REMINISCENCES OF A RAILWAYMAN

S. NATARAJAN

GENERAL MANAGER (RETIRED)

INDIAN RAILWAYS

DEDICATION

Hundreds of Railwaymen with whom I have interacted during my career on Indian Railways will be remembered by me for ever with fondness and love. Many of them have been behind me in my achievements ; more than that, they have all contributed to my happiness at work and outside. It is to them that this Book is dedicated.

CONTENTS

	Preface	7
1	The probationary days	9
2	My First Boss	18
3	On Drafting letters and Bogie cracks	19
4	How is the firm's man present when we are discussing the Tenders ?	21
5	Did they bother you too much ?	22
6	A subtle message	24
7	A DEE becomes DOS effectively	25
8	A Traction Rectifier comes back to life	28
9	The cheque that was not cashed for months	30
10	From concept to commissioning	32
	- A DC Traction Substation takes shape in ten months	
11	A "Cock-and-Bull" story	34
12	Learning from each other	35
13	At the Davis Cup Match	37
14	These things happen	38
15	The Engine had failed but the DME was smiling	40
16	A DC EMU operates in AC territory	41
17	A point of view	42
18	Patriotism is penalised	43
19	No information ever goes waste	45
	- No work ever goes in vain	
20	Faith in Fundamentals	47
21	Legal advice	50
22	Contrast	52
23	The Nomex Mica wrapper	54

- A day's labour achieves a break-through

24 The first Kapton-covered Conductor is made in India 57

25 Hey, Jagdish ! (O, God!) 60

26 The useful role of odd and even numbers 63

27 I stood upon a table for hours 65

28 A production crisis averted 66

29 An Armature Winding is X-rayed 68

- And what a revelation ?

30 Over-emphasis creates problems 72

31 A bill for tea that was only years late 75

32 When drops drowned me, a deluge came to my rescue 76

33 The introduction of Dynamic Braking on WCG/2 Locos 79

34 How brainstorming helped re-design a carbon brush 82

35 An indigenous Test Plant at one-fifth the Imported cost 84

36 The operation was successful - but the patient died 87

37 The public are our masters 89

38 A productive meeting 94

39 A turning point 96

40 The Manabar Experimental Project 98

41 A point scored for Railway staff 102

42 Arbitration 104

43 Secret Code helps Scrap disposal 106

44 How Random Numbers helped 108

45 A Truth that was stranger than fiction 110

46 A Surprise Inspection produces results 112

47 The Noting side and its Pitfalls 114

48 The Hattangadi Chart 116

49 Systems, Methods and Styles in Managment 119

50 Accidents 124

51 Hindi - the official language 130

52	A Faux Pas	135
53	Moments of Discomfort	136
54	Food for thought and action	141
55	I bid good-bye to Railways	148
	Epilogue	150

APPENDICES

A. Indian Railways - An overview (i)

B. Explanation for Codes, Acronyms and Abbreviations used in the text (vi)

C. A sample Hattangadi Chart

D. A page from a 3 digit Random Number table

E. A map of Indian Railways

PREFACE

I joined the Indian Railway Service in the Electrical Engineering Department on 5th April 1954. I retired from the service on 5th August 1988.

In a career spanning 34 years, I served on the Southern, Central and South Eastern Railways, Chittaranjan Locomotive Works and the Research Designs and Standards Organisation of the Indian Railways.

It so happens that it was these three to four decades that witnessed momentous, quantitative and qualitative changes for the better in the responsibilities and career opportunities of Electrical Engineers on Railways, arising primarily from technological advances in the field of Electric Traction and the progressive switch from " Steam to Diesel to Electric " Motive Power for operation of Passenger and Freight trains on most of the important trunk routes. The single most significant development responsible for this sea-change was of course the introduction of 25 KV AC Single Phase 50 Cycles system of traction and its success in improving operation.

After the disintegration of the USSR, India ranks as the `Number- One' Country with the largest Electrified Railway Network in the world. Twelve thousand route Kms out of a total 60,000 route kms are electrified and over 50% of all traffic is carried on Electric traction.

I was fortunate to have been associated with some of the landmark developments and challenging assignments in the field of Electric Traction, such as :-

- The change over of the Madras Beach-Tambaram meter gauge section of Southern Railway, from 1500 Volt DC to 25 kv AC traction (1967).

- The establishment of manufacture of the TAO-659 Traction Motor and quite a number of other traction equipments in Chittaranjan Locomotive Works; and the indigenous development of components and materials required for their manufacture (1968-75).

- The introduction of Rheostatic Braking system on the 1500 Volt DC WCG2 locomotives employed on the Bombay division of Central Railway (1976-77).

- The setting up of Traction Machine Workshop on Central Railway at Nasik Road (1977-81).

- The selection of prototype 6000 HP, 25 KV AC Thyristor Locomotives for trials (1984-85).

- The introduction for the first time on Indian Railways and perhaps in the world of Thyristor-switched Capacitors at a Traction Sub station for Power factor improvement (1986-88).

Besides, towards the end of my career, my assignments in General Management on South Eastern Railway -- as Additional GM in 1986-87 and as GM for six months in 1987-88 -- provided me with unique opportunities for contribution in many other facets of Railway working.

I recall that there were so many days, which were packed with events, incidents, problems solved and technical and managerial decisions taken, some of them of far-reaching consequence and importance. There were also quite a few episodes -- unusual, interesting and humorous -- which brought out the character or stamp of the persons and threw up the oddities in the "system".

I felt that putting down some of my unforgettable and unusual experiences may be a good thing to do, as I believed that such a compilation may guide, inspire and motivate not only serving Electrical Engineers of the Railways but also new entrants to the Cadre, for them to aim at and achieve professional and managerial excellence. I thought that some of the anecdotes would be of interest to managers in other fields, within and outside Railways.

This, then, is the excuse for "Reminiscences".

I have, however, gone beyond mere recounting, in these pages. I have thrown up suggestions, advice, criticism and food for thought and action by today's policy makers on Railways, in the limited areas which are covered by or are related to the experiences of my main narrative. I know that there could be and that indeed there are different points of view, conflicting with or contrary to mine, and that possibly they may be justified too. I have merely stated what I have honestly felt to be correct and would not like to be drawn into any controversy on them.

I wrote Reminiscences almost at one stretch in 1992. But, for various personal reasons and other preoccupations, I had laid the draft aside and did not pursue seriously the small effort that was required to be put in to give Reminiscences the shape and form of a Book. Some friends and well wishers have now persuaded and encouraged me to complete this task and assisted me in more than one way to bring out this publication. To them, I owe a deep debt of gratitude.

NASIK ROAD S.NATARAJAN

April,1995

THE PROBATIONARY DAYS

The stipulated period of 24 months was cut short in my case by 2 months. Of the 22 months, approximately 15 months (April 54 - June 55) were spent on Central Railway and 7 months (July 55 - Jan 56) on Southern Railway.

There was no organised system of training for Electrical Probationers in those days. There was no Institute, no formal instruction, not even a co-ordinating authority to look after the progress of training. The probationers were sent from place to place and were generally left to fend for themselves, as best as they could. This system -- or shall I say lack of system -- prevailed for the earlier batches and many of the subsequent batches too. How lucky today's probationers are ! Their training is carefully arranged ; progress is monitored closely; and above all, the entire training effort is co-ordinated and looked after by the Indian Railways Institute of Electrical Engineering (IRIEEN) at Nasik Road.

However, I may at once say that I did learn a lot in my probationary days. The very flexibility in the environment provided opportunities to see some problems at close quarters, although many other areas were left untouched. The kind of "anarchy" that prevailed then had its interesting moments too. I shall narrate some experiences, which are uppermost in my mind.

i) Within a few days of our reporting at Bombay, the CEE/Central Railway gave me and another probationer a special task. The Tenders for Turbo-alternator sets and Boiler equipments for a 18 MW expansion to the Thakurli Power House had just been received. We were handed over the offers - running to many volumes and were asked to go through them from A to Z and tabulate the salient features, to enable appraisal by the Railway. I had never seen any Tender papers earlier, not having had any work experience. But I had the benefit of a 3 months training in 1953 in the Bokaro Thermal Power Station of the Damodar Valley Corporation, as part of my academic career at the Indian Institute of Science, Bangalore and during this period I had occasion to study very closely the working of a 50 MW

set - probably the biggest power plant in those days in India. This background stood me in good stead. We completed the assigned task in ten days, in what we thought was a comprehensive manner. I suppose this effort must have benefited Central Railway, for the tenders were finalised in quick time and orders were placed. The Thakurli Power House has been closed down for some years now: a later Chapter in these Reminiscences refers to the circumstances leading to the closure.

ii) The foundation course in the Railway Staff College, Baroda in May-June 1954 will be remembered for three things.

a) The terrible heat in the barracks where we lived.

b) The obvious difference in life-style and manners of the direct recruits and the "Jamalpur Boys". The latter were better dressed; probably many of them came from aristocratic background; knew table manners better; played Contract Bridge with the Principal; and knew quite some Railway jargon, abbreviations and codes like COPS, Power (for loco) and so on, which they aired on every conceivable occasion generally to impress others. It took some time for us, the probationers to overcome the inferiority complex that developed; but when we finished the course, the gap had narrowed. Besides, it was understood on both sides that in areas that mattered the probationers as a group were at no disadvantage whatsoever.

c) An incident on a Sunday morning - about 7 A.M. We had finished the final examination the previous day. Some of us had just got up from bed. Suddenly, I heard the Principal's shout in the corridor.

"King of dance, you have passed". The Principal used to call me sometimes King of Dance -- a literal translation of my name. "Thank you, Sir". I remembered how I was struggling to find the right answers to some questions in the Civil Engineering paper, which was his subject and how the Principal who was also doing the invigilation, used to stop near me, breathe down my neck, looking at whatever I was scribbling and go away with a shake of his head. I had almost reconciled myself to a failure in that subject. The Principal's second shout woke me

up from my reverie. "You know, many of your answers were not right. But then, there was one question to which you only had the guts, in the entire class, to say that the question itself was absurd. Indeed, the question was absurd -- deliberately so. Evidently, you had grasped the essentials. That answer clinched the issue in your favour". So saying he walked away, his two hundred pound frame swaying from side to side as usual. I don't remember precisely what question that was -- something relating to Points and Crossings, perhaps, I was relieved. My gamble had worked. More than my guts, I thanked my lucky stars.

iii) It was a difficult and delicate mission, for a probationer who had hardly completed 3 months in service. I was despatched by the CEE/C.Rly. to Jhansi, with a confidential letter to the DEE. There had been a report that proper accountal had not been kept of a number of materials -- quite a few of them imported -- which had been received for rehabilitation of the boilers of the Jhansi Power House and that DEE/Jhansi was responsible for this state of affairs. My job was ostensibly to assist the DEE in checking up the ground stocks; but I had a vague suspicion that the idea of `some one' in the department was to `fix' the DEE and that I was being used as a tool in the game.

The DEE was an amiable person. He deputed one of the supervisors to assist me in the physical verification of stocks and to draw up a status report. I had no idea what registers were to be kept as per rules, what formalities were to be complied with, etc. But I did find that we had to dig out almost `excavate' -- quite a few superheater and economiser tubes and fittings from one foot of mud and earth in the compound adjacent to the Power House.

It was a task to do the reconciliation with the list of materials as received, which was available in the records. The unexplained shortage was not anything significant and it appeared to me that the reconstructed accountal did not throw up any major discrepancies to warrant motives to be attributed to the DEE.

On return to Bombay, I signed the list of actual ground stocks as verified by me with the local supervisor and gave only an oral report to the CEE that not much discrepancy was there. I must have stayed in Jhansi, about a month. I used to share lunch many a day with the

DEE (and my breakfast was quite often with the WM). When I got tired with my specific assignment I picked up a few things in electrical maintenance on the General services. I even assisted the DEE in his inquiry into an accident which occurred in the Power House. But all the time, there was an uneasy calm that prevailed between us. When I left Jhansi, I was really relieved that it was all over. I did not care to find out what came out finally of this exercise.

Looking back, two aspects strike me.

- Why at all did the CEE resort to putting a probationer with no experience, on this kind of fact-finding (fault-finding?) mission, when so many straight-forward alternative methods of tackling the situation existed; and I did not have the courage to refuse such an assignment?

- My contribution towards improvement was next to nothing. I suggested better storage; painting of some of the steel items to protect against rust. But I did not propose any re-arrangement of materials in a covered shed, nor did I suggest a proper register to be introduced, as required by rules. I left the stuff very much in the same condition as I had seen them except that a few items had been dug out and kept on the ground on some supports. May be, I was not expected to contribute towards any improvement. But today, I cannot help realising how awfully inadequate I was for the job.

iv) Another specific assignment that came my way was the accountal of coal that was delivered at the Thakurli Power House. Mr. J.D.Malhotra who was the boss wanted an analysis to be done from A to Z , a correct assessment to be made of specific fuel consumption (kg of coal per KWH generated) and a report to be submitted to him in 10 days. I must have gone up and down the Conveyor belts, walked round the yard and coal stacking area and boiler house bunkers so many times to see things for myself. The officer in-charge of "Stores and Statistics", who was one year my senior, was a great help giving me figures from the record books and documents.

This effort was a good experience in making observations, compilation of facts and figures, analysis and presentation of a comprehensive report. Mr. Malhotra was happy when I handed over the report to him. I do not think there was much new in my report that he did not know already. But he had succeeded in his objective, which I suppose was primarily to educate and inform me. He was an affable and genial person and on the few occasions that I met him later in my career (He rose up to become Adviser/Elect. Railway board) I could not but recall the first impact he had made on me as the boss of the Thakurli Power House. And he was a " Jamalpur boy" !

I did not know when I was in Thakurli - indeed how could I know it -- that in less then a year I was destined to report for training on Southern Railway to a person, who was quite a contrast in sportsmanship like the officer under whom I had to spend a few months of my training. I suppose the thrill in one's official career as well as in private life is that one meets people of different hues and shades and willy-nilly learns to get on with them.

v) A funny incident happened when I was under training in Kurla Car-Shed on Central Railway.

A Transformer (BTH make) with automatic tap-changer had been brought into the shed from Dadar traction sub-station for attention to a winding fault. It was a good opportunity to learn how an automatic Tap Changer works. The core (with winding) had been lifted out, the fault located and repaired. The old oil had been removed; the tank had been flushed clean and new oil had been filled. The core and winding had been lowered. All this work had taken some ten days. It was then that an Indian Engineer -- representative of BTH -- who was watching the operations, got an irresistible impulse. He wanted to satisfy himself, for whatever reason, that the job had been done properly. He got a ladder, climbed upto the top and bent down to have a look. His costly imported pen dislodged itself from his shirt pocket and fell into the transformer tank. He got off the ladder with a sheepish look. There was no doubt that he wanted that his precious possession must be recovered and restored to him. He would not express his desire, though. The railway staff who did the work were also keen to get that stuff out, for, it was after all "foreign" material. It all meant re-doing quite a few

operations and another couple of days lost in restoration of the transformer back in service. The Engineer got back his pen. Of course, I had learnt two invaluable lessons, which I have faithfully followed ever since.

- If you have nothing to contribute, keep quiet.

- Empty your shirt pocket (and trouser pockets if necessary) of all contents before you venture to do any inspection of this nature.

vi) It was while in Jhansi that I copied in my handwriting, page by page, an excellent document, some 100 pages in length. It was a report dated 1930 of the Consulting Engineers, Merz & Mclellan, on the "1500 volts DC Electrification on GIP Railway". I had picked it up from the library of the CEE at Bombay. I had been told that it was the only copy available and that I should return it. It was a well written narrative report full of essential information on Sub-Stations, OHE, Rolling Stock, the Thakurli Power House, the high voltage transmission lines of the Railway etc. and contained some explanation as to why certain features had been adopted on this Electrification. As I wrote the pages and copied the diagrams with diligence and patience, the facts and figures were absorbed by me as it were, quite easily. It was an effort that took many days. Unfortunately, I misplaced this manuscript later -- during one of my transfers perhaps -- and never recovered it.

Years later, a couple of years after my retirement, when I was functioning as RITES Consultant to Central Railway I wanted to refer to this masterpiece badly, to get some information regarding rail-earth voltage, in connection with a Project I was doing on "Fires in DC traction sub-stations". I knew that the information was there in that Report; but in spite of my efforts I could not get hold of it from the library of CEE/C.Railway, or from the Bombay Division of the Railway.

I have a suggestion, born out of this experience. Well- written technical documents, Reports, Proceedings of conferences and the like need to be preserved. Such documents as Nouvion's Report (1955-56), The Proceedings of IEE conference on 25 KV. AC traction in UK;

the Lille convention papers on AC traction (1955) come to my mind in this context. In fact, these documents deserve to be preserved. They have value for the future generations of Railway Electrical Engineers, I can think of no better place than IRIEEN Nasik Road, to undertake this effort of documentation. Latest tools and techniques available in the field of Information Technology could of course be used to economise on space requirement for such documentation and presentation.

Photo-copying or "xeroxing" is the fashion today and may continue to be very much in vogue in the Twentyfirst century too. If it had existed in the fifties, my impulse would have been to get a xerox copy of the Merz & Mclellan Report. But I am reasonably certain that I may not have gone through a page of that Report. Certainly, I would not have grasped the contents as much as I did when I took on myself the job of writing the Report down. The tendency all too often noticed these days of busy executives to get a XEROX copy of any matter longer than a couple of pages is a sure sign that it will not be read-certainly not that day but most likely forever too. One has to strike a balance somewhere and make effective use of modern facilities without losing sight of the real objective- viz. the stuff is there for one to read and absorb now or later.

vii) It was December 1955. I was at Madras undergoing training on Southern Railway, I wanted to have a week off, to go to Bombay and relax generally. I met Mr. S. K. Gopinath the Dy.CEE/Southern Railway and conveyed my request. He said, "Yes, you can go, provided you tackle a job successfully. There is an Air-conditioned coach in Madras Central Yard. There is some problem with it on the electrical side. We want it desperately for service. They are on the job for almost 4-5 days now but have not been able to put the coach right so far".

I thanked him and left for the Train Lighting depot.

Mr. D.M.Conyers, the foreman was a soft-spoken, pleasant chap. He took me to the coach and showed me the problem. The contactors, connecting the generator to the battery and the load were behaving erratically. They would close at times but refused to close at other times. I explained my predicament to the foreman and my keenness to leave for Bombay the next day. Mr.Conyers left all his other work aside. We sat down together to

check the wiring, continuity etc. He knew the layout well, I did not; but did my best to give him moral and technical support. We must have spent at least three hours crouching, lying in front of the panel, connecting, dis-connecting, pulling at wires etc. We were working in poor light. It was about 7 p.m. Suddenly, there was a spark from the panel; I had, in my efforts, inadvertently touched something. It was a coil of one of the relays of the closing contactors. It was most likely that there was touch-and- go connection at the termination of the coil winding, and that I had opened it up. We looked at each other. The fault had been located. Because it was intermittent, it had not shown up easily. The relay was replaced ; the job was over, and the coach was functioning normally. I telephoned Mr. Gopinath that night and left the next morning by the Express for Bombay, and thanked my stars. What a lucky BREAK that was!

Mr. Conyers went up to the position of Dy.CEE on Southern Railway and retired.

(viii) The training in Perambur workshop is remembered for three aspects.

(a) I was on shop floor most of the days at 7.00 a.m.(the shop started at 6.30 am). Almost the first thing I noticed was that in front of the " Train lighting and Air-conditioning shops" -- a bald headed person around fifty with Smeared ash and kumkum tilak applied on his forehead, dressed in half pants and tucked in shirt used to line up all chargemen and important front-line fitters before him. He would go from person to person, talk about the allotted work of each for the day and give him further instructions as necessary. The whole operation used to take about ten minutes. Only thereafter the men would disperse to their respective places of work. It did not take me long to find out that this person was the Foreman-in-charge, the boss of the place. I have not come across this feature anywhere else in my entire service, nor have I attempted to enforce this system in any jurisdiction under my control later. I would still consider that if this discipline can be enforced it would be a good thing to do. Success in enforcement would depend on the personal magnetism of the foreman/shop superintendent and his relationship with the subordinates.

(b) Whatever little I learnt of air-conditioning and train lighting was gathered mostly through working closely with two persons in this shop - Mr. John Joseph, Chargeman and Mr. Kurup, a fitter. All about Dynamos, contactors, relays, junction boxes etc. was picked up.

There was a problem which the shop faced one day when they tried to commission a brand new Motor Generator set for battery charging. The generator would not build up voltage. The supervisors were getting perplexed. Reasoning that this problem could have arisen from residual magnetism having somehow been wiped out I suggested separate excitation of the field in the proper direction for a short time. This over, when the machine started again , the MG set behaved normally and the Generator built up voltage correctly. The supervisors were relieved and happy that they did not have to answer the AEE or DEE for delay . It is quite possible that this particular incident made my relationship with them easy and friendly and they were prepared to share with me certain practical aspects of work.

(Mr.John Joseph rose to the position of DY.CEE and Mr. Kurup became a DEE on Southern Railway before they retired. Well deserved in both cases, for they knew their jobs well all along and had the right attitude to work).

(c) In the Electrical workshops of Perambur and its counter part in Golden Rock, which used to be called "Post-war Reconstruction Workshop" what impressed me most was the willingness to take on any job. I particularly remember how Perambur shops developed a Berth light fitting and made every part within the shop itself. One part was a cylindrical plastic knob (knurled), to be fixed to the spindle of the on-off control switch. I remember the effort put in by the shop for fabricating an Injection Moulding Machine from shop scrap and for making the dies, heaters and establishing the moulding process by trial and error and finally succeeding in their effort. And that was at a time when the plastics Industry in India was in its infancy.

Of course, the Berth light fitting design has seen many changes since then. If I remember right, it has the distinction of having featured for the maximum number of times at meetings of the Electrical Standards Committee for years.

The berth light fitting is now a "bought out" item procured though the Stores Department. Indeed quite a few items have been transferred progressively over the years from "Shop manufacture" to "bought out" category. This change has primarily come about as a result of the overall Railway policy to contain staff strength and to concentrate on 'core' areas of manufacturing and repair activity. Likewise, there is an increase over the years in scope and nature of works done through contract not only for construction but also on maintenance activities on outside firms. While these trends may be considered to be inevitable, as Railway 'operations and responsibilities grow bigger and bigger, I cannot but warn against certain pitfalls. Specifications, drawings, quality control procedures, precise definition of work, inspection methods etc. are important whether an item is made in Railways or bought out from an outside firm; whether a work is executed departmentally or through contract. But their role is much more crucial and significant from every angle if an outside agency is employed rather than if the work is undertaken within the Railway. Are Railways taking care of this aspect? Introspection is necessary here.

Today the easy way out is considered to be to purchase an item or to let work on contract. This approach is spreading even to very small jobs and to areas which are peculiar to Railways only and have a direct bearing on safety. This trend is causing concern to me. It is not uncommon to see jobs being given to outsiders, in areas where speciality and expertise has been built up within the Railways through struggle over years.

The versatility, willingness to take on challenges, and the capability to deliver the goods, which were once associated with the Railway engineers (Civil, Electrical, Mechanical or S&T) are gradually disappearing. Railway engineers were once upon a time considered to be the first choice for filling up important positions of responsibility in Public Sector and elsewhere in industry; but this is not the situation today. If one does not take up challenges in one's own domain, the touch and confidence are lost and this is not a good sign for the future. The importance of engineering as a profession as distinct from merely the ability to manage has to be recognised. It is necessary that in the madness and the pressure to reduce

staff strength, to offload items to contracts or trade etc. we do not lose sight of this important aspect. Will the policy makers put on their thinking caps and wake up to realities?

(ix) In my probationary days on Southern Railway, I spent quite a few months at Madras. I used to live in a good hotel at Madras Egmore, about five minutes from the Egmore Traction Sub- Station. One day, I came to know from the Technical Assistant (Traction) that the same night, they were going to open up a 750 KW Mercury Arc Rectifier tank at the Egmore Sub-station, for a thorough overhaul. I did not want to miss a unique opportunity. Around midnight, I walked up to the Sub-station. They had commenced the operations and the DEE/traction was present. I greeted him but there was no response. It was fascinating to watch the foreman Mr.Muthukrishnan do every thing so systematically, as if with the expert hands of a surgeon-cleaning the mercury, the anodes and the tank, providing new gaskets, tightening the bolts etc. I thought I had seen something worth while and learnt a lot. I thought no more about the DEE's indifference and lack of warmth towards me.

In the course of a conversation with this gentleman's successor a few months later, I came to know that my visit to the sub-station after the DEE had come there that night was considered to be an act of indiscipline !

(x) In 1954-55, I was subscribing for three technical magazines published from U.K. - The Electrical Times, The Electrical Review and the Railway Gazette -- from out of my salary, however small that was. The very thrill of handling new magazines was one thing that was looked forward to every fortnight. The magazines were read from cover to cover including the "ads", which were quite eductive. I used to share the magazines with other fellow Electrical probationers. When I left Bombay for continuing my training on Southern Railway, Mr. S.S. Narayanan, an Electrical probationer of the next batch moved into the same Paying Guest accommodation, and continued the subscriptions. Later perhaps the system died a natural death.

In the confidential Report forms, one of the items to be commented on is "Does he keep himself abreast with latest technical developments?." The answer is invariably 'Yes' in

most of the Reports. However, has any thought been given to how an officer can go about this business of "Keeping abreast?" The Railway Board may be too busy to look into such trivialities. I am sure however that IRIEEN and similar Institutes for other disciplines can do some positive thinking in this regard. As a first step, a rational system of distribution and circulation of the numerous technical magazines and reviews already being received by a Railway in its various offices and at various levels should be worked out as to reach them to young interested officers.

(xi) The only written matter that I ever sent in my entire career to a Technical journal outside India was when I was a probationer. It was a very small effort-description of an interesting experience I had while testing a single phase motor. Electrical Times, London published my contribution in one of the issues of September '1955 and sent me a cheque in pounds sterling.

I have long since lost my office copy and cannot bring myself to remember the details. All that I can recall is that it was a capacitor start motor of 1/4 HP or so, which had been brought to the Tambaram Car Shed, with the complaint that it would not work after it had been rewound/repaired. The starting winding and capacitor had not been connected correctly with the centrifugal switch; and the Car Shed foreman and I stumbled on this fact, after we measured through testing, induced voltage on the starter winding, through transformer action from the 'main winding'. I was truly fascinated by that observation which was what prompted me to send the details to Electrical Times. I believe it must have had some merit, for it to be accepted, published and paid for.

MY FIRST BOSS

I remember with admiration and love, my first boss Mr.G.K.Ambady, Chief Electrical Engineer, Southern Railway, a person full of drama, humanity, wit and humour and a twinkle in his eye all the time. He had his failings which made him unpopular with some officers. To me, he was a great personality. There were countless occasions when his way of tackling men and matters taught me a lot. In today's context, when the responsibilities of the Electrical department have grown so much with expansion of Electric traction and other activities, the leisure, humour and the sparkle that characterised that person may perhaps be difficult to expect from the present day Chiefs.

I visited Mr. Ambady in his house in Cochin sometime in the seventies long after his retirement. He recalled our association fondly and extended to me warm hospitality. He died a few years later.

I cannot resist the temptation to put down in these "Reminiscences" some events which are so vivid and clear even today. The next four chapters are in a sense dedicated to the memory of Mr. Ambady.

ON DRAFTING LETTERS AND BOGIE CRACKS

Mr. Ambady was a master of the English language. Perhaps one of the reasons that I got on famously with him was because I could produce a draft letter or report which met his exacting standards. I remember two instances.

i) 1956, It was only a few months after I had occupied a working post. There was an accident (with no serious repercussions, though) in which an EMU train collided with the rear of a stationary train ahead. The accident had occurred due to non-observance of the rule regarding passing an automatic signal showing danger aspect. Mr. Ambady asked me to draft a letter to DEE/Traction pointing out the rules in this connection. Why the CEE should have chosen to write to DEE/T on this subject is not clear to me today. But at that time the question just did not occur to me. I went through the relevant General rules (GR 276,277 etc. in those days) and the Subsidiary rules many times over, drafted a half page letter bringing out the essence of the rules in direct, simple and clear sentences. and showed it to him. "Excellent. Issue it - under your signature" was his comment. I don't seriously believe that the letter made any difference to operation or safety. But it certainly improved my ability to think and write clearly and precisely. Perhaps, that was all Mr.Ambady wanted to achieve.

ii) A few months later Six 4 car DC EMU's had been imported from Breda, Italy in 1956 and commissioned on the sub-urban section. It was the DEE traction, Tambaram who bore the brunt of the efforts that were necessary for commissioning trials, evaluation, tackling teething problems, thinking of modifications/improvements etc. I was in headquarters at that time and kept in touch with the field situation by frequent visits and was generally au fait with the details. The CEE wanted me to put up a status report for being sent to the Railway Board. I compiled one with the facts and information available, giving a list of technical problems, modifications being considered etc. and put up the draft in three pages to CEE for approval.

Back came the draft, with just one correction. I had said at the end of the letter that "there have been no other problems". He merely added 'So far' at the end this sentence. The letter was sent to the board. The next morning, there was a phone call from the DEE/Traction. The headstock of a motor bogie frame (all-welded construction) had cracked right through the section. It was quite a serious matter. Was inclusion of "so far" a premonition or was it merely the result of experience -- I wondered. The story ends here as far as Mr. Ambady was concerned. But there are some side-lights or digressions which I must share with readers.

(a) Similar cracks started appearing soon on almost all the other bogies of the same stock in epidemic fashion. The EMU's had to be continued in service, however. By way of abundant caution and prudence, the DEE/Traction decided to station a couple of fitters at the terminal stations so as to keep a watch and to withdraw "unsafe" bogies from service quickly. RDSO acted promptly by sending a Deputy Director to Madras, who produced a strengthening modification in no time. The improvement was carried out speedily on allbogie frames by ICF who were considered to be specialists in welding.

Progressively over the years, I have noticed that the involvement, speed of response, quality of decision making and association with implementation in such cases, have all been declining from the RDSO's side. My predecessor in RDSO, Mr. A.A.Hattangadi did try to pursue Railway problems with gusto and I continued that policy with some success. But of late, there is a tendency even at the highest policy making levels, to think that RDSO should not be bothered unduly about the 'Service engineering' aspect but concentrate only on Research, Design and Standards. I do not agree with this thinking or approach. I do not wish to elaborate, in this narrative, the reasons for my thinking as that many take this digression further.

(b) When I took charge as DEE/T at Tambaram some years later, there was a pending note from Audit that the Railway should recover from the Italian firm, the money spent on staff deputed for checking bogies at the terminal stations. Of course, this objection was answered and closed. I am certain however that audit objections such as this, bordering on the absurd, are by no means rare, in Government and Public sector undertakings. It is tragic that

the executive has quite often to devote his time and effort on useless occupations of this nature.

(c) 'Bogie cracks' has been a universal and chronic problem for many years on Indian Railways, on all types of Rolling stock Indian/Imported; welded/cast steel; locos/wagons; meter gauge/broad gauge; goods/passenger operation and so on - ANYWHERE.

I came across this problem on the Breda EMU stock at the beginning of my career in 1956, it was a misery in 1988, when I retired; and it continues even today some where or other on the Indian Railways. May be, the causes are different. Analysis and studies have been made, reports drawn up and some recommendations implemented. But I do not think that one can say with any degree of confidence that Indian Railways have understood the subject; or that they are in a position to assert that whatever bogies are bought or manufactured henceforth will not fail or crack up in service.

With the wealth of data available over the years, I believe that the time has come for a comprehensive indepth, 'Systems approach' and analysis to be done by the Indian Railways, associating Engineers of calibre from within Indian Railways and from outside in industry and Research and Academic Institutions. There should be no hesitation to associate acknowledged experts from outside India in the effort. A dedicated Task force with no other diversions and no departmental bias should, I am sure, be able to find a permanent remedy for this malady, which has been afflicting Indian Railways for years.

Is it too much to hope that at least from DAY ONE of the Twentyfirst century, Indian Railways will achieve total freedom from the bogy of bogie defects ?

HOW IS THE FIRM'S MAN PRESENT WHEN WE ARE DISCUSSING THE TENDERS

It was middle of January 1957.

Tenders for OHE for Tambaram-Villupuram Electrification on 3000 V DC system had been received a fortnight earlier. Mr. Ambady, had set a target that the recommendations of the Tender Committee should go to the Railway Board before 31st January. A stiff target, indeed, by any standards.

I was the only officer to assist the CEE in this matter and I had only just about ten months of experience in a working post. I did my best to study the offers and had got my analysis ready. I had briefed CEE also.

"Natarajan, FA says he has time just now to see the OHE tenders. Let us go" That was CEE on telephone one morning. I bundled the papers - the offers, comparative statement, salient points etc.

CEE and I were in FA's room in minutes. I had not met FA earlier. CEE presented an overview of the position. The comparative statement was shown. The original offers were on our side of the table. "What does firm `A' say on this point ?" FA asked. CEE looked at me. I read out verbatim the relevant portion of the offer. "And what does the firm say on this other aspect ?" was FA's next question. I read out another extract from the offer, verbatim again. I do not know what had made me do so - I had read out both portions with intonation, emphasis, pleading and persuasion as if the points put forward were gospel truth.

FA looked at me intently. He then turned to CEE.

"Ambady, since when have we started on this practice of associating firm's representatives at internal discussions and meetings of members of Tender Committee ? Surely, there is no question of negotiation at this stage?"

CEE had a good laugh.

"Rama Rao, this youngster is not a firm's man. Natarajan is my assistant officer. I should have introduced him to you at the beginning".

FA joined in the laughter. What a faux pas, he must have thought. I looked at myself. I was dressed in a good full sleeved shirt and had a lovely tie on. I realised that apart form the tone of my delivery, my sartorial appearance may also have contributed to FA's bewilderment. The meeting was over in a few minutes. The T.C recommendations were sent to the Board before the end of January. Nothing happened though ultimately. The Railway Board dropped the 3000 V DC Project.

DID THEY BOTHER YOU TOO MUCH ?

"I have to go to Tambaram Shed tomorrow, can you come along ?" That was Mr. Ambady.

" Yes, sir". "Let us meet at Egmore at eight. We shall go by the motor-man's cab". " Yes, sir".

"FC has come from Delhi. He wants to see the Car shed in connection with our proposal for import of spares for English Electric EMUs".

The conversation ended. It was Mr. Ambady's first visit to Tambaram that I knew of, in my couple of years of service on Southern Railway. I was a junior officer assisting him in headquarters. Mr.R.K.Selot was DEE/Traction/Tambaram. I knew all about the import proposal. In fact, I had drafted it. A number of traction motors, contactors, resistors, auxiliaries etc. were to be imported from U.K., to keep the EMUs going for some more years. The foreign exchange required was about Rs.13 lakhs -- a big sum those days.

The next day was Sunday. We reached Tambaram by 8.45 a.m. Mr. Ambady wished the motor man well and enquired about his family. We were in the office of DEE/Traction by 9 a.m. FC arrived at 9.30 a.m. by road in GM's car from Madras. With him were ME, GM, CE and DS. The party was shown round the shed. Most of the explanations were given by Mr. Selot and myself.

We were back in office by 10.30 a.m. After sometime, FC was ready to leave. The big size American sedan pulled up. Everyone got in. There was room for one more person in the front seat. "Come along, Ambady". That was GM.

"Mukherji, I have some important work yet to be done here. I would like to stay back. I suggest you take this youngster. He lives in Perambur. He could be dropped there. He has been out, the best part of a Sunday morning", Mr. Ambady said. The GM motioned to me. I got into the car. And the car did drop me at my residence.

First thing, the next morning I met the CEE.

"Did they bother you too much ?" he asked. I did not quite grasp what he was trying to convey. Then it dawned on me. " "Not much sir, They asked me a few more questions about the proposal", I clarified.

"You know now why I kept out of the car journey and put you in. I would not have been able to answer their questions as satisfactorily or as well as you". There was that twinkle in his eye again.

The Foreign Exchange was released soon after. The order was placed on English Electric Company and the spares came after a year or so. And that was great relief.

I did not believe then nor do I believe now that Mr. Ambady's ploy of keeping himself out of the car journey had any effect on the final results. But, then, that was his way of doing things!

A SUBTLE MESSAGE

One of the CEE's confidential stenos knew the kind of "Guru-Shishya" relationship that existed between Mr. Ambady and me. He too had regard for his old master. Mr. Ambady had retired some years earlier. The steno showed me an exchange of correspondence, on an old file, between CEE and SDGM, which brought out the man and the punch he was capable of.

SDGM in those days was really next to GM in the hierarchy, possibly a step higher than what AGM today is.

SDGM had sent notice to all HOD's of a PNM meeting (Permanent Negotiating Machinery) with labour Unions at Headquarters level. But, no representative from Electrical department attended the meeting. The result was a DO from SDGM to CEE admonishing him for this lapse and almost asking for his explanation. Reply sent by Mr. Ambady has his characteristic stamp. I reproduce it from memory.

" My dear _____

As you know, I was away in Delhi on important official work. My tour programme had been approved by GM. Mr. Gopinath, my deputy, had been nominated to attend the PNM meeting but all of a sudden there was some emergency at Cochin, which required his presence and he had to go.

I would have come over to you and explained the circumstances in detail. But I regret I am unable to do so, as I am having a bad throat and cannot speak; and I am going on half a day's leave this afternoon.

Yours sincerely,

G. K. A.

C.E.E.

CEE's room those days used to be adjacent to SDGM's room in Southern Railway headquarters. What an effective and subtle way, I thought, of telling the SDGM that he should have talked over this matter rather than written a complaining DO.

How many a bureaucrat continues to write to a colleague when a telephone call or a chat across the table would have served the purpose cheerfully and effectively ?

A DEE BECOMES DOS EFFECTIVELY

When I took charge of the 30 Km long Metre Gauge Section between Madras Beach and Tambaram, electrified on 1500 V/DC system, early in 1962, as DEE/Traction, the Electric Rolling Stock, the Substations, the OHE and the Power Supply arrangements for station lighting and Signalling were my responsibility.

Besides, the Train Controllers for movement of electric Suburban trains and the few goods trains on the section were from the Traction Substation Cadre and were also responsible for carrying out switching operations at the Substations, issue of Power Blocks etc., They reported to DEE/Traction.

Traditionally, the DEE/Traction had to keep an eye on and answer for everything that happened on the section. He had to attend to emergencies/problems that arose form time to time, co- ordinating with the DEN, DSTE, and other officers as necessary. Often times, due to operational and technical problems, the controller had to resort to "turn back" i.e. (partially cancel) or fully cancel EMU trains or run extra EMU trains not provided for in the time table. The decisions on such occasions used to be taken by the controller keeping the DEE/Traction informed or under his directions, depending upon the seriousness of the situation. Running of Special trains for the annual Horse racing season at Guindy, located midway on the section was also finalised by the Controller in consultation with DEE/Traction.

Within a couple of months of my taking charge there was a Demi-official letter to me from DOS, expressing his concern about the poor punctuality of the Suburban trains. I kept the DO aside. A month later there was one more DO on similar lines. I believed that the Chief Controller (DTNL/T as we used to call him) must have fed the DOS with the data on his own or at the DOS's request. The EMU stock and all the four DC locos were thirty years old and there were quite a few problems on spares, repair assistance from Mechanical Workshop etc., and we had to strain hard to keep services going. The DOS's letters were probably routine stuff; but I considered that it was unacceptable that an officer of the Division who contributed next-to-nothing for the operation should write to his colleague who was actually bearing the brunt day and night. And the DOS had not met me or spoken to me any time.

My DS at that time was an Operating officer. I explained to him that as the services were being managed virtually by the DEE/Traction all by himself, it was but proper that his role was recognised officially. It did not take more than five minutes for the DS to see my point. He issued a written order, some-what on the following lines, then and there :-

"With immediate effect, the running of EMU trains and goods trains hauled by Electric Locos on the Electrified Section will be looked after by the DEE/Traction. The responsibility of the DOS on the electrified section would be limited to forming the goods trains and offering them at the terminal stations, namely Madras Beach and Tambaram".

There were no more DO's from the DOS. On the contrary, the Station Masters, Guards, and the DTNL/T knew who the real boss was. It meant, of course, added responsibility officially on the DEE/Traction. But I welcomed it. I could and did take important decisions concerning operation on many an occasion, including a crucial one soon after the Anti-Hindi agitation in 1965. There was also an occasion, I remember when during my surprise Inspection of a Station at five in the morning, I exercised my authority and took up with the Station Master whom I found to be sleeping on duty. A Break-down Special had passed his station and he was totally unaware of the fact. A retired and re-employed person, he was sacked straight-away and sent home on my report.

I took this responsibility so seriously that one evening when there was a signal failure on the main line at Tambaram and a long distance train was held up, I personally carried the authority from the cabin for a mile by a road vehicle and handed it to the driver, merely to save time. In the normal course,a pointsman would have had to be sent and he would have taken half an hour to walk the distance.

The above situation existed for over a couple of years until Electrification was extended to Villupuram on the main line when the Traction charge on the Division was divided between " Traction Distribution " and " Rolling Stock " wings, with the extended jurisdiction. When the Madras Beach - Tambaram section was eventually changed to AC Traction in January 1967, the system of having a single controller to look after Train movement and Traction Power ceased and with that the DEE/Traction's role as DOS disappeared automatically.

Many years later in my career, I was once told by a Chairman, Railway Board that what stood in the way of my being cleared for GM's post was that I had not worked as DRM. I knew, of course that this was merely an excuse and that indeed there were officers working as GMs, who had not served as DRMs. But I felt somewhat upset that an Electrical officer, who even at Senior Scale Level had volunteered and shouldered wider responsibilities of operation should be the recipient of such an unliked treatment. But I did not protest or make an issue. To some extent, I was perhaps "responsible" because for certain reasons, I did not and could not take up the post of DRM when an opportunity was given to me.

GM-ship of the South Eastern Railway came my way in due course albeit on a temporary basis and it lasted a full six months. And I felt no handicap for not having worked as DRM.

I have always found that responsibilities automatically get thrust on those who are prepared to shoulder them, be it in routine activities of management or in emergencies. I can say this certainly of Government working; perhaps it is true in Public and Private sectors as

well. However, there are a few matters which have to be borne in mind. I would recommend these to aspiring young managers in any enterprise.

(i) One has to do well in his assigned sphere, before one can aspire to spread his wings.

(ii) Treading on someone else's corns is to be avoided.

(iii) Corporate goals and objectives should never be lost sight of.

(iv) A spirit of service and not profit nor power should be one's motive for handling enlarged jurisdictions and responsibilities.

A TRACTION RECTIFIER COMES BACK TO LIFE

My CEE looked worried.

"Natarajan, the Minambakkam Rectifier is out of action for six weeks now ; they are at it, I am told ; but I have no clue as to what is wrong and when it will start working again. I am going to Minambakkam tomorrow. I want you to come with me".

It was 1966. I was SEE/Traction in Headquarters of Southern Railway at Madras. By "they", I knew that CEE was referring to the DEE/TRD in Madras Division and his team and also to Dy.CEE/Traction who was not only in charge of Railway Electrification works but was also expected to provide assistance to CEE in Traction maintenance from Headquarters.

I knew the substation foreman very well. I had great regard for him. Muthukrishnan was an expert of extraordinary skill in handling Mercury Arc Rectifier Maintenance and overhaul. Above all, a disciplined soldier too. The DEE/TRD and the Dy.CEE had also had years of experience on the DC Traction System. I had chosen not to get in to the problem, unless I was asked to do so; and until CEE spoke to me, nobody had even suggested that I should have a look.

It was a 1000 KW, 6 anode steel tank rectifier, pumped type, Brown Boveri make, about ten years old. It had given excellent service, until it suddenly went out of action one fine day.

CEE and I were informed on arrival at the substation by the DEE/TRD that the tank had been opened out twice, anodes etc. thoroughly cleaned, gaskets replaced, mercury filtered, normal vacuum recreated, etc. But inspite of the usual coaxing, the arc refused to strike. CEE directed that I should go into this problem forthwith. We left the substation. I told the foreman before leaving that I would visit the substation again that evening.

I spent about half an hour that evening at the substation going through the log book and the records of whatever checks and special maintenance works had been carried out on the Rectifier after it had failed. I instructed the foreman that he should keep a multimeter ready for certain measurements I proposed to do the next day.

The next day was a holiday. I was at the sub station by 10.30 a.m. The foreman was there and the meter was ready. The breaker on the AC side was closed. We measured the Anode-Cathode voltages, they were all right. When we checked the Grids, there was no voltage. The foreman knew at once that something was wrong. He switched off the supply. I could see his face light up suddenly. He walked over to the control panel and quietly removed a Resistor and tested it for continuity. It showed open circuit. He then showed me a schematic diagram from the manual. (I had not seen the manual till then). It was clear that if the resistor was open circuited, there would be no voltage to Grids. A new resistor (imported) available at the Substation as spare was connected up. When we switched in, the rectifier fired normally and started taking load. The restoration was over. There was relief on the foreman's face. What had defied a solution for weeks had been solved in less than half an hour.

I telephoned to CEE at his residence. He congratulated me. I informed Control. Certain restrictions on the train services between Tambaram and Guindy, which had been in force to limit the load on the substation, were lifted and suburban train services were back to normal.

I did not follow a systematic procedure for trouble-shooting in the above case. I was lucky to put my finger on the exact trouble spot almost intuitively; although I must say that I had some guiding factors, such as:

- The two other Rectifiers (750 KW) at the substation did not have Grids and this was a difference which may have had something to do with the problem remaining unsolved, as everyone concerned had a lot more experience on the 750 KW sets.

- The Log book did not show any back-fire or tripping on fault or any such problem before the breakdown occurred. The Rectifier went out quietly all of a sudden.

- The vacuum had been excellent throughout.

I spent that evening relaxing on the Marina Beach for which Madras is world famous. The sea and the sands and everything else around had never looked more beautiful.

The next day I recorded a technical note for the information of the CEE, Dy.CEE and DEE/TRD.

There was not a word of thanks or appreciation from the Dy.CEE or the DEE/TRD. I had hurt them perhaps - in some way. May be, I should have taken them into confidence before I entered the scene, although I did so at the behest of CEE. But then I thought that I was only going to explore. I could never imagine that I would strike success so soon. I had no intention to hurt anyone. These thoughts and counter thoughts persisted for a few days after the event but melted out with the passage of time.

THE CHEQUE THAT WAS NOT CASHED FOR MONTHS

1963, I was DEE/Traction/Tambaram then. An EMU coach was held up in the shed. The foreman said that axle bearings needed to be replaced but there was no stock of new bearings.

I knew about my immediate predecessors in the shed. They were good engineers and capable managers. I had nothing but respect and admiration for their abilities. Surely, they could not have omitted to arrange this important input.

I probed further. The bearings had indeed been arranged and they were available. They had come in almost a year earlier but the shed had not had any opportunity to try them out till then. And when they were tried now, they would not fit the axle box.

It took me only an hour to realise that the problem was that whereas we required a bearing with a tapered sleeve, what had been obtained was a bearing with cylindrical sleeve. The mistake was in the description sent with the non stock requisition - a vital alphabet "K" had been omitted to be mentioned in the description consisting of numerals and alphabets. Six sets of bearings costing Rs.1500/- in all (Rs.250/- per set) were involved. They had been supplied by SKF/Bombay. (Bearings were "dead" cheap those days!).

I telephoned to SKF/Bombay. Mr. Lengdren of the firm said he sympathised with me on my predicament. He would try to get the right bearings from SKF/Sweden but it would take a minimum of four months. He would take action straight away in anticipation of an order for 6 sets. Regarding the un-usable bearings, he would examine them, if the bearings were shown to him; and do whatever best he could to assist the Railway. I thought that his response was most helpful and positive.

A fresh non-stock requisition for 6 sets with PAC on SKF was sent to COS the same day - The description was checked, cross checked, and doubled checked this time.

I sent my Technical Assistant to Bombay within a couple of days, with a letter to SKF. Some more jobs with Western Railway etc. to be done were entrusted to him.

I was in for a surprise. I had not expected to get such a fast response from SKF. My Technical Assistant was back in a week from Bombay with SKF's cheque in favour of Southern Railway for RS.1500/-. He told me that although they were minor rust marks, Mr. Lengdren had accepted the bearings. I sent the cheque immediately to the SAO/Stores explaining the case history. I thought that I had done something wonderful for the Railway.

I was in for a surprise again, this time from SAO/Stores. Questions were raised by him.

i. You have not collected the sales Tax back from SKF
(that was a few rupees).

ii. The TA (Travelling allowances) paid to the TA (Technical Assistant) are also to be collected from SKF.

iii. You have sold Railway material unauthorisedly - totally against rules.

iv. Who prepared the wrong requisition and what have you done with him.

The questions were replied in writing. I met the SAO and explained to him the bonafides of the transaction. After four months of follow-up effort, the SAO sent the cheque back saying that I could pursue the matter with the DAO (Divisional Accounts Officer), if I felt like it. Well, another round of explanation, justification etc. this time with the DAO. The DAO agreed to my proposal, reluctantly though and marked the papers to DS for sanction and for condonation of my crime. By that time, I had got tired. I did not have the energy to pursue the matter further. However, as I heard no more from the DAO or DS, I presumed that the DS had approved the proposal and the cheque had been credited to Railway account at long last - after some six months. Or the cheque had lost its validity by then ? I did not care to check.

If the useless bearings had been destroyed and returned to the stores as scrap or even buried in the yard, there would probably have been no questions. I had shown initiative. In that process, I had violated established procedures and rules. But, did I do anything wrong ? I am not convinced even today.

FROM CONCEPT TO COMMISSIONING
A DC TRACTION SUBSTATION TAKES SHAPE IN TEN MONTHS

Those who are familiar with the history of the advent of 25 KV AC traction in India will doubtless recall how an AC traction sub-station (the first in India) was set up on South Eastern Railway in a record time of four months.

I had no part to play in that great effort. But, some five years later (1963), I was closely associated with the setting up of a 1500 V DC traction substation at Saidapet on Madras - Tambaram electrified Suburban section of Southern Railway. I, Although it was a small project, I remember that work for many reasons.

i. It was executed cent per cent departmentally, by the traction maintenance organisation.

ii. The total cost of setting up a 1500 KW Mercury Arc Rectifier Unit and feeding the power out put to the DC Bus of an existing Track Sectioning Cabin Closeby cost less than Rs. 3 lakhs, including all civil and electrical works . This unbelievably low cost was primarily due to the fact that the equipment was bought second hand from British Railways at a throw way price of Rs. 2 lakhs. Thanks to the initiative and interest shown by the then Railway Adviser to the Indian High Commission, London who happened to be an Electrical Engineer from Indian Railways, the deal was clinched. But substantial economies were also due to the simplicity of design, careful planning, improvisation and speed of execution. The various civil and electrical works progressed to meticulously planned schedules, dovetailed in such a manner as to

ensure optimum use of the limited manpower resources available, with an eye on time of completion. This substation was commissioned in ten months from placement of order on British Rail and in less than two months of receipt of equipments at site in India.

(iii) A few technical improvisations and innovations were adopted, successfully. For a standard REYROLLE make 33 KV indoor switchgear, with compound filled cable box entry, locally insulated copper leads were used to bring power in to the building from the outdoor yard through three porcelain, hollow wall bushings. This was done because it was not possible to procure the small quantity of 33 KV cable required, and we did not have a qualified cable jointer who could do 33 KV cable jointing work. Also maintainability was a prime consideration.

- A 11 KV 3 core power cable was stripped, the 3 cores separated, additional insulation (paper) was applied on each core and secured with empire tape. No grounding tape was used. These leads which were brought through the wall bushings were connected inside the switch gear at an entry chamber specially manufactured to receive transformer oil and retain it without leakage. The cable box was thus dispensed with. There was corona noise with this arrangement. But there was not a single instance of failure/problem throughout its life.

- A simple brick masonry building was designed and built to house the 33 KV switchgear, the Mercury Arc Rectifier and the DC HSCB of the Rectifier. The substation battery and battery- charger were located in a corner of this building. The output from the Rectifier HSCB was taken by a cable passing under 3 tracks and connected to the DC bus of an existing Track Sectioning Cabin about 100 meters away, through a simple isolating switch. The only protection was the Rectifier HSCB. On the 33 KV side, provision was made for tapping either of the two 33 KV transmission line circuits passing at the site, to feed into the outdoor switch yard, with isolation only by gang operated switches. No breaker was used. The only protection on the 33 KV side was the Rectifier breaker itself. A lot of costly switch gear was thus avoided.

In the design and layout of the building and outdoor structure, we worked on whatever drawings had been passed on by the British Rail; and all necessary holes, openings in the walls, trenches in the floor etc. were provided well in advance. Everything worked out perfectly. The only item which went wrong was the platform on which transformer was to be placed. It had been built about a foot higher than it should have been. This was the only rework done, after the transformer arrived causing a delay of 15 days. In a project where everything was working out fine, even this small rework caused me disappointment.

There was no contractor on this job ; thus there was no formal inspection, no measurement, no payments and therefore no controls for authorising payments. The inspection for quality was there all the time even as the work was executed. In addition to my responsibility on the Rolling Stock and OHE, I took special interest on this Project and made frequent visits to progress the work at site.

The AEE, Foreman and staff (not more than half a dozen) worked with such great team spirit, dedication and enthusiasm un- mindful of the long hours put in, caring for only one goal - that is commissioning a trouble free installation in quick time. And how well they succeeded !

When the Sub-station was switched on by the D.S. in the presence of the CEE and a gathering of some 50 persons - all of them Railway-men - there was great satisfaction that this small Project which would bring relief to the adjacent Sub-stations and help avoid frequent tripping at those Sub-stations could be completed so smoothly and speedily.

When the entire section was changed over to AC traction on 15th January 1967, the Saidapet Sub-station was closed down finally. It had thus a limited useful life of just over three years, but at a low cost of some Rs.3 lakhs only. The assets must have been disposed of soon after and I believe the Railway would have got a good amount from such disposal.

A "COCK - AND - BULL" STORY

I was in my Tambaram office, when the call came from Mr. P.N. Murti, CEE. He sounded cheerful.

"I liked your story. Your cock-and-bull story, I mean" he said.

The story was true substantially. It was an one page report on a train failure on the busy suburban section that I had sent to CEE a few days earlier.

I remember the incident in all its detail even today.

To supplement the EMU trains we used to run a couple of loco-hauled passenger trains (loco + 5 coaches) in the peak hours to assist in clearing the commuter rush. The total fleet strength was only four electric locos called EG's and they were meant primarily for hauling goods train. These locos had done 30 years of faithful service and were in no top condition ; yet we had no alternative to bringing them on to important passenger service in peak hours.

One fine morning at about 9.30 a.m. It was between Meenambakkam and St. Thomas Mount Stations that an EG - hauled train failed. The Control reported that the pantograph had come down and as there was a big leak from the compressed air reservoir below the under-frame, the train had to be abandoned. The driver had reported that it was a case of "runover". It was quite an operation to propel the disabled train into the next available siding at Guindy station, using two following EMU trains coupled together. The morning train services had been badly dislocated, as a result.

The loco was examined on arrival in the shed. I found fresh marks of blood, flesh and hair in the under-frame and near the reservoir. The handle of the drain cock of the reservoir had broken and the cock was in the open position. The animal, in crossing the track had hurt itself and caused damaged to the cock also.

I had concluded the factual report on the incident, thus:

"Believe me Sir, this is no cock-and-bull story".

Some years later I was witness to a similar occurrence on the Broad Gauge. I was DEE/Southern Railway and had, with the permission of the driver got on to the footplate of the Diesel Locomotive hauling the Howrah - Madras Mail, at Waltair. The loco was disabled on the run within an hour of leaving Waltair. It took about three hours for a Relief loco to arrive and clear the train. This time it was a buffalo.

Are cattleguards (cow-catchers) effective enough ? Can the location of the drain cocks be changed to prevent accidental damage ? How can we prevent stray cattle entering from the side from getting entangled ? These are the questions which the locomotive designer should address himself to, if such incidents continue to occur even today.

LEARNING FROM EACH OTHER

One of the standard techniques of problem-solving on Railways -- I suppose this is true of many other organisations -- used to be to see how your neighbour has solved the problem and learn from him. Sometimes it turns out to be "the blind leading the blind".

For many years the exterior of Meter Gauge EMU's homed at Tambaram Shed used to be an excellent aluminium paint finish and the trains had a gleaming look. RDSO decided in early sixties that the coaches should be painted in colour --Oxford blue upto cantrail and cream above. Neck-deep as we were in dealing with more pressing problems on the EMU's such as bogie cracks, flashovers on contactors, fire in resistor boxes, seizures of exhausters, heavy lurching, failures of Traction Motor shafts and so on, it was not unnatural that the new colour scheme did not receive adequate attention, for presenting a good appearance. Also, the colours tended to get dirty quite fast.

Mr. Murti, CEE came on telephone one morning and I was all attention. When your Boss speaks to you only rarely, you listen to him much more attentively than if he lectures to you day in and day out.

"CME and I watched YOUR* EMU's at Madras Fort station. They look awfully dirty. CME says Carriage Workshops, Perambur are doing a far better painting job. Why don't you learn from them ?".

It was possible that they had seen an EMU which was due repainting. But I did not press any point in defence. I knew that I was on a weak wicket.

I despatched an intelligent charge man to the Perambur Workshop and to ICF to gather information on their methods and processes. At the same time, I was determined to get paint of better quality. We got panels painted with paints of different makes and indeed found considerable variation in the finish and appearance. I was able to persuade the COS to buy adequate quantities of paints of the particular make that I had found to be most satisfactory. The preparation of the surface was improved; whatever minor process improvements my chargeman had learnt were incorporated. Closer attention was given to the quality of work in the Paintshop. There was noticeable improvement in the finish and appearance. The major contribution had come from quality of the paint used.

Some six months later, Mr.Murti was on telephone again.

"Congratulations. CME thinks you are doing far better than Perambur and is sending his men over to Tambaram to learn from your boys".

I merely said "Thank you, sir". * A FOOT NOTE ON "YOUR" AND "MINE"

Years later. 1985, Howrah platform. The Kalka-Howrah Mail was due to arrive. I was CEE, South Eastern Railway and a witness to
the following conversation between Chief Electrical Engineer and Chief Electrical Locomotive Engineer, both of Eastern railway, when the train entered right time on the platform with, Member (Mechanical) on board:

CEE (the boss): You see, MY loco has brought the train on time.

CELE: Noted Sir. But may I say that if the train had been late, you would have called it My loco.

I had a hearty laugh at that time. But how sadly true it is that the boss usually takes the credit for himself for what goes well and puts the blame on his subordinates for whatever goes wrong.

A SECOND FOOT NOTE: I noticed that the Southern Railway went back again to Aluminium paint for the exterior of the meter gauge EMU's. It should not be surprising if further transitions between Colour and Aluminium continue to take place from time to time.

AT THE DAVIS CUP MATCH

It was sometime in the early sixties. I do not remember the year. The Davis Cup tennis match between India and Mexico was on in Madras. I was keen to see the opening singles matches. I was the DEE/Traction at Tambaram. I informed Control that I would not be available for 4 to 6 hours and left Tambaram for the site of the match, which was close to Madras Central Station.

I had just seated myself in the open gallery. When I looked up, whom should I see but Mr. P.N. Murti the CEE in the Umpire's Chair. There was time for the match to start. He got down from the high chair and walked towards where I was seated. I became somewhat tense.

"Natarajan, could you ask that young lady in the green saree behind you to speak to me ?" My tension disappeared.

The young lady was too busy talking to someone else, to hear Mr. Murti's voice. I did not know how to draw her attention, I did not know her name. Mr. Murti noticed my embarrassment.

"Don't feel shy. Touch her or pull her. She is my niece" he said.

I did not have to do anything of that kind. The young lady had finished her conversation with her neighbour and turned her attention to Mr. Murti. They talked to each other in sweet Telugu.

I relaxed, in a way. If there was any serious problem or accident on the suburban section, the control would certainly inform the CEE and I would come to know from him and no questions would be raised about where I had disappeared mysteriously.

Mr. Murti conducted the match with aplomb and dignity. India lost both the singles matches.

When I got back to my office it was seven p.m. I was relieved that the day had passed off uneventfully, as far the suburban train services were concerned.

I went home, trying to figure out why Ramanathan Krishnan had lost to Rafel Osuna.

THESE THINGS HAPPEN

Mr. P.N.Murti was the first Electrical Engineer on Indian Railways to reach the position of a General manager, when he was posted as G.M., Railway Electrification, Calcutta. A suave person, tall and erect, fit and active, he was a sportsman every inch. Of greater interest to Railway Electrical Engineers is the fact that he was the person who in those crucial years (1956-57) fought and won the case for introducing 25 KV AC traction on Indian Railways, amidst doubts and questions raised by many of his colleagues in the department. A great contribution of much foresight indeed.

In 1964 when Mr.Murti was Adviser (Electrical) Railway Board, he had been invited by CEE, Southern Railway to have alook at the newly commissioned meter gauge AC loco, type YAM-1, procured from the Japanese Group. It had been arranged that he would travel on the foot plate of a loco hauling a goods train from Acharapakkam (100 Km from Madras) to Tambaram.

It was 11 a.m. on a lovely morning when Mr. Murti reached Acharapakkam by road from Madras. With him were the CEE and the Dy.CEE who had executed the Electrification Project. I was already there on the footplate. I was then DEE (Rolling Stock). The goods train formation was ready with a steam loco also behind the electric loco as a stand by to take care of any problem. This was done as per instructions of the Dy. CEE.

I knew the YAM-1 loco well, having been trained in Japan during its manufacture. We had by then received 4 locos out of the 20 ordered. These had undergone trials for a month and had behaved quite well - no problem whatsoever. With me on the footplate was Raju, Electrical Foreman (Operation) who had considerable experience in AC loco operation on the Broad Gauge system.

Mr. Murti and the senior officers got on to the footplate. We started. The train would have moved only a KM, when there was a loud report. We could see and feel smoke coming from behind. The Circuit Breaker had tripped. Raju dropped the pantograph and applied brakes. The train stopped. Raju applied the fire extinguisher at the zone where the smoke was coming. It was clear that there was some major trouble which could not be got over through the usual trouble-shooting procedure.

The CEE was visibly upset. That this should have happened with the Electrical Adviser on the footplate must have annoyed him.

Mr. Murti got off the loco. There was not a sign of anger or irritation on his face. He shook hands with me and said.

"Natarajan, do not worry. These things happen". He walked away along with the CEE and Dy.CEE to the road and took the car which was coming along, to proceed to Madras.

We examined the loco. The Surge Arrester (ETF) connected across the DC output terminals of the main Silicon Rectifier had burst. After visually checking and ensuring that

there was no other damage, we isolated the Arrester and cleaned up the mess a bit, I told Raju to move with out ETF. After a 20m minute halt in the mid section we started off and reached Tambaram in the afternoon without any further mishap. The steam loco was not used to assist at any time during the run.

I called on the CEE next morning and informed him that we had worked the loco after isolating the defect. He was still in a gloomy mood. He merely said "but the damage has been done". I felt sorry for him.

That was the first failure of any kind on a YAM-1 loco. More ETF failures followed in quick succession on other locos too, qualifying for the Railway's standard description "Type defect". Mitsubishi eventually replaced the ETF's on the locos with Arresters of better design.

Having said all this, It is necessary to record here that the fleet of 20 YAM-1 locos has to this day, after thirty years of service, remained one of the most reliable,Electric locomotives on Indian Railways, consistently earning very high kilometers per failure, year after year.

THE ENGINE HAD FAILED BUT THE DME WAS SMILING

I was travelling by Howrah - Madras Mail in a First class compartment. I was working on Southern Railway then and had gone to Calcutta on some assignment and was going back to Madras.

The train stopped in mid-section somewhere near Koilaghat on the Howrah - Kharagpur section.

I waited for a few minutes in my compartment. There was no sign of the train starting. I went over to the engine. It was a WP. (The Howrah-Kharagpur Section had not been electrified then ; even diesel locos had not been pressed into use on the service.) I saw a few people crowding near the engine. There was a familiar figure standing with his feet on the

cattle guard. I could easily recognise the fair, tall and somewhat bulky figure, even from a distance. It was Mukherjee -- a Jamalpur boy who had been with me in the 1954 course at the Railway Staff College, Baroda. He was in some kind of Khaki dress, dirtied all over.

I had known Mukherjee to be a jovial chap. He looked very relaxed and happy.

"Hello Mukherjee, what are you doing here ?" I asked him.

"I am the bloody DME in charge of this blessed WP. The connecting rod is broken. I have asked for a relief engine". He lit up a cigarette.

"You don't look very much concerned" I asked him. I thought I saw a faint smile on his lips.

"I am thanking my lucky Stars that this damned thing did not happen a couple of hours earlier, I was on this very engine working the President's Special into Howrah", he said.

The relief Engine arrived after an hour and the train resumed its journey.

(Mukherjee is no more. He died young, a few years later).

A DC EMU OPERATES IN AC TERRITORY

1967, I remember that midnight very well, when we travelled on a DC EMU under 25 KV AC OHE on the Tambaram - Chingleput section of Southern Railway.

My good friend and colleague Sambamurti was in-charge of Tambaram Car-Shed. We had changed over the Madras Beach - Tambaram section to AC Traction in January 67 and introduced new AC EMU's and Motor Coaches to run the train services. Twenty four 3-Coach DC EMU's which were quite old had all been stripped of their electrical equipment and converted for use as trailer coaches to be hauled by new AC Motor Coaches. However there were six 4-Coach DC EMU's (known as Breda-Units) which were relatively new - only about 10

years young at that time - and no decision had been taken as what to do with them. One idea was to convert them to suit AC operation by adding the necessary traction equipments and controls. RDSO had in this connection, asked Southern Railway to verify the performance of Breda - Traction Motors under "pulsating" current.

A train was formed in the Shed with a 25 KV AC loco type YAM-1 attached to a 4-Coach Breda Unit. The DC Output from the Loco Rectifier (+ve and -ve) was taken by heavy cables laid on the top from the roof of the loco to the roof of the Motor coach of the EMU. This sounds simple but a lot of care had to be taken to get this job done satisfactorily. By operating the Master Controller on the YAM-1 Loco, the train was run on the mainline section between Tambaram & Chingleput for some 15 kilometers under AC OHE. It was the Traction Motors of the Breda DC EMU and not the Traction Motors of the AC loco that powered the train. We watched the quality of the commutation of the Breda Traction Motors, removing the "hatch" cover and literally spreading ourselves flat on the floor, face downwards . The commutation was satisfactory. A report was sent to RDSO and was well received by the Director.

There was a certain amount of risk in the above experimentation as high voltage DC was being transmitted not by special couplers (as in Calcutta Metro) but by direct cables on the roof. If there had been "parting" for any reason, a fire would have resulted and we would have been in the "docks". Perhaps our enthusiasm and confidence had got the better of even reasonable doubts and apprehensions.

Nothing came out of this experiment, eventually. The Breda coaches were all converted as ordinary trailer coaches to be coupled to conventional AC Motor Coaches. Even so, I have mentioned this episode for two reasons :

- It must have been a unique experimentation on the Indian Railways, never attempted earlier or later elsewhere on the system.

- Officers and Supervisors were willing to try new ideas and take on challenges even for the sake of acquiring technical knowledge and information and to gather experience . They were not afraid to take risks. Alas, these attitudes became rare to find, as I approached the end of my career.

A POINT OF VIEW

1965, One of the few technical problems encountered on the newly received Meter Gauge AC locos type YAM-1 on Southern Railway was the occasional but sudden tripping of the Circuit Breaker (DJ) due to one or other of the contacts of the Tap Changer Contactors (CGR) getting welded in the closed position. The phenomenon was sporadic and it used to occur generally in mid section, completely paralysing the locomotive and affecting train services on the single line section.

I wanted to see the phenomenon in some detail and at close quarters. I called a loco to the shed and after isolating the traction motors, connected the Rectifier output to a set of Resistor banks kept on the shed floor. These Resistor banks which had been released from the old DC EMU's provided the `load' into which the locomotive power could be fed. A supervisor was asked to operate the Master Controller up and down, right upto high notches and back, thus simulating to some extent the conditions which CGR contactors were subjected to under normal operation. The loco was of course stationary as the motors were not in circuit.

Mr. J. Shigeura, the Commissioning Engineer of Mitsubishi Electric was watching the proceedings. We must have gone through about 50 operations up and down on the Master Controller, when there was a loud report. The DJ had tripped. We found that the contacts of one of the CGR Contactors had got stuck in the welded position.

With available resources of equipment I had thus set up a test scheme which simulated successfully inside the shed a condition that was happening on line.

"I am happy" I told Mr. Shigeura.

"I am not so happy" was his reply. He certainly looked a worried man. It was just as well that he was not happy. For, in due course, improvements to cam profile and contact tip material and profile were implemented by Mitsubishi and the problem was solved satisfactorily.

PATRIOTISM IS PENALISED

Oct.'1964. Calcutta Airport. It was 9 p.m. I had come in by an Air India Flight from Tokyo, which had landed at 7 p.m. I was the lone man, held up at the Customs counter. All other passengers had been cleared and had gone, including four personnel of Indian Railways who had landed along with me by the same flight.

I was carrying a small SONY Transistor radio. I had declared it. I had also declared that I was carrying a Card board Box containing 4 Axle Bearings for Railways. I had nothing else with me.

The bearings were required urgently for re- commissioning some WAM-2 locomotives at Sealdah Car Shed. The box had been handed to me a few hours before I left Tokyo by a Mitsubishi representative at Tokyo Air Port. I had known him and trusted him fully. He showed me a Telex received from General Manager, Railway Electrification, Calcutta for immediate assistance by despatch of 4 bearings to Calcutta. He requested that I should assist in this matter. I felt that it was best that I carried the bearings for that would be fastest for the bearings to reach Calcutta. The Air India counter at Tokyo Airport allowed the excess luggage free, without charging me ; after all, I was carrying the stuff only for Govt. of India. I was returning, along with four other Railwaymen, from a 6 months training in Japan and this luggage had to be shown against one of us. I had volunteered for it to be shown against my name, as I was leader of the team.

There was a DEE from Railway Electrification, Calcutta at the Calcutta Airport, to meet me. He had brought an official letter from the RE organisation addressed to the Customs, explaining the background and the urgency. There was also a representative from

Mitsubishi, Calcutta ready with his car to take the bearings to Sealdah shed straight away. The letter from RE bore an endorsement from the Collector of Customs "clear, as per rules".

I was told by the Calcutta customs that bearings were a banned item and that I should not have brought it into the country at all. The Customs man suggested that I may leave the stuff at the Airport and walk out and leave it to RE to sort out this matter and clear it later.

I was not willing. I felt that having brought the bearings all the way into India, if I left them at the Airport, the purpose would not be served and the urgency was all lost.

After a lot of discussion, and finding that I was obstinate the Customs man cleared me after collecting duty for the Transistor Radio and the bearings. It came to some Rs.600/- (Rs.200/- for the Transistor Radio and Rs. 400/- for the bearings). I handed over the bearings to the DEE and left. It must have been around 10.30. The next day I left for Madras to re-join my post on the Southern Railway.

I was hoping that RE would take the initiative and arrange reimbursement of the duty I had paid for the bearings. This did not happen. On the other hand it took me some three months of correspondence to collect the amount. I did not relish this exercise but went through it all the same.

Worse was to follow. I had not bargained for this development. I had bought a small (70 litre capacity) refrigerator while in Japan and had sent it by sea to Madras. When the frig. arrived Madras port, I was notified that I should pay a stiff duty and penalty too. I had reckoned that the cost of the frig. plus the Transistor should fall within my overall allowance and that no penalty would be payable. but thanks to the changed circumstances, as the Railway bearings had already been shown as cleared against my personal allowance, there was very little allowance left for import of the Refrigerator and therefore the duty and the penalty had to be borne.

I showed the entire correspondence with General Manager, Railway Electrification to the Customs people at Madras. I met the Assistant Collector and the Collector of Customs and explained my case. I pleaded that as the bearings were not my property and I had only brought them in the interest of the Railways as a patriotic citizen, I should not be penalised. They did not budge. Eventually I paid some Rs.500/- as penalty and cleared my frig, lest I should incur the risk of damage and further payment by way of Wharfage charges.

I did not give any thought to recovering the penalty from Railway Electrification as it was only an indirect consequence of my action in bringing the bearings.

It is common knowledge that Customs officials can and do exercise discretion in many matters. In this case of penalty waiver could they not have used their discretion, I wondered. What a pity, I thought, that they had chosen to penalise a patriotic Govt. Servant ?

FOOT NOTE:

On further reflection, I wonder whether I have been less than fair to Customs Officials, as a `Tribe'. Indeed, when the drama happened at Calcutta Airport, there was an official who showed sympathy and concern that here was an honest Govt. officer who was willing to pay the duties and was keen to clear the bearings rather than leave them behind at the Airport. He called me aside and said :

"Sir, I have a suggestion. I can let you pass your Transistor Radio outside without showing it on your papers. Only the bearings will be shown. That would reduce the duty you have to pay. But then, of course.... I am sure you would not mind passing a small amount to me. It is not much you know. I have to please my boss too".

Needless to say that I did not accept his suggestion. The rest of the story has already been told.