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Volume 45

JANUARY 1954

Part 1

PROCEEDINGS AT THE FORTY-FOURTH ANNUAL GENERAL MEETING

Held at Kelvin House, corner Marshall and Hollard Streets, Johannesburg

Thursday, 28th January 1954

A. R. MULLINS (President) was in the Chair and declared the meeting opened at 8.5 p.m.

There were present 120 members and visitors and the secretary.

MINUTES

The minutes of the monthly general meeting held on the 11th December 1953, were taken as read and were confirmed.

WELCOME TO VISITORS

The President welcomed the visitors among whom were Mr Kenneth Richardson, President of the Transvaal and Orange Free State Chamber of Mines; Mr D. H. C. du Plessis, General Manager of the South African Railways; Professor W. G. Sutton, Principal of the University of the Witwatersrand; Mr O. Rau, Chief Inspector of Machinery; Mr F. G. Hill, President of The Associated Scientific and Technical Societies of South Africa; Mr L. T. Campbell Pitt, President of the South African Institution

of Mechanical Engineers; Mr P. J. Louw, representing the President of the South African Institution of Civil Engineers; Mr S. F. Gimkey, President of the Institution of Certificated Engineers, South Africa; Mr M. C. G. Meyer, President of the Chemical, Metallurgical and Mining Society of South Africa; Mr A. W. Lineker, Chairman of the Local Advisory Committee of The Institution of Electrical Engineers, London.

MR D. H. C. DU PLESSIS, replying on behalf of the visitors, said he regarded it as a very great honour to be able to speak on behalf of the visitors, particularly as the incoming President, Mr Anderson, was an officer of the South African Railways. He was very gratified that that great honour should have been conferred on a member of the staff of the Railway Administration, and he was particularly pleased to be present that evening.

It would be, he thought, rather impertinent on his part to attempt to express any views on the functions of electrical engineers,

but he would certainly listen with great interest to the proceedings, particularly the address of Mr Anderson.

He would just like to mention a few matters very briefly. Recently they had had the honour of having Mr Whitney Straight, the Vice-Chairman of B.O.A.C. as a visitor. He thought Mr Whitney Straight, who was a very experienced person, did not lightly refer in laudatory terms to anything that he saw, and it was very gratifying to hear him express his admiration of the Jan Smuts Airport. It was also a compliment to the Railway engineers, because they had done pioneer work. They were called upon to construct three airports, the one of Jan Smuts, the one at Durban and the third one now being constructed at Cape Town, near Bellville. In that regard, one felt it was very flattering for the Railway Administration to know that the work of its engineers was being recognized.

On behalf of the visitors present, he would like to thank the Institute for its hospitality. He personally hoped to spend a most interesting evening and to learn something more of the Blue Train.

MEMBERSHIP

THE PRESIDENT announced that, in terms of By-Law 5.2.4, the Council had elected the undermentioned candidates to membership of the Institute in the following grades:—

Associate Members: ROBERT OSCAR HEINEMANN, GORDON HAWLEY RITCHIE, GRAHAM FRANCIS WAINWRIGHT TUDHOPE.

Graduates: PETRUS JOHANNES BOTES, HERBERT ROLAND FITT, PERCY SHEIMANN, HARRY WOOD.

Associates: ALFRED STAINTHORPE, DOUGLAS HAIG GORDON STEWART.

Students: DANIEL SALOMON DU PREEZ, RICHARD MANFRED GURTEL, FRANS JOHANNES MEINTJES, JOHANN MICHAEL FRIEDRICH PEINKE, RODNEY GEORGE SMITH, KONRAD CHRISTOFF SIGFRED SPITZE, ALBERTUS LAMBERTUS VENTER.

Transfer from Graduate to Associate Member: CHRISTIAN NICHOLAS JACOBUS BRANDT.

Transfer from Student to Graduate: GEORGE BRUCE ANDERSON, EDGAR CHARLES CURTIS, HOBBE DIRK HOLSCHER, THEO RUDOLPH OCKERSE, GRANT ALEXANDER PARK, MALCOLM OLIVER SMITH, ARTHUR SIDNEY SMIT.

Transfer from Student to Associate: JACK CROWN, WALTER HERBERT MULLER, DAVID CECIL PYM, BAREND CHRISTIAAN VOGEL SMIT.

ANNUAL REPORT AND BALANCE SHEET

THE PRESIDENT presented the Annual Report, Balance Sheet and Income and Expenditure Account for 1953.* He informed the meeting that the annual report of the Council was in their possession. Before formally proposing the adoption of the report he wished to take the opportunity of commenting on some of the Institute's happenings and problems, past and future.

It was indeed an honour to our Institute for him to have received, as President, the Coronation Medal.

The report referred to the constitution on June 5th of the Cape Western Local Centre. It had been his good luck to be in office when the plans and hard work of his predecessors came to fruition. He thoroughly enjoyed his short visit to Cape Town for the inaugural meeting. Those responsible for the creation of the centre deserved our sincerest thanks and we congratulate them on the very obvious success of their work. The need for such centres had been amply proved by the experience of the Cape Town Local Centre and it was sincerely hoped that other centres would follow their good example. He would ask Mr C. G. Downie, the newly elected Chairman of this centre who was present to bear our best wishes back with him to our friends in Cape Town.

The report had recorded the further truly munificent gift of £2 000 to our Education and Bursary Fund, donated by Mr S. F. Harvey. This was generosity indeed. Regarding this Fund he could not do better than repeat some of the facts and figures that he gave at our annual banquet. The Institute in 1947 started putting aside sums of money each year into this fund. In 1950 we felt we had sufficient to start certain bursaries and the following sums had been paid out since 1950—£100, £150, £250, £245 and for this year a further £245 would be paid out. These payments had been of tremendous assistance to the recipients. Thanks to Mr Harvey's generosity the Fund which started in such a small way was now well on its feet and warranted a much wider conception in its future operation. Mr Harvey had shown the way and it was the

* The Annual Report, Balance Sheet and Income and Expenditure Account are printed on page 21 of this issue of the *Transactions*.

Council's duty to expand the operation of the fund in such a manner as to encourage others to follow his excellent example. He would like to express on behalf of all members of our Institute their sincere thanks to Mr Harvey.

The last conference of Engineering Institutions of the British Commonwealth it will be remembered had taken place in Johannesburg in April 1950 when the S.A. Institution of Civil Engineers, the S.A. Institution of Mechanical Engineers and our own Institute had been the hosts.

The next conference was to take place in London this year from May 24th to June 4th. We had already received a draft agenda and it was apparent that great importance must be attached to the discussions which were to take place. These would deal with a very comprehensive range of subjects which included registration, education both general and technical, reciprocal recognition, practical training, consideration of reports on work being carried out by similar conferences, etc.

The conference had also been invited to meet in Brussels representatives of E.U.S.E.C. which was the conference of representatives from the Engineering Societies of Western Europe and the United States of America. The E.U.S.E.C. reports in our possession showed that they had under discussion many matters similar in import to those facing us here in this country.

It was sincerely to be hoped that it would be possible for our incoming president, Mr J. P. Anderson, to attend this conference on our behalf.

Regarding the Registration Control of Scientific and Technical Professions, the report recorded the factual statement on the result of the ballot on the question

'Are you in favour of compulsory statutory registration of the individual engineer?'

The Institute had shown decisively that it was not in favour. It must not be thought, however, that the matter had reached finality with this rejection. Other institutions and societies were pursuing this matter with the Governmental Department concerned. It was, however, sincerely to be hoped that, if a decision was made to proceed with a bill covering registration, the

views of the Institute would be respected when dealing with electrical engineers. The report was surely ample evidence that the Institute represented the majority of electrical engineers in this country.

He would stress that the desire to reject registration was not a desire to be obstructive or reactionary. We sincerely believed that in the long-term view greater benefit would accrue to electrical engineers and to the public by building on secure foundations such as provided by the Institute and by retaining a high degree of independence for development by evolution within our country and by conferring with sister institutions throughout the world.

As we had Mr du Plessis, the General Manager of the South African Railways with us he would like personally to thank him for the annual award of 25 guineas.

Thanks were also expressed to the Electricity Supply Commission for the annual award of £25 and to the S.A. Cable Makers' Association for the annual award of five guineas.

He now formally moved the adoption of the Annual Report, the Statement of Income and Expenditure and the Balance Sheet for 1953 and asked the Honorary Treasurer, Mr A. W. Lineker, to second the motion.

A. W. LINEKER (Past President, Honorary Treasurer) said that this was the second time he had been called upon to perform this duty. The previous occasion was in January 1947 when he had deputized for the Honorary Treasurer, Mr Joseph White, who was at that time serving on the Broadcasting Commission sitting in Cape Town, consequently he was not in Johannesburg to see how that deputizing for him was done. Those present would, therefore, appreciate with what trepidation he undertook this duty tonight, having been elected Honorary Treasurer to succeed such an illustrious predecessor, and the more so as Mr White himself was present to see whether his precept and example were being soundly followed.

We here, in Johannesburg, regretted that Mr White had now transferred his affections to Cape Town on a more permanent basis but our loss was the gain of the Cape Western Local Centre, in the formation and

successful operation of which Mr Joseph White had played no small part and was continuing to do so as their Honorary Treasurer, so his talents were still being exercised in the right direction. With his many years of service to the Institute he was particularly fitted to act as guide and mentor in such capacity. In fact, it had been suggested that Mr White be now prevailed upon to undertake a sojourn in another 'wilderness,' say Durban, and thus enable the Institute to bring light into their darkness by the formation of the Natal Local Centre.

Now to proceed to his real duty—once again revenue had exceeded expenditure, this year to the extent of £288.

There had been one or two items of what might be termed non-standard expenditure under the headings of 'Printing and Postages' in connection with the ballot held on compulsory registration.

There were also one or two other items of expenditure in connection with the formation and the holding of the meetings of the Cape Western Local Centre.

With regard to the *Transactions*, there was a deficit of just on £32. The thanks of the Institute were expressed to those advertisers, without whose assistance the publication of the *Transactions* would be an insupportable burden. In that connection, it was necessary that the revenue from that source should be increased, due largely to the increasing length of papers and discussions—a very healthy sign that that should be so, but it had got to be met by additional revenue; the Council had the matter in hand and had taken certain steps to attempt to achieve that increase.

As a point of interest, he would like to draw attention to the fact that the cost of publishing the *Transactions* for 1953 was approximately 11 per cent greater than the total amount received in the form of subscriptions.

Last year, the Council had decided that it was not able to add to the Education and Bursary Fund, mainly on account of the extraordinary expenditure which had been incurred during the course of the year in connection with the publication of the Constitution and By-Laws and the List of Members. This year Council had decided to contribute £300 to that Fund which, thanks to the very generous assistance of

Mr S. F. Harvey, to which the President had already referred, now stood at £3 815. It was the aim of the Council to build that Fund up to such a figure that it would be no longer necessary to call upon what one might call Capital in the award of bursaries; it should be possible for the Institute to award those bursaries from interest derived from that Fund. With that aim in view, the generous attention of members was directed towards Mr Harvey's excellent precept.

In accordance with tradition, he had to thank Mr Adams, Mr Southgate and the staff for their very capable and unfailing assistance during the year; his personal thanks were all the more sincere for the unostentatious but capable manner in which his faltering footsteps had been guided during the last seven months.

He formally seconded the motion by the President, that the Annual Report, Statement of Accounts and Balance Sheet for 1953 be adopted. *Adopted.*

AUDITORS

J. K. Gillett (Member) proposed and F. W. Stutterheim (Associate Member) seconded that Messrs G. K. Tucker and Wilson be re-elected the Institute's Auditors for 1954. *Adopted.*

HONORARY LEGAL ADVISERS

G. H. Woods (Member) proposed and F. J. Hewitt (Associate Member) seconded that Messrs Stegmann and Able be re-elected as the Institute's Honorary Legal Advisers for 1954. *Adopted.*

PRESENTATION OF AWARD CERTIFICATES

The President called upon Mr O. Rau (Chief Inspector of Machinery) to present the certificates awarded during the year 1953.

MR O. RAU: It was indeed an honour to me and the Department I represent, that I was invited to present tonight the award certificates to authors of papers of merit read before your Institute during the year 1953.

It is very gratifying to find that even in these times of shortage of personnel and consequent pressure of work, there are

engineers who often at great personal sacrifice are prepared to carry out the necessary investigations and record their experience for the benefit and assistance of their colleagues and other interested persons.

I sincerely hope that electrical engineers, particularly those associated with the Mining Industry will continue to place on record unusual electrical problems met with at mines and the manner in which they have been solved. I can think of no better method of making such information available than by way of contributions at meetings of your Institute.

It is my privilege specially to congratulate you gentlemen to whom I have presented the award certificates as recognition of the high standard maintained in your contributions and I can assure you that your efforts and the discussions which followed have not only helped materially in furthering one of the main objects of your Institute but have also enhanced the value of your journal as a useful addition to any technical library.

I welcome this opportunity, Mr President, of thanking you for the valuable assistance so readily rendered from time to time by your Institute in matters pertaining to the Mines Department's Certificates of Competency and to drafting and amending Mines, Works and Machinery Regulations, and it is my Department's fervent hope that these cordial relations will continue.

Disappointment has been expressed by electrical engineers from time to time in regard to the limitations placed on their responsibility when appointed in terms of the Mines, Works and Machinery Regulations. This matter is receiving serious attention at the present time and I am confident that a solution which will be satisfactory both from the legal aspect and from the electrical engineer's point of view will be found.

The awards presented by Mr Rau to the respective recipients are listed in the Annual Report.

DECLARATION OF OFFICE BEARERS AND MEMBERS OF COUNCIL FOR 1954

The President announced the result of the ballot for Council as follows :—

The total poll was 362 out of a total electorate of 776. The votes polled was, therefore, 46 per cent.

Members : H. P. Alexander, G. Williams, A. C. Backeberg, J. C. Downey, J. Monks.

Associate Members : W. Cormack, H. O. Collett, T. H. D. Page.

The Council for 1954 is, therefore, as follows :—

President : J. P. Anderson.

Vice-Presidents : G. R. Bozzoli, R. W. Kane, I. de Villiers.

Immediate Past President : A. R. Mullins.

Honorary Treasurer : A. W. Lineker.

Honorary Vice-President : A. B. Cowen.

Members : H. P. Alexander, L. G. Axe, A. C. Backeberg, J. C. Downey, J. K. Gillett, J. Monks, G. Williams, G. H. Woods.

Associate Members : H. O. Collett, W. Cormack, R. Gettliffe, F. J. Hewitt, T. H. D. Page, F. W. Stutterheim.

Chairman, Cape Western Local Centre : C. G. Downie.

Chairman, Light Current Section : E. H. Harwood.

In addition, the following Past Presidents had accepted the invitation to serve on the Council for 1954 :—

E. Vivian Perrow, Joseph White, J. C. Fraser, L. H. L. Badham, G. A. Dalton, W. H. Milton, H. T. Aspinall, J. A. F. Michell, J. T. Allan.

G. WILLIAMS (Member) proposed a vote of thanks to the scrutineers who were : J. P. Anderson, H. T. Aspinall, G. A. Dalton, K. D. Findlay, J. C. Fraser, J. F. Michell, Joseph White and Lieut-Col. J. Stewart Ross. It was particularly pleasing to refer to the last name as the gentleman concerned had the honour of serving on the very first scrutiny that occurred in the Institute in 1909.

DR W. CORMACK seconded the vote of thanks.

DECLARATION OF ELECTION OF HONORARY VICE-PRESIDENT

THE PRESIDENT announced that, under Clause 3.10 of the Constitution, the Council

had elected Mr A. B. Cowen of Salisbury as an Honorary Vice-President of the Institute for the year 1954.

INDUCTION OF J. P. ANDERSON AS PRESIDENT FOR 1954

THE PRESIDENT: I now come to the most important item of the evening, the induction of our incoming President.

Mr J. P. Anderson was born in Pretoria in 1904 and was educated at S.A.C.S. Cape Town. He then served an apprenticeship as an electrician with the South African Railways, during which time he attended the Cape Technical College at Cape Town and in 1925 passed the A.M.I.E.E. examination.

In 1926 he transferred to the Chief Mechanical Engineer's Office as a draughtsman.

In 1928 he was seconded to the General Electric Co., England for special training on electric traction turbines, oil engines, etc.

From 1930 on his return until 1940 he was in the Chief Electrical Engineer's office, on the Western Transvaal system and on the Western Cape system in various capacities of increasing responsibility. In 1940 he was posted as Electrical Engineer (Power production and Lighting) in the Chief Electrical Engineer's office.

In 1952 he was posted to the position he now holds, that of Inspecting Engineer (Electrical) in the Chief Electrical Engineer's Department, providing liaison between the system electrical activities and the head office.

He joined the Institute in 1936 and has served on the Council since 1944.

To this record of his experience must be added the fact that he is the fifth generation of his family who has trained and worked in the railway tradition.

It is a fitting appreciation of his service to the State and to our Institute that he should be asked now to take over as your president; in doing so I offer him my sincere congratulations and best wishes for his year of office.

J. P. ANDERSON (President) having taken the Chair said:

Gentlemen, I thank you, who, through your Council, have elected me to this high office. I am mindful of the high standard

set by my predecessors and I will do my best to emulate them. I am sure this will be possible with the able assistance of the Office Bearers, the Council, your forbearance and with the guidance of our good friend the Secretary.

I will now ask the Vice-Presidents to take their proper places. Professor Bozzoli, as Senior Vice-President will you please take the seat on my immediate right.

Mr R. W. Kane, our second Vice-President has been unavoidably prevented from being present and should take his seat on the right of Professor Bozzoli.

It now gives me great pleasure to invite Mr I de Villiers, our newly elected Vice-President to take his place on the left of the rostrum.

Gentlemen, Mr de Villiers is no stranger to you as he is Chief Engineer (Electrical) of the Electricity Supply Commission.

I. DE VILLIERS (Vice-President): I thank you for the very high honour you have bestowed on me today. I shall do my best to maintain the high traditions of my predecessors.

PRESENTATION OF CERTIFICATE AND VOTE OF THANKS TO THE RETIRING PRESIDENT

J. T. ALLAN (Past President): Last year, when I presented Mr Mullins to you as the President for 1953, I remarked that this was my final duty. I am glad, however, to have another opportunity of congratulating him. I am sure 1953 will go down in the history of our Institute as an outstanding example of how the proceedings can be dominated by the personality of the President. I do not wish you to infer that Mr Mullins dominated the Institute like a dictator, on the contrary he led the Institute, and organized its activities so skilfully that the Council and members had no alternative but to follow.

I now have very much pleasure in presenting him with this Past President's Certificate as a permanent record of our sincere appreciation of his work on behalf of the Institute. I trust that it will also remain with him for many years as a treasured memento of a very happy year.

Finally I would welcome him to the Ancient and Honourable Company of Past Presidents where I hope he will continued to

assist in the guidance of the Institute through the years that lie ahead.

A. R. MULLINS (Immediate Past President): This is my ultimate swan song. I have to thank all members of the South African Institute of Electrical Engineers for making my year such a happy one. We have tried to make it, to a great extent, a mining year; we have had quite a number of mining papers. I am very indebted to my colleagues for supporting me so well. I have to thank my Vice-Presidents who have backed me up so well, and all the Past Presidents who acted on the Council; and last, but no least, I have to thank Mr Adams and Mr Southgate for doing all the hard work. Thank you, gentlemen.

PRESENTATION TO THE INSTITUTE OF BOUND
VOLUME OF LETTERS TO SIR CHARLES WILLIAM
SIEMENS

THE PRESIDENT: The next item on the agenda is an unusual but very pleasant one. Sir George Nelson, a Vice-President of The Institution of Electrical Engineers, London, wishes to present to the Institute a beautifully bound volume of letters written to Sir William Siemens.

Unfortunately Sir George cannot be present this evening and he has asked Mr Nethersole to make the presentation. Before calling upon Mr Nethersole I think I should remind you that Sir William Siemens was born in Germany, 150 years ago and emigrated to England in 1843. He became the first President in 1872 of the Society of Telegraph Engineers now The Institution of Electrical Engineers.

I have had the privilege of perusing the volumes of letters and when I tell you that among the signatures I saw those of Faraday, Wheatstone, Maxwell, Alexander Graham Bell, Huxley and Lord Kelvin, you will appreciate not only the versatility of Sir William but also the value of these facsimiles to us. The deterioration in the standard of handwriting among electrical engineers is very obvious.

I now call upon Mr Nethersole.

H. J. H. NETHERSOLE (Member): I have here a volume containing a collection of letters written to the famous electrical engineer, Sir Charles William Siemens, by

eminent scientists and engineers of his time, such as Faraday, Clark-Maxwell, William Thomson and T. H. Huxley.

The originals of these letters came into the hands of Sir George Nelson about three years ago through a relative of Lady Siemens and he felt that they should be preserved because of their scientific interest and the picture they give of the social life of the time.

They have, therefore, been bound and are housed in the Boardroom of the English Electric Company in London. Sir Charles William Siemens was first President of the Institution of Electrical Engineers in 1872 and Sir George felt that due to this association with electrical engineers and the interest the letters would have for present and future members of the Institution, he would like to present a facsimile volume to the I.E.E. and also to those institutions in the Commonwealth Countries who have kindred interests. Five copies, specially bound were, therefore, prepared (one of which I have here) and have been or are being presented to the respective institutions in Canada, Australia, India, New Zealand and South Africa.

The presentation of a Special Volume to the I.E.E. in London took place on the 14th May last year by Sir George Nelson.

Apart from exact copies of 22 of the most interesting of the letters, and printed copies of some further 230 letters, the volume contains a short biography of Sir Charles Siemens written by the well known scientific writer, Mr W. H. Kennett prepared from basic research undertaken by Mr W. G. Friggens.

A feature of the binding of the original volume, and that one presented to the I.E.E. London which is of special interest to us in South Africa, is that the material used for the covers was made from the best Cape Morocco.

You will be interested to know that the exact reproductions of 22 of the letters were carried out by a process called 'Collotype' and the papers used were obtained from the manufacturers of the originals using their nearest match available today, and in some cases it was found that the same paper with the same watermark was still being produced.

Apart from these Special Volumes presented to the I.E.E. and the Commonwealth

Institutions, a further 1 000 volumes in a general edition were printed and have been distributed to universities, technical colleges, schools and public libraries of England and the Commonwealth Countries, including South Africa and the Rhodesias.

I have today received from Sir George Nelson, a cablegram which I would like to read to you :

'Please convey my warmest personal greetings to the President of The South African Institute of Electrical Engineers and express to them my sincerest regrets that it is not possible for me to make their presentation of the letters of Sir William Siemens in person. Stop I however send them warmest wishes and the hope that these letters of the First President of the British Institute of Electrical Engineers will stimulate further interest in the early history of the great industry with which we are associated and also provide a further bond between our two great Commonwealth Countries : George Nelson

I now have the greatest pleasure in presenting on behalf of Sir George Nelson this specially bound volume to you, Mr Anderson, as President of the South African Institute of Electrical Engineers for the use and pleasure of our Members, both now and in the future.

THE PRESIDENT : I have much pleasure in proposing a vote of thanks to Sir George Nelson and I hope Mr Nethersole will convey our thanks and in so doing tell Sir

George that we appreciate his generous gesture and will always treasure the volume.

GENERAL BUSINESS

C. G. DOWNIE (Member) : At the monthly general meeting of the Cape Western Local Centre last Thursday it was resolved that a telegram be sent to our new President, Mr Anderson. It gives me very great pleasure to be here in person this evening to read this telegram :

'Members Cape Western Local Centre at a general meeting in Cape Town last night attended by forty-one members and visitors resolved to send you heartiest greetings and best wishes for a successful term of office as President of our Institute for the ensuing year.'

It gives me very great pleasure to be here personally tonight to witness this ceremony, to see our new President inducted and to wish him personally the greatest of success for the year 1954.

PRESIDENTIAL ADDRESS

The President asked the Senior Vice-President, Professor G. R. Bozzoli, to occupy the Chair while he delivered his Presidential Address.

The vote of thanks was proposed by G. A. Dalton (Past President) and seconded by P. J. Louw, Immediate Past President, The South African Institution of Civil Engineers.

The President resumed the Chair and declared the meeting closed at 9.45 p.m.

PRESIDENTIAL ADDRESS

ELECTRICAL SERVICES ON THE BLUE TRAINS OF
THE SOUTH AFRICAN RAILWAYS

By J. P. ANDERSON

INTRODUCTION

I am greatly honoured at being selected as your President for the ensuing year and thank the Council and the Membership for entrusting me with the highest office which can be bestowed upon an electrical engineer in this country. With the assistance of the Office Bearers, the Council and the Secretariate I will do all in my power to emulate the high traditions set by me predecessors.

You will be aware of the efforts made by the Institute on behalf of electrical engineers and indeed, through the Associated Societies, on behalf of engineers of all categories. Our Institute is still the largest Constituent Society and its progress and activity can be gauged by the way in which our meetings are attended and by the forthright discussions on papers presented.

I am sure that in electing me to be your President you had also in mind honouring the electrical engineers of the South African Railways the great concern which it is my privilege to serve. It is strange indeed that I will be but the second railway engineer to succeed to this high office, yet if you consult Mr Dalton's address to you in 1946 you will find that the predecessors of what we know as the South African Railways were the first users of electric power in this continent. The arc lights at Table Bay Harbour were first lighted on the 20th April 1882, i.e. the same year as those in the little village of Godalming in Surrey which is generally accepted as the earliest public electricity supply in the world.

It is of interest to note that in 1883 the Cape Government Railways acquired from the Brush Electrical Co. the licence to vend electricity in the Municipalities of Cape Town and Green Point.

The earliest recorded electrical services on trains dates back to 1889 when the Cape

Government Railways fitted certain suburban trains running between Cape Town and Kalk Bay with electric lighting. Each coach was fitted with 8-candlepower carbon-filament lamps operated from a 16-volt Faure-type accumulator which was charged at the terminus during the day. Work on the first railways to be constructed in the Transvaal commenced in the previous year.

The selection of a subject for the Presidential Address is always difficult and is becoming more so as the list of Past Presidents grows. After much thought I decided to address you on a subject with which I have been associated for many years but about which little or nothing has been written.

I suppose it is safe to say that none of us ever really grow up where the interest in railways is concerned and it may be that those of us who have been involved in the design and operation of the Blue Trains of the South African Railways, one of world's premier services, are the envy of many young and others not so young.

The story is not complete when we merely look at the well kept exterior and interior finish of the saloons or at the rather uninspiring but nevertheless powerful electric locomotive which hauls the train on the early stages of its journey or even at the magnificent looking steam locomotive which does the major part of taking the train over its 1 000-mile journey between Johannesburg and Cape Town.

It is not likely that passengers or indeed many engineers whilst travelling in the unostentatious luxury of the saloons pause to think of the achievement. Many problems of operating and engineering lie behind it but here we are concerned only with the electrical services and in this term I include air-conditioning equipment.

SUMMARY

The Union of South Africa covers an area of 742 000 square miles and lies between the latitudes of 22 degrees South and 35 degrees South. The climatic conditions over such a vast area, covering as it does tropical, sub-tropical and temperate zones, are subject to wide variations in such a short journey as the 1 000 miles covered by the Blue Trains in their normal journeys between Cape Town and Johannesburg. The extremes of temperatures may be taken as 26°F and 110°F whilst the relative humidity may range from as low as 20 per cent to as high as 90 per cent. The train travels from the winter rainfall area of the Cape Peninsula and the Boland to the dry winter of the Karroo in the short space of 36 miles in 85 minutes with a change in altitude of 2 352 feet during the passage of the Hex River Pass.

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6. LIGHTING
7. OPERATION AND MAINTENANCE
8. ACKNOWLEDGMENTS

1. THE DRIVE

The method used on these railways is from the axles of the saloon and as the amount of power required to be transmitted is of the order of 30 h.p. per saloon special arrangements had to be adopted.

If Fig. 1 is examined it will be seen that the first step in the drive from the coach axle is by belt. There are four vee-belts each 2 inches wide (top) and about 15 ft long. The two driving pulleys are 22 inches effective diameter and the driven pulleys are 11 inches in diameter. These latter pulleys are mounted one on each side of the gear box which itself is suspended so that suitable tension may be applied to the belts. The tension applied is approximately 250 lb per belt.

The gear box contains bevel-cut gears and raises the ratio of the drive by 1.97 and at the same time changes the plane of the drive through 90 degrees so that the telescopic propeller shaft may be driven.

Between the gear box and the propeller shaft a torsion-spring coupling is inserted so that the uneven motion of the shaft when the train is negotiating a curve may be

absorbed. It should be mentioned here that the saloons may have to negotiate curves of 300 ft radius.

The telescopic propeller shaft performs much the same function as its namesake on a motor car. A universal joint with needle bearings is fitted at each end of the shaft.

At the generator end of the propeller shaft a centrifugal clutch is inserted—this clutch performs three functions, the first being that of allowing the saloon to move off without the relatively heavy load of the electrical plant being imposed on the locomotive—the generator starts to rotate at train speed of about 4 miles per hour, the second being to isolate the generator from the axle drive when it is being driven from the electric motor mentioned in the following paragraph and thirdly it isolates the equipment from buffing shocks. The average drag imposed on the locomotive by the air-conditioning equipment is about 90 h.p. for a 12-coach train.

Between the clutch and the generator a 20-h.p. electric motor is inserted. This motor provides sufficient power to maintain all the electrical and air-conditioning services when the saloons are occupied and stationary for periods beyond the hold-over capacity of the batteries. It is supplied from any nearby source of current at 380 volts 3 phase.

2. GENERATOR AND ITS CONTROL EQUIPMENT

The generator is rated at 17 kW at a nominal voltage of 125; it is totally enclosed with a steel yoke and light-alloy end shields. It is fully finned to ensure satisfactory cooling.

The design is such that the cut-in train speed is approximately 17 miles per hour whilst the minimum full-load output speed is about 21 miles per hour. The maximum safe speed is 75 miles per hour i.e. some 20 miles per hour above the maximum allowable speed of the train. This means that the generator must be stable at all speeds between 680 r.p.m. and 3 000 r.p.m. and moreover in both directions of travel.

This question of operation in both directions of rotation is a problem for the designer since any one conversant with the operation of direct-current machinery will know how difficult it is to obtain good com-

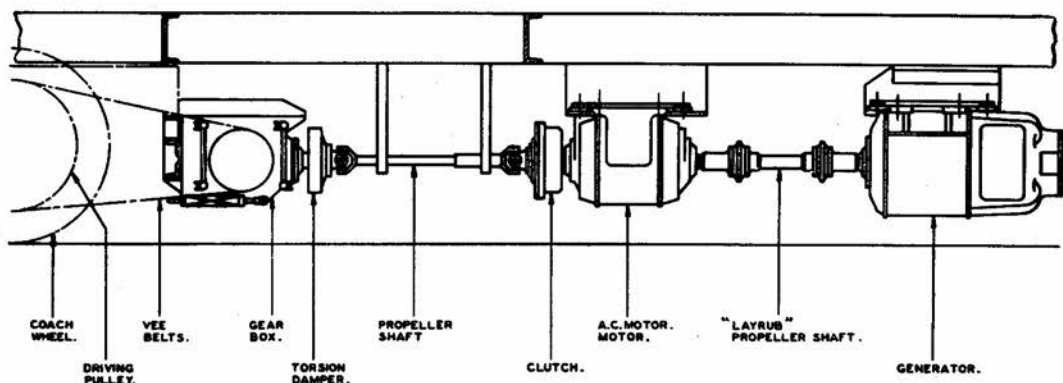


Fig. 1—General arrangement of drive

mutation on a variable-speed generator in one direction let alone in both directions. A further complication is caused by the need for interpoles which prevents the use of the simple and commonly used brush-rocking pole-changer which uses the friction of the brushes on the commutator to drag the brushes through 90 degrees into the correct neutral plane for the desired condition. Where interpoles are used it would be necessary to reverse their polarity simultaneously and in the case of small-capacity machines say up to 5-kW rating at 110 volts this is sometimes achieved by centrifugally-operated reversing switches mounted alongside the commutator.

In the particular case of the generators under review the relatively heavy output of 140 amperes requires another solution. At the end of the armature a small inductor alternator is fitted and this is so designed that it will operate a pilot relay at the cut-in speed of 17 m.p.h. which in turn causes the battery voltage to be applied to the main generator field thus establishing voltage across the generator output terminals. The relative polarity at these terminals naturally depends on the direction of rotation of the machine and of the direction of excitation from the battery.

The generator voltage is applied to a bridge-connected rectifier which then selects the correct set of contactors to connect the generator output to the battery with proper polarity. It will be seen that this method also tends automatically to prevent severe current surges at the moment of switching the generator on to the battery.

At this stage the automatic generator-output regulator takes over the control of the whole of the generator and battery circuit.

The output voltage of the main generator is controlled by the shunt coil of the carbon pile regulator (5 in Fig. 2). Examination of

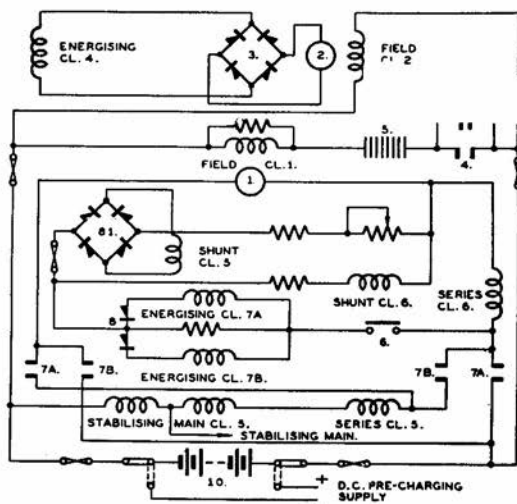


Fig. 2—Schematic diagram of generator and battery circuit Index

1. Main generator
2. Alternator for generator field switch
3. Rectifier for generator field switch
4. Generator field switch
5. Generator carbon pile regulator
6. Auto cut-in relay
7. A. B. Main cut-in switch: mechanical interlock;
8. Selective rectifier for main cut-in switch
10. Battery
28. Field discharge condenser
65. Battery isolating links
81. Selective rectifier for generator regulator
- B. Generator field fuses
- C. Generator cut-in fuse
- E. Battery fuses
- A. Terminals on main switch-board

the circuit diagram (Fig. 2) will show the regulator coils as shunt coil 5, series coil 5 and the stabilizing main coil 5. The series and stabilizing coils of the regulator modify the effect of the shunt coil in such a way that the voltage is slightly reduced when charging the battery in a discharged state at high charging rates limited only by the capacity of the generator and then as the state of the battery improves slightly increases the voltage. The stabilizing coil is brought into circuit when it is necessary to parallel two or more generators by means of an equalizer connection provided through plugs at the ends of the saloons.

3. THE BATTERIES

It is necessary to provide power to operate the air-conditioning equipment and for lighting when the train is at a standstill. For this purpose a lead-acid storage battery of 56 cells and of 390-ampere-hour capacity is installed on each coach.

These cells may be called upon to absorb 140 amperes of charging current when in a discharged condition or on the other hand provide as much as 8 kW (80 amperes) whilst the train is standing or when running at low speeds. It is obvious that such treat-

ment requires batteries with specially designed plates. The positive plates are made up in such a way that the active material is held in tubes which have narrow slits, thus ensuring that the shedding of the active material is reduced to a minimum. The negative plates are of box-grid con-

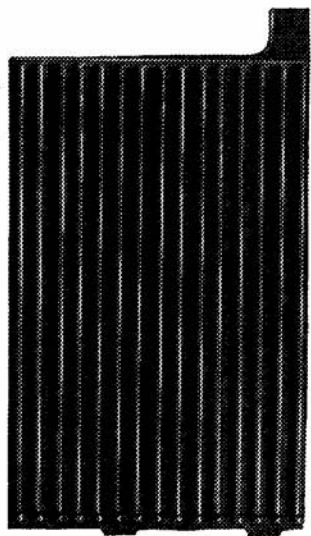


Fig. 3a—Positive plate assembly

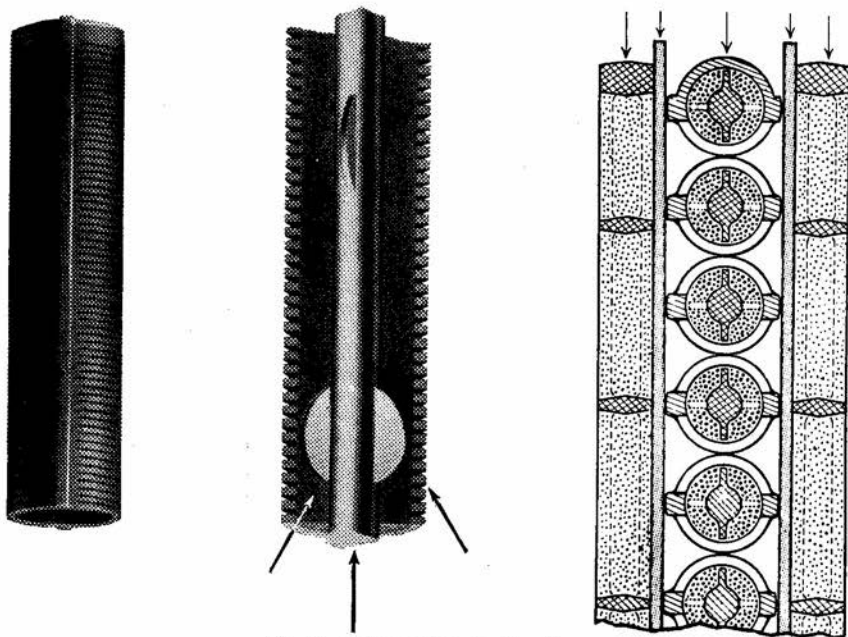


Fig. 3—Positive plate construction

struction and the separators are made from an inert inorganic substance. The success of this design is revealed in the fact that the batteries have withstood the arduous service for six years and seem likely to last for at least ten years.

The design of the plates is shown in Fig. 3.

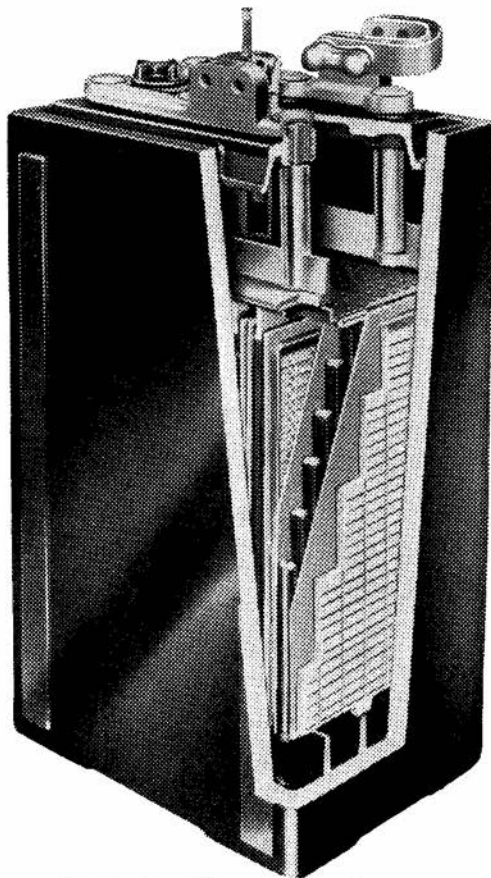


Fig. 3b—Complete assembly of battery

4. THE AIR-CONDITIONING EQUIPMENT

The term 'air-conditioning' has many interpretations but perhaps the best definition is that used by the American Society of Heating and Ventilating Engineers which is: 'The simultaneous control of all or at least three of those factors affecting both the physical and chemical conditions of the atmosphere within any structure. These factors include temperature, humidity, motion, distribution, dust, bacteria, odours,

toxic gases and ionization, most of which affect in greater or lesser degree human health or comfort.'

The earliest attempts to provide comfort for passengers might be termed the beginning of what we know today as 'air-conditioning.' These early attempts comprised foot-warmers made up of a metal container filled, at the main depot, with hot water. These same foot-warmers are still in use today on many railways, including the South African Railways but have been modernized by the use of a chemical such as sodium acetate instead of water. This later version of the foot-warmer is plunged into boiling water which causes liquefaction of the crystallized sodium acetate, the recrystallization process causing heat to be radiated for some hours. This form of heating is used on mixed trains where it is not possible to obtain steam from the locomotive.

We are all familiar with the more usual form of train heating where steam is bled from the locomotive boiler and is piped along the coaches which are fitted with steam radiators.

In the case of the Blue Train saloons we are concerned mainly with temperature, distribution, dust and motion.

The outside air is drawn in through a grille high up on the side of the saloon into the vestibule where it passes through the outside air viscous oil filters (see Fig. 5) and is then mixed with a proportion of the re-circulated air drawn from within the saloon. The proportions can be varied but usually about 40 per cent of fresh air is injected in each cycle.

The mixed air is then forced over the evaporator unit and through the heater unit. The automatic temperature control naturally selects which of these two conditions is required.

The pressure is created by an impeller-type fan driven by a $1\frac{1}{4}$ -h.p. motor and approximately 2 400 cubic feet of air is passed per minute.

The now conditioned air then passes along the ducts in the roof and is bled into the various compartments through multi-vent panels. These multi-vent panels cover nearly the whole roof area and in effect break up the air stream into a great number of small streams thus preventing passengers from being conscious of air movement.

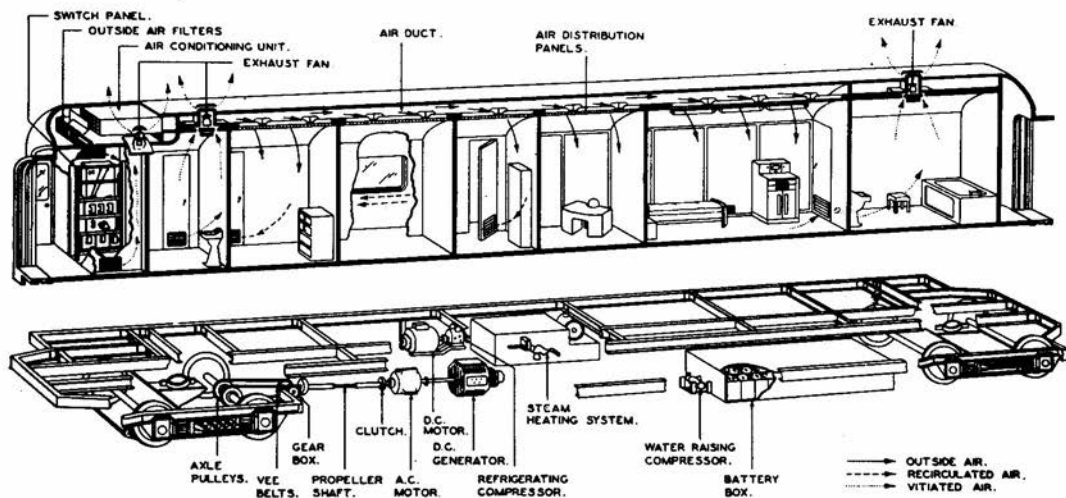


Fig. 4—General arrangement of equipment and air flow. King's car of South African Royal Train

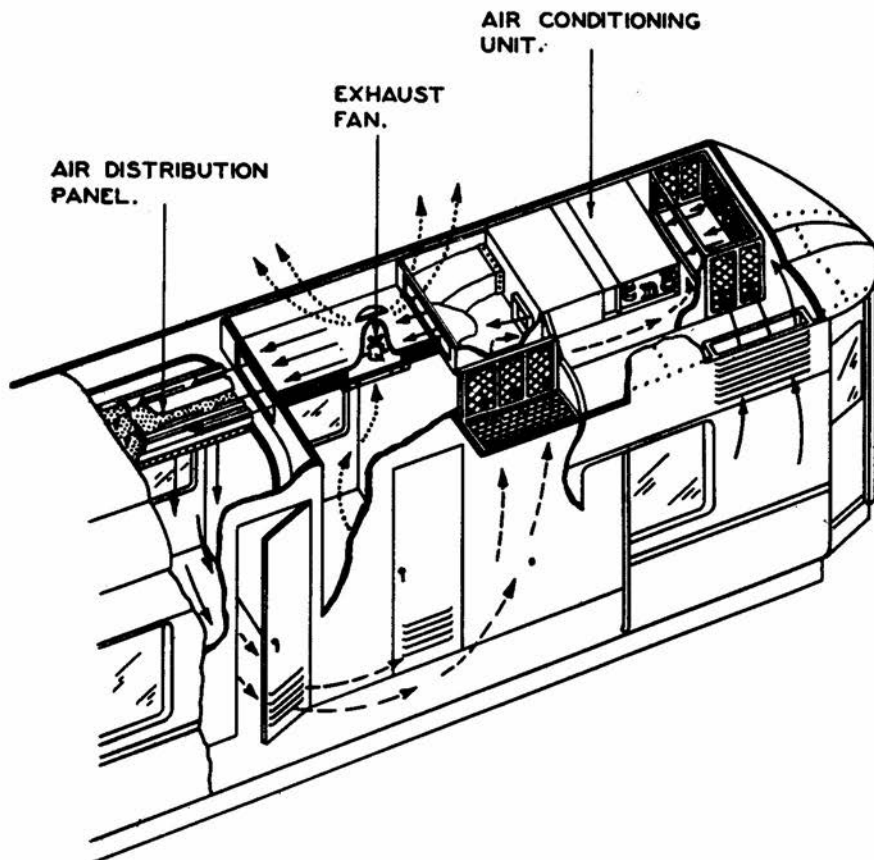


Fig. 5—Fresh air entry and recirculation

The air then passes through a grille into the corridor from where, as will be readily seen from Fig. 4, it is exhausted in two channels. One portion is drawn in into the toilet compartments by means of the roof-mounted exhaust fans whilst the other portion is partially exhausted to the outside and partially recirculated through the re-circulation air filters and again is mixed with fresh air to commence the whole cycle again.

It is now necessary to consider the individual components used in the air-conditioning system. These comprise the roof unit; the compressor with its associated condenser; the evaporators and heater elements.

The roof unit as its name implies is mounted in the roof of the saloon and its actual position can be seen by examining Fig. 5. It comprises the primary air-circulating fan capable of delivering about 2 400 cubic feet of air per minute under the normal conditions found in the saloon. The fan is of the impeller type driven by a 1½-h.p. motor operating from a 110/135-volt direct-current circuit.

Within this unit is found the evaporators connected to the cooling compressor and over which the air passes and is cooled when the climatic conditions demand it. When the converse conditions are met the heater elements, of 4 000-watt rating, heat the air. These heater elements are also housed in the unit. Neither the evaporation nor the heater elements possess unusual features except that of special robustness so necessary to meet the arduous service conditions and it is not proposed to describe them in detail.

These parts are conveniently built into one unit and by releasing a large number of bolts and breaking certain pipe joints the whole unit can be removed and replaced much in the manner of truck-type switch-gear.

The refrigerating compressor is a four-cylinder, single-acting reciprocating type and force lubricated. It is driven by a 8-h.p. motor from the 110/135-volt direct-current supply. Great care has been taken in the mounting of this machine since any vibration from this unit is easily transmitted through the whole saloon. The refrigerant used is Freon 12 which, although requiring relatively high pressures, is non-toxic and non-inflammable.

The condenser is mounted on the under-frame and is provided with two propeller-type fans driven by a single direct-current motor. The condensers are fabricated in the usual way and of copper. Their performance under the arduous conditions of railway service has been remarkable. In the many years of service the only trouble experienced has been that of failing to carry off enough heat on two or three occasions when the ambient temperature in the Paarl Valley reached the unusually high figure of 110°F. To meet these few occasions means has been provided to spray water on to the condensers thus increasing the heat exchange.

The usual protective equipment such as low- and high-pressure cut-outs on the compressor, low-voltage on the batteries and overload thermal protection for the motors is provided. These devices follow conventional lines and need not be described.

The equipment so far described is that actually used to produce the desired state of affairs within the train but there remains the question of how to control these in the light of the rapidly changeable weather conditions encountered during the 1 000-mile run.

The control equipment provides that the car attendant may select the temperature condition it is desired to maintain and thereafter the operation of the plant is automatic in that the cooling or heating plant will be operated according to the ambient conditions. When the heating cycle is in use the four selected temperatures may be 62°, 64°, 66° or 68° Fahrenheit whilst under cooling conditions the selection becomes 68°, 70°, 72° or 74° Fahrenheit.

The circuits are so arranged that when only a relatively small amount of heating is required to supplement the heat load of the saloon and to maintain a pleasant and agreeable temperature the control is effected by an air-heat thermostat placed in the car and the heating is by the electric heating elements in the roof unit. A further variation is obtained by reducing the volume of air passing through the saloon. Under severe weather conditions, and this is very seldom experienced, assistance can be given from the normal steam heaters found in any compartment. The operation is automatic.

There are actually three thermostats employed in the system, all of which are mounted in the re-circulated air duct i.e.

one each for cooling, air heat and floor heat. These thermostats are of the glass mercury-bulb type and in order to obtain the various settings on the selector switch a small heater element surrounds each mercury-bulb—this winding is connected to a constant-voltage supply through a tapped resistance. By selecting the tapping required the temperature values mentioned above are obtained.

The thermostats are fitted with 'cycle modulation' control in order to avoid violent changes in the temperature of the circulated air and of course so overcome discomfort to passengers. As the compartment temperature approaches the selected setting the thermostat automatically causes impulses of either heating or cooling according to the required condition to be injected into the system. These pulses occur in five- to ten-second periods until the thermostat makes final contact. In effect the thermostats are, by this means, given increased sensitivity.

5. WATER-RAISING

The usual method of raising water from the under-frame tanks to the overhead service tanks is by means of a manual semi-

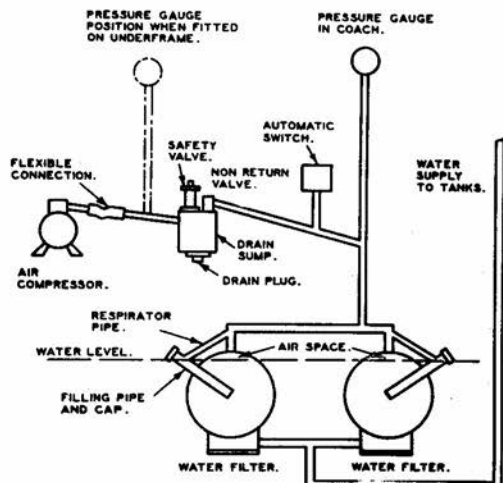


Fig. 6—Schematic diagram for water raising apparatus

rotary pump. In the case of the air-conditioned saloons the limited space in the roof and small service tanks renders some automatic means necessary.

A small electrically-driven air compressor maintains a pressure of from 5 to 9 lb/sq.in. in the air space above the water in the under-frame tanks.

Examination of Fig. 6 reveals the details of the system. The usual limit pressure switches and safety devices are fitted.

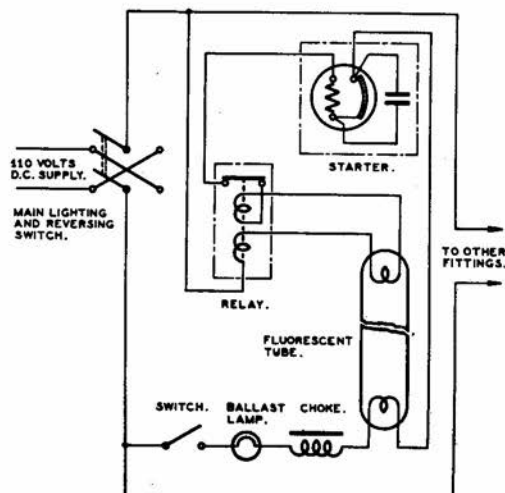


Fig. 7—Circuit diagram—Direct-current operation of hot-cathode fluorescent lamps

6. LIGHTING

A high standard of lighting is employed throughout the saloons and most of the lamps are of the fluorescent-tube type mounted in fittings covered with reeded glass. A level of 12 to 15 candelas is usual in the compartments whilst 20 candelas is used in the lounge cars and dining saloons.

There are some incandescent lamps used and it is necessary to use a lamp-voltage regulator to ensure that the high charging voltage of 135 is not applied to these lamps. The regulator is of a series carbon-pile type and comprises a pilot pile which responds to voltage variations and imposes control over the resistance in the main circuit.

The use of direct current for the operation of fluorescent tubes is perhaps unusual. Fig. 7 indicates the circuit employed.

The lamps used are standard 24-inch tubes and operate satisfactorily over a voltage range of 98 to 135 thus eliminating the need for any lamp-voltage regulator as in the case of the incandescent lamps. The switching is so arranged that the polarity is

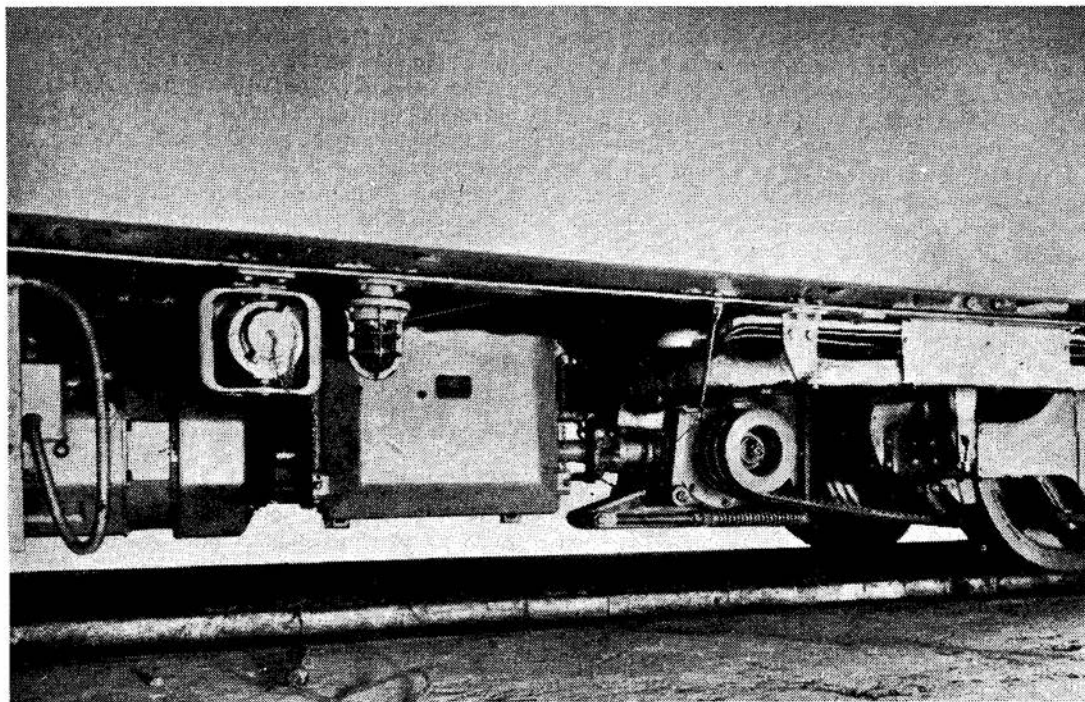


Fig. 8—General view of drive and electrical equipment on underframe

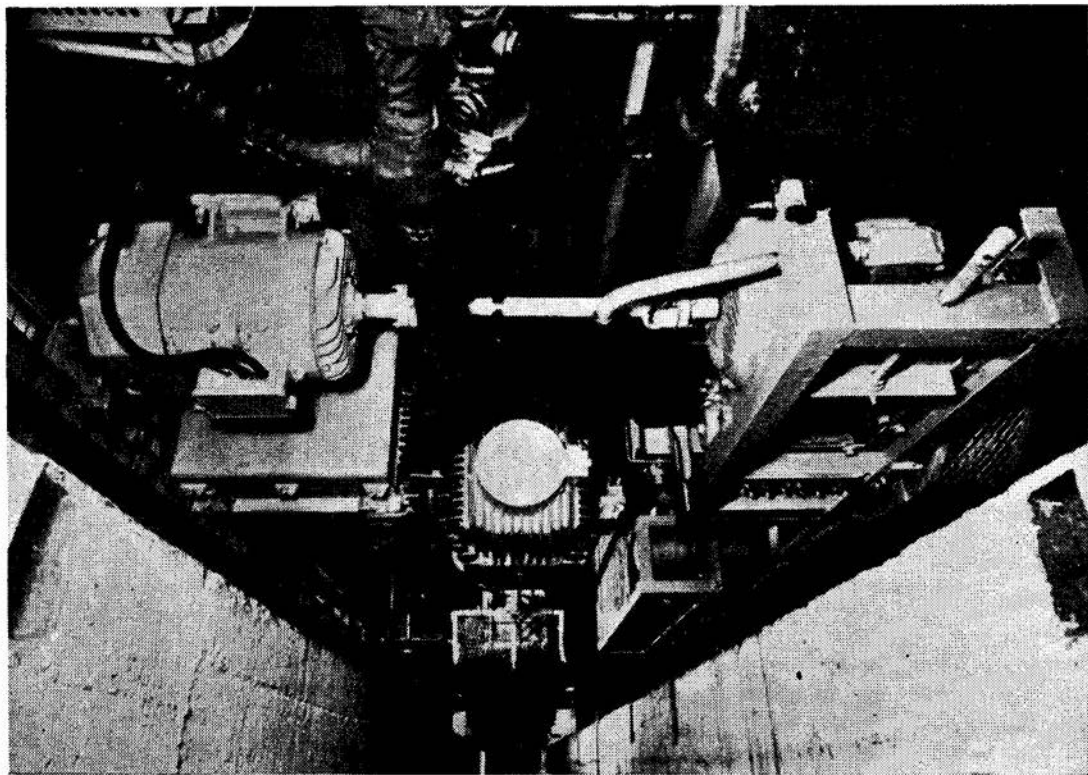


Fig. 9—View of underframe mounted equipment from below

reversed each time the lamp is switched on and this reduces the end-blackening effect which is inevitable at one end of a fluorescent tube working without polarity change. It will be appreciated from the diagram that the starter switch is out of circuit whilst the lamp is burning thus effecting longer life of this component and also greater reliability. The starter operates over the range 98 to 135 volts and at the lower range without having to overrun the lamp at the nominal voltage. The lamp may be switched off and on again without the need to wait for the thermal switch to cool. The operating results have been very satisfactory and naturally the greatly increased light from the limited available power is most useful.

7. OPERATION AND MAINTENANCE

It will be realized from the description given above that each saloon is a complete entity from the electrical and air-conditioning points of view. The saloons may then be detached and operated as units on any train although this course is not often followed except in the case of special saloons such as those used by high officers of state or distinguished visitors.

An electrician, who has been thoroughly trained in the intricacies of air-conditioning systems on trains, accompanies the Blue Trains and is entirely responsible for the correct and reliable functioning of the system.

During the day it is necessary for him to patrol the train at fairly frequent intervals in order to set the controls for the widely varying conditions and to meet the special whims of some travellers. After nightfall the conditions over the route remain fairly stable and usually only one adjustment at about 9.30 p.m. is necessary. The temperature is held at 66°F i.e. somewhat lower than the comfort conditions during daylight.

It speaks well for the equipment when it is realized that the electrical and air-conditioning equipment received its first heavy overhaul after twelve years of service. At this stage the saloons were rewired at those points where severe conditions exist.

The normal maintenance require is relatively small and consists of removing and steam cleaning the air filters, impregnating them with a blanc and odourless oil.

The oil and grease levels are checked and the batteries receive attention.

The compact nature of the plant as indicated in Figs. 8 and 9 creates the chief difficulty in proper maintenance. It will be seen from this photograph which was taken from underneath the saloon that there is no room to move round the equipment. However, notwithstanding all these difficulties the record of service of these trains is a proud one.

8. ACKNOWLEDGMENTS

I desire to express my thanks to the General Manager of the South African Railways for his permission to use the information needed for this address. I also acknowledge the ready assistance of the Chief Electrical Engineer and my colleagues of the Electrical Department of the South African Railways in the preparation of the slides and photographs.

VOTE OF THANKS

G. A. DALTON (Past President): Mr Anderson has regaled us with a most interesting Inaugural Address, covering a subject with which he has been closely identified since its inception in this country. He has uncovered for us, chronologically, the substance of a little-known facet of electricity ingeniously applied for comfort in railway travel. His tribute to the South African Railways Blue Trains as one of the world's premier services is appropriate, and it seems fitting to mention here that resulting from this supremacy, and experience gained, the Royal Train—probably the finest train yet built—was designed and commissioned for the tour of Southern Africa during 1947.

It is a far cry to the paper presented to the Institute during 1922 by the late Mr C. T. Cocks, Past President, entitled 'Some train-lighting systems,' and only by a comparison of that paper with our President's Address, is it possible fully to comprehend the remarkable achievements in this particular sphere during the intervening years.

Mr Cocks, however, made mention of the fact that 'the trainlighting axle-generator system' was pioneered by J. Stone & Co. of Deptford, England, during 1894, and there-

after became standard practice. It is interesting to record that this system of drive remains fundamentally the same after 60 years, and that its progenitors, the House of Stone, also pioneered the air-conditioning system as applied to trains, details of which have formed the highlight of Mr Anderson's illuminating address. He has undoubtedly whetted the appetite, and provided a very attractive invitation to members to forsake the air, and the road, and taste the joys of Blue Train travel. Mr Joseph White has very definitely done this, since taking up residence at the Cape, and probably enjoys the distinction of being South Africa's Patron Number 1.

Mr Anderson has for many years been a devotee of learned societies, both here and overseas, but, in addition to active interest in this sphere of professional life, he has given much time, thought and energy to the development of technical education in South Africa. Evidence of this lies in the fact that he is a member of the National Apprenticeship Board, the South African Railways Apprenticeship Committee, and the Council of the Witwatersrand Technical College. This is indicative of the fulsome life he leads.

It is our fervent wish that Mr Anderson will enjoy a memorable year of office. As President he becomes a member of all the Institute's committees, but there is one to which he will be especially welcome, the Constitution and Bye-Laws Sub-Committee, for, reinforced by his presence and stature, members can be quite sure of a total absence of constitutional crises during 1954.

At some time in our lives, either as adults, or in the idyllic days of youth, we have been interested in trains and their operation. In the light of this Mr Anderson's address has been doubly interesting, and forms a most valuable contribution to the literature of the Institute.

It therefore gives me great pleasure, on behalf of all those present, to propose a cordial vote of thanks to the President, and, coupled with this—as tomorrow is the most important date in his calendar—the old time wish, 'Many happy returns of the day.'

P. J. Louw (Immediate Past President, The South African Institution of Civil Engineers): It is indeed a honour and a

great pleasure for me to be able to speak on this occasion.

This honour is appreciated more by me on account of the fact that I am not a member of your Institute but a civil engineer.

However, I think I can claim a certain amount of justification for this honour by virtue of my long association with Mr Anderson in an official capacity on the South African Railways.

In this capacity and on behalf of the General Manager it affords me great pleasure to congratulate Mr Anderson on his election to the very exalted position of President of your Institute. I look upon it indeed as also an honour conferred on the organization of which he is an officer.

Mr Anderson, although a comparatively young man, has already had 33 years' service in the Railways and, springing from a railway family, he has railways in the blood. He is very enthusiastic about all matters appertaining to the railways no matter whether they refer to his particular branch or any other branch. He is what we are proud to term a typical railwayman.

For a considerable period his particular interest has been in lighting, power supply and air-conditioning on trains. It was during this period that the great improvements in train-lighting, as compared with its primitive beginning, have taken place.

Before proceeding to the air-conditioning in the Blue and Royal Trains I should mention another field in which Mr Anderson has and is still rendering his fellow-men a great service; this is the training of young engineers and apprentices in the Administration's service. As a member of the Railway Apprenticeship Committee he has devoted his energies to this work for many years. For the solution of any problems in this field Mr Anderson's wise counsel is eagerly sought. I personally have done so on many occasions.

Gentlemen, as a civil engineer, I am not competent to comment on the technical matters raised by Mr Anderson in dealing with the air-conditioning in the Blue Train. It is sufficient for me to say that the problems encountered and solved to make the air-conditioning in South Africa stock the success that it has been, were formidable.

Although the Blue Train was engineered and put into service before the last war,

nowhere in the world has a higher standard of lighting and comfort been attained, and the excellence of the equipment can be gauged by the fact that no material changes were necessary to provide for the comfort of our Royal visitors in 1947 when the Royal Party lived under all the varying climatic conditions in South Africa for a period of approximately three months, and at the conclusion of their visit gave their unqualified approval.

It is of interest to note that many of the luxury-class trains in the U.S.A. still obtain their cooling by means of ice loaded at the

depots, and it may not be realized that the electro-mechanical refrigeration provided in the Blue Train coaches was very much in the nature of pioneering.

The efficiency of the equipment and the excellence of design have been favourably commented on by visitors from all over the world and a number of those present to-night have no doubt had personal experience of the standard of comfort provided.

With these few remarks, Mr Chairman, I have pleasure in seconding the vote of thanks to Mr Anderson for his very interesting and instructive presidential address.

Institute Notes

The Illuminating Engineering Society—Dow Prize competition

The Institute has been advised by the Illuminating Engineering Society, London, of the Dow Prize competition for 1954.

The subject is the layout, lighting, decoration and furnishing of a dining room and cocktail bar in a city hotel. The competition is open to anyone who, not having completed his 26th year by the opening date (1st April), can show that he is taking or has taken a course of instruction, or has equivalent training of a nature appropriate to the subject of the competition. The last date for submission of entries is 15th November 1954. The winning entry will receive a total cash award of £75 and a certificate will be presented to each member of the winning team.

More detailed conditions for the 1954 Prize can be seen at the office of the Institute's Secretary, Kelvin House.

South African Bureau of Standards

The Institute has received from the Bureau an article of non-destructive testing. This will be available at the office of the Institute's Secretary, Kelvin House for any member who wishes to peruse it. Any member particularly interested in non-destructive testing should communicate directly with the Bureau, Private Bag 191, Pretoria.

ANNUAL REPORT AND BALANCE SHEET

For the year ended 31st December 1953

GENTLEMEN,

Your Council has pleasure in submitting the Forty-fourth Annual Report of the Institute as follows:—

FINANCE

The finances of the Institute continue on a sound basis and, in view of the continued rise in costs, it is gratifying to be able to show an excess of income over expenditure.

Investments

At the close of the last financial year, investments stood at £10,289 8s. 4d. These were increased by £1,065 11s. 11d. during the year, making the total moneys invested at the 31st December 1953, £11,355 0s. 3d.

The investments are shown in detail in the Balance Sheet.

Subscriptions

Subscriptions for the last three years are as follows:—

1951	...	...	...	£3,109	11	3
1952	...	...	...	£3,273	18	0
1953	...	...	...	£3,409	17	6

Transactions

The cost of producing the *Transactions* for the year under review was £3,800 1s. 6d. and the revenue from advertisements and sales of copies amounted to £3,768 5s. 2d.

Your Council herewith places on record its thanks to those commercial firms who use the *Transactions* as an advertising medium.

Assessment

£1,256 17s. 0d. was paid to the Associated Societies in respect of assessment for 1953; this is an increase of £51 19s. 6d. on the amount paid in 1952.

Donation

The Associated Societies donated the sum of £233 12s. 6d. to the Institute.

The Institute is indebted to the Controlling Executive of the Associated Societies for this consideration.

HONOURS AND AWARDS

The following premiums and prize have been awarded:—

INSTITUTE PREMIUM

C. F. Boyce, A.M.(S.A.)I.E.E., for the paper 'The earthing of telephone systems with particular reference to South Africa,' *Transactions*, December 1952.

INSTITUTE AWARD FOR ITEM OF PRACTICAL INTEREST

R. Gettliffe, A.M.(S.A.)I.E.E., for the item 'Experiences due to irregularities in Ward-Leonard winder motor airgaps and controller resistances,' *Transactions*, September 1952.

INSTITUTE WITWATERSRAND TECHNICAL COLLEGE PRIZE

The Institute Prize was awarded to R. A. Forbes, Student(S.A.)I.E.E., who was adjudged the best student of the Witwatersrand Technical College in electrical engineering (A.T.C. II grade) for the year 1953.

ESCOM PREMIUMS—PAPERS

Class A

(i) T. K. A. Douglas, A.M.(S.A.)I.E.E., for the paper 'A 66-kV grid in Northern Rhodesia,' *Transactions*, February 1952.

(ii) J. K. Gillett, A.M.(S.A.)I.E.E., for the paper 'The modernization of the power system at Oranjenmund,' *Transactions*, March 1952.

ESCOM PREMIUMS—CONTRIBUTIONS TO DISCUSSION

(i) R. R. Gilmour, A.M.(S.A.)I.E.E., for contribution to the discussion on the paper 'A 66-kV grid in Northern Rhodesia,' by T. K. A. Douglas, A.M.(S.A.)I.E.E., *Transactions*, February 1952.

(ii) A. Trevor Williams, M.(S.A.)I.E.E., for contribution to the discussion on the paper 'The modernization of the power system at Oranjenmund,'

by J. K. Gillett, A.M.(S.A.)I.E.E., *Transactions*, March 1952.

(iii) E. F. Gait, A.M.(S.A.)I.E.E., for contribution to the discussion on the paper 'Service operation of d.c. traction motors,' by A. A. Middlecote, Graduate(S.A.)I.E.E., *Transactions*, April 1952.

(iv) M. Hewitson, M.(S.A.)I.E.E., for contribution to the discussion on the paper 'Coaxial-cable carrier telephone systems in South Africa,' by T. W. Elliott and N. J. Paola, A.M.(S.A.)I.E.E., *Transactions*, November 1952.

SOUTH AFRICAN RAILWAYS AND HARBOURS AWARD

A. A. Middlecote, Graduate(S.A.)I.E.E., for the paper 'Service operation of d.c. traction motors,' *Transactions*, March 1952.

SOUTH AFRICAN CABLE MAKERS' ASSOCIATION AWARD

T. W. Elliott and N. J. Paola, A.M.(S.A.)I.E.E., for the joint paper 'Coaxial-cable carrier telephone systems in South Africa,' *Transactions*, November 1952.

Acknowledgment to donors

Your Council expresses its appreciation to the Electricity Supply Commission for its annual 'Escom Premium' of £25; to the South African Railways and Harbours Administration for its Annual Award of £26 5s. 0d. and to the South African Cable Makers' Association for its Annual Premium of £5 5s. 0d.

PAPERS

The following papers were read during 1953:—

'Centralized load control,' by R. G. Hunter, *Transactions*, February 1953.

'Colenso-Durban 132-kV overhead line—a description of its design and construction,' by W. N. Powell (Member), *Transactions*, March 1953.

'Some technical aspects of the reconstruction of the British mining industry, 1945–1953,' by B. L. Metcalf and F. Marsh, *Transactions*, April 1953.

'Electro-magnetic testing of winding ropes,' by A. Semmelink (Associate Member), *Transactions*, May 1953.

'A telemetering instrument for the measurement of acceleration and deceleration of mine hoists,' by G. ff. Bellairs (Associate Member) and M. R. Gericke (Member), *Transactions*, June 1953.

'The activities of the Power and Communications Systems Co-ordinating Committee during the period May 1941 to July 1952. A report by C. F. Boyce (Associate Member) on behalf of the Committee, *Transactions*, July 1953.

The Third Bernard Price Memorial Lecture—'Secondary industry in South Africa,' by Dr H. J. van Eck, *Transactions*, August 1953.

'Introduction to communication theory,' by E. H. Harwood (Member), Chairman, Light Current Section, *Transactions*, August 1953.

This address was presented to the members of the Light Current Section of the Institute on the 19th May 1953.

'Some developments in control of electrically driven hoists with special reference to automatic control,' by D. R. Love, *Transactions*, September 1953.

'Construction and operation of a 66-kV network in the copperbelt of Northern Rhodesia,' by R. S. Arnot (Member), *Transactions*, October 1953.

'The code of practice for earth-leakage protection on mines for alternating current circuits up to 660 volts,' *Transactions*, November 1953.

'South Africa's submarine cable communications,' by S. Theobald and J. G. Wells, *Transactions*, December 1953.

DISCUSSION ON PAPERS

It is pleasing to your Council to be able to record that a large number of members contributed to the discussions on papers read before the Institute and it is hoped that this interest will be maintained since extensive discussion can increase appreciably the value and interest of a paper.

JOINT MEETING WITH THE UNIVERSITY OF THE WITWATERSRAND

THIRD BERNARD PRICE MEMORIAL LECTURE

The Twenty-third Annual Joint Meeting with the University of the Witwatersrand was held on Thursday, 27th August 1953, when Dr H. J. van Eck, Chairman of the Industrial Development Corporation of South Africa Limited delivered the Third Bernard Price Memorial Lecture entitled 'Secondary industry in South Africa.' A vote of thanks was proposed by Mr T. P. Stratten (Past President) and seconded by Principal H. R. Raikes.

The meeting was well attended, there being present approximately 190 members and visitors, and your Council places on record its thanks to Principal H. R. Raikes and the University authorities for the arrangements made.

ATTENDANCE AT COUNCIL AND COMMITTEE MEETINGS

Designation of Committees		<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>
Note: Meetings of Committees <i>b</i> and <i>c</i> are held concurrently.	Council	Finance	Papers	General Purposes	Examinations	Status	Honours and Awards	Education and Bursary Fund	Annual Banquet
Number of meetings held during the year	12	11	11	11		3	1	1	1
A. R. Mullins (President, Chairman <i>d, e, f, g, h</i>) (<i>ex-officio</i> all Committees) (<i>a, b</i>)	11	10	10			3	1	1	
J. P. Anderson (Vice-President, Chairman <i>b</i>) (<i>a, d, e, f, h</i>)	10	10	10			3	1		1
G. R. Bozzoli (Vice-President, Chairman <i>e</i>) (<i>a, d, e, f, h</i>)	10	9		9		3	1	1	
R. W. Kane (Vice-President) (<i>d, e, f, g, h</i>)	9	8		8		3	1		1
J. T. Allan (Immediate Past President, Chairman <i>d</i>) (<i>a, b, e, f, g, h</i>)	9	8	8			3	1		1
A. W. Lineker (Honorary Treasurer from May, 1953, Chairman <i>a</i>) (<i>b, e, f, g, h</i>)	12	8	11			3	1	1	
H. P. Alexander	11		10						
L. G. Axe	9			8				1	
I. de Villiers	7			6					
J. C. Downey	7		5						
J. K. Gillett	12		11						
J. Monks	11		10						
G. Williams	4			4					
G. H. Woods	6			5					
A. C. Backeberg	4			4					
H. O. Collett	11		10				1		
W. Cormack	10		9				1		
R. Gettliffe	12			11			1	1	
F. J. Hewitt	10		9						
F. W. Stutterheim	9		8						
E. H. Harwood (Chairman, Light Current Section from May 1953)	4		3						
M. Hewitson (co-opted Member)	9			7			1		
H. T. Aspinall	10			8		2		1	
L. H. L. Badham	8		7					1	
G. A. Dalton	11			10		1	1		1
J. H. Dobson	2		2						
J. C. Fraser	6			5		1			
J. A. F. Michell	3		3			2			
W. H. Milton									
E. Vivian Perrow	3			2					

REPRESENTATION, 1953

THE ASSOCIATED SCIENTIFIC AND TECHNICAL SOCIETIES OF SOUTH AFRICA

Members: A. R. Mullins, J. P. Anderson

Alternates: G. R. Bozzoli, R. W. Kane

TRANSVAAL CHAMBER OF MINES PREVENTION OF ACCIDENTS COMMITTEE—
TECHNICAL SUB-COMMITTEE

Member: A. R. Mullins

Alternate: A. C. Backeberg

WORLD POWER CONFERENCE—S.A. NATIONAL COMMITTEE

Member: A. W. Lineker

Alternate: A. M. Jacobs

SAFETY PRECAUTIONS COMMITTEE

W. H. Milton

E. T. Price

R. W. Kane

BUILDING RESEARCH ADVISORY COMMITTEE

Member: W. E. John

Alternate: Joseph White

COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH

(A) NATIONAL SCIENTIFIC COMMITTEE FOR RADIO

G. R. Bozzoli

(B) COMMITTEE ON ELECTROTECHNICS AND ELECTRONICS

Member: G. R. Bozzoli

Alternate: J. A. F. Michell

In addition, the Institute is represented on a number of committees constituted by the South African Bureau of Standards.

MEMBERSHIP

				Honorary Members	Members	Associate Members	Com- panions	Gra- duates	Asso- ciates	Students	Total
As at 31st December 1952	...			4	212	558	5	307	358	280	1 724
<i>Deductions—</i>											
Resignations	...	...	...	—	—	—	1	5	4	9	19
Deceased	...	...	...	1	5	6	—	—	2	—	14
Struck off	...	...	...	—	—	2	—	—	9	47	58
Transferred	...	...	...	—	1	14	—	21	8	31	75
				3	206	536	4	281	335	193	1 558
<i>Additions—</i>											
Elected	...	...	...	1	1	22	—	23	16	108	171
Transferred	...	...	...	—	14	26	1	26	7	—	74
Re-instated	...	...	...	—	—	—	—	—	—	2	2
As at 31st December 1953	...			4	221	584	5	330	358	303	1 805

The table shows an increase in the number of Members of 9, Associate Members 26, Graduates 23, Students 23, and Honorary Members, Companions and Associates remain the same. The net increase in membership for the year is 81.

HONORARY MEMBERSHIP

In recognition of his outstanding services to the Institute since its inception, the Council has elected Mr E. Vivian Perrow (Past President) an Honorary Member of the Institute.

THE ASSOCIATED SCIENTIFIC AND TECHNICAL SOCIETIES OF SOUTH AFRICA

The following are the Office Bearers of the Associated Societies for the year 1953/1954 :—

President—F. G. Hill.

Vice-Presidents—Dr B. F. J. Schonland, J. P. Leslie.

Honorary Treasurer—Dr P. N. Lategan.

The New Patents Act (Act No. 37 of 1952)

The promulgation of the new Patents Act was referred to in the last Annual Report, and it is pleasing to report that all members nominated by the Associated Societies to the Panel of Advisers have been approved by the Minister in terms of Section 75 (2) of the Patents Act 1952.

Proposed periodical surveys of scientific and technical professions

At the request of the South African Chemical Institute, the Associated Societies communicated with the Department of Education, Arts and Science stressing the need for periodical surveys of the scientific and technical professions to be undertaken by the Government and also the need of a suitable section in the Department to conduct such surveys.

A meeting of representatives of interested organizations, including the Associated Societies and the South African Chemical Institute, was held in the office of the Department of Education, Arts and Science in Pretoria on the 28th August 1953, for the purpose of considering the question and it was agreed to recommend that a survey should be undertaken by the Department assisted by an honorary consultative or advisory committee.

Should this recommendation be accepted the Associated Societies will, when invited to do so, appoint a representative to serve on the abovementioned Committee.

OBITUARY

Your Council records with deep regret the death during the year of J. H. Ryder

(Honorary Member: Past President), H. Bough (Member), R. F. Franks (Member), T. Miller (Member), R. Tarran (Member), C. E. Scott (Member), Q. H. Bullard (Associate Member), A. J. Charlton (Associate Member), P. C. Cowie (Associate Member), L. Johns (Associate Member), C. P. Marais (Associate Member), T. Riley (Associate Member), P. D. Kruyt (Associate) and G. Mortimer (Associate).

The condolences of the Institute have been extended to the relatives of the deceased.

LIGHT CURRENT SECTION

The following are the Office Bearers of the Light Current Section of the Institute for 1953/1954 :—

Chairman—E. H. Harwood.

Vice-Chairman—F. J. Hewitt.

Immediate Past Chairman—M. Hewitson.

Members of the Committee are G. R. Bozzoli, H. O. Collett, G. A. Hopkins, L. Webster and the President (*ex-officio*).

The Section held five general meetings during the year, details of which are as follows :—

19th May : Chairman's Inaugural Address entitled 'An introduction to communication theory.'

This address was published in the August 1953 issue of the *Transactions*.

9th June : 'The coupling of three transmitters to a vertical radiator,' by R. Curling Hope.

11th August : 'Variable-frequency crystal-controlled receivers and generators,' by T. L. Wadley.

8th September : Informal discussion on 'The television problem in South Africa.'

13th October : Short talk on 'The disc processing and coating,' by E. J. Middleton (Associate Member).

This talk was followed by a visit of inspection to the workshops, disc coating and the process and pressing sections of the South African Broadcasting Corporation's engineering headquarters.

The meetings of the Section were attended by members of all grades.

CAPE WESTERN LOCAL CENTRE

Reference was made in the last Annual Report to the steps being taken in this Local Centre of the Institute and your Council is pleased to record that the Cape Western Local Centre was duly constituted on the 5th June 1953, in terms of Clause 3.16 of the Constitution, and in accordance with the rules for the formation of local centres.

The Inaugural General Meeting of the Centre was held in the Library of the City Hall, Cape Town, on Tuesday, 11th June 1953, at 8.15 p.m., and was attended by some 70 members and visitors. The President, Mr A. R. Mullins, attended the Inaugural Meeting and presented an Address, which was printed in the June 1953 *Transactions*.

Thanks to an enthusiastic and energetic Committee representative of all branches of the profession the Centre has, since its inception, made rapid strides. General meetings are held regularly at which papers are presented and discussed. The interest Cape Western members are taking in their Centre augurs well for the future.

The Officers of the Centre for the year 1953 were :—

Chairman—H. H. Jagger.

Vice-Chairman—C. G. Downie.

Honorary Treasurer—Joseph White.

Honorary Secretary—H. D. Einhorn.

Assistant Honorary Secretary—B. Morison.

Members of Committee—H. R. Arthur, G. D. G. Davidson, E. G. Ivey, H. Keyter, C. N. Larkin and F. D. Opperman.

The following papers and discussions have been presented :—

16th July : 'Industrial lighting,' by Dr H. D. Einhorn (Associate Member).

13th August : 'Some electric metering problems,' by R. R. Gilmour (Associate Member).

17th September : 'Hydro-electric possibilities in the Western Cape,' by Professor A. F. P. J. Heydorn (Member).

18th October : 'Transformer design,' by L. A. Grierson.

12th November : 'Laboratory work in telecommunications,' by H. M. Trainor (Associate Member).

10th December : Discussion on 'The code

of practice on earth-leakage protection on mines for alternating current circuits up to 660 volts.'

EDUCATION AND BURSARY FUND

Your Council, on behalf of all members of the Institute, wishes to record its sincere thanks and appreciation to Mr S. F. Harvey for a further sum of £2,000 to the Institute's Education and Bursary Fund.

Your Council has to report that nine bursaries have been awarded for the year 1954, two to students of the University of the Witwatersrand, two to students of the University of Natal (Howard College) and four to students of the Witwatersrand Technical College, and that the 'S. F. Harvey Bursary' for 1954 was awarded to Mr H. B. van der Raay, who is continuing his studies at the University of Birmingham.

STANDARD REGULATIONS FOR THE WIRING OF PREMISES

The publication in Afrikaans of the second edition of the Institute's Standard Regulations for the Wiring of Premises was completed during the year under review: the demand for the Regulations continues to be satisfactory.

REGISTRATION AND CONTROL OF THE SCIENTIFIC AND TECHNICAL PROFESSIONS

Reference was made at the last Annual General Meeting and in the Annual Report to the fact that this matter was being discussed with other interested organizations.

A ballot was prepared, in collaboration with four other engineering institutions and the South African Chemical Institute and, in May 1953, Corporate Members were asked to answer 'yes' or 'no' to the following question:—

'Are you in favour of compulsory statutory registration of the individual engineer?'

The result of the ballot of Corporate Members of this Institute was—

Votes against compulsory statutory registration	443
Votes in favour of compulsory statutory registration	133
Percentage poll	74%

Of the five societies which conducted this ballot, one was in favour of and four were against registration and this information was conveyed, through the Associated Societies, to the Department of Commerce and Industries.

CORONATION MEDAL

Your Council is pleased to record that the Institute was honoured by the award of the Coronation Medal to its President, Mr A. R. Mullins.

ANNUAL BANQUET

The Institute's Annual Banquet was held in the Main Hall, Kelvin House, Johannesburg, on Friday, 20th November 1953; 174 members and guests were present.

The toast list was as follows:—

HER MAJESTY THE QUEEN

HIS EXCELLENCY THE GOVERNOR-GENERAL

THE UNION OF SOUTH AFRICA

Proposed by Mr F. G. Hill
(President, The Associated Scientific and Technical Societies of South Africa)

Response by Mr Gideon Roos
(Director-General, South African Broadcasting Corporation)

THE SOUTH AFRICAN INSTITUTE OF ELECTRICAL ENGINEERS

Proposed by Mr Kenneth Richardson
(President, Transvaal Chamber of Mines)

Response by Mr A. R. Mullins
(President, The South African Institute of Electrical Engineers)

OUR GUESTS

Proposed by Mr C. G. Downie
(Vice-Chairman, Cape Western Local Centre)

Response by Mr L. T. Campbell Pitt
(President, The South African Institution of Mechanical Engineers)

VISIT TO THE VEREENIGING PUMPING STATION OF THE RAND WATER BOARD AND THE ISCOR WORKS AT VANDERBIJL PARK

By the courtesy of the Chairman of the Rand Water Board and the Chairman of the South African Iron and Steel Industrial Corporation Limited, 150 members of the Institute paid a most interesting visit of inspection to the Rand Water Board Pumping Station at Vereeniging and the Iscor Works at Vanderbijl Park on Friday, 28th August 1953.

The party assembled at the Vereeniging Pumping Station at 10 a.m. and were taken on a conducted tour of the water treatment system and pumping plant of the Rand Water Board.

Members then proceeded to the Vanderbijl Park recreation club where they were the guests of the Corporation to lunch. Immediately after lunch the party travelled by special bus to Iscor Works, where members were given the opportunity of seeing both the hot and the cold continuous strip mills in operation.

A most enjoyable day was spent by those who had the opportunity of attending the visit and the thanks and appreciation of the President and Council were conveyed to the Institute's hosts.

THE ASSOCIATION OF MUNICIPAL ELECTRICITY UNDERTAKINGS OF SOUTHERN AFRICA — 1953 CONVENTION

The President and Mr E. Vivian Perrow (Honorary Member) (Past President) represented the Institute at the above Convention held in Johannesburg from Tuesday, 21st to Friday, 24th April 1953.

SOUTH AFRICAN BUREAU OF STANDARDS

The Institute is represented on a number of Committees appointed by the South African Bureau of Standards to prepare specifications which affect the electrical engineering profession and receives copies of draft specifications issued by the Bureau for criticism and comment.

MECHANICAL AND ELECTRICAL ENGINEERS' COMMISSION

At the request of the Acting Government Mining Engineer, your Council nominated members to fill a vacancy which had occurred on the above Commission.

MINES, WORKS AND MACHINERY REGULATIONS

At the invitation of the Government Mining Engineer, your Council submitted its comments on various proposed amendments to the Mines, Works and Machinery Regulations.

ELECTRICAL WIREMEN AND CONTRACTORS ACT (No. 20 of 1939)

At the request of the Electrical Wiremen's Registration Board, Pretoria, your Council submitted its comments on the Electrical Wiremen and Contractors Act (No. 20 of 1939), in the form of memoranda to the Board for its attention when considering amendments to the Act.

CONFERENCE OF ENGINEERING INSTITUTIONS OF THE BRITISH COMMONWEALTH

As a member of this Conference the Institute is in constant touch with similar organizations in the Commonwealth and useful information has been interchanged. The next meeting will take place in London from the 24th May to the 4th June 1954.

THE RHODESIAN INSTITUTION OF ENGINEERS — 1953 CONVENTION

On the occasion of the Rhodes Centenary Exhibition the Rhodesian Institution of Engineers held its 1953 Convention at the Centenary Conference Hall, Bulawayo, on the 22nd and 23rd June 1953. Your Institute was represented at the Conference by Mr A. R. Sibson (Member).

THE SOUTH AFRICAN INSTITUTION OF CIVIL ENGINEERS—JUBILEE CONVENTION

The President represented the Institute at the Jubilee Convention of The South African Institution of Civil Engineers, held in Johannesburg from Wednesday, 23rd to Friday, 26th September 1953.

SOUTH AFRICAN NATIONAL COMMITTEE OF THE INTERNATIONAL COMMISSION ON ILLUMINATION

Reference was made in the last Annual Report to the formation of a South African National Committee on Illumination. The Inaugural Meeting of the Committee was held in Pretoria on Monday, 26th January 1953, when Mr J. C. Downey was elected the President of this new body with Mr J. P. Anderson and Dr H. D. Einhorn as Vice-Presidents.

The South African Institute

(Incorporated)

INCOME AND EXPENDITURE ACCOUNT FOR THE

1952

£1,230	0	0	SECRETARIAL FEES AND RENT	...	...	...	...	£1,230	0	0
901	8	10	STATIONERY AND PRINTING	...	...	...	...	387	9	2
258	7	7	POSTAGES	...	...	...	...	243	16	2
209	8	5	GENERAL EXPENSES	...	...	...	...	249	17	6
1,204	17	6	ASSESSMENT—ASSOCIATED SOCIETIES	...	...	...	...	1,256	17	0
116	5	0	CERTIFICATES	...	...	...	...	87	13	3
33	1	6	SUBSCRIPTIONS WRITTEN OFF	...	...	...	...	55	12	6
31	10	0	AUDIT FEES	...	...	...	...	31	10	0
1	11	6	LEGAL EXPENSES	...	...	...	...	3	6	6
10	0	0	INSTITUTE'S AWARDS	...	...	...	...	25	0	0
57	8	3	LIGHT CURRENT SECTION	...	...	...	...	53	6	0
6	10	0	DEPRECIATION	...	...	...	...	—
—			CAPE WESTERN LOCAL CENTRE	...	...	...	...	36	11	0
10	0	0	WITWATERSRAND TECHNICAL COLLEGE PRIZE	...	...	...	...	10	0	0
—			TRANSACTIONS	...	...	...	...	31	16	4
Cost of printing, commission on advertisements, etc.								£3,800	1	6
Less Advertising and sales								3,768	5	2
								<hr/>		
								3,702	15	5
—			EDUCATION AND BURSARY FUND	...	...	...	...	300	0	0
65	19	2	BALANCE—being excess of Income over Expenditure carried to Accumulated Fund	...	...	...	...	288	0	6
								<hr/>		
<hr/>								£4,136	7	9
								<hr/>		
								£4,290	15	11
								<hr/>		

JOHANNESBURG,

6th January 1954.

of Electrical Engineers

ated 1909)

YEAR ENDED 31st DECEMBER 1953

1952

£3,273 18 0	SUBSCRIPTIONS ...	...	...	...	...	...	...	£3,409 17 6
274 11 6	ENTRANCE FEES	...	...	...	...	...	...	240 9 0
208 19 0	DONATION	...	...	...	...	...	...	233 12 6

The Associated Scientific and Technical Societies of
South Africa.

358 17 10	INTEREST ON INVESTMENTS	...	...	...	...	...	...	406 16 11
20 1 5	TRANSACTIONS	...	...	...	...	...	...	—

£4,136 7 9

£4,290 15 11

A. R. MULLINS, *President*

A. W. LINEKER, *Honorary Treasurer*

A. J. ADAMS, *Secretary*.

G. K. TUCKER & WILSON, *Auditors, Incorporated Accountants*

The South African Institute

(Incorporated)

BALANCE SHEET AS AT

1952									
£12 15 11	V.F.P. AWARDS FUND (Awards unclaimed)	...	...	...	...	...	...	£4 2 2	
1,690 5 4	EDUCATION AND BURSARY FUND	...	...	...	...	...	...	3,815 6 10	
	Balance 31st December 1952	...	...	...	...	£1,690	5 4		
	Add Donation received	...	...	...	...	2,000	0 0		
	Interest on investment	...	...	...	...	3,690	5 4		
	Institute's contribution, 1953	...	...	...	...	70	1 6		
						300	0 0		
	Less 1954 Bursaries	...	...	...	...	4,060	6 10		
						245	0 0		
11 14 7	F. C. STURROCK AWARD	...	...	...	...			12 0 7	
	Balance 31st December 1953	...	...	...	...	10	5 4		
	Add Awards unclaimed	...	...	...	...	1	15 3		
4 19 9	SOUTH AFRICAN CABLE MAKERS' ASSOCIATION AWARD (Awards unclaimed)	...	...	...	...			10 9 10	
13 7 4	SOUTH AFRICAN RAILWAYS AND HARBOURS AWARD (Awards unclaimed)	...	...	...	...			12 9 3	
51 13 5	ESCOM PREMIUM	...	...	...	...			53 0 5	
	Balance 31st December 1953	...	...	...	...	15	0 5		
	Add Awards unclaimed	...	...	...	...	38	0 0		
101 18 8	M. J. T. AWARD	...	...	...	...			104 11 2	
	Balance 31st December 1953	...	...	...	...
69 14 0	SUBSCRIPTIONS PAID IN ADVANCE	...	...	...	...			77 0 6	
1,022 19 7	SUNDRY CREDITORS	...	...	...	...			1,370 19 8	
57 14 10	ANNUAL BANQUET RESERVE	...	...	...	...			66 6 2	
11,489 1 2	ACCUMULATED FUND	...	...	...	...			11,777 1 8	
	Balance 31st December 1952	...	...	...	...	11,489	1 2		
	Add Excess of Income over Expenditure for the year 1953	...	...	...	...	288	0 6		
£14,526 4 7								£17,303 8 3	

We have examined the books and accounts and vouchers of the SOUTH AFRICAN INSTITUTE OF ELECTRICAL ENGINEERS, and have obtained all the information and explanations which, to the best of our knowledge and belief, were necessary for the purposes of our audit. We have satisfied ourselves of the existence of the securities. Proper books of account have been kept by the Institute, so far as appears from our examination of those books. We have audited the above Balance Sheet and annexed Income and Expenditure Account which are in agreement with the books of account.

JOHANNESBURG,

6th January 1954.

of Electrical Engineers

ated 1909)

31st DECEMBER 1953

1952									
£12	15	11	V.F.P. AWARDS FUND	...	...	...	...	£4	2 2
			At United Building Society with interest accrued						
1,690	5	4	EDUCATION AND BURSARY FUND	...	...	...	...	3,815	6 10
			At South African Permanent Mutual Building and Investment Society with interest accrued...				£4,060	6 10	
			Less 1954 Bursaries	...	...	...	245	0 0	
11	14	7	F. C. STURROCK AWARD	...	...	...	...	12	0 7
			At Natal Building Society with interest accrued						
4	19	9	SOUTH AFRICAN CABLE MAKERS' ASSOCIATION AWARD	...	...	...	...	10	9 10
			At Natal Building Society with interest accrued						
13	7	4	SOUTH AFRICAN RAILWAYS AND HARBOURS AWARD	...	...	...	...	12	9 3
			At Natal Building Society with interest accrued						
51	13	5	ESCOM PREMIUM	...	...	...	...	53	0 5
			At United Building Society with interest accrued						
101	18	8	M.J.T. AWARD	...	...	...	...	104	11 2
			At Natal Building Society with interest accrued						
10,289	8	4	INVESTMENTS—at cost	...	...	...	...	11,355	0 3
			£2,000 Union of South Africa 3 per cent Local Registered Stock 1958/65, Second War Bond issue	...	...	2,000	0 0		
			£2,500 Union of South Africa 3 per cent Local Registered Stock 1958/68	...	...	2,500	0 0		
			£1,500 City of Johannesburg 3½ per cent Local Registered Stock 1962/65 at cost	...	...	1,485	0 0		
			1,000 Union Loan Certificates (Eighth Series) with interest accrued	...	...	533	6 8		
			Fixed Deposit with the United Building Society, with interest accrued	...	...	1,669	1 5		
			United Building Society Current Account with interest accrued	...	...	1,167	12 2		
			Forty £50, 5 per cent Paid-up Shares in South African Permanent Mutual Building and Investment Society	...	...	2,000	0 0		
1	0	0	FURNITURE AND FITTINGS	...	...	...	...	1	0 0
1,177	13	6	SUNDRY DEBTORS	...	...	...	...	1,382	15 6
			Subscriptions in arrear	...	...	219	15 6		
			Advertisers	...	...	1,163	0 0		
808	11	3	CASH AT BANK	...	...	...	...	312	19 9
362	16	6	STANDARD WIRING REGULATIONS (Second Edition)	...	...	...	...	239	12 6
£14,526	4	7						£17,303	8 3

In our opinion, and to the best of our information and according to the explanations given to us, the above Balance Sheet is properly drawn up so as to give a true and fair view of the state of the Institute's affairs as at 31st December 1953, and the Income and Expenditure Account gives a true and fair view of the profit for the year ended on that date.

A. R. MULLINS, *President*
 A. W. LINEKER, *Honorary Treasurer*
 A. J. ADAMS, *Secretary*

G. K. TUCKER & WILSON, *Auditors, Incorporated Accountants*

Your Institute is a Foundation Member of the Committee and is represented thereon by Mr L. G. Axe and Mr J. C. Downey.

PUBLIC SERVICE STRUCTURE COMMITTEE

At the request of the Secretary of the Public Service Structure Committee, received through the Associated Societies, your Council submitted a memorandum on Sections (b) (i), (ii) and (iii) of the terms of reference of this Committee.

RESIGNATION OF HONORARY TREASURER— MR JOSEPH WHITE

Mr Joseph White (Honorary Member) who had been the Honorary Treasurer of the Institute since 1944, tendered his resignation from that office on the 7th April 1953, as he was taking up permanent residence in Cape Town.

At the Council meeting held the same day the following resolution was passed:—

‘That the Council records its deep appreciation of the long and valuable services as Honorary Treasurer rendered by Mr Joseph White and trusts that he may long continue in Cape Town to serve the Institute in his inimitable manner.’

The Council is very pleased to record that Mr White has accepted the office of Honorary Treasurer and Corresponding Member of Council of the Cape Western Local Centre.

HONORARY SERVICES

Your Council acknowledges, with thanks and appreciation, the services rendered to

the Institute during the year under review by Joseph White (Honorary Member and Past President) as Honorary Treasurer, A. W. Lineker (Past President) as Honorary Editor and since May, 1953, Honorary Treasurer *vice* Mr Joseph White; H. P. Alexander (Member) and Dr W. Cormack (Associate Member) as Assistant Honorary Editors.

GENERAL

In general, the year 1953 can be regarded as satisfactory and although costs continue to rise the finances of the Institute as reflected in the Balance Sheet are sound.

The membership continues to increase and now totals 1 805, the highest since the formation of the Institute.

The interest taken by members in the activities of the Institute is exemplified by the attendances at general meetings which this year averaged 107.

In addition to the items mentioned in this report, various matters concerning the electrical engineering profession have been considered from time to time and, where deemed expedient, representations made to the appropriate authorities.

The Council looks forward to the coming year with confidence in the continued progress of the Institute and its usefulness to the profession.

On behalf of the Council,

A. R. MULLINS, *President*.

A. J. ADAMS, *Secretary*.

JOHANNESBURG,

8th January 1954.

Cape Western Local Centre

*Chairman's Report presented at the First Annual General Meeting
of the Centre, held in the Railway Recreation Tea Room, Railway
Institute Buildings, Cape Town, on Thursday, 21st January 1954,
at 8 p.m.*

C. G. DOWNIE (Member): An important event in the activities of the South African Institute of Electrical Engineers occurred when on the 13th of March 1953, the first Committee meeting of the Cape Western Local Centre of the Institute was held in Cape Town.

This event virtually heralded the setting up of the Institute's first local centre. It marked the success of the endeavours of several enthusiastic members of the Institute at the Cape who had been striving for several years to have such a centre formed in the interests of local members of the Institute. Great credit is due to them for their persistence towards that end. In this connection I cannot pass on without referring to the inspiration and assistance rendered by Mr Joseph White who has come to retire at the Cape. It is quite significant that the setting up of our Local Centre happens to have synchronised with his frequent visits to, and final arrival to settle in the Cape.

The first meeting of your main Committee was attended by our then Senior Vice-President, and now the Institute's President-Elect, Mr J. P. Anderson, who took the chair; Mr Joseph White (as Treasurer); and Mr A. J. Adams, Secretary of the Institute.

At this meeting a branch constitution for local centres, which had been drafted by the Institute Council and submitted to your Committee for comments, was considered. The opportunity also was taken to appoint the following members as a permanent Committee for the first year to manage the affairs of the Cape Western Local Centre on behalf of members of the Institute in this area:—

Chairman : H. H. Jagger.

Vice-Chairman : C. G. Downie.

Members : H. R. Arthur, G. D. G. Davidson, E. G. Ivey, H. R. Keyter, C. N. Larkin, F. D. Opperman.

Hon. Secretary : Dr H. D. Einhorn.

Assistant Hon. Secretary : B. Morrison.

Hon. Treasurer : Joseph White.

The Cape Western Local Centre itself was officially launched on the 11th June 1953, when our President, Mr A. R. Mullins, came to Cape Town especially to inaugurate the Centre and present an inaugural address. The meeting was attended by sixty members and visitors, the latter including representatives of the South African Institution of Civil Engineers and of the South African Institution of Certificated Engineers.

Since the inception of the Local Centre a general meeting has been held each month, making seven meetings in all for the year 1953. The papers read and discussed and the attendances at these meetings were as shown in the Table on the following page.

In every instance interesting and fruitful discussions were forthcoming from members and visitors. The proceedings in most instances continued beyond 10.30 p.m.

The number of attendances at these meetings averages 55 per meeting for a total membership resident within the Local Centre numbering 160 comprising the following classes of membership as at the 15th December, 1953:—

Honorary Members	...	...	1
Members	...	...	23
Associate Members	...	...	54
Associates	...	...	37
Graduates	...	...	30
Students	...	...	15
Total	...	...	<u>160</u>

General Meeting No	Month 1953	Paper of discussion	Read by	Attendance No. of members and visitors
2	July	Paper on 'Industrial lighting'	Dr H. D. Einhorn (Associate Member)	54
3	August	Paper on 'Some electric metering problems'	R. R. Gilmour (Associate Member)	45
4	September	Paper on 'Some hydro-electric possibilities in the Western Province'	Prof A. Heydorn (Member)	75
5	October	Paper on 'Transformer design'	L. A. Grierson	54
6	November	Paper on 'Laboratory work in telecommunications'	H. M. Trainor (Associate Member)	55
7	December	Discussion on 'Code of practice for earth-leakage protection on mines for a.c. circuits up to 660 volts'	Discussion introduced by C. D. G. Davidson (Associate Member)	41

Your main Committee has met regularly every month since its first meeting, having had ten meetings in all to date.

At its sixth meeting in September last the Committee decided to appoint a Papers Sub-Committee to draw up a programme for the presentation of papers, discussions, visits to places of engineering interest, etc., and thus assist your main Committee towards providing facilities similar to those available to members who are resident near our Institute's Headquarters in Johannesburg.

A difficulty in this connection has been to find a convenient and suitable place for members of this centre at which to meet for the reading and discussion of papers and, what is just as important, so that members can get to know one another personally. It is hoped that it will not be long before this difficulty is overcome.

As announced at our general meeting on the 10th December last, the following office bearers have been elected for the year 1954:—

Chairman: C. G. Downie.

Past Chairman: H. H. Jagger.

Vice-Chairman: C. N. Larkin.

Hon. Treasurer: Joseph White.

Hon. Secretary: B. Morrison.

As nominations, which were recently invited for the election of members of your main Committee, exceeded the number required to constitute the Committee, namely six, a ballot became necessary, the result of which, I am now able to announce, was as follows:—

G. D. G. Davidson, Dr H. D. Einhorn, E. G. Ivey (to hold office for two years); H. R. Arthur, H. R. Keyter, J. D. Opperman (to hold office for one year).

Forty-eight ballot papers in all were returned, representing a 64 per cent poll of those entitled to vote.

The scrutineers were our President, Mr A. R. Mullins, and our President-Elect, Mr J. P. Anderson.

In conclusion I take this opportunity of expressing on your behalf, and on behalf of your main Committee, our appreciation of the assistance and encouragement which has been forthcoming from our Institute's Headquarters in Johannesburg in the running of our Local Centre. In this connection I would refer particularly to Mr A. J. Adams, the Secretary to our Institute, and his staff.