Brakes & Parking Brakes.

DMRC Mitsubishi Rake

Image courtesy: Metro Mania Blog



Thread brakes with double shoe are used for braking purpose. Pressurised air is used to apply braking effort, controlled by BECU (Brake Electronic Control Unit). Parking brakes are provided on two out of four wheels in an alternate fashion & Service brakes are provided on all four wheels of the bogie. Service brakes are implemented by combined use of Electric Regenerative Braking and Electro-Pneumatic Braking (EP). The other types of brakes available are emergency brakes & holding brake. The BECU performs some tasks like bus connection to Train Control Management System (TCMS) via multifunction vehicle bus (MVB), weigh braking demand, jerk control, WSP control etc. The rakes are also equipped with wheel-slip protection to prevent wheel slip during heavy braking.

Automatic Door Mechanism: Each coach has 8 automatic doors, 4 on either side, controlled by an Electronic Door Control System (EDCS). The EDCS consists of a DC motor regulated by a chopper driven Pulse Width Modulation (PWM) controller. An Automatic Door Locking System (ADCS) instantly locks the doors after closure.

At present, most of the RS-1 rakes are running in Red Line while 34 hybrid rakes (made up of RS-1 and RS-13 coaches) serve the Blue Line. Another 2 hybrid rakes operate on the Yellow Line.

► Bombardier Transportation Rakes

With growing ridership and continuous extension of routes, new rakes became the need of the hour to keep the services running. New contract named RS-2 was awarded to Bombardier Transportation who would manufacture the Broad-gauge rakes through a consortium of Bombardier, Germany and BT, India. A total of 424 coaches were inducted. The first few coaches were manufactured in Goltz, Germany and Sweden and then at Bombardier's Indian facility located at Savli, Gujrat. These trains were also supplied as 4-coach units but can be extended upto 6-coach or 8-coach formation by augmenting additional Motor (MC)/Trailer (TC) coaches. The trains have IGBT-based three-phase

DMRC - Bombardier Rake



Image courtesy: Metro Mania Blog

VVVF (Variable Voltage Variable Frequency) propulsion system. The rakes are equipped with high-capacity air conditioning, TFT display boards, mobile chargers etc. The rakes have similar suspension system as the RS-1 rakes. The rakes run extensively in Red, Blue and Yellow lines of DMRC.

► BEML Rakes (RS-3)

The rakes deployed in the Green and Violet lines are made for standard gauge (1435 mm) and 25 KV AC OHE combinations. 196 coaches have been procured from M/s. MRMB consortium, consisting of Mitsubishi, Hyundai ROTEM, MELCO and BEML. All of the 4-coach rakes were built at BEML's Bangalore facility. The rakes were formed of two Driving Trailer Cars (DTC) at either end and two Motor Cars (MC) in between. These rakes had the facility of upgrading to 6-car rake (DTC-MC-TC-MC-MC-DTC) or 8-car rake (DTC-MC-TC-MC-TC-MC-MC-DTC). The key features of these rakes are:

- Stainless steel bodies.
- 3-phase IGBT based VVVF type propulsion system supplied by MELCO.
- Squirrel cage 3-phase induction motors capable of regenerative braking.
- Electro-pneumatic wheel mounted disc brakes along with electric-regenerative braking.

Each DMC and MC contains two IGBT based VVVF units driven AC traction motors which run at 550v 3-phase AC supply.

- **Bogies:** The bogies are double-axle, bolster less, tubular pipe transom type with traction drives based on central pivot, mono-link and lateral dampers.
- **Suspension:** The primary suspension is formed by rubber-spring while secondary suspension is provided by air spring and anti-roll bar.
- **Brakes:** The coach wheels are designed with double disk brake system for greater braking efficiency. The blending is done on demand by calculating braking demanded and

DMRC BEML Rake



Image courtesy: Metro Mania Blog



DMRC BEML Rake

Image courtesy: Metro Mania Blog

dynamic brake performance. It provides for Regenerative braking from 85 kmph to 1 kmph and Pneumatic braking from 7 kmph to 0 kmph, i.e., when the brakes are applied by a train moving at a speed of 85 kmph, the Regenerative braking works. Pneumatic brake is used when the speed is not above 7 kmph. The braking is controlled by BECU. Each car has one BECU per bogie.

- **Control Systems:** These rakes are equipped with Ethernet-IP based Advanced TCMS for real-time control and management of the entire rake.

- The TCMS controls traction and auxiliary components, braking, ventilation and HVAC, door systems, PAPIS (Passenger Announcement and Passenger Information system), signalling systems etc. The TCMS is integrated with high-data rate broadband radio system which live streams the CCTV footages to OCCs.
- The PAPIS is a full time IP-based system which facilitates OCC Radio Public Announcements, cab to cab communication, passenger to motorman emergency communication, playing of recorded messages and chimes during opening and closing of the doors.

The trains are equipped with Automatic Train Protection (ATP) and Automatic Train Operation (ATO) modes on compatibility with signalling system.

► Hyundai ROTEM Rakes (RS-10) :

The Pink Line and Magenta Line of DMRC are equipped with the most advanced CBTC. For this, DMRC awarded a contract named RS-10 to Hyundai Rotem for supplying 81 trainsets, 6-car each for Phase-3 project. Accordingly, Hyundai Rotem supplied the first 20 rakes from its Changwon plant, South Korea to Magenta Line's Kalindi Kunj depot. The rest 61 rakes were assembled at BEML's Bangaluru facility with assistance from ROTEM. The rakes support Unattended Train Operation (UTO) which implies driverless operation aided by the CBTC signalling system. Some of the key features of these rakes are as follows:

- Three-phase IGBT-based VVVF propulsion system.



DMRC Hyundai Rake

Image courtesy: Metro Mania Blog

- Tubular transom type bogie.
- Primary suspension is provided by coil springs and secondary suspension is provided by air springs and anti-roll bars.
- The braking system uses brake blending of electric Regenerative braking and Electro-pneumatic braking. The Electro-pneumatic braking is facilitated by a thread braking system.
- The whole rake is inter-connected by an Ethernet-based TCMS which controls all major and minor functions of the train like traction, braking, signalling, ventilation etc.

► CAF Rakes (Airport Express Line):

The Airport Express Line was built for the special purpose of seamless transportation from various parts of NCR and New Delhi Railway Station to the IGIA. The trains needed to be a bit spacious, luxurious and flyer-friendly. For this, the RS-14 contract for 8 rakes, each of 6-car length was awarded to a Spanish firm CAF (Construcciones y Auxiliar de Ferrocarriles). The trains are designed for Standard Gauge and 25 KV AC OHE systems. The train formation is (MC-TC-MC-MC-TC-MC) where MC stands for Motor car and TC for

Delhi Airport Express Metro

Image courtesy: Metro Mania Blog





Delhi Airport Express Metro

Image courtesy: Metro Mania Blog

Trailer Car. Some of the key features of these rakes are as follows:

- Top speed of 120 kmph compared to 80 or 85 kmph on the other metro lines.
- Schafenberg type automatic coupler and front evacuation doors.
- Noise and jerk-free rides with in-built noise reduction system.
- Padded fabric seats arranged perpendicularly to the direction of movement of the train.
- The coaches have LCD screens for onboard entertainment and flight information.
- The wheels are fitted with flange lubrication system for jerk free ride & better riding comfort.

► CRRC Nanjing Puzhen Rakes (Noida Metro):

For the Noida Metro or Aqua line, nineteen 4-car trainsets were imported from CRRC Nanjing Corporation, a Chinese state-owned rolling stock company. Some of the key features are as follows:

- Light weight stainless steel and aluminium rakes equipped with modern amenities.
- Regenerative braking.
- Top speed of 80 kmph.
- Seating capacity of 186 persons per coach.
- Air suspension at secondary stage.

Noida Metro

Image courtesy: Metro Mania Blog



Gurgaon Rapid Metro

Image courtesy: Somsubhra Das

► CRRC ZhuZhou Rakes (Gurgaon Rapid Metro):

In 2010, Siemens was awarded the contract to supply metro rakes to Gurgaon Rapid Metro. Siemens sub-contracted them to Chinese CRRC ZhuZhou Corp to supply five three-coach metro rakes made by CRRC ZhuZhou. The trains run on Standard Gauge and have 750V DC third rail technology which is strikingly different from any other DMRC line. The key features are:

- Aluminium-bodied coaches, 2.8 metres wide and 60m long with four doors on each side.
- Maximum capacity of about 800 passengers.
- The trains run on CBTC signalling system.

:: KOLKATA METRO ::

The oldest metro railway of South-east Asia and the first metro railway of the nation started its commercial run in 1984. The first stretch to be inaugurated was Bhowanipur (now Netaji Bhavan) to Esplanade. The whole route from DumDum to Tollygunge (now Mahanayak Uttam Kumar) was thrown open in 1994. This line, popularly known as North-South Line was extended to Kavi Subhas in South and Dakshineswar in North in subsequent phases. The other operational stretch is Line 2, popularly known as the East-West Metro from Saltlake Sector-V to Sealdah. These two lines vary to a large extent in terms of infrastructure, aesthetics, rolling stock, signalling, passenger facilities etc. as there has been a yawning gap of decades between the construction and operationalization of the two systems. The first line being the oldest in the country did not manage to cope up with the international standards even after subsequent upgradations. It is on Broad Gauge and the traction is supplied through 750V DC third rail system. The signalling system on this route is Train Protection and Warning System (TPWS). The Kolkata Metro started its journey with the Non-AC fleet manufactured indigenously by the ICF in collaboration with Bharat Heavy Electricals Limited (BHEL). Later, New Government Electrical Factory



Kolkata North-south Metro Rake (Line 1)

Image courtesy: Arkopal Sarkar

(NGEF) collaborated with ICF to build another phase of more powerful Non-AC rakes.

After 26 years of service, AC rakes finally found their way through the tunnels of the North-South corridor in 2010. While the first lot were DC rakes built with auxiliaries from BHEL and Knorr Bremse, the second lot were 3-phase AC rakes with propulsion from Medha Servo Drives. On the other hand, all of the rakes of East West Metro are air-conditioned ones from BEML with electricals from MELCO. The East-West Metro line is equipped with CBTC signalling and control system by the then Ansaldo STS.

All about the Rakes --

► ICF-BHEL Non-AC Rakes:

The first metro rakes of India were manufactured by the ICF in Chennai with Russian expertise. The underframe and bogie were decided to be of purely ICF origin. The shell posed to be a problem for the engineers – the conventional Broad-Gauge shell would not fit with the dimensions of the tunnel. After lot of planning and brain storming sessions, a simple way out was found– placing the Metre Gauge ICF Shell on the BG bogie. This innovation proved to be a successful one. The metro coaches were way ahead of their time – electro-hydraulic automatic doors, fully fluorescent lighting, powerful ventilation fans, passenger announcement system, fibre-seats to name a few.

- Traction & Power: These rakes were equipped with BHEL made DC series traction motors regulated by carbon-pile based voltage regulator. The main traction equipments like transformer & rectifiers were also supplied by BHEL. The total power output was about 3000 hp.

- Suspension: The primary suspension was provided by helical spring and secondary suspension by coil spring with swing link and bolster arrangement.

- Brakes: The brake system was mainly eddy-current based & air brakes.

- Operations: These rakes were originally configured for 4-



Kolkata Metro BHEL Rake

Image courtesy: Rudranil Roy Chowdhury

car operations but later got upgraded to 8-car formation with increasing number of daily footfalls. The configuration of an 8-car formation was 2 DMCs, 4 NDMCs and 2 TCs where DMC stands for Driving-Motor Car, NDMC for Non-driving Motor Car and TC for Trailer Car. Initially, the rakes were painted in orange and blue stripes but later on, they were rendered a yellow-maroon attire. The coaches were numbered as per the ICF-1000 series and the rakes were numbered as BN. As of today, all rakes have been withdrawn from service and thereby scrapped.

► ICF-NGEF Non-AC Rakes:

The second series of rakes for Kolkata Metro were the ICF-NGEF ones. They were manufactured with the similar bogie and shell by ICF but electricals were supplied by New Government Electrical Factory (NGEF).

- Traction & Power: The ICF-NGEF rakes had more powerful traction motors, each rated at 566 kW which made a total of approximately 5221 kW for the entire rake. Besides having bogies and shells similar to their BHEL cousins, these rakes also used similar DC traction motors.

Kolkata Metro NGEF Rake

Image courtesy: Rudranil Roy Chowdhury





Modified NGEF Rake - Kolkata Metro

Image courtesy: Anamitra Bose

The rakes were numbered as 8N.

- **Suspension:** The primary suspension was provided by helical springs while the secondary suspension was provided by coil spring with swing link and bolster arrangement.
- **Operations:** The ICF-NGEF rakes were also operated with the same configuration of 8-coaches, like their BHEL counterparts. Initially, the rakes were painted in green and yellow stripes followed by a change in livery to cream and blue stripes livery. Although, most of the rakes were withdrawn from service after completion of their codal lives, some of the later rakes were renovated and refurbished at Texmaco which extended their codal life by another 5 years. The rakes underwent the following enhancements:
 - Floors were changed
 - Seats were Replaced
 - Provision of digital display boards
 - Overhauling of all major electrical and mechanical components

Two of the rakes 12/14 and 16/18 are still in operational state. Now they are being used as test rakes for the upcoming Joka-Esplanade and New Garia-Airport Metro lines for initial testing and commissioning of electrical systems.

► ICF-BHEL-Knorr Bremse AC Rakes:

The first metro of the country was quite late in receiving air-conditioned rakes. On 7th October, 2010 an air-conditioned rake ran on the tracks of Kolkata Metro for the first time when the section from Tollygunj (now Mahanayak Uttam Kumar) to Kavi Nazrul was opened for public. The AC rakes were manufactured by ICF, Chennai. The first two rakes were prototype ones. The rakes used Linke-Hoffmann-Busch (LHB) bogies and LHB shell.

- **Traction & Power:** The electricals were supplied by Bharat Heavy Electricals Limited (BHEL). The rakes were equipped with DC traction motors controlled by variable



BHEL-Knorr-Bremse AC Rake - Kolkata Metro

Image courtesy: Anamitra Bose

resistance on the main transformer. The formation was the same as that of the Non-AC ones with 6 Motor Coaches (2 Driving and 4 Non-driving) and 2 Trailer coaches. The rakes have 6 out of 8 coaches as motor coaches implying that these rakes are $(6/8) \times 100\% = 75\%$ powered. The total power produced by the rakes was 5449 HP.

- **Brakes:** Air brakes manufactured by Knorr-Bremse, Germany have been used for braking purpose.
- **Suspension:** The primary suspension of the rakes was provided by coil spring whereas secondary suspension was provided by air spring with levelling valve.
- **Operations:** The rake formation was similar to the Non-AC ones with 6 motor coaches (2 Driving and 4 Non-driving) and 2 trailer coaches. The rakes have micro-processor regulated ambience control, micro-processor based fault diagnosis system and electronic display boards in all coaches. Although the rakes were snag-prone, eventually they became the main rolling stock of the Kolkata Metro. As of today, 13 rakes of this category are in service. Initially, there were numbered as per AC N/N+1 nomenclature but later they were re-numbered as MR-30X series, starting from MR-301 to MR-313. The first two rakes were painted in steel colour with blue stripes. Later, the older rakes sported a combination of white and violet whereas the later rakes were painted in steel and violet after undergoing major overhaul at Noapara workshop.

► ICF-Medha AC Rakes:

Kolkata Metro's North-South line faced a rake shortage from 2015 as the already overaged and overutilized Non-AC rakes were failing to meet daily needs. So, Kolkata Metro authorities placed demand for allotment of more rakes for the North-South corridor to the Railway Board. Accordingly, ICF again got the responsibility of supplying 14 AC rakes. This time, the rakes were technically much advanced.

- **Bogies:** The rakes were constructed using Train-18



ICF Medha AC Rake - Kolkata Metro

Image courtesy: Anamitra Bose

trainset bogies and LHB coach shells. The bogies were based on a Y-shaped frame and bolster-less design.

- **Suspension:** The primary suspension was provided by conical springs with control arm and secondary suspension was provided by usage of air spring with anti-roll bars.
- **Traction, Power & Electrics:** The propulsion used is a state-of-the-art IGBT-based VVVF three phase propulsion system provided by Medha Servo Drives Pvt. Ltd. The traction motors are 3-phase synchronous traction motors which are much efficient and require lesser maintenance than DC traction motors. The formation of the 8-car rakes is DTC-MC-MC-TC-TC-MC-MC-DTC where DTC stands for Driving Trailer Car, TC stands for Trailer Car and MC stands for Motor Car. The rakes have 4 out of 8 coaches as motor coaches signifying that these rakes are (4/8) X 100% = 50% powered. The total power produced by the rakes was 3264 hp.
- **Passenger Amenities:** In order to match the international standards, the rakes have been built with sealed gangway, wider vestibules, full LED lighting, TFT screens for passenger information, door alarm system, talkback system and most importantly a very powerful cooling system.
- **Signalling System:** The rakes are also equipped with TPWS signalling system to operate on the North-South Line but they are upgradable to CBTC signalling. Moreover, MR-414 onwards, all five rakes are fully CBTC compatible. These rakes consume much lesser energy than the DC ones.
- **Headlamps:** Medha rakes have an interesting phenomenon with the type and position of headlamps. From MR-401 to MR-414, all the rakes have M/s. ENSAVE made LED Dual Beam Headlamps in mid-position below the windshield. In an attempt to enlarge the dimensions of single emergency exit gate in the cab, the headlamp



ICF Medha Rakes with Top-mounted Headlamps Image courtesy: Anamitra Bose

position was shifted to the top of the cab and above the destination code display from MR-415. The same exercise was done with MR-416. But the LED beam intensity brought visibility issues regarding the destination code. To address this issue, the last two Medha rakes MR-417 and MR-418 were fitted with conventional halogen headlamps in the top-position of the rake.

- **Brakes:** The rakes are provided with electro-pneumatic braking along with regenerative braking which saves a huge amount of energy by converting the energy dissipated during braking to electricity.
- **Operations:** The rakes are operated as per the customary standards of 8-coach formation, i.e., DTC-MC-MC-TC-TC-MC-MC-DTC. The rake numbers are denoted in the series MR-4XX, stating from MR-401 while the coach numbers are denoted as per the ICF-40** series. In July 2017, the first sets of rakes were delivered to Noapara carshed from ICF, Chennai. They were full of technical glitches and failed many trials. Even in 2018, RDSO turned down the permission to run these rakes because of too much oscillation index which can interfere with the signalling frequency. Officials and engineers from Medha as well as ICF repeatedly visited the Carshed to cater to these numerous shortcomings. Finally, the first Medha rake began its commercial service in 2019. MR-404, as a matter of fact, was returned to ICF Chennai for troubleshooting. MR-405 onwards, rakes did not face any impediments and were commissioned without much fuss. They became highly favourable for operations on the North-South line. These rakes are now the major rolling stock of the NS line.

► BEML-SG Rakes:

In 2009, the East-West Metro project of Kolkata from Saltlake Sector-V to Howrah Maidan was started. Though the project was in the very initial stage, bids were invited by Indian Railways internationally to supply 14 state-of-the-art



BEML Rake of East-west Metro, Kolkata Image courtesy: Rudranil Roy Chowdhury

rakes for the line. This bid was won by Spanish firm, CAF. The rakes were proposed to be supplied by end of 2014. But due to continuous delay and missing of deadlines, CAF lost interest and the deal was cancelled in 2015. Again, a tender was floated named RS-3R and this time BEML bagged the deal of around 900 crores in 2016. Accordingly, BEML gradually supplied fourteen state-of-the-art rakes for Kolkata's only Standard Gauge Metro Railway system. A few salient features of these modern state-of-the-art standard gauge metro rakes were as follows:

- **Bogies:** The rakes were made of stainless steel and were similar to those already running under RS-3 scheme in DMRC. The rakes are equipped with double-axle, bolster less, tubular pipe transom type bogies with traction drives based on central pivot, mono-link and lateral dampers.
- **Suspension:** The primary suspension comprises of rubber-spring while the secondary suspension is provided by air spring and anti-roll bar.
- **Traction, Power & Electrics:** The rakes derive their traction from the 750V DC third rail system. The propulsion is of 3-phase IGBT based VVVF type, supplied by MELCO. The traction motors are squirrel cage 3-phase induction motors which are capable of regenerative braking. Each DMC and MC contains two VVVF units driven AC traction motors which run at 550v 3-phase AC supply. The VVVF converter utilises IGBT-based PWM inverter.
- **Brakes:** The trains use Electro-pneumatic wheel mounted disc brakes blended with Electric-regenerative braking. The coach wheels are designed with double disk brake system for greater braking efficiency. The blending is done on demand by calculating braking demanded and dynamic brake performance. It provides for Regenerative braking from 85 kmph to 1 kmph and Pneumatic braking from 7 kmph to 0 kmph, i.e., when the brakes are applied by a train moving at a speed of 85 kmph, the Regenerative braking works. Pneumatic brake is used when the speed is not above 7 kmph. The braking is controlled by BECU. Each

car has one BECU per bogie.

- **Operations & Electronics:** Each 6-car trainset has the following formation: DMC-TC-MC-MC-TC-DMC. Each train is provided with Ethernet IP-based Advanced TCMS for real-time controlling and management of important entities like traction and auxiliary components, brakes, ventilation and HVAC, door systems, PAPIS, signalling systems etc. The TCMS is integrated with high-data rate broadband radio system which live streams the CCTV footages to OCCs. The trains are also equipped with ATP and ATO modes which are compatible with CBTC signalling system. An Ansaldo-based STS system is also present to facilitate CBTC operation. The PAPIS system in the rake is an IP-based system which enables OCC radio public announcement, cab to cab communication, passenger to motorman emergency communication, playing of recorded messages and door close/open alarms. Currently, these rakes are numbered as MR-6XX, starting from MR-601 to MR-614 and three more rakes of this type are yet to join the fleet.

► CNRR-Dalian Rake:

In 2015, Indian Railways awarded a contract of supplying 14 international standard Broad Gauge AC rakes for North-South metro to China's CRRC owned CNR Dalian Corporation. Accordingly, the first Dalian rake arrived at Kolkata Dock on 3rd March, 2019.

- **Bogies:** Stainless steel bogies with irregularly fluted body shell & ultra-modern passenger amenities.
- **Traction, Power & Electrics:** IGBT-based 3-phase VVVF propulsion system where the converters and inverters are based on IGBT-based PWM power devices. The motors used are 3-phase asynchronous traction motors.
- **Brakes:** The brakes use blending of Electro-pneumatic and Regenerative braking. The regenerative braking makes these rakes energy-saving and also increases braking efficiency.
- **Operations & Electronics:** The rakes are also operated as

CRRC Dalian Rake - Kolkata Metro Image courtesy: Rudranil Roy Chowdhury



per the customary standards of 8-coach formation, i.e., DTC-MC-MC-TC-TC-MC-MC-DTC. The rakes support TPWS signalling system and have provision for ATP/ATO compatible with the CBTC signalling system. The TCMS works as an IP-based system which controls traction, brakes, cooling and troubleshooting of the rake through a common MVB. The PAS and PIS, LED display boards, talkback to crew systems use TCMS as their medium. The rakes are in regular trial runs since 2019 but final clearance is yet to be received. Moreover, the pandemic delayed the whole process of rake handover from CRRC to IR. A total of 13 rakes are waiting to be shipped at Dalian.

In India, whenever we discuss metro, Kolkata always hogs the limelight being the pioneer metro system of the nation with their upgraded rakes while the Delhi metro's rise to stardom can be attributed to their huge network and swanky rakes. These rakes run through the hearts of Delhi and Kolkata transporting a host of people from different corners

of the urban settlement every day. The metro rakes are the mainstays of the metro railway system which in turn is the backbone of public transport system in these cities. These modern railway systems not only support the economic well-being of the country but also attributes to a total upliftment of transit system of the nation. In the following part of the series, we will explore another three metro railway systems from the Orange City, the City of Pearls and the City of Nawabs. Until then, happy ride to all!

Cover photo courtesy: Arkopal Sarkar, Anamitra Bose, Rudranil Roy Chowdhury, Aishik Bhattacharya & Metro Mania Blog.

Acknowledgement:

1. Railway Enthusiast Society
2. Rail and Metro Brochure by BEML
3. MetroRailBlog
4. RDSO documents
5. Wikipedia

Past present & future of Kolkata North-south Metro (Line 1). Photo taken by author.



EAST INDIAN RAILWAY COMPANY.

Nos. 3731 / 3740

Ten Shares.

The Holder of this Scrip Receipt, on which the Sum of £2. 10s. has been paid, will be entitled to Ten Shares in the East Indian Railway Company, when duly constituted, upon the terms stipulated in the Subscribers' Agreement.

Entered, London

EIR Early Days

Part-V

1848



P K
Mishra

Presently the Additional General Manager of South Western Railway, is a distinguished member of Indian Railway Service of Mechanical Engineers. In addition to his technical acumen, Shri Mishra is an ardent rail enthusiast, historian and researcher. While working as the Divisional Railway Manager in the Asansol Division of Eastern Railway, Shri Mishra has restored several heritage structures and artifacts in the Division, including the famous Durand Railway Institute (built 1878), now renamed as Vivekananda Institute. As AGM of SWR, Shri Mishra led the Heritage team of the railway to create a Museum at Hubballi, apart from improving the Rail Museum at Mysore. He has assisted many non-railway organisations to restore various heritage artifacts including the famous 130 years old clock of the main tower of the Karnataka University at Dharwad. One of the foremost Railway historians of India, Shri Mishra has put on paper several unknown facts of yesteryears through his invaluable books and articles on the Indian Railways.

Mr. Bourne, one of the engineers of East Indian Railway, suggested that Railways in India could be constructed cheaply by EIR, if line was laid on existing road without affecting road traffic. In order to attract the water traffic to the railway, however, he maintained that the charges must not be higher than the existing rates on the river, and that the railway must, in order to prevent the necessity of trans-shipment, be carried in an unbroken line from Calcutta to Mirzapore. It was stated to be a solution of the difficulty caused by the inadequacy of the guarantee, and Bourne suggested to Mr. Stephenson the expediency of making application to the Government to grant the request....

The Delay

But on the 24th February 1848 the Revolution broke out in France, which for the time paralyzed all commercial operations. In this unexpected emergency the Railway Board, in the month of April, applied to the Court of Directors for a further prolongation of the interval for payment of the deposit, which the Court of Directors, however, declined to extend beyond the 1st May, adding, that in the event of the money not being paid into the Treasury on that day "their arrangement with the Railway Company would cease and determine".

This unexpected announcement rendered it necessary to call the Proprietors together, and to make a new call on them, and the result of that meeting was communicated in a letter to the Secretary of the

East India Company on 20th April 1848:

"I am desired by the Board of Directors of the East Indian Railway Company to state, that in consequence of the letter received from you, agreeing to extend the time for payment of the Deposit of 100,000/ until the 1st May, the Board of Directors called a Meeting of the Proprietors at the earliest possible period, to take their sentiments on the course to be pursued.

In pursuance of the desire expressed by the Proprietary, the Directors have this day met, and made a call of 2/ per share, which the Board have every reason to expect will enable them to make the required deposit by the day named, or within a few days of that time." - Letter from Noad to Melvill on 20th April, 1848.

In the extraordinary meeting of the proprietary held on 18th April 1848, the following resolution was moved by B. M. Willcox, Esq., M.P., seconded, and carried-

"That a Call of 2/. per Share be made on the Shares in the Company, to be placed in trust and that in the event of the said Call not being responded to in such manner as to enable the Directors to pay the sum of 100,000/ to the Honourable East India Company, on or before the 1st of May, or any extended time that may be allowed, the amount realized by the said Call, together with any interest accruing thereon, be returned, on or before the 1st day of October next, to the parties paying the same; and, in the event of the said sum of 100,000/- being paid into the East India Company, the Call now paid shall not be expended in any way without the sanction of another General Meeting of the Company." --- **Extra Ordinary General meeting, April 18, 1848, EIR.**

EAST INDIAN RAILWAY COMPANY.

BOARD OF DIRECTORS.
Chairman—HENRY AGLIONBY AGLIONBY, Esq., M.P.
Deputy-Chairman—BAZETT D. COLVIN, Esq.,
(Messrs. Crawford, Colvin, and Co.).

W. P. Andrew, Esq. (Hon. East India Company's Service),
John Henderson, Esq. (formerly Chairman of the South-
Eastern Railway Company).

R. M. Bird, Esq., (late of the Bengal Civil Service),
C. D. Bruce, Esq. (Messrs. Finlay, Alexander, and Co.),
Francis Carlston, Esq. (Director of the Peninsular and
Oriental Steam Navigation Company).

John Gattley, Esq. (Chairman of the London Dock Com-
pany).

Robert Wigram Crawford, Esq. (Messrs. Remington and
Co., Bombay).

T. S. Kitchin, Esq. (Messrs. Remington and Co.),
R. Hartley Kennedy, Esq. (Deputy-Chairman of the
Oriental Bank).

John Pascal Larkins, Esq. (formerly of the Bengal Civil
Service, and President of the Marine Board).

John Horrien Magens, Esq. (Director of the Rock Life In-
surance Office).

Major-General Duncan McLeod (late Chief Engineer of
Bengal).

Captain Alexander Nairne (formerly of the Hon. East-India
Company's Service).

Edward Howley Palmer, Esq. (Messrs. Palmer, Macchillop,
Dent, and Co.).

T. C. Robertson, Esq. (late Governor of the North-west
Provinces of India).

John Stewart, Esq. (late of Bombay).

Managing Director—Rowland Macdonald Stephenson, Esq.

NOTICE is hereby given, that the Board of Directors of
the East Indian Railway Company is prepared to receive
applications for the shares in the Company, forfeited in pur-
suance of the Report of the Directors made to the Annual
General Meeting of the Company, held on the 12th day of
February last. All applications must be made in the form
subjoined, on or before the 31st day of March instant.

Dated the 12th day of March, 1848.

By order of the Board,
HENRY AGLIONBY AGLIONBY, Chairman.
D. I. NOAD, Secretary.

To the Secretary of the East Indian Railway Company,
8, Broad-street-buildings, London.

Sir,—I have to request that the Board of Directors of the
East Indian Railway Company will allot to me _____ shares
in that Company, on which the deposit of 5s. per share has
been paid; and I hereby agree forthwith on such allotment
to take and accept the same or any less number, and to pay
the call of 5s. per share thereon already made, and to make
the 2nd required to be executed by the proprietors of such
shares.

Dated this _____ day of _____, 1848.

I am, Sir, _____

*A public
notice was
issued in the
papers
informing the
proprietors to
pay the call
money before
April 29, 1848.*

EAST INDIAN RAILWAY COMPANY.

—NOTICE is hereby given, that in pursuance of the
resolution passed at the extraordinary general meeting of
the proprietors, held at the London Tavern, Bishopsgate-
street, London, on Tuesday, the 18th day of April inst., a
CALL of 2/ per share has been made on the shares in the
East Indian Railway Company, and the proprietors are
hereby required to pay the amount of the said Call on the
respective shares held by them, at the banking house of
Messrs. Glynns, Halifax; Mills and Co., Lombard-street; on
or before Saturday, the 29th day of April instant.

And Notice is hereby further given, that all shares on
which the said Call shall not be paid will become liable to
forfeiture, pursuant to the terms of the Company's deed of
settlement.

HY. AGLIONBY AGLIONBY, Chairman.
D. J. NOAD, Secretary.
London, 8, Broad-street Buildings,
20th April, 1848.

outlay of the sum of three million sterling, as required by the Court of Directors, without an increase in the rate or term of guaranteed interest.

The Court of Directors, in reply to these communications, declined either to extend the period for making the deposit, or to increase the rate or term of guarantee. East India House on April 29, 1848 acknowledged the letter, dated the 20th April 1848, along with copy of resolutions passed on meeting of proprietors of EIR held on 18th April, and refused to grant any extension of time beyond 1st of May.

if, after payment of the deposit of 100,000/- within the prescribed period, a Deed of Contract upon the basis already agreed upon was not be executed within a reasonable time, the Court would return the sum deposited, with interest thereon, at five percent, the agreement with the Railway Company being there upon entirely at an end. --- **Letter from Melvill to Noad on 29th April, 1848.**

The Board of Directors felt that the determination thus communicated, at a time of peculiar difficulty, when the position of this Company, as of all enterprises of a similar nature, required the greatest forbearance and encouragement, was less liberal and considerate than they were prepared to expect from the Court of Directors. --- **Letter from Noad to Melvill on 29th May, 1848.**

Revolt in the Board and Cost Cutting

When the diminished proprietary met in June, 1848, it was observed that the Directors of the Great Western of Bengal Railway Company, Major-General Duncan McLeod, W. P. Andrew, Esq., and R. H. Kennedy, Esq. had seceded and carried with them another Scottish chief, one Sir J. Campbell, a Hanoverian knight. The ex-colonel of Engineers, the old postmaster, and the retired doctor, were all gone, and to judge from the pamphlets and circulars with which the shareholders were inundated, one at least of the party, Mr. Andrew, who was very fond of writing Railway Pamphlets, had taken to the pen. Mr. Andrew in a letter to Railway times, dated 20th July 1848, complained about the functioning of East Indian railway company and attempts to mislead the shareholders and authorities about the present position and future prospect of the company.

Though I am not the author of any of the circulars which gave such discomfort to the friends of the East Indian Railway Company, I agree with the writers in almost everything but their tone of personalities.

The real reasons of this rebellion were not known. It might have been that these economists felt heartbroken at the reckless expenditure for the Indian management by the board, at which two of them at least had sat and acted. General McLeod stated in EGM July 1848 that if the information that he was about to ask for were given, the shareholders would fully understand what it was that he objected to the enormous staff of the Company, and the unnecessary expenses incurred. He wanted to be laid before the meeting were the names and designations of the staff sent out to India in 1847, including those already there, with the amount of their salaries, individually and collectively, and the terms of the agreement entered into, with the sums that had been paid to them, and what was the amount of liability to be provided for under the terms of such agreement, with a statement of the expenses of the London establishment, including officers of all kinds.

It might be that they could not quite reconcile their duties, as representatives of the Great Western, in settling the bill for amalgamating the companies with their responsibilities as directors of the East India Railway; it might be that the knowledge they had obtained as directors enabled them to foresee rain, and to wish to escape from the falling house; and it might be that out of the ruins of all the companies, they might create another monopoly for selves and friends. --- Simmond's Colonial Magazine 1849.

Facing the funds crunch and shareholders protest against the expenses of Indian management, East India Railway Company earnestly set to work to reduce the enormous expenditure to which they had pledged themselves. The Indian Management, as it was called, consisted of Mr. Stephenson, at 3,600/- a year, Mr. Adams, a young barrister of the Midland Circuit, and one Mr. Beeston, at 1,200/- a year each, and certain M/s. Daniel and Theobald, at 1,200/- a year between them. Thus was 7,200/- to be spent for three years, — for three years the contracts were made. But besides this, there were eleven engineers and an assistant drawing 9,420/- a year between them. Sixteen thousand, six-hundred and twenty pounds, a year the directors had bound the company to pay for three years. It was informed in half yearly meeting held on August 1848 that with regard to the Indian establishment, the Directors had decided to request Mr. Stephenson to return to this country, both with a view to the benefit of his information in and also to a diminution of the Company's expenses; and they had given the notice to M/s. Adams, Reeston, and Daniel, which they reserved in the agreements with them, to terminate their engagements at the end of six months, so that, at the expiration of this period, that expense may wholly or in part cease.

The Relentless Pursuit

The Court of Directors, in reply to the communications of East Indian Railway, declined either to extend the period for making the deposit, or to increase the rate or term of guarantee. Meanwhile GIPR had accepted the terms proposed by the East India Company and made the deposit of 30,000/- required of them on the sum of 500,000/- It

extended guarantee, would be unavailing.

Directors of EIR were left with two alternatives: the one of winding up the company and taking the chance of obtaining a return of the whole or a part of the expenses incurred; the other of continuing the discussion and bringing back the Court to a consideration, of the policy of commencing operations, in the first instance, on one section of the line between Calcutta and the North-West Provinces.

Directors felt that there was no adequate reason for abandoning, at a sacrifice, an undertaking, the merits of which remained the same, notwithstanding the temporary depression in commercial affairs; and they felt bound, under any circumstances, to endeavour to secure to their shareholders the option of carrying out a scheme for which the machinery was prepared and ground work laid.

Frustrations of Shareholders, that the scheme could neither live with profit nor die with dignity, were expressed in a letter to Chairman of East India Company:

"Nothing is more notorious, than that the shareholders in the East Indian Railway Company long ago wished to abandon the undertaking by forfeiture of their shares, and the non-payment of their calls, and they are daily becoming more impatient of its perpetuation; But neither is anything more notorious than that the remaining directors and officials, in spite of this prevailing wish, persist in keeping the scheme in a sort of galvanic existence. So that, it can neither live with profit nor die with dignity".

Directors addressed a letter to Court urging upon them that it would be matter of regret to all parties that a capital so considerable as that in the means of this Company, and machinery so effective for the purpose, should be entirely thrown away; and requested the permission to commence works on one portion of line, cost not exceeding one million sterling.

To this letter Directors received a reply from the Court on 4th July, 1848. The secretary of East India Company Mr. Melvill wrote that Court was prepared to accede to the proposition above quoted, upon condition that a sum of 60,000/- be forth with deposited in the Company's treasury.

It was resolved that a new call of 2/- per share, in lieu of cancelled, be made and that the shareholders be requested to respond without delay, it being understood that whole call thus made be returned, unless the contract be made with the East India Company to the satisfaction of a general meeting of shareholders called for that purpose.

Chairman explained that they had been offered the same terms as had been required of the Bombay Company -- with a capital of 500,000/-, they were required to deposit 30,000/-, and with 1,000,000/- capital, this Company was required to deposit 60,000/-. That Company had power to proceed with further portions of the line as the public, in proportion to their confidence, gave them the means of doing so; and there was no doubt this Company would have the same power. --- **Chairman speech, EGM; 18th July, 1848.**

In pursuance of above Resolutions, the sum of 60,000/- was deposited by the Railway Company in the Treasury of the East India House, on the 19th August 1848. On the completion of this deposit, it was fully assumed that all obstacles to the progress of the Company's Bill would be withdrawn.

Defective Guarantee - Taking the Guarantee Literally

In September 1848, a further difficulty arose regarding the nature and extent of the guarantee granted by the Court to the two railway companies. The directors of the railway boards under stood the guarantee to be one of 5 percent to each individual shareholder for twenty-five years, while the Court of Directors intended the guarantee to refer to sums paid into their treasury by a railway company in its collective and corporate capacity.

"The Court will guarantee on the part of the East India Company an interest, or dividend for 25 years at the rate of 5 percent per annum, on 500,000/-." This guarantee was given on the 5th of October, 1847, and the chairman of GIPR company, Lord Wharnclyffe, and the Directors, construed it as a promise of a guaranteed dividend to the shareholders, taking the words used by the Court in the sense ordinarily attributed to them.

Directors of EIR and GIPR immediately made known the prospects and advantages of the undertaking by advertisement in the public prints. They announced that -- *"Company would be incorporated by Royal Charter, and that the East India Company had guaranteed 5 percent as a minimum dividend for 25 years."* This advertisement was allowed to circulate for eleven months, without contradiction, through the medium of the Times and other influential journals.

On the 29th of August, 1848, however, Mr. Mihill Slaughter, of the Stock Exchange, addressed the Hon'ble Court relative to some doubts which had been raised as to the real nature of their guarantee, when, to the surprise, the Court of Directors for the first time announced that *"their guarantee did not extend beyond an interest of 5 percent determinable under certain contingencies, and that it did not provide for any dividend to the respective shareholders."*

The storm came from the money market and directors new call of 2/- per share did not find favour with shareholders. The shares bore no sellable price, and a gradual mistrust arose respecting the interest supposed to have been guaranteed by the India Company. Those who now read the terms without the comment made on them by the railway company, saw clearly that it was merely a contribution of 5 percent, determinable under certain contingencies, and not a guaranteed dividend on the basis of a government stock.

Meeting of Dissident Shareholders

This withdrawal of the guarantee operated as an extinguisher on the prospects of the Indian railway cause, and created a feeling of deep dissatisfaction amongst the shareholders and some of the shareholders were in favour of dissolving the

company and liquidate their holding. At a meeting of dissentient shareholders of the East Indian Railway, held on January 23, 1849 at the London Tavern, Sir John Campbell, K.C.H., in the chair, the following resolution was unanimously adopted —

"That since of late it has been made manifest that the original anticipations of profits, held out by the directors in their first report, could not be realized by the limited undertaking in which it is now proposed to embark, and that the guarantee, instead of being equivalent to a 5 percent Government stock, as stated by the Directors, in the opinion of this meeting is a mere contribution which would probably be wholly absorbed by the cost of maintaining and working the line. There remains no reasonable inducement to shareholders to pursue the enterprise further; and it is consequently desirable to dissolve the company in the most speedy and inexpensive manner, and release the shareholders from the of the responsibilities incidental thereto." — **Allen's Mail 1849.**

Sir John Campbell, late a director of East Indian Railway Company, made a statement to the effect that the Company was in embarrassed circumstances, and the concern could not be profitable, and the resolutions passed at that meeting were communicated to the Court of Directors as the proceedings of a meeting of shareholders, whereas all shareholders not representing the opinions of that meeting were excluded.

Meeting with Board of Control

Railway directors had been frequently corresponding with the India House, in the hopes of obtaining more favourable conditions, struggling hard for a 5 percent dividend, as it was unreasonable to expect individuals to undertake so novel a project as a railway in India, the length and direction of which was to be left to other persons. On the 8th February, 1849, a deputation of thirty gentlemen interested in the promotion of railways in India waited on the Board of Control, and the interview lasted upwards of an hour. There were present Sir John Hobhouse, the President of the Board, accompanied by other members of it, and Mr. Wilson, M.P., the secretary; on the part of the East Indian Railway Company, Mr Aglionby, M.P., the chairman, with other directors, and Mr. D. Noad, the secretary; the chairmen of the other Indian railways; Mr. Bright, M.P., Mr. Chapman; the president and other members of the Manchester Chamber of Commerce and commercial associations; of the Blackburn Chamber of Commerce; and other members of Parliament and gentlemen connected with commerce.

The President assured the deputation that due attention would be paid to their statements, and that he felt inclined, as then advised, to render less stringent one of the terms intended to be offered by the Court of Directors to the railway companies, the confiscation clause. 'The Times' reported that Sir John Hobhouse did not give the deputation to understand that he was disposed to yield upon the main

point on which the railway managers seemed principally to insist, that is, on the unconditional guaranteed dividend of five percent. On the contrary, lest any misunderstanding should prevail on this head, Mr. Wilson, the secretary, declared - and his statement was confirmed by the President -- that the concession to which allusion had been made had no reference whatever to the guaranteed dividend. Nothing was said of the Government granting pecuniary aid to the companies. --- **The Times, 1849.**

Later in the annual meeting of the Blackburn Commercial Association, directors, giving an account of the meeting with president of board of control, congratulated the members of the Blackburn Commercial Association on the attainment of one of the most important measures of the day. They informed that by the united and effective co-operation of this and similar institutions certain definitive terms and conditions, highly favourable to the undertakers, the actual formation of the East India (Bengal) and the Great Indian Peninsular (Bombay) Railway Companies in India had been allowed.

The Lobbying

The Directors of the East India Company declined, by a mere majority, to amend their terms and did not accede to Railway Company's request for granting five percent guarantee, equivalent to a 5 percent Government stock. Both sides prepared for new attempts. The promoters of EIR worked among the cotton interests, and put the screw on Sir J. Hobhouse, the President of the Board and eventually showed him a certificate from the monied city men that there would be no difficulty of raising the money on a 5 per cent guarantee. Sir John put the pressure on the East India Company, and the matter was once more opened, and in course of negotiation when the shareholders met at their half yearly meeting in February 1849. Nor had the dissentients been idle. The writing and printing seemed inexhaustible, and eventually both sides deluged their friends with statements, letters, and explanations. But they did more; though no longer entitled to vote, they canvassed for proxies, and came down to the February meeting in full strength. They had the consolation of finding that they were no longer able to make or mar, but were nothing more than spectators.

The half-yearly meeting of the shareholders of the East India Railway Company was held on the 19th February 1849. The Directors' report referred to an interview, on the 18th December 1848, between the chairman of the Railway Company, Mr. Aglionby and four directors with a committee of the East India Directors, the result of which was a further discussion in the Court of Directors, on the 21th January, 1849 of the question of a guarantee of profit equivalent to a fair rate of interest for the use of the money. The report mentioned the interview with Sir John Hobhouse on the 8th February, who said that the Company had been represented to him as defunct, and that he had received a memorial from Sir John Campbell stating that four-fifths of the Company

were desirous of having its affairs wound up; whereupon the chairman of the Railway Company and other directors rebutted this statement, assuring Sir John that, if the guarantee of 5 percent were conceded, there would be no difficulty in raising the money.

Subsequently, Sir John Hobhouse communicated with the Court of Directors, and the latter with the railway directors, who made a proposition to the Court, which, while it secured the principle of immunity from loss, and a return of 5 percent. on the capital paid up, would meet the views of the latter.

Modified Opinion of the Board

At last, on the 29th January, 1849, the Court, considering that no advantage would result from a continuation of these negotiations, proposed to the Board of Control to return the deposit of the railway companies and to cancel the agreement absolutely. The question thus fell into the hands of James Wilson, Esq., M. P., secretary to the Board, who took up the subject energetically, and on the 19th March, 1849, a dispatch containing the modified opinion of the Board was sent to the Court.

In this important letter the Board endeavoured so to alter the terms that had been up to the present time proposed, as to make them at once safe for the Government and acceptable to capitalists. The Board observed that to guarantee 5 percent absolute dividend, as demanded by the railway companies, would be to remove all risk from shareholders, and thus to take away the strong motive which the hope of an increased profit gives for economy, care, efficiency, and good management. With the risk, the object for vigilance would cease, and the scheme would simply resolve itself into the creation of East India 5 percent stock.

If the guarantee were to be absolute, it would be infinitely better that the East India Company should keep the whole control in their own hands. From these considerations, it followed that a guarantee of 5 percent on the capital expended was the utmost that could be conceded. The Board were willing, however, to alter the terms of the guarantee, and the period to which it was to extend. They suggested that the East India Company should agree to guarantee 5 percent, interest on all sums paid with their permission into their treasury as long as the railway company may continue to possess the railway; that if there be any loss in working the line the railway company shall bear it, but shall be at liberty to give it up to the East India Company at any time they please, on giving six months' notice of their intention to do so; and shall then obtain repayment of the actual capital expended on the construction of the line, plant, and rolling stock.

Practically, this was an absolute guarantee of 5 percent, with a risk to the shareholder of six months only; as if a line were proved to be worked at a loss, and the East India Company declined to make up the deficiency, the shareholders would of course avail themselves of the option of re-payment of

capital which the contract was to allow.

On the 22nd March, 1849, the Court, though stating that the modifications now proposed were at variance with the views which had been taken by them, yet, anxious to bring the question to an early and satisfactory conclusion, they consented to the alterations suggested.

On the 28th of March, 1849 the ultimatum of the company reached the railway directors. Board of Directors of East Indian Railway had requested secretary of East India Company to return the payment of 10000/- with interest at five percent, in the event of the Board of Directors not being able to arrange the terms of a contract with the Court of Directors of the Honourable East India Company. The India House had condescended to reconsider and modify their former decision, in the hopes of an early and satisfactory conclusion, and they were determined to secure the first, at least, by demanding the assent of the railway company within one month.

Revised Terms and Conditions

A revised paper of terms and conditions was drawn up, and this ultimatum, as it was called, effected radical changes in the character of the guarantee, all favourable to the shareholders. The Home Government had at length given way, upon the subject of the Indian railways, to an extent which appeared to have exceeded the hopes of the most sanguine.

The terms and conditions embraced the following points:

- The selection of the line to be left to the Government of India, and the construction of the railway to be under the supervision and direction of the officers of the East India Company, the Government providing the land, which was to be leased to the Railway Company for ninety-nine years, terminable, in certain events, at a shorter period; the capital raised by the Railway Company to be paid into the East-India Company's treasury in London, and to bear an interest of five per cent., which was to be repaid out of the profits of the undertaking; and if they exceed five per cent., one-half of the excess was to go towards repaying the interest advanced in former years, and the other half to the shareholders, who were to have all the extra profit when the whole arrears of interest should have been repaid .

- Over the arrangement and construction of this line the East India Company was to exercise a supervision amounting to a virtual dictation of all the engineering and architectural conditions involved in the work, and as the project was avowedly experimental, a power was also reserved to the Indian Government of altering at pleasure either the character or direction of the line itself.

- Upon its completion, the East. India Company was to have a controlling voice in the arrangement of trains and the settlement of fares, and the Government of India was to be a favoured party in all transactions of traffic.

- The Railway Company were to run such trains as would be deemed necessary by the Government in India, whose

officers were to have a perfect supervision of the working of the line. Any loss sustained in working the line was to be borne by the Railway Company, who, however, would be at liberty to give it up to the East India Company after six months' notice, receiving payment of the original capital invested.

- A company undertaking such a work must lodge with the East India Company a subscription list for the whole amount of the capital, with a deposit of six percent, and the East India Company would take measures to obtain charters for the Railway Company, in which a clause was to be introduced binding the Railway Company to the payment of the required capital, and the completion of the works within a certain period; and the Government of India were to have the option of purchasing the railway at the expiration of twenty five or fifty years, at the mean market value of the shares during the three preceding years.

- The present arrangement was in no respect to supersede the terms in the Legislative letter of the Indian Government of May 7th, 1845, with the exception of the guarantee of interest; and the Railway Company was to carry the mail free, and troops and stores at the lowest rates charged for passengers and goods.

These terms, according to the Times, were such as would give full satisfaction to all the parties; and put an end to a very disagreeable state of things, which threatened to suspend, if not prevent, these useful undertakings. The paper said that however unreasonable were the demands, it was wise on the part of the Government to make this concession, and the precautions taken would provide an effectual security against negligence, waste, and all the evils attendant upon the self-management of railway concerns.

Revised Terms and Conditions Proposed by East India Company

The following were the terms and conditions upon which assistance would be afforded by the East- India Company for the construction of a line of railway in the Bengal presidency:

1. That the selection of the line of railway be left to the Government of India, it being understood that the section to be undertaken, in the first instance, shall be the commencement of the line which may be determined upon from Calcutta towards the upper provinces, so as to form a commencement of the line leading either to Mirzapore or to Rajmahal.
2. That the railway be made by a company under the supervision and direction of the East India Company, whose officers in India or in London shall attend to the whole expenditure, and see that the capital account is properly kept in the course of construction.
3. That a capital of £ 1,000,000 sterling, for the execution of the proposed experimental section, shall be raised by the railway company from the shareholders, and paid into the East India Company's treasury in London, to be redrawn as required for expenditure for such purposes only as shall be admitted to be capital,
4. That the land be provided by the Government.
5. That the land remains the property of Government, and that the railway company be granted the use of it on lease for 99 years; but which,

nevertheless, shall be terminable at any shorter period, when the East-India Company shall, under the conditions and stipulations herein contained, become possessed of the railway.

6. That the East-India Company shall pay annually to the directors of the railway company a sum equal to 5 per cent, interest on the capital of one million paid into the East-India Company's treasury, under the provision contained in clause 3.

7. That the whole of the profits shall be applicable to repay the East-India Company the interest of 5 per cent. thus advanced; and if more profit than 5 per cent. is made, then that one half of the surplus shall go towards repaying the interest advanced in former years, and the other half to the shareholders. When the arrears of interest, with interest thereon, calculated at the rate of 5 per cent from the time it shall have been advanced by the East-India Company, are all paid, then all the extra profit to go to the shareholders.

8. That in order that the public may have security that the railway, when opened, shall be kept in use, it be a condition that the railway company shall run such trains as the Government in India shall consider necessary for the convenience of the public and the general traffic.

9. That, in the working of the line, the East-India Company shall have perfect supervision of works, books, accounts, & c., and shall see that the line and working-stock are at all times kept in perfect repair, equal to the first state; and that if the railway company fail to follow the directions of the East-India Company's officers, the latter shall be at liberty to make repairs, and deduct the cost from the next accruing interest, or other moneys, to be paid to the railway company.

10. That in no case shall the East-India Company be called upon to pay more than 5 per cent per annum on the capital paid into the Company's treasury, to an extent not exceeding £ 1,000,000 sterling; and that if there be any loss in working the line, the railway company shall bear the same so long as they retain it. They shall, however, be at liberty to give it up to the East-India Company at any time they please after six months' notice in writing, which may be given at any time after the line first to be made shall have been finished and in operation for the space of three months, but the railroad to be given up in perfect condition, both as to the line and the working-stock. They shall then receive payment of the original capital invested in the actual survey and construction of the line, either in one sum, or, at the option of Government, it may be commuted for an annuity, according to the provision hereinafter contained for the purchase of the railway by the East-India Company, the railway company having satisfied the East-India Company that all claims against the railway company, in respect to the railway, have been discharged.

11. That any company undertaking these works shall lodge with the East India Company, within two months from the date of the Court's letter transmitting the present revised terms, a subscription contract list of the shareholders, to be approved by the East-India Company, for the whole amount of the capital required, -namely, £ 1,000,000 sterling, with a deposit thereon of 6 per cent. ; whereupon the East-India Company will return the present deposit of £ 60,000, and will take measures in view to obtain without delay for the railway company a charter from the Government of India, and a charter in conformity therewith from the Crown.

12. That a clause be introduced into such charters which shall bind the railway company to the payment of the required capital, and the completion of the works undertaken within such period as may be agreed upon between them and the East-India Company, and which, in case of failure of such engagement, shall enable the East-India Company to take possession of the line upon the repayment only of the cost of survey and construction of such portions of the line as shall have been actually completed and opened to the public.

13. That provision be made for securing to the Government of India the option of purchasing the railway at the expiration of 25 or of 50 years.

14. That the terms of such purchase shall be computed at the mean market value of the shares of the railway during the three years last preceding the said period of 25 or 50 years, as the case may be.

15. That the purchase-money so computed may, at the option of Government, either be paid to the railway company in one sum, or be commuted for a fixed annuity for the remainder of the lease of 99 years.

16. That it is to be understood that the annual payment guaranteed by Clause 6 of these terms and conditions will be confined to the experiment now under consideration.

17. That it is to be likewise understood that the present arrangement in no respect supersedes the terms communicated to the Government of India in the legislative letter of May 7, 1845, with the exception only of the question of guarantee of interest.

18. That, in consideration of the rate of interest having been raised from 4 to 5 per cent. per annum, the railway company undertakes to carry the mail free, and the troops, the artisans, and the stores of the Government, at the terms chargeable for the lowest class of passengers, and at the lowest rate for goods respectively."

The terms and conditions granted to the Bombay line (the Great Indian Peninsula) were similar to the above, a capital of £ 500,000 being allowed for the section from Bombay to Callian, with a further £ 500,000 should the Government engineer report in favour of the extension of the undertaking.

It was, in fact, a compromise between the conflicting views of the Government and railway companies, the Government yielding in reality the main points about which there had been dispute. The East India and Great Indian Peninsula Railway Companies at once accepted the revised terms proposed, and the legal agreements were forthwith put in hand, and were finally signed on the 17th August, 1849.

Acceptance of Terms by EIR

A special meeting of East Indian Railway Company was held on the 10th of April, 1849 for the purpose of considering the terms and conditions proposed by the East-India Company, and deciding thereon. The Chairman, Mr. Aglionby said that it was the intention of all the authorities, both here and in India, to give every fair construction to the terms, and to agree to any reasonable modification that might be requisite in detail. He felt a strong conviction, from the information he had received, that such modifications would not be less favourable than the general terms.

EIR Directors considered the terms satisfactory, and the security so good that there was not the possibility of a loss. They hoped the proprietors would readily subscribe the 1,000,000/-, and any further sum necessary to carry out the extension of the line.

The terms offered in the letter of Mr. Melvill, of the 28th March, 1849, were approved, and the directors were requested to conclude a contract in accordance therewith, subject to such modification as they might think expedient. Chairman assured the shareholders that a charter would be

granted to the company, and what could not be embodied in the charter would be provided for by Act of Parliament. The shares would be reduced from 50/- to 20/- each. All the scrip upon which only 5s. per share had been paid had been forfeited, but the shares upon which only 1/- per share had been paid would not be forfeited, provided the holders would shortly pay up the call of 2/- per share which was overdue.

At last, on the 10th of April, the conditions of the India House were accepted, and the dissentients had the annoyance of discovering that delay had not ended in bankruptcy, and of receiving, doubtless, a fair premium on those shares of their own, which they had been only anxious to throw away.

Signing of Agreement

Thus, in 1849, after discussions extending over a period of nearly four-and-a-half years, which the Times would term it an ordeal of unusual severity and disheartening duration, a definite conclusion was reached and the first contract was signed on 17th August 1849 between the East India Company and the EIR for the construction of a short, experimental line and the route that was ultimately selected for it covered the distance of 121 miles between Howrah to Raniganj via Burdwan. The operations of the East Railway Company would remain confined to this portion only for a considerable period of time, in tune with the cautious policy enunciated in the Court's despatch of 7 May. --- **The Quarterly Review, Vol 125, October 1868.**

The original conditions of the enterprise excluded those extraordinary augmentations of the cost of construction, which were now pressing heavily on even the best lines in England.

On the principle of Government co-operation and control, the scheme of the East Indian Railway Company was taken up by the East India Company in the year 1849; and an Act of Parliament passed in that year empowered the Railway Company, not to make the Railway, but — "to carry out such objects as might be agreed upon between them and the East India Company," for the making of it, — and in the same year an agreement was made between the Court of Directors and the Railway Company, for the making of an experimental line at the estimated cost of a million sterling, to be advanced by the former and repaid by instalments. It was the culmination of long protracted negotiations during the course of which the Railway Company was insistent on having more liberal terms and the Court was resolutely opposed to that. Mr. Aglionby, M.P., chairman of the Company, informed the shareholders in the second half-yearly general meeting held on the 28th August, 1849, that the interest of 5 percent per annum guaranteed by the East India Company would be paid, on and from the 17th of August instant. It would include the preliminary deposit of 5s. paid on the existing shares in the Company, and upon which hitherto no interest had been paid.

The liability of each shareholder was limited to the amount of

his or her shares in the Company. The Board of Directors had reduced the shares in the Company from 50/- to 20/-, and had made a redistribution of the capital into 50,000 shares of 20/-, each. It was also decided, in consequence of intimation from court, to reduce number of directors from thirteen to nine, of which three be a quorum, and M/s. Bruce, Kelsall, and Stewart were asked to go out of office accordingly.

The contract limited the profits to ten percent, and the question now was, whether that was to be a positive maximum, or whether, after the profits had reached that amount, Government should step in and interfere with the tolls.

The Chairman explained that if the expenses in carrying out the work should exceed the contemplated capital of 1,000,000/-, the guarantee extended to the surplus. He further stated that, if the experiment succeeded for the 70 miles, the line would no doubt be extended 900 miles to Delhi and the North-west provinces, with whatever branches the East- India Company might approve of. The Company hoped that being the pioneers in the work, they certainly would be entitled to a preference. Should they fail in raising the required sums, other parties must be applied to.

The Tender from Mr. Jackson

The directors had received a tender from Mr. Jackson, of Pimlico, for the construction of the first line of railway to be undertaken by the Company. This tender embraced the construction and completion of the railway within two years from the commencement of operations, and its maintenance for three years after completion, at a cost, including a double line of rails and stations, of 8,500/- per mile. The respectability of the contractor afforded every security for the satisfactory completion of the work.

Chairman in half yearly general meeting held on 28th August, 1849 informed that Mr. Rendel, the consulting engineer, had recommended the acceptance of this tender, and the directors had submitted it to the Court of Directors of the East- India Company for their consideration. Shareholders were informed that no step could be taken, as to the construction of the railway, until possession of the land had been given by the Government of India.

The Board received, on the 31st October 1849, a communication from the East-India Company, on the subject of Mr. Jackson's tender, referred to in the report of the 28th August, to the effect, "*That this tender is not one that should be accepted; and that the Court consider it would be advisable for the Railway Company themselves to proceed with the undertaking, leaving it to them to communicate with the Indian authorities on the subject of a contract.*"

Directors of the railway company, or rather their Managing Director, Mr. Macdonald Stephenson, had made in London great efforts to induce some of the great contractors of England to undertake the construction of Indian railways; but, excepting a Mr. Jackson, all held back; thinking, apparently, that the profits to be obtained on contracts so

strictly supervised by Government as those for railways in India, would not be sufficiently large to warrant their entering upon the business. Mr. Jackson's proposal was favourably received and recommended by the Directors of the East Indian Railway Company; but after a consideration of three months by the Hon'ble Court, and the Board of Control, it was rejected without any reason being alleged for its being declined.

But at the time erroneous opinions that railways could be made in India for about 5000/- a mile, were prevalent. This having been the result of the negotiations with contractors in England, it was not surprising that when the agreement between the Hon'ble Court and the railway company was at last finally concluded, it was determined to make an attempt to use contractors who might come forward in Calcutta. — Railways in India by Edward Davidson.

Mr. Vignoles had guessed the cost at one third, or probably a quarter, of the average cost in England, namely, from 16,000/- to 25,000/- per mile; which would give from 6,000/- to 8,000/- per mile. Mr Ashburner doubted that a double line to Mirzapore could be laid down for 6,000/- a mile. but thought a single one might for something less. Captain Goodwyn guessed at 3,000/- a mile, which was obviously too low, for Mr Stephenson himself suggested 8,000/- to cover all contingencies. The prospectus of the East India Railway Company, however, had proposed a capital of 4,000,000/- for the line to Mirzapore, about 400 miles, which pointed to an average of 10,000/- a mile.

The decision of court to not permit English Contractors would have a profound impact on the future of EIR, depriving the Company, the opportunity to employ Contractors experienced in construction of Railways, resulting in huge cost and time overrun in laying rail lines by local Contractors, who had no prior experience and most of them would later become bankrupt.

Despatch to Indian Government

The Court sent a despatch on 14th November 1849 containing detailed explanation of each of the conditions and terms of the contracts signed with both the Railway companies along with copies of contracts, as it was felt that much trouble could be saved later if more clearly various provisions of these contracts are understood by Indian authorities.

In this despatch the India Directors remarked that, although they had insisted upon complete control over the construction and working of the lines in order to ensure efficiency and economy, it was not their desire that this control should at any time be exercised in a way to restrain the energies of the parties engaged in the undertakings, to whom, on the contrary, they earnestly desire every facility to be afforded. With regard to the nature of the guarantee, the directors stated that "the terms formerly offered to the companies being 5 percent in the shape of interest and subject to reduction by various contingencies," which were

such as to prevent the capital from being raised, they were induced to modify those terms "so as to present a more acceptable security to the capitalist." They added also an opinion that undertakings of the description in question were better conducted by private Companies under proper regulations than by the direct agency of Government; while at the same time they stated their satisfaction that the Governor-General, Lord Dalhousie, having given so much attention to railway concerns in England, would be enabled to render the most valuable assistance by contributing the results of his great experience to these works in India.

Indian Government was advised to immediately furnish the land necessary for the undertakings as soon as the precise route or direction was fixed; necessary changes in existing laws to be made, if required. East India Company was of the opinion that the experimental line should consist of double line primarily on account of safety and lack of real saving of capital in constructing single line Railway.

Moreover even though only a single line were laid down in the first place, it would undoubtedly be advisable, that all the earthworks for the permanent way, and that all bridges, tunnels, should be constructed for a double line, the real saving of capital would be very little, and would only be the price of the iron rails, chairs, and the laying of the same, which would amount to little more than 1,000/-, or 1,200/- a mile, which, in the contemplated entire expenditure, would form a very small proportion. With respect to the weight of rails and the gauge of line to be employed on these railways, they were disposed to recommend those used by the North-Western Company here, mainly, a gauge of 4 foot 8 inches, and a weight of rails of 84 lbs. to the yard, as combining the greatest utility and economy.

East India Company would exercise complete super vision and control over the Railway Companies, and their officers, servants, and agents, in all accounts, matters, and affairs whatever, both during the construction of the railway, and after it had been opened for the conveyance of passengers and goods. Regarding granting the charter of incorporation to the Railway Companies by the Indian legislature, the Court informed the opinions of law officers that no act of incorporation by the Indian legislature would be necessary as EIR and WIPGR were incorporated by acts of parliament.

Special attention of government was requested that under no circumstances any charge whatever might be made to the capital account that was not strictly entitled to be so. This was more necessary with regard to these undertakings than is usually the case, insomuch as the East India Company can be called upon at any time after the railways have been completed for three months, to purchase the same at the first cost. The Court of Directors concluded the despatch by calling attention of Indian authorities to a great error, the unnecessary and extravagant expenditure in ornamental works, which had been committed by railway companies in Europe, and directed them to studiously avoid a similar error.

Rally for a cause

Dr. Debasish Bhattacharyya

“Calcutta Tramways, in its history of 150 years, witnessed the first apolitical rally organised by the citizen's forum CTUA to protest against closure of Belgatchia Tram Depot....”

Calcutta Tramways in its history of 150 years, witnessed the first apolitical rally arranged by the citizen's forum 'Calcutta Tramways User's Association' demanding rejuvenation of the tramways. Being exhausted by the indifferent attitude of the authorities, CTUA members in association of Cycle Samaj and Switch-On Foundation, marched from Belgatchia Tram Depot to Shyambazar Tram Depot on 17th July 2022 at 11:00 am. Belgatchia depot and its connection with the city over Chitpur railway yard through Belgatchia bridge are under threat of closure in one pretext or another. This 'first of its kind' event was extensively covered by print, electronic & social media and received over-whelming response from local citizens.



Blast from the past!!! A Belgatchia depot Tram plying on Route - 4 (Belgatchia-BBD Bag) in the year 2013. Both the destinations mentioned in the route board are currently out of Kolkata Tram map and uncertain of their future like many other routes in the city



As many as 32 road worthy trams are sitting idle inside Belgatchia Depot

Buses taking over the spaces once exclusively meant from Trams.

Belgatchia depot, built in 1097 having holding capacity of 110 tramcars, is one of the largest depots of CTC and served rolling stocks very efficiently in North Calcutta comprising the routes along College Street/Bidhan Sarani, Chitpur Road, Grey Street, Baghbazar and the Central Business District of BBD Bag and Esplanade (Route Nos. 1 – 11). Innumerable schools and colleges, two major universities, several medical colleges and hospitals, terminal railway stations, many wholesale and retail markets, cinema and theatre halls grew up along the tram tracks. Many historical places ranging from Galiff Street – Sunday market to Jorasanko Thakur Bari (residence of Tagore), Kumartuli (place for Durga idol making), Swami Vivekananda's house, independence movements etc are along these tram routes. In fact, every tram stops along College Street and Chitpur carries the testimony of the past. Residents of these areas are tram users by birth.

Belgatchia Depot some four years back, considerable investments were done within the depot in concretizing and realigning of tram tracks. In addition, a significant portion of the tram track along Belgatchia bridge was replaced and

concretized. Thereafter, rumor was floated that the bridge is weak, unable to carry the load of tramcars. Ironically, huge overloaded trucks carrying construction materials like stone chips, sands, marble slabs flew freely over the bridges under the supervision of Calcutta Traffic police who never bothered about erection of height bars for restriction of traffic. Interestingly, Kolkata Metropolitan Development Authority responded against a RTI that these bridges are fit for tramway operation.

At present, there are 32 roadworthy tramcars in Belgatchia depot sitting idle for years. More running cars were sold to scrap iron dealers without considering offering fresh lease of lives from Nonapukur workshop. We have witnessed installation of battery charging machines for e-buses in tram depots deliberately on tram tracks. Huge tram sheds were dismantled to accommodate diesel buses or sold to real estate owners. Recent gimmick is installation of far more expensive and unstable trolley buses in North Calcutta replacing trams. CTUA members are determined to act against corrupt anti-tram lobbies to save this priceless asset of the city.

Titbits of the first ever pro-tram rally in the history of Kolkata

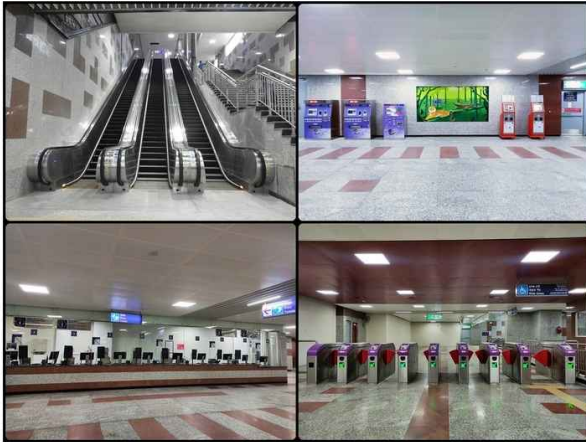




Rudranil Roy Chowdhury

The cutting-edge East-West Metro, which began operating in stages from March 2020, now has seven operational stations, including the newly opened Sealdah station. The extended service of the East-West Metro up to Sealdah on its 9 km. truncated route commercially started from Thursday, 11th July, 2022. The service is now available between Salt Lake Sector V, the IT hub and Sealdah – busiest suburban railway station in Kolkata. The construction of this stretch of 2.33 km. between Phoolbagan and Sealdah was done at a whopping cost of ₹ 1,250 crores. It will take only 21 minutes to cover the distance from Sealdah to Sector V which generally takes more than an hour by road, thereby facilitating more than 35,000 passengers in their daily commute.

But before all these hustles and bustles, Team TrainTrackers got an opportunity to visit the Sealdah Metro premises long before its inauguration as the team members were among the invitees with Rail Enthusiasts' Society, who formed a team of delegates to get a first-hand experience and a maiden train ride from Sealdah to Central Park on the 18th June, 2022. It was truly mind-boggling to experience the state-of-art facilities at Sealdah Metro station – by far the largest amongst all in Kolkata. This three-storied underground station was built at a cost of ₹ 250 crores. It has two entry/exit gates – one at the western end, opposite to Sealdah North Railway terminal gate and the other just beside the Sealdah South terminal gate at the eastern side. The concourse and the platform area are 200 meters long and 30 meters wide. At each entry point, there is one wide staircase and three escalators – two for going up and one for



getting down. The station also has two elevators. The entire station area is covered with beautiful murals and paintings which were innovatively designed incorporating local traditions and craftsmanship. There are as many as eight Token/Smart Card machines for Metro Card recharge & Tokens along with four ATMs of Indian Railways for Suburban Tickets - two at each end. Apart from that, there are eight ticket counters at each end. There are fourteen electronic entry/exit points in the concourse area at the eastern end and seven at the west end. There are two assistance kiosks and two Public Rest Rooms – a first of its kind in the Kolkata metro system. There are three platforms of which two on each side and one is an island platform. Platforms are numbered as 1A, 1B, 2A & 2B – of which 1A & 2A are the island platforms. As per officials, in future, metro gates will open on both sides. This will enable the double discharge facility at this station which is of utmost importance keeping in mind about the huge rush in near future once the entire route becomes operational from Howrah Station to Sector V. The single discharge platforms have two escalators – one for up, one for down and two



staircases whereas the middle platform also has similar arrangement with four escalators – two up & two down. According to the officials, the station can handle 20,000 passengers per hour. As planned earlier like all underground stations of the East-West corridor, Sealdah station is also equipped with Full-sized Platform Screen Doors (PSDs). Likewise, elevated stations have half-sized PSDs. The Sealdah metro area is equipped with Environment Control System along with a Complete Automatic Fire Detection system. In case of any fire break out, the sensors detect the smoke at once to stall all the moving objects in and around the metro premises immediately which includes the lifts, escalators etc. including the train movements.

Gathering all these information, we readied ourselves for the most interesting part of the event – the maiden train ride from Sealdah. Rake # 608 was chosen for us and at 1200 hrs our journey commenced with a cab-ride – a moment to cherish forever. As the train started moving through the tunnel the entire team was overjoyed and captured every bit of their experience either by videography or clicking snaps all the way through. Around 1220 hrs, we reached Central Park station from where we were transported to the Central Park

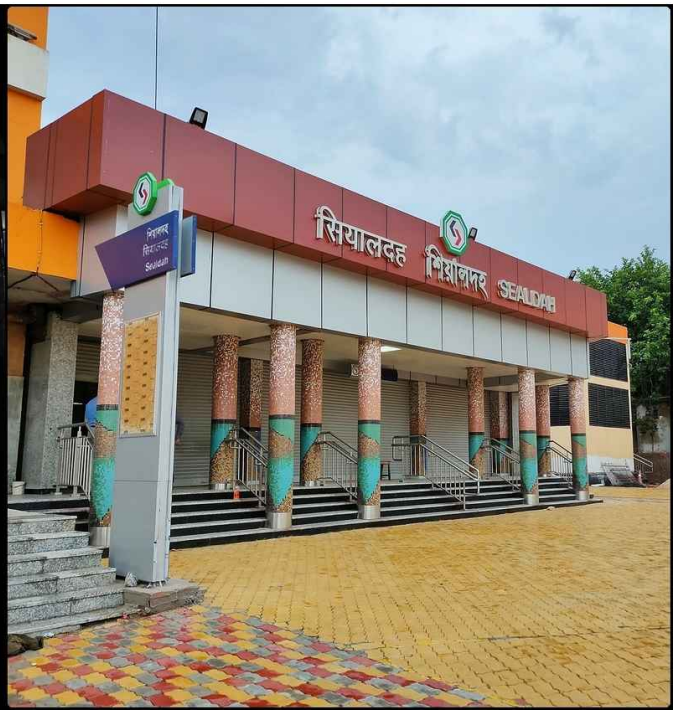




depot of KMRCL. There we got to see the Centralised Panel Room from where entire operation is controlled and monitored. We learnt that even an escalator movement in any of the 12 stations of East-West corridor can be managed from this Centralised Control Centre. The introduction of sophisticated modern technology has changed things around big time. Arrangement for a quick round of snacks was just the sort of break everyone desired. Having fulfilled all the desires, we got into the final phase of our itinerary – a visit to the Stabling Yard where the beautiful grey-violet BEML beauties were quietly cooling their wheels as the earlier rakes shared space with the newer ones.

It was indeed an experience of a lifetime for Team TrainTrackers. We express our heartfelt thanks and gratitude to the Rail Enthusiasts' Society (Kolkata Chapter) and KMRCL for arranging this outstanding event which enabled us to learn, to observe and to get a first-hand experience of this state-of-art metro system which marked its footsteps to rewrite the history of urban transportation in our beloved City of Joy.

Photographs courtesy: Anamitra Bose, Arkopal Sarkar & the author



COROMANDAL EXPRESS
করমণ্ডল এক্সপ্রেস
कोरोमंडल एक्सप्रेस

CHENNAI MAIL
চেন্নাই মেল
चेन्नई मेल

12841 UP M.G.R. 12840 DN
SHALIMAR **CHENNAI** **HOWRAH**
12842 DN CENTRAL 12839 UP

Coromandel Express LHBfication

Arkopal Sarkar

12841 Coromandel Express is the one of the legendary trains of Indian Railways connecting Kolkata and Chennai since 1977. The name "Coromandel" derives from the name of India's south eastern coast which this train traverses to reach Chennai. The train, which is termed as the "pulse of Kolkata and Chennai for the last 45 years", has finally been upgraded to Modern LHB coaches, replacing its old ICF-CBC rake for 5th July 2022.

Several rail enthusiasts made the moment very special with colourful banners, posters and a beautifully designed destination board. ELS Santragachi also decorated one of its HOG-equipped WAP7 # 30601 with flowers for this event.

All the planning for this event were made by an S.E.R.-based railway enthusiast group, namely 'S.E.R. fanatics' after the allocation of LHB rake to Coromandel Express in 2021. The planning started from February 15th 2022, when the group first met with the CPRO of SER and apprised him of their plans. A few days later, their proposal was accepted by the authorities. The S.E.R. fanatics created a team of 10-15 rail enthusiasts (of which TT is also a part). All designing & printing started quickly thereafter.

But before the final work could commence, GM SER cancelled the event that was supposed to take place the next day due to a surge in COVID-19 cases. As a result, everything got ruined after this declaration, but the team refused to give up! They requested the senior officials several times on the morning of the event after reaching the SRC CDO where they got the final permission to decorate the rake with banners just 3 hours before the scheduled departure of the train. Thus, the team got down to work with full enthusiasm and completed everything just a minute before the scheduled departure of the train from Shalimar station.

TrainTrackers acknowledges the efforts of Mr. Shankhadeep Maiti & Mr. Swarnendu Mukherjee, two founder members of S.E.R. Fanatics, without whose tireless labours and sheer dedication this program would not have succeeded.



Siuri -- Sealdah MEMU Inauguration

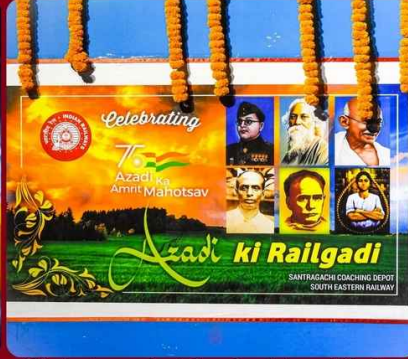
Arkopal Sarkar

On 31st July, a brand new MEMU service was inaugurated between Siuri – the district headquarters of Birbhum and Sealdah in West Bengal. The MEMU is running as an Express service and the 248 km. stretch is covered in 4 hours 37 minutes. The train number is designated as 13179 Up/ 13180 Dn and the train stops at Dubrajpur, Pandabeswar, Andal, Durgapur, Panagarh, Barddhaman, Bandel and Naihati. The train in Down direction is scheduled to depart Siuri at 05:20 hrs. and reach Sealdah at 09:57 hrs. On up direction, the train departs Sealdah at 17:25 hrs. and reaches Suri at 22:15 hrs. The MEMU started amidst much fanfare and the rake was beautifully decorated for the inaugural run.



All photographs taken by Arkopal Sarkar

AZADI KI RAILGADI



▲ All photographs taken by Arkopal Sarkar ▲

▼ Photograph courtesy: Sourav Dey & Arajit Gharai ▼





Sumit Nath



K Gautham Karthik



Roshan Rajeev



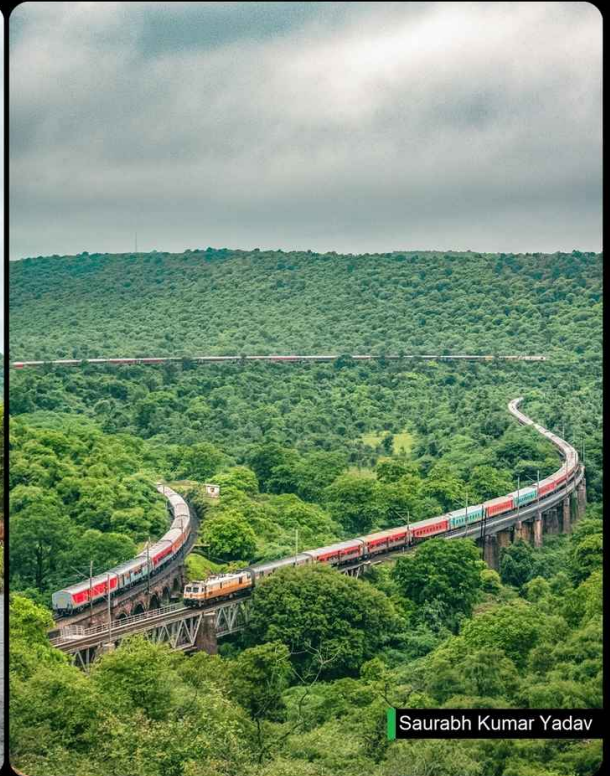
Ayan Dutta



Protkarsh Kumar



Saurabh Kumar Yadav



Saurabh Kumar Yadav



Anwesh Anshuman Ronak

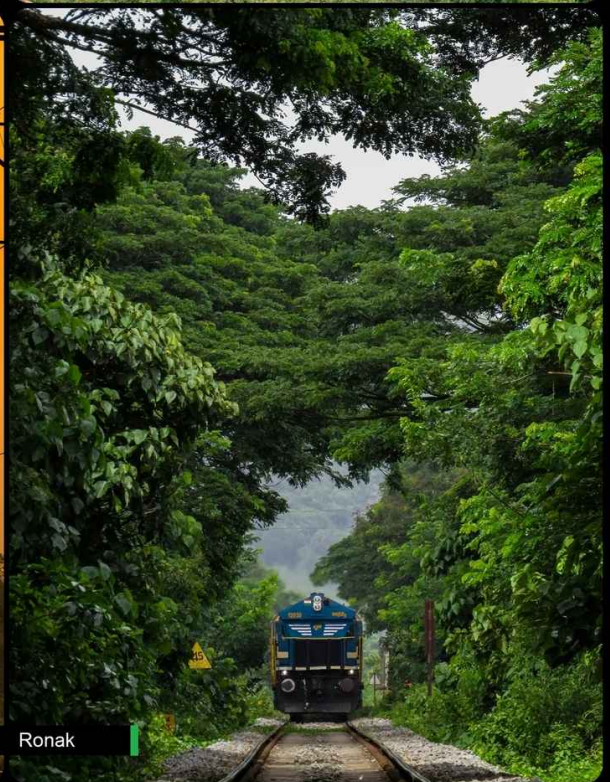


Photo Junction



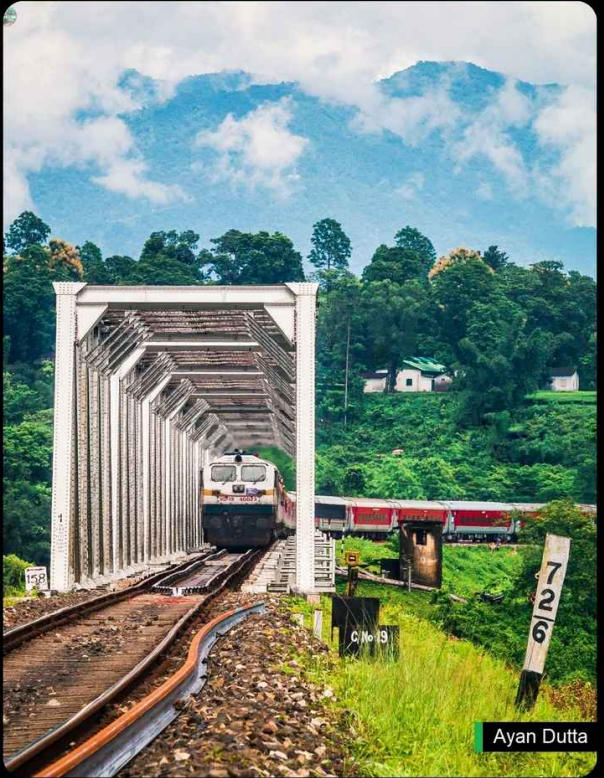
K Gautham Karthik



Protkarsh Kumar



Roshan Rajeev



Ayan Dutta



Akhil Sanjeev



Prithivi Raj



Prithivi Raj



Tryambak Ojha



Akhil Sanjeev

Non-AC Metro Rake shifted to Joka Depot Kolkata for trials



Photo credit: Mallar Banerjee

The Non-AC rakes of Kolkata Metro have already been given farewell from commercial services in October last year. But for the trial run of Joka-Taratata section of the Purple line of Kolkata Metro, one of the two remaining rakes i.e. 12/14N NGEF rake is being shifted to Joka. The rake will be taken in phases by road on trailer. On assembling the rake at Joka, trials run will start from the end of August but without any installed signalling system. On the other hand, another rake 16/18N will be taken to New Garia depot for the trial run of a similar kind between Kavi Subhas-Ruby stretch of the Orange line.

Second Pod Hotel under Indian Railways Set-up at Mumbai CSMT



Photo credit: travelbiz.com

The second pod accommodation facility of Indian Railways was unveiled at Mumbai CSMT railway station in the month of July, a first of its kind under Central Railway's jurisdiction. Also, it's the 3rd pod hotel setup in the city of Mumbai. There are 40 pods in total which includes 30 single pods, 6 double pods & 4 family pods. It is managed by Namah enterprises & is located near the waiting room of CSMT's long distance concourse. As of now, the tariffs are very minimal, starting at ₹499 for a 12 hours reservation in a single pod which makes it cheaper than the pods located at Western Railway's Mumbai Central.

Historical Railway Line Unearthed in Howrah Railway Station



Photo credit: The Telegraph

On 4th August, the excavation works of East West Metro's Howrah station unearthed a railway line in the Howrah station premises. The railway line was discovered near the parcel shed and is believed to be dating back to the 19th century. The first train from Howrah chugged off in 1854 towards Hooghly and departed from the same place where there is now a parcel shed. Years later, platforms 1, 2 and 3 were shifted to the 'New' station of Howrah which is now known as old complex. The old line was developed as a parcel shed. Members of the Railway Enthusiasts' Society (RES) were actively involved in this heritage exploration and its recognition.

NEWS STATION

World's Highest Railway Bridge Over Chenab All Set to Connect Kashmir with the Rest of the Nation



Photo credit: wsp.com

Located at a height of 359 m above the river Chenab, the 1.3 km long single arch Chenab bridge is all set to provide an all-weather rail connectivity to Kashmir. The "Golden Joint" (a term coined by the civil engineers) connecting the two ends of the overarch deck was inaugurated on Saturday i.e. 13th August, 2022. As a matter of fact, the bridge is 30 m higher than the world famous Eiffel Tower in Paris. A part of Northern Railway's ambitious USBRL (Udhampur - Srinagar - Baramulla rail link) project worth Rs 28,000 crores, the bridge has been constructed by Afcons, Mumbai on behalf of KRCL (Konkan Railway Corporation Limited) & the total cost of construction was Rs. 1,250 crores. Given the height & the challenging geological conditions, it has been specially designed to withstand earthquake forces of zone V & winds up to 100 kmph using steel fabrication of 28,660 tons & concrete filled trusses. Once operations begin, the bridge will connect the already existing, isolated rail connectivity between Banihal & Baramulla to the rest of the Indian Railways network.

Bharat Forge and Talgo join Hands for High Speed Trains



Photo credit: India.com

Bharat Forge Pvt. Ltd. and Spanish Firm Talgo has signed an agreement to manufacture high speed passenger trains for India. Talgo, previously conducted a trial run of their coaches in Indian Railways tracks clocking upto 180 kmph in 2016 but the deal was not finalized because of many technical adversities. This time, the plan is to set up a manufacturing plant to design, build and provide life cycle support to lightweight high-speed passenger trains in India under the Make-In-India initiative.

Kangra Valley Railway Service Stopped Indefinitely



Photo credit: Somsubhra Das

Train services on the Pathankot-Joginder Nagar narrow gauge railway section was closed indefinitely from 1st August. The closure happened as a result of a weak Chakki River Railway Bridge near Kandwal in the Nurpur district of Himachal Pradesh which was declared unfit for railway operations by the railway authorities. The damage has been attributed to the illegal sand mining activities in the vicinity of the bridge which has weakened its pillars and supporting walls.

Odisha The Railway Story

Dilip Kumar Samantray



Odisha The Railway Story

The Indian Railways are often called the 'lifeline' of the nation. Apart from being an important mode of transportation for freight and passengers, the railways in India have been a great integrating force for more than 150 years. This book, besides narrating the captivating saga of the Indian Railways, is a maiden effort to bring out the role of railways in the history and development of Odisha.

In spite of hundreds of books written on the railways in India, none celebrate the socio-economic evolution of an Indian state in tandem with the growth of rail transportation. This is what this unprecedented book, Odisha – The Railway Story is all about.

"Odisha - The Railway Story" is a commendable effort by the author in tracing the history of railways, especially focusing on the association between railways and the development of Odisha. It tells many fascinating stories about Indian Railways in the course of its long history. All great women to the author for this fine reading treat!

Dr. Pradip Bar
Padma Bhushan, Jangpoh Award Winner.

The Author

Dilip Kumar Samantray served the Indian Railways for over three decades before taking up the assignment of Managing Director, Orissa State Roadways Ltd. Shri Samantray has been an active contributor to the growth and development of several railway infrastructure projects in Odisha. He is passionate about the glory of the railways and its contribution to the nation.



COMING THIS SEPTEMBER!!!