AN INDIGENOUS TEST PLANT AT ONE FIFTH THE IMPORTED COST

As I write this today (1994), the performance and reliability of traction motors is fairly good. Yet, until some ten years ago, it was not satisfactory-particularly, the life of armatures rewound/repaired in Railway Work Shops and elsewhere was woefully short ; quite a good percentage used to fail within a few months of being put in service.

While introduction of improved materials and processes to increase the reliability was being thought out even then - and in fact improvement has been achieved to a considerable extent today - I felt that it was necessary to subject rewound armatures to a Load Test, under rated voltage and rated current conditions simultaneously atleast for an hour on a Test Bed, to detect any obvious areas of weaknesses, before the machines were sent out for service. Indeed, Load Tests on new machines were regularly being done in Production shops like BHEL, Bhopal and CLW, Chittaranjan as part of inspection and acceptance procedure. My thinking was only to extend such testing to rewound machines as well. But there were two impediments - the high cost and the need for importation of the special Testing plant and equipments. A plant which had been imported from ASEA/Sweden and commissioned in CLW in 1968 cost Rs.7 lakhs ; A second plant imported by CLW from Toyo Denki, Japan four years later cost Rs.25 lakhs.

When I took charge in 1978 of the Project on Central Rly. for setting up a Traction Motor Repair factory at Nasik, I decided that I should equip that factory with a Test plant which would be relatively cheaper and would be totally indigenous. It was clear that I could hope to achieve that goal, if the source machines that would provide voltage and current for testing could be built of indigeneously available Static equipment in place of imported rotating machines, which had been employed all along.

The Load Test is done by coupling up two identical machines mechanically and electrically in such a manner that a machine A functions as Motor to drive the other machine B as Generator, the electrical output of machine B being fed back to machine A to run it as a motor. Known as the Back-to-Back test or Hopkinson Test, the system is self-sustaining, it

being necessary only to feed from external sources sufficient energy to supply the combined "losses" of the two machines. In CLW, the Parallel Hopkinson method had been adopted; but I decided that to reduce the cost and to simplify the arrangement, a Series Hopkinson scheme could be adopted for the Test plant for Nasik Factory. Variable voltage outputs required could be obtained from transformer- rectifier units fed through motorised auto transformer type of voltage regulators instead of Excitation control as used with rotating machines employed on the imported system.

Figure shows the scheme as conceived and implemented. The Booster equipment is a variable low-current high voltage output source to provide the voltage to the armatures to push up the speed. The Exciter equipment is a variable high current low voltage output source to feed the field of the generator, for loading the motor. By manipulating the outputs of the two equipments, any required stable operating conditions could be obtained.

It was felt adequate if the capacity of the source machines was sufficient to take care of the TAO-659 motor, the most common locomotive motor then in use. Smaller motors of locomotives and of course all EMU motors could be covered easily.

Conceptually, the system had taken shape in my mind. For it to be translated into reality, it was necessary to decide on the type of equipments, the ratings, the details of instrumentation, control system, safety features etc. to be provided. Although I had worked in CLW for about eight years, I decided I should spend a couple of days there once again exclusively on a detailed study of the imported plants, instrumentation etc.. I visited Chittaranjan for the purpose in 1978. The Engineers concerned in CLW confirmed that they had not used the series Hopkinson method although facility existed. They had certain reservations on my scheme. I could however gather all the basic data required for designing the plant that I had in my mind.

My return train journey from Chittaranjan was eventful. Between Asansol and Calcutta, I chanced to meet a co- passenger who was a Rectifier system designer. I discussed with him my preliminary ideas and outlines of my design. He saw no reason why my ideas

would not work. In fact, when we did some calculations together, it was clear that the kind of variable voltage transformers I was looking for could be met from the range of standard products of Automatic Electric Company, Bombay, a well-known firm in the field.

Back in Bombay, I worked on drawing up the detailed Technical Specification of the plant for procurement. Every detail in regard to equipment ratings, instrumentation, controls, interlocks, safety features, layout of control desk etc. was incorporated in the Specification. Following normal procurement procedure, the plant was ordered on a Bombay firm, Universal Industrial Products, Ghatkopar at a cost of Rs. 3 lakhs.

In the development of the Control Desk and its ergonomic design, I spent a lot of time and attention. Here, I was lucky to interact with a knowledgeable person, Mr Shirali of Universal Industrial Products. (As I write this, he is no more) We worked together on many occasions, discussing alternatives and arriving at optimum solutions in details of design and execution. When the plant was finally inspected by me at the firm's works at Ghatkopar and cleared for despatch to Nasik, I was satisfied that here was an equipment which could compare well with any imported test plant in quality, finish and appearance.

It took me about a fortnight to do the initial trials and to commission the plant at the Traction Machine Workshop, Nasik Road. When the first two Traction Motors type TAO-659, which had been borrowed from Bhusawal Loco Shed, were tested successfully, there was a sense of pride and jubilation on the achievement all around.

It is a matter of great satisfaction to me today (1994) to learn that over a thousand motors have been tested with this Plant; and that it has performed very well so far without any major failures or problems and has demanded very little maintenance attention.

As stated earlier, the cost of the Nasik plant was only about one fifth of that of the imported plant, for similar application. It is of course true that in terms of technical capabilities, the two are not strictly comparable as the imported plant had certain special features which were not catered for in the indigenously developed design.

I conclude this story with certain observations and suggestions.

(i) For all Rewinding and Repair workshops dealing with DC Traction Motors, a Test Plant of the above design would be an invaluable acquisition. It is understood that after the Nasik success some plants of this type have been procured and installed by Indian Railways.

(ii) In the Nasik Test Plant, Analog meters were incorporated in the design for indication and for measurement of the various parameters. I preferred Analog meters to digital meters for this application, as I believed that trends i.e. rise or fall are important for the testing Engineer to know and adjust controls and that this feature is more easily available with Analog instruments. The tendency to go in for digital meters, simply because they are the "in thing" should be resisted. For accurate measurement of voltage drops, however, digital meters could be considered.

(iii) In Acceptance testing to be undertaken in a production factory, there is need for accurate measurement and stable conditions of testing, specially in regard to control of voltage and current parameters. These can be achieved satis factorily only by adopting the Parallel Hopkinson Scheme.In due course, consideration could be given to development of a Test Plant based on that scheme, from indigenously available static equipment. At that time, "Black Band" testing facility for checking on quality of commutation for new designs could also be considered for incorporation.

(iv) I had adopted the simplest technology for the Nasik Test Plant, based on motorised auto-transformers for controlling voltages and currents. With changes in technology which have since been established, Thyristors could be employed instead of Diodes. Also the number of devices in series/parallel can be reduced. In attempting such changes, however, comparable costs and levels of reliability have to be kept in view.

THE OPERATION WAS SUCCESSFUL BUT THE PATIENT DIED.

1981. Mr. Krishan Chandra, Member (Engineering), Railway Board was on a visit to Central Railway. I was Chief Electrical Project Engineer at that time. CEE and I were summoned to the GM's room. Mr. Krishan Chandra addressed the CEE. He had known me earlier, during his tenure as GM on C.Rly.

"This estimate that the C.Rly. has sent to the Board is no good. It does not seem to be realistic. Let Natarajan review the whole thing and send up a fresh one, properly framed, with Finance's blessings. Only then we will consider it."

He was referring to the Estimate sent by C.Rly. amounting to Rs.22 crores for replacement of the old power plant of the Thakurli Power House by a new 60 MW plant comprising turbo set, boiler plant, auxiliaries and all.

I had no part until then in the formulation of that estimate. In fact, I had not dealt with the subject. On CEE's request arising out of ME's directives, I entered the scene. The papers were gone through. There was no Project Report or justification in any great detail, for such an important and major work, the only one of its kind to be executed on Indian Railways. There was only an Abstract Estimate, with summary of costs. The total cost of Rs. 22 crores appeared to be too low, prima facie. Whether this under-estimate arose from lack of knowledge or experience or had been deliberately done, I could not say.

Fortunately, I had some background knowledge of modern Power houses. I visited Thakurli to see the ground realities, consulted some power engineers outside Railways and obtained realistic cost estimates and information on latest technology. I decided that whatever estimate I would prepare should be realistic and should cater for all necessary inputs on infrastructure. The total cost as assessed by me that time (1981) worked out to Rs.45 crores.

The Project Report to accompany the estimate was virtually dictated by me - a forty page document with facts and figures, justification, calculations, annexures and so on. At my

request, the Deputy Financial Adviser came over for a para-by- para discussion of the Report. Some minor changes were made as per his advice. The letter from Finance, received a week thereafter, floored me totally. It read ...

"The Report and Estimate may be sent to the Board with the remarks that it has been vetted and concurred in by FA & CAO".

Never in my experience had I come across such a brief, and unequivocal clearance from Finance on a Major Project. That it should come with reference to a Project whose cost had gone up from Rs.22 crores to Rs.45 crores within a year's span, made me breathless.

The matter was actively pursued with the Railway Board. The Board's sanction came with-in a few months. I had by then gone over to RDSO. A dynamic Electrical Engineer of Central Railway took charge of further action for getting on with the job and started moving things with speed and a sense of urgency.

But - and this is the big BUT - all these efforts went in vain ultimately. The Project was dropped by the Board after a couple of years, never to see daylight again. The ostensible reason - only State Electricity Boards who are in the business of Generation of Power should set up Power Stations. The Thakurli power house has since been wound up; the assets disposed of; the staff disbanded, etc., The last acts of burial are going on at a place which in my imagination was going to be the birth-place of a lovely new baby.

It hurts me. May be, it has hurt others too, who have put in tremendous efforts to no purpose.

Who cares for feelings, anyway ?

Policy changes take place, oftentimes without rhyme or reason but on hunches and whims of those in position and power. The irony is that as I write these lines, the policy seems to be that private investments and even foreign enterpreneurs at that - are being

wooed by the Government to enter the field of Generation and Transmission of Electric Power !

THE PUBLIC ARE OUR MASTERS

Some fifty years ago, if you asked an Indian what he was doing for a living - he would not have got offended at being asked such a personal question. Those days - he would have replied "farming", "teaching", "trade" etc.; and if he was in a Government job, he would merely have said "Service". The General Rules for Railways use the word Railway servant repeatedly. I have reflected quite often about the significance of the words `service' `servant' etc., and have throughout my career attempted to focus attention on the cardinal principle that in whatever I did, I should not lose sight of the perspective that the travelling public are our ultimate masters and that it is to them we should owe our allegiance.

I considered my posting as Additional General Manager for a year and later as General Manager for six months on South Eastern Railway (during 1986-88) as opportunities to look at problems more closely from the customers' point of view and to do whatever one should to give satisfaction without compromising on principles or acting against the "commercial" interest of the Railways. The AGM was the apex authority on a Zonal Railway for looking into Public Grievances and I did spend a lot of time in looking into complaints and grievances, from whatever source or level they came from; and attempted not only to solve the problem of the individual concerned but more importantly to look into "system" aspects, for identifying the problem areas and for evolving and implementing improvements, particularly in procedures. And what a pleasure it was to receive from the complaining individuals, high or low, so many letters expressing satisfaction at the Railway's response.

This approach of "service" is not to be necessarily restricted to apply to persons who are employed in departments and areas of responsibilities calling for front line dealing with the public. It applies to everyone in whatever capacity and however remotely linked with public good and convenience. I have narrated elsewhere how in 1965 the train services on a suburban section were restored quickly inspite of serious damages to the signalling

installations and level crossing gates arising from violence due to anti-Hindi agitation and rioting. It may not have been difficult to postpone the restoration, waiting for orders from above, as there were extenuating circumstances; yet the services were restored quickly for public good, inspite of difficult conditions of operation.

I shall narrate here two other instances which come to my mind.

1976. I was Sr. DEE, Rolling Stock in Bombay Divn. of Central Rly. After a day's work at the Kalyan Loco Shed, when I reached Kalyan Station to take a train to Bombay, it was about 7.00 p.m. There was commotion on the platform. A long distance mail train bound for North east direction which should have left Kalyan a couple of hours earlier was still there and passengers were running up and down, agitated and shouting. I went to the Station Master who told me the problem was that there was not adequate vacuum in the Brake Van (only about 20 cm) and the guard would not start the train as it was far below the minimum laid down in the rules. The TXR staff could not locate the defect. They had brought one more loco and attached it; even then the vacuum could not go up. The standard check using a "test disc" had been done and it had proved that there was nothing to doubt about the capability of either engine to create the desired vacuum. The TXR staff had suspected one particular coach; and shunting had been done to pull it out of the formation but even thereafter the problem persisted.

It was a puzzling situation. The train had left Bombay VT apparently in good condition but had developed this peculiar defect in an hour's run to Kalyan. Evidently it was a kind of unusual obstruction in the train pipe; but to discover its location by trial and error would mean many hours of detention at Kalyan and a large number of shunting operations, to isolate coach after coach. It was clear to me that it was no solution- certainly it was not in the interests of the passengers. I thought for a while and gave following orders on the spot.

- The coach which had been detached to bebrought back into the formation.

- Both locos to go up to Igatpuri.

- Move with restricted speed of 60 KMPH max. upto Kasara.

- Guard to work the train even with 20 cm of vacuum.(This order was given in writing)

I put a Loco Inspector on the front engine and a TXR on brake-van to keep a watch and be of assistance, should any emergency arise.

Annoucements were made on the Public Address System and the train left after about an hour.

I spoke to Control and wanted them to arrange for a detailed check at Igatpuri by TXR staff, before allowing the train further. At mid-night I checked with Control from my residence in Bombay. The train had reached Igatpuri safely. The TXR staff at Igatpuri had located the defect on the formation with the help of a special device and without detaching any coach. I did not ask for any further details. I went off to sleep, relieved and happy at the thought that my presence at Kalyan station by chance and the decisions that I had taken had perhaps prevented a major flare-up.

Looking back, I must say that my decisions were instinctive and almost intuitive. A process of reasoning was not deliberately gone through or explicity discussed with anyone else at Kalyan. Familiar as I was with the train operating conditions namely viz. (rising gradient generally and a Ghat section from Kasara to Igatpuri with Banking locos at the rear, I was reasonably certain that my decisions would not lead to dangerous conditions, although they were against rules. I had taken the responsibility on myself clearly and I had the confidence that the staff concerned would not let me down. What clinched the issue really was however my concern for the passengers. I felt that they may not have minded even a couple of hours of delay at mid-night at Igatpuri, but further indefinite delay late in the evening at Kalyan station would certainly have inconvenienced them far more.

I now come to the second incident.

Summer of 1983. It was about 11.00 a.m. on a rather warm morning. I was in a First class compartment on the Gorakhpur-Bombay Express.The station - Jalgaon, on Bhusawal-Igatpuri section of Central Railway.

The young Sardarji accosted me from the platform and handed over a peda (sweet) - "one rupee sir" he said. Of course, I knew him. He was the vociferous leader of passengers who had shown annoyance and anger the previous night when our train was at Jhansi station. He was different now, all smiles.

"The AC coach is still the same - unbearably hot inside; but we are happy that you took so much interest in the problem and have assured us help. The sweet is a celebration. Everyone affected has to contribute one rupee"- he said. I gave him a rupee and he left.

My wife and I had got into the AC sleeper coach the previous morning at Lucknow. I was Director (Standards) Electrical at RDSO. Our berth numbers were 7 & 8. I observed that the coach was not cool. The ACC coach incharge was meddling with some contactors on the control panel. I could make out that there was nothing wrong with any contactors. The pressure gauges told the story. There was no refrigerant in the system. On my revealing my identity, the AC incharge came out with the truth. He had sent a message to Kanpur to arrange for the charging. At Kanpur nothing happened. The ACC sent a second message to Jhansi. I knew that nothing much could be done en route. One of the two AC plants was totally out of action. Passengers in berth No. 1 to 24 were affected. As the other plant was working, the rest of the coach berths 25 to 46 was fine. We opened the emergency flap door to permit the air to go from the healthy side to the affected side but that did not give any relief.

The train had two or three unscheduled halts on the run from Kanpur to Jhansi. The passengers were getting restive as the conditions were getting to be oppressive on a hot day. The train was getting delayed further. I calmed them down, stating that I would do something to help them at Jhansi. Meanwhile one passenger came out with a revelation.

"Do you know, Sir, that on this very train there is one more AC Sleeper coach ?. It is cool but people having only ordinary Second class tickets are on that coach. Why should we, who have paid AC Sleeper fare, suffer ?"

At the next unscheduled halt I got down and went over to the other AC sleeper coach. The story was substantially correct. The attendant of that coach said that his coach which had been marked "SICK" at Kanpur, a couple of days earlier due to a bogie spring breakage had been certified fit after replacement of the spring. The original plan was to return it to Bombay as empty coach by this train but at the last minute the Station Superintendent had pushed in a number of Second class passengers saying that he had got "special clearance" from Northern Railway Headquarters for the action. I could make out from their appearance that at least some if not all those passengers were politicians. I went back to my coach.

The first thing I did on reaching Jhansi was to try to contact DRM or ADRM to find out what assistance was possible. They were not easily accessible. I asked Control if they had a spare AC sleeper coach or First class coach at Jhansi. There was no AC sleeper but they could locate one First class coach in some other rake which they would spare on my orders but then it would take about one hour more to do the shunting and put it on our train.

I went back to the coach and talked to the passengers again. Would they prefer to wait for an hour and get on to a First class coach which could just accommodate 22 persons or travel to Bombay in discomfort in the AC sleeper coach ? In the latter event, I assured them that although the rules provided only for refund of difference between AC sleeper and first class fares, I would make a special effort to get them refund of difference between AC sleeper and Second class fares from Jhansi onwards to their destinations. They agreed to the "refund" proposals. I got a TTE on to the coach and the train left Jhansi.

I made out a letter to CCS C.Rly. asking for special refund in the circumstances and got it signed by affected passengers only. I got the TTE to issue individual certificates to each one of the passengers regarding defective AC unit, which they could send in support of their

claim for refund. I advised them to send their claims for refund individually to CCS C.Rly. and pursue the matter. I on my part would do my best to assist them in getting full refund using the joint representation.

The next forenoon at Bombay was spent by me in finalising a detailed letter from me to CCS, CEE and GM, Central Railway. I handed over the letters to CCS and CEE and explained to them the special circumstances. I left it to them to check on facts with Northern Railway, if required. I happened to meet the officiating GM, C.Rly. at a party that evening and made my point. Copy of my letter was left with his secretary.

On my return to Lucknow, I pursued the matter with CCS C.Rly. I was informed by him that the Railway had received the individual applications for refund and had arranged refund of full difference between AC sleeper and Second class fares.

In my letter, I had put forth the view that while in that particular case, refund of full difference between AC sleeper and Second class fares was totally justified, the policy itself should be reviewed, as travel in an AC sleeper minus AC comfort could in no way be considered comparable to First class; indeed the conditions were even worse than in Second class sleeper coach. Three years later, while I was on South Eastern Railway I came to know that the policy had been revised to permit refund of difference between AC sleeper and Second class fares, in the event of AC equipment failure. I was happy that what I had advocated had come to be accepted. I did not bother to check further whether and if so to what extent my having championed the cause had precipitated the change in policy.

When I had occasion to visit ICF/Madras some months later, CEE/ICF (my good friend and colleague Sambamurti) and I spent quite some time on the floor of an AC sleeper coach under construction, to examine if some changes/improvements in the air ducts could lead to less uncomfortable conditions of travel, even if one of the AC Plants failed. I learn that an improved design has since been adopted and incorporated in the AC sleeper coaches being turned out at present, more or less on the lines thought out by us on that day.

A PRODUCTIVE MEETING

It was 1983, I was at that time Director (Standards) Electrical in RDSO. My wife and I were on our way from Lucknow to Madras on a brief holiday. The journey had been planned in such a manner as to allow about four hours at Jhansi enroute, for me to attempt to clinch an important outstanding technical issue with the engineers of the Bhopal Unit of BHEL.

The TM 4939AZ traction motors manufactured and supplied by BHEL from their Bhopal factory for the WCG2 locomotives had shown up a peculiar defect with in a few months of service on Central Railway. The commutator micanite segments were getting loose and flying out; and in some cases even the copper segments were getting disturbed. This problem had been reported to BHEL by Railways from 1975 onwards but inspite of a number of meetings and discussions, no finality had been reached as to what should be done to get over this problem. Some temporary palliative solutions were implemented form time to time but without much success. The fleet of motors was kept going by constant and frequent nursing attention and repairs.

BHEL's stand was that the motors were being subjected to much more onerous duty than they were designed for, especially on locos used as Bankers on the Ghat sections. The Railways put the blame on poor design and poor quality of manufacture.

I had had first hand experience of this problem in 1976-77, when I was in charge of the Kalyan Loco Shed. I had besides familiarity with the design and manufacture of commutator of the TAO-659 traction motor (French-design) during my earlier tenure in CLW (1968-76). And the TAO-659 commutator did not have this type of problem. Ideas had been exchanged by my predecessor in RDSO with BHEL regarding process improvements that were necessary in their manufacturing belt but no finality had been reached as to what should be done to the design itself. When I took over as Director (Standards) Electrical in RDSO in 1962, I pursued the matter with BHEL. I believed that a technically satisfactory solution should first be evolved and contractual and other issues could be tackled later on. It was then that I suggested that we should meet at Jhansi.

BHEL Engineers connected with design, manufacturing and Quality Control had come from Bhopal to Jhansi with relevant drawings and information regarding the processes. The RDSO Inspecting engineer stationed at Bhopal joined me. We met at the Guest house attached to the BHEL Transformer Factory at Jhansi. There was an intensive interaction for two hours, undisturbed by any telephone calls or other business.

Pros and cons of various alternatives regarding design details and manufacturing processes were thrashed out and we agreed on the exact final design in all its details - Arch bound commutator; Lightening Hole in the copper segment; precise angles of V to take into account the change from wedge-bound to Arch bound construction; use of micanite separators based on Alkyd Vinyl instead of Shellac; new design of securing bolts etc. Outline drawings were jointly cleared in principle. The nature of and extent of special tests to be carried out on the test bed to prove the effectiveness of the changes in the design were also settled in outline.

The discussions over, I left for the station just in time to take the train for Madras.

I learned later that the commutators manufactured by BHEL and by Traction Machine Workshop, Nasik Road to the modified design have been giving trouble-free service.

The two hour meeting had indeed been productive. A technical problem which had been bothering Railways for years had been solved. I believe to this day that more than anything else, it was the undisturbed and concentrated attention that was possible and the atmosphere of cordiality and informality that prevailed at the unusual venue that had contributed to the success, in no small measure.

Years later, I repeated this experiment with success, when as GM, South Eastern Railway, I had the preparatory round of my discussions with the Heads of Departments on the Railway's Works Programme proposals for 1988-89 at a venue in New Delhi unconnected with

Railway working. Our meeting with the full Board next day went off smoothly and satisfactorily much to the delight and relief of the South Eastern Railway team.

I remember having come across the following lines, in a magazine that I read recently.

"The meeting is an investment in time. it must be made to pay out".

An advice that any manager must heed, if he wishes to succeed. And I can say from experience that quite often this wholesome rule was violated at the various levels in Railway management. Particularly sad was a directive thrust down the throats of Zonal General Managers some years ago that meetings must be held daily to discuss punctuality performance of previous day. I hope things are better today!

A TURNING POINT

One of the features that for many years characterised operation of Electrified sections on Indian Railways was the concern at all levels in the Electrical Department and outside about the availability of electric locos for traffic and their reliability. It would be no exaggeration if I say that CEE's of Railways were preoccupied so much with problems concerning Electric locomotives that 75% of their effort and time was devoted to reducing failures and reducing "ineffectives" on the Electric locomotives front.

I was no exception to this state, when I took charge as CEE on South Eastern Railway in July 1985. And South Eastern Railway had at that time the largest fleet of electric locomotives, of all Indian Railways- about 350 - and had the heaviest freight traffic.

The biggest single problem as I surveyed the situation, was the frequent failures of the locomotive transformers. A large number of locomotives had been disabled and kept away from service, due to defective transformers. Over 20 locomotives were deficient of transformers and on top of it, the failure rate was 3 every two months. The ability of the

Railway to execute such heavy repairs within its own resources in loco sheds was at best a doubtful one transformer every two months. I could foresee that what was a "problem" then could transform itself into a "disaster" within a few months if some effective action was not taken urgently.

Northern Railway had tackled a similar problem successfully - I came to know about this. They had merely asked BHEL, the major supplier of locomotives transformers to undertake the repair at the prices quoted by them. The number of transformers to be tackled on South Eastern Railways was larger. But more importantly there was a "cultural" difference between the two Railways in their approaches. Particularly, the Finance on South Eastern Railway had earned a reputation of looking at every proposal of the executive with suspicion.

I lost no time however to make a beginning. A comprehensive proposal and justification was sent to Finance, not only to tackle the transformers which had already become defective but also to cater for repairs to those which would arise at a projected rate for the next eighteen months or so, through contracts on outside firms including BHEL. It took quite some effort to get the FA&CAO to accept the proposals. Tenders were invited, examined and following established procedures, contracts were awarded to 3 firms (including BHEL who got a major share) valued over Rs.3 crores. The entire processing had taken some 5 to 6 months ; but I was convinced that it was time well spent.

BHEL in particular and one other firm took up the contracts in right earnest and started executing the repairs with promptness and speed. The despatch of defective transformers and the receipt and commissioning of the repaired transformers were closely monitored. The availability of locomotives improved progressively.

April 1986 when the contracts were entered into thus proved to be a decisive turning point in the history of electric locomotive availability on S.E. Rly.

I left the CEE's post soon after. By the end of 1987, the "ineffectives" had been brought down significantly, largely due to a continuing effort put in on many fronts by my able

successor, who was a locomotive specialist. He confided to me, however, that the transformer repair contracts of April 1986 was possibly the single largest contributor to this achievement.

Side by side with processing the repair proposals, I felt that I should also look, from a technical angle, at this phenomenon of major failures on a costly equipment which was causing so much headache to Railways all over the country. It was the particular "leg" which contained the auto transformer winding that was featuring in most of the failures. I remembered that sludge formation and ineffective cooling had been highlighted at a Seminar I had attended a couple of years earlier at Kanpur. Evidently the problem had not been solved.

I started thinking. One evening, as I was planning a train journey from Calcutta to Lucknow on some work I got an idea on how to improve circulation of oil to the Auto transformer winding. Instead of taking a direct train to Lucknow, I decided to take a train upto Mughalsarai to check at the Mughalsarai Loco Shed if my idea was practical and feasible of implementation. Mughalsarai shed was on Eastern Railway territory and as CEE of S.E.Rly., I did not have jurisdiction over it. Yet I had chosen this peculiar method, because, having thought of the idea, I did not want to lose time and I did not want to wait until I came back to Calcutta and planned a visit to Tata Nagar Electric Loco Shed, the nearest Shed on S.E.Rly.

The brief visit to Mughal Sarai Shed was useful. The supervisors and staff received me and listened to my idea patiently. We examined it together. I got reassured that the idea was worth being tried out and could be executed with relative ease. The shed staff contributed their suggestions to improve on my proposals.

On my return from Lucknow to Calcutta, I lost no time to discuss the proposals with my officers at head-quarters. I went to Tata Shed and explained the modifications to be carried out. Some length of special tubing and connections had to be procured and fitted. In about two months, the shed was ready to show me two alternative proposals executed as proto-types. Both were equally simple and looked effective. A note was sent with sketches to RDSO

and BHEL's factory at Jhansi asking them to evaluate quantitatively the relative merits of the two proposals, conducting, if necessary, special tests.

I heard later (1987) that RDSO accepted one of the ideas and that BHEL had started implementing the improvement on the new transformers. I do not know for certain, however, whether the modification was carried out on the large number of transformers in service on Railways and whether it actually resulted in reducing the incidence of failures. If that has been achieved, I shall be a happy man.

THE MANABAR EXPERIMENTAL PROJECT

This story is about how a Thyristor-switched Capacitor Bank for improvement of Traction Power Factor came to be installed at the Manabar Traction Substation on the Waltair-Kirundul section of South Eastern Railway. It is the story of :

- An untried concept becoming a successful reality in three years.

- A Sr.DEE of one division working on a discarded computer of the Passenger Reservation office to do technical calculations on field data received from another division.

- An FA & CAO known to be conservative, agreeing to a proposal which spelt clearly sizable profits if the idea worked, but some definite loss if it did not.

All-in-one, of course.

One of the areas on which I had chosen to concentrate soon after I took over as CEE on S.E.Rly. in 1985 was how to cut expenditure on electricity consumed on Traction. Reduction in Maximum Demand charges and in payment of penalties for low Power Factor seemed to offer considerable scope for savings. A 25 KV capacitor Bank had been commissioned in Manikui Substation in the Chakradharpur Division and proposals for doing similar work at more

Traction Substations were being evolved. But I was told that there was no prospect of this problem being tackled at the substations on Waltair-Kirundul Section, where heavy penalty payments were being made month after month on low power factor.

It was with this background that in Aug.'85, a month after I took over as CEE on S.E. Rly., I visited Manabar, a typical substation on the section, not far away from Koraput in Orissa.

The problem was explained to me by Sr. DEE/TRD and his supervisors. The power factor was 0.7. Penalty was levied by the Orissa State Electricity Board for Power factor lower than 0.85. The load factor was quite low. The Maximum demand varied considerably. The traffic consisted mainly of goods trains carrying Iron Ore in one direction and empties in the other, on this single line. There were many hours in the day when there was no train at all on the section fed by the Manabar substation. They had tried a 25 KV - 400 KVAR Capacitor Bank on experimental Basis, without any tangible benefit. It struck me straightaway
that a Thyristor Controlled Capacitor which would enable automatic matching of the corrective KVAR to suit the load would be a solution. Back at head-quarters I was told that there was indeed some proposal from ASEA, Sweden received through RDSO, which would cost around Rupees 50 lakhs. But even this proposal was tentative and preliminary. I wanted something to be done quickly. I asked myself - why not use Thyristor SWITCHED instead of Thyristor CONTROLLED Capacitors ? It would cost much less and at the same time could give us substantial relief quickly.

The problem with a fixed Value Capacitor was that while it reduced KVA and therefore KVAH during loaded conditions, it was adding to the KVAH drawn during no load and very low load conditions, with the result that the overall power factor for the

purpose of billing, which was $\frac{\text{KWH for the month}}{\text{KVAH for the month}}$

would not show improvement. The KVAH meters merely added up KVAH over the period irrespective of whether the KVAH was leading or lagging or at unity power factor. The benefit of whatever reduction in KVAH was achieved by improvement of Power Factor in loaded period was offset - and indeed could get more than offset - by the leading KVAH (= KVARH) drawn during no load period because of the capacitor.

The Manabar substation represented a situation when there was no load at all during some six to eight hours of the day. Clearly we did not require any correction by capacitors during such periods. Even during loaded period, as the load of goods trains were fixed/constant, we could perhaps manage with two steps of correction.

Use of Thyristors meant low voltage (not 25 KV) operation. Using a transformer very similar to a locomotive transformer having 2 secondary windings - about 1000 to 1500 volts each was felt to be ideal. Each winding would feed one bank of capacitors through a Thyristor equipment. 1500 volt capacitors were available in the country and we could get any desired KVAR by putting the required number of Units in parallel.

The proposal had been born in outline. To give it concrete shape and to get it accepted and implemented, I proceeded step by step as under :

STEP-I

(1) By arranging special hourly observations and recording of KWH and KVAH meter readings at Manabar for full one week, the basic data in regard to the load pattern was collected.

(2) Calculated from fundamentals the hourly Power Factor and the progressive Power Factor i.e.

$$\frac{\text{KWH, hour to hour for the entire week}}{\text{KVAH}}$$

(3) Assuming different values of KVAR correction by Capacitor (500, 1000, 1500, 2000 KVAR etc.) and using actual KVARH derived from (2), calculated for each hour the new Power Factor and the new progressive Power Factor, corresponding to each value of correction.

Calculations at (2) & (3) were done using a Computer at Koilaghat Reservation Office by Sr.DEE/RS, Tikiapara (Near Howrah) through a FORTRAN programme drawn up by him for doing these calculations. The results proved clearly that a fixed Capacitor, whatever its value, was unsuitable for improving Power Factor, from the billing point of view.

STEP-II

Larsen & Toubro had developed Thyristor Drives and I thought they could help in development of Thyristor equipment for capacitor switching. I had a good friend, my class mate in fact, who was in a senior management position in L&T.

At my request, he arranged for their engineers to meet me in Bombay. The L&T Engineers felt that my proposal seemed technically feasible but as nobody had tried this idea earlier, we could run into some unforeseen problems. A BHEL specialist who was consulted by me warned me that without a Reactor in series, the scheme would just not work.

I believed that the Step down transformer would itself provide adequate impedance and a Reactor was not necessary. I had made up my mind and decided to go ahead, notwithstan ding the general air of discouragement as well as lack of any enthusiastic support from RDSO.

STEP-III

I got FA & CAO's concurrence to incur expenditure on this experimental project at Manabar, clearly stating that :

(1) The proposal would cost Rs.5 to 6 lakhs.

(2) If it succeeded, the monthly savings in the electricity payments would be about Rs. 50,000/- and the entire investment would be paid back in about one year.

(3) If the idea worked at Manabar, it could be extended to many other Sub-stations with considerable benefit.

(4) If the experiment failed there could be a loss of Rs. 2 lakhs.

It required a lot of convincing. FA & CAO agreed and GM accorded his sanction eventually.

STEP-IV

A technical specification for the Thyris(Loading levels) at which the two banks would cut in were also decided, to match with loads of a lightly loaded (empties) Goods Train and fully loaded Train (4500 Tonnes) on the section. Two identical equipments each to control 800 KVAR at 1.5 KV was catered for in the specification.

A specification was framed for Capacitor Banks as also for the special step down transformers.

STEP-V

Orders were placed, following normal procurement procedure, for the capacitor on a Pune firm and for the Thyristor equipment on L&T, with prospects of the Capacitors being received earlier.

As the design/development work on the Thyristor equipment was half way through, L&T developed cold feet and proposed that a special circuit breaker may be required additionally in series with Thyristor equipment to take care of heavy inrush currents under certain conditions. I had a discussion with their Engineers in their works at Bombay and explained why we could go ahead without a circuit breaker. They reluctantly agreed. More than anything else, I considered that incorporation of an additional circuit breaker would make the scheme more costly and complicated.

The delay in receipt of the Thyristor equipment from L&T; the earlier availability of the Capacitor Banks; and the reluctance of manufacturers in the field to develop a special, although simple, step-down transformer required for this project led me to think of a solution for an interim period which would give some reduction in electricity payments, once Capacitors only were received and installed. Why not use a locomotive Transformer with its own tap changer to supply the two banks from the two secondary windings and use manual means for sensing line current and switching in/out of Capacitor Banks to suit ? A "sick" WAG,

locomotive without Traction Motors was stabled near the Sub- station and the output from its transformer was connected to the Capacitor Banks. By communication between the Sub-station operator and the Locomotive Operator , the Capacitor was brought in and out, using the Master Controller on the loco to suit requirement of trains entering and leaving the OHE Section fed by the Sub-station. This scheme tried in 1987 was a success - and continued for some months bringing in clear financial benefits.

In due course, the Thyristor Equipment was received and commissioned successfully in 1988, about the time I had retired from Service.

The entire work at Manabar Sub-station had been executed by a team of enthusiastic men of TRD & TRS Wings of Waltair Division. It was a matter of great satisfaction to me that even after I left my post as CEE on that Railway, technical interest continued to be shown by those in charge for making a success of this effort. I also kept an eye on the progress from the higher levels of management on South-Eastern Railway.

I do not know whether the development of a special transformer has since been done; no do I know if my proposals that for Power Factor improvement and Maximum Demand reduction, even at main line Traction Sub-stations, we could with advantage use a combination of 25 KV Capacitor Banks (as already established) and the special Thyristor Switched banks on the lines of the experimental project at Manabar have been progressed and implemented.

I am aware that there is considerable scope for learning from the Manbar experiment and for improving the system design and equipment design for Thyristor Switched Capacitor Banks, for future applications. I believe that Manabar was the first of its type not only in India, but perhaps in the world. Will Indian Railways take off to further glory from that small start ?

NOTE : There are some reports that a new metering system

has been developed in recent years which would record only the net lagging KVAH summation over a period, thus obviating the need for Thyristor Switching for low density traffic sections. The acceptance of the Electricity Boards to the installation and use of such a special KVAH meter for billing purposes may have to be obtained, before we can totally abandon the idea of installing thyristor switched capacitors. Even for sections with higher traffic density , it appears that compared to 25 KV Capacitor system, the reliability of Thyristor Switched low voltage Capacitor systems would be better and would therefore merit consideration . A lot of interesting work awaits Traction Engineers with vision and zeal.

A POINT SCORED FOR RAILWAY STAFF

1985, it was the concluding session of the Conference of Chief Electrical Engineers with the Railway Board. The Minister of State for Railways and the Chairman and Members of the Railway Board were present.

It was my turn to speak, as Chief Electrical Engineer, South Eastern Railway. I stated that I did not want to raise any technical matters; these had been discussed earlier. I said "There is discontent amongst Railway staff that they have to pay much more for Electricity consumed in their quarters than other citizens in the same locality. Some thing has to be done. I have sent specific proposals to the Board recently".

The problem was briefly this. Railways had for many years adopted a system of "pooled rate" at which the consumption in Railway quarters was charged. From the total amount paid for electricity consumption (other than on Traction) on the entire Railway and the total KWH consumed, an overall all-inclusive rate per KWH was calculated, as the input cost per KWH; to this was added a certain element towards the cost incurred by the Railway for transmission and distribution and the final "pooled rate" was arrived at, for charging supplies to Railway quarters. Initially, this was done on a Zonal basis for many years. At a certain point of time, a Divisional basis was adopted, as a measure of decentralisation, applicable for quarters on that Division. Bulk of the power received by the Railways being on

HT, the "pooled rate" arrived at was governed more or less by the HT tariff structure, whether the calculations were done on a Zonal or Divisional basis,

In the fifties and sixties, the overall rate per KWH charged by the Electricity Boards and other suppliers for HT supplies worked to be lower than that for domestic supplies on LT. Therefore the "pooled rate" worked out to be beneficial the staff. But, as the years went by, the comparison reversed. This was because the domestic tariff rates were increased only marginally whereas steep hikes were imposed by the Boards in HT tariffs continually. For example in the mid-eighties, at most of the places the "pooled rate" worked out by the Railway came to 80-90 paise per KWH, while the LT domestic tariff rates of the Electricity Boards were 50-60 paise per KWH.

The staff had kept quiet, as long as the "pooled rate" was not adverse; but as the "pooled rate" became more and more unfavourable progressively, they became restive. This was only to be expected.

During latter half of 1985, as CEE/S.E.Rly., I made out a comprehensive Memorandum on this issue, and sent it to the Board, with the blessings of FA & CAO/S.E.Rly. It was proposed that the "pooled rate" approach should be given up in favour of a rate based on supply at domestic tariff. There was support from CEE's of other Railways to my proposals. Apart from staff discontent, another unsatisfactory aspect which had prompted me to take up the issue was the delay in the periodical revision of the " pooled rate ", which had caught attention of the Audit. Certain guide lines had been laid down for periodical revision of the " pooled rate" and as this exercise had fallen into arrears, whatever the reasons, the question of making "recoveries" from the Railway staff (serving and retired) had to be considered and the Audit had taken up the issue that this matter was not receiving due attention and that the Railway was incurring"losses".

The thrusts of my proposal were ;

- Domestic rates had not been increased by Electricity Boards significantly, presumably as a matter of deliberate pE0@ national policy. This policy should apply to energy consumed by Railway staff in their quarters, as they are as much a part of the country's population as non-Railway-men.

- The approach taken by the Audit was unrealistic. The "losses" were notional. It was more appropriate to visualise that only some kind of subsidy had been extended by the Railway to staff and if this view was accepted, there would be no arrears and therefore no recoveries to be made.

I raised the above issue at the CEE's Conference, as I felt that action would be progressed fast on this important policy matter if I highlighted it at that forum; but my expectation did not materialise for some months and nothing much moved in the Railway Board's office.

Midway in 1986, GM/SE Rly. took me to a brain-storming session in the Boards office, with the Minister and the Members of the Board. I was AGM then. We could speak on anysubject. I took the opportunity to raise the issue of " pooled rate" again. The Minister was visibly unhappy that no progress had been made and that was enough.

In January, 1987, the Railway Board issued orders that brought parity between Railway quarters and non Railway domestic consumer in the neighbourhood, on Electricity rates. My perseverance had paid, I had been a crusader. I was happy that it succeeded. Almost the entire family of Railway-men through out the country had benefited and on a recurring basis. What a great satisfaction that was !

One other mission - although on a smaller canvas - that I always felt happy about was the procurement of a Bus for the newly set up Traction Machine Workshop, Nasik Road, 1n 1981. There was no provision for acquiring a Bus, in the sanctioned estimate for the project. There was no precedent. I was in- charge of the execution of that Project. I was convinced that a Bus was essential as that would be the only satisfactory mode of transport for

schoolgoing children of Railway staff who would settle down in the colony, which was 4-6 Kms away from schools in the town. Indeed, it appeared to me that unless this facility was provided, there would not be many optees for the Workshop. It took quite some effort to persuade the Railway finance and later the Railway Board to agree to the proposal. And when the sanction came, we saw to it that the chassis was procured and a 60 seater Bus built in quick time, The rules and regulations governing the use of the Bus were also finalised well in time with concurrence of Finance, for implementation from "day one".

After retirement, I have settled down at Nasik Road. Quite often I see that bus carrying school children of Railway- men to and fro. I derive satisfaction that my effort in 1981 has contributed in some measure to the happy living of Railwaymen in the colony of the workshop at Nasik Road.

ARBITRATION

A typical Railway contract on a firm for execution of works runs to many pages. Literally, hundreds of clauses are incorporated defining the responsibilities and liabilities of the Contractor primarily and the Railway secondarily, under various contingencies and occurrence of omissions and commissions, faults and failures, delays and damages and so on. Yet it is a truism to say that, by and large, these clauses are rarely read, much less their implications understood, at the time of signing of the contract by the parties. Each understands the other - in terms of essentials in scope of work and prices. That is about all. The signing, page by page, of the contract is considered to be a formality that has to be gone through.

Disputes and problems that arise during execution of the contract are mostly solved in a spirit of give-and-take in overall interests of speedy execution of the work under reasonable conditions within the scope of the contract as understood originally. In the rare event of disputes not being solved, recourse is taken to Arbitration, provision for which is incorporated in one of the numerous clauses of the contract. There is a school of thought, not totally unjustified, that at times the parties take recourse to Arbitration in cases where

a dispute may exist only at the surface and an understanding prevails about the "justness" of a contractor's claim, but the settlement cannot unfortunately be reached merely because the scope of the contract provisions as they are, can not permit such a settlement.

The Arbitrator in many cases is appointed by the General Manager. He is generally a Railway officer who has not handled the particular contract directly at any time. The Arbitrator's verdict is usually accepted and the matter is settled. A special feature is that the Arbitrator is not required to elaborate or even mention as to why the particular award is given by him ; rather it is enough if he merely spells out a judgment which in his opinion is a fair decision in the particular case. The Arbitrator is paid fees for his efforts depending upon the number of sittings etc.

When I was functioning as Addl. General Manager on S.E.Rly., almost all cases requiring appointment of an Arbitrator passed through me. And then it struck me as something unusual how it came to be that in over 30 years of my career in Railways, of which at least 20 years were at a level when I could have appointed as an Arbitrator there was not one instance on any Railway or Production Unit I had worked, of my having been appointed as an Arbitrator ? Was anything wrong with me ? Was I unsuitable for any reason ? I continue to wonder even today, for I have not found an answer to my questions.

Yet, I remember the only case where I participated in any Arbitration Proceedings and I did so, on behalf of the South Eastern Railway, a party to the dispute. The Arbitrator in this case was a Senior officer of the Central Electricity Authority and the other party was the Madhya Pradesh Electricity Board.

It was 1986. I was CEE/South Eastern Railway then. The dispute had arisen in 1979 or thereabout. The MPEB claimed that for power supply to some traction substations on the Waltair- Kirandul section, they had made all arrangements and were ready but as the Railway were not ready to take the supply, the Railways would have to pay certain amounts. The Railway had not agreed. As the matter had not been resolved, for some 5 years, the MPEB invoked the provisions for Arbitration in the Agreement for the supply and got a person

from CEA nominated as Arbitrator. pE0@ I saw the papers for the first time when I got notice from the Arbitrator of his intention to fix up a meeting at Jabalpur.

The amount claimed by MPEB was Rs.95 lakhs and a substantial part of it was interest which had accrued, over the years.

After examination of the case I reached the following conclusions :

(1) The so-called facts on which Railway had disputed the claim were not all true. There was distortion and quibbling on "words" not expected of a Government while dealing with a Public Sector Organisation.

(2) Although MPEB's claim was `technically' justified, the amount claimed was unreasonably high having regard to facts of the case. Besides there were certain aspects in favour of the Railway which had not been taken into account.

(3) Even after the Arbitrator had entered the scene, a verdict had not been reached, primarily because the Railway had somehow been dodging the issue.

In these circumstances I decided that I should attend the proposed meeting at Jabalpur and present a fair and true picture, whatever may have been the "stand" taken earlier. I feared that if the Railway delayed the matter further, the Arbitrator might give an ex-parte award which could hurt the Railway badly. I also decided to take Railway's "Finance" into confidence.

I spent many hours in doing various types of calculations and mentally going through all aspects of possible defence the Railways could put up ; briefed my Finance Officer and got him prepared for receiving a verdict which might not be liked by the Railway. In particular, I showed him how we had not been totally fair and honest in the interpretation of the Agreement reached and had over-stretched indefensible arguments on obviously flimsy and untrue grounds. I took him to Jabalpur for the meeting.

The meeting at Jabalpur lasted a mere two hours. I explained all the points favourable to the Railway and accepted where we had not been quite fair earlier. The MPEB representative spoke just one sentence. He would not dispute whatever I had said and would leave the matter in the Arbitrator's hands.

The award of the Arbitrator came quite fast, in April 1986- The Railway to pay Rs.40 lakhs against MPEB's claim of Rs.95 lakhs. The decision was accepted by the Railway. A cheque was sent to MPEB in a week and a matter which had been pending for years was settled.

SECRET CODE HELPS SCRAP DISPOSAL

Some-one told me when I was on S.E.Rly., that there were only two items of performance on which the Ministry of Railways was required to submit regular Status Reports to P.M.O. (Prime Minister's Office).

i) Sale of scrap.
ii) Supply of materials like Axle bearings etc. by Railways to Wagon Builders.

I have not, to this day, checked on the veracity of this observation, which certainly appeared to be "tilted". May be, the person concerned was from the Stores Department and wanted to impress on me how important the role of that Department was. Or was it perhaps his intention to convey that these were the only two items on which the Stores Deptt. was required to submit information to P.M.O. and I had misunderstood him ?

However, There was a circular letter from the Railway Board in 1986, that AGM's of Railway will be responsible (Did it say personally responsible ?) for ensuring that the targets for scrap sales were achieved. I was AGM on S.E.Rly. at that time; we had some 3 months left in 86-87; but at the rate at which we were progressing, we were not quite certain of achieving the target, which I remember was as Rs. 30 Crores. The matter used to be

reviewed by me with the Heads of the concerned Departments at monthly meetings. But I had not stepped in to the system and practices, which were really the concern of the Stores Department.

When the Board threw the challenge to the AGM's, I decided that I should stick my neck out, rather than be a spectator giving merely minor pushes and prods here and there. On analysis, I saw that:-

i) Most of the scrap sale was done through auctions.

ii) The ACOS/DCOS in charge of the Depot took decision to sell or not to sell, at the price bids secured.

iii) He was guided generally by the "Reserve price" which he himself had fixed. Rarely did he auction off an item below "Reserve price".

iv) There were quite a few items which had remained undisposed of for many years.

Associating representatives of Stores & Accounts Departments, I worked out for each item, a `reasonable' price and a "rock-bottom" price (even lower than DCOS's Reserve price), at which it could deposed of, taking into account how long it had been stagnant, what prices it had fetched in the previous three auctions, general trend of inflation, allowance for depreciation, and damage in storage etc. In fact, a "formula" was evolved with which to work out "reasonable" and "rock-bottom" prices. A committee of two monitors (one from the Stores and the other from the Accounts Departments) was appointed to stand by the side of the DCOS during the auction and guide him appropriately. The monitors had the authority to signal through an unobtrusive gesture to the DCOS to close the auction at the best price obtained or drop the sale when even the highest bid was not acceptable.

The monitors had with them a statement in which the rock bottom prices were written out against each item in a Code Form (an alphabet substituting for a number as per

secret Code evolved by me). The key for the code was known only to the monitors and myself. Even if the statement was seen by any one else, he could not have not made head or tail out of it.

The first auction where this system was tried was a success. Quite a few items that had been lying unsold for years were disposed of. More than that, the fact that there were monitors who had the authority to take decisions on the spot seemed to have created a general impression on the participating traders that the Railway meant business and this itself improved the sales.

The practice was continued for a few more auctions, each time the monitors meeting me a day before the auction and taking certain specific instructions not only on non moving items but on certain other items as well, so as to get better prices, generally following the overall policy outlined at the beginning of this exercise. Representative of the Stores Department (usually COS) was present at such briefing Sessions. Note of instructions in my handwriting drawn up after each session, with prices in code of course, was handed over across the table to the monitors and to COS and one copy was kept with me under lock and key. We reached the year's target before the end of March'87.

The unorthodox and unusual auction procedure was decided by me at a time when the neighbouring Railway was having "problems" and vigilance cases were in progress against officers for decisions concerning sale of scrap.

The success of the experiment and the results achieved were not so much due to any intrinsic merit in the idea itself as due to its novelty and the involvement it conveyed of management at very high levels n activities that were till then regarded as routine. It is also possible that the morale of the officers concerned had been boosted up because the AGM himself had taken so much initiative and responsibility on his shoulders.

I have often wondered how elaborate procedures and systems have been laid down for purchase of stores costing even a few thousands of Rupees - Tender Committees and approvals etc. - whereas for disposal of materials worth lakhs of rupees through auctions,

it is almost left to a single officer at fairly low levels in the hierarchy to fix a Reserve Price and take decisions. But then, many policies of Government are not always rational!

HOW RANDOM NUMBERS HELPED

It was early Feb.'88. I was then GM/South Eastern Railway. My ACPO brought up a problem. The money sanctioned by the Board for the West Bengal Flood Advance to be disbursed to `Affected' employees of S.E.Rly. had not been disbursed. In fact, even the first step viz. calling for applications had not been taken. The hitch was that the amount sanctioned by the Board (I remember it was about RS.20 lakhs) fell very much short of the estimated requirement. Although the Board had been approached some three months earlier for allotment of the extra funds of another Rs. 20 lakhs, there had been no response. ACPO feared that unless the additional funds were authorised immediately there would be staff resentment either way: -

a) If applications were called for, there would be a "flood" and as the amount to be paid to any applicant was constant and fixed, every one could not be satisfied.

b) If applications were "NOT" called for, the amount already available would lapse and there would be serious criticism.

I asked the ACPO to check on the following aspects and report within three days.

i) Check with the Board- talk to the Director concerned- and ascertain if there is any hope of S.E. Rly getting the extra funds asked for.

ii) Have any criteria been fixed as guidelines to decide on relative preference between applicants or even rejection of any application?

iii) What had our neighbour, the Eastern .Railway done?

Sure enough, I got the reply on the third day.

i) No hope of additional funds.

ii) No guidelines exist to choose or to reject. The amount per person was also fixed.

iii) The Eastern Railway had not only dispersed the full amount but had exceeded the sanctioned amount considerably.

The second set of directions that I issued was as follows:-

i) Call for the applications - time limit 10 days - in small localised areas.

ii) Let the Senior Supervisor in-charge in each area collect the applications, number them serially and keep them in his custody.

iii) Confine this exercise only to offices and workshops in West Bengal territory.

iv) At the end of 10 day period , prepare a list of supervisors and the number of applications with each supervisor.

v) Report back if the total money required exceeds the sanctioned amount.

It was end of February when the ACPO reported back to me. There were 30 supervisors and the number of applications varied - about 200 maximum with any one. At the fixed rate at which we were obliged to disburse, we could meet 50% of the requirement, with the money sanctioned.

It was at this stage that I pulled out a number of xerox copies of about 5 different sets, each of three pages, of extracts from Tables of 3-digit Random Numbers from a book on Mathematics. (Appendix D is a sample table) Without telling the ACPO what these were (and he could not recognise them himself) I handed them over with the following instructions.

- Send these sets - one to each supervisor.

- Let the supervisor follow the sequence of numbers as appearing in the tables and pick up those serial numbers of the Applications which tally with the last two digits of these three digit numbers.

- Once he has picked up 50% of the total Applications with him, he should stop. The Applications he has picked up will be entitled for Flood Advance. Others are just unlucky.

ACPO reported to me by 10th March that the disbursement was over. Everything had gone off smoothly and there was no resentment. I explained to him at that stage what Random Numbers were and how they had come in hand - somewhat like a lottery - to sort out the Applications without bias.

Looking back, I think that the strategy that was adopted, although nothing great nor wonderful, had worked because of its novelty and the obvious chance element. It is also likely that a story might have circulated about tables with printed numbers having been taken out from some mysterious source by the GM himself, who had shown interest in the matter and this may have induced confidence in the minds of staff about fairplay.

A little digression here. Would the reader be surprised if I say that when there was a flood in Tamil Nadu in 1971, I had as Dy.CEE in CLW, received a large number of applications from staff of Traction Motor Shop - everyone, Mukherjee, Banerjee, Sen, Ghosh etc. saying that his property in some street in Salem or Cuddalore town in Tamil Nadu had been affected. I had held up the applications for a while but then the Personnel Officer pleaded with me to sanction them, just as other Managers had done. I complied.

Are we not encouraging and acquiescing in falsehood, in most cases of "Advances" of various types ? Is there no way out from this trap ?

A TRUTH THAT WAS STRANGER THAN FICTION

The DRM suddenly stopped . He turned to me and said, "Here is the man, Sir. We have found him".

We were walking down the Kharagpur Station Platform, the longest I had come across in my career. The walk seemed to be interminable. The interruption was welcome.

In the direction the DRM pointed out, I found a meek old man, humility personified.

"He has the keys for the Soda Water Factory which we inspected this morning Sir". The DRM beamed, supremely satisfied about his achievement, as if he had discovered the Theory of Relativity.

I remembered the Inspection very well. The gate was locked and the RPF sainik posted out-side gave us a salute. I could see through the fence two dilapidated sheds. One must have been the Factory and the other some kind of godown or office, I thought. The DRM was apologetic that we could not get inside as the keys were not available. And this was the state when the GM's intention to inspect the place had been notified earlier.

I turned my attention to the man.

"I retired some three years ago, Sir. Ever since, I have been knocking at the doors of some Railway Officer or other, to get some one to relieve me of the keys. I have not succeeded. The key are with me still", he said.

My inspection had been precipitated by a decision that I took only a few days earlier at one of the meetings of the Corporate Enterprise Group at SE Railway Headquarters. The Union had brought up an item "Soda Water Factory" for discussion. It was conveyed that years earlier, the Railway used to manufacture aerated water at a factory in Kharagpur for supply to Catering Units and Dining Cars on the Railway but that the factory had been closed for some time. The Union wanted that the factory should be restarted if possible , as least the machinery were still available in the premises. It could afford some employment potential. If restarting was not possible, at least the machinery could disposed of and the space and structures utilised for staff quarters or some such other Railway use.

The DRM had stated at the meeting that his grouse was that he was being asked to provide security on 24 hrs. basis and that RPF sainiks were being wasted on this job.

The CCS (Head of the Catering Department) was silent and did not appear to be unduly concerned.

Even at the meeting, I had felt something was wrong. That such a state of affairs should have been highlighted to the top management through the Union rather than through the Departmental officers concerned was unusual. It was then that I decided on inspecting the place. Of course, I could not see the Factory during my inspection. But I had seen enough. The keys being in the possession of a retired official for years stumped me totally. That was preposterous - something I had not expected to come across when I had decided on this Inspection.

I directed that a committee of officers at appropriate level should look in to the matter and put up recommendations in a month, for final decisions being taken on all related aspects. I left soon after on a long leave and retired. I only hope that this peculiar problem was resolved at least during the calendar year 1988 and never came up again at CEG meeting or at any other forum.