

Die Vereniging van Munisipale  
Elektrisiteitsondernemings van  
Suid-Afrika

NEGE-EN-VEERTIGSTE  
KONVENSIË VERRIGTINGE

30 SEPTEMBER - 2 OKTOBER 1985

**BENONI**

The Association of Municipal  
Electricity Undertakings of  
South Africa

FORTY NINTH  
CONVENTION PROCEEDINGS

30 SEPTEMBER 2 OCTOBER 1985

**BENONI**

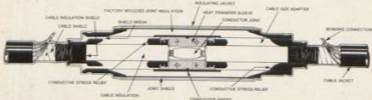


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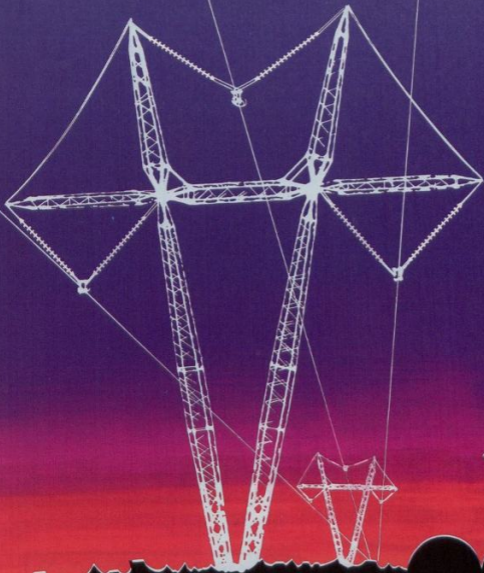
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## DIE VERENIGING VAN ELEKTRISITEITSONDERNEMINGS VAN SUID-AFRIKA

OFFICIAL PROCEEDINGS  
49TH CONVENTION  
30TH SEPTEMBER TO  
2ND OCTOBER 1985



AMPTELIKE VERRIGTINGE  
49e KONVENSIE  
30 SEPTEMBER TOT  
2 OKTOBER 1985

### SECRETARY - SEKRETARIS

Bennie van der Walt

### HEAD OFFICE - HOOFKANTOOR

613 Volkskas Building - Volkskasgebou 613  
76 Market Street - Markstraat 76  
JOHANNESBURG 2001  
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The AMEU is the body to bring together municipal councillors, electrical engineers and all persons interested in the advancement and the development of undertakings and to promote wider contact and the exchange of views.

Die VMEO is die organisasie om munisipale raadslede, elektrotegniese ingenieurs en alle persone met belang in die bevordering en ontwikkeling van ondernemings bymekaar te bring en om wyer kennismaking en die wisseling van sieningswyses te bevorder.

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OFFICIAL OPENING / AMPTELIKE OPENING

Rev. C. L. W. van Coller opened the proceedings with scripture reading and prayer.

MR WESSEL BARNARD : PRESIDENT

His Worship the Mayor of Benoni, Councillor Sam Grolman, Mr John Maree, Chairman of Escom, special guests, ladies and gentlemen, it is my privilege to welcome you to the 49th Convention of the Association of Municipal Electricity Undertakings of South Africa, which has been in existence for 70 years. It is therefore appropriate that we are holding this Convention in Benoni, who this year celebrates its 75th Anniversary.

Dit spyt my dat ek moet aankondig dat die Minister van Minerale- en Energiesake, mnr Danie Steyn, weens staatsverpligtinge in die buiteland, nie hier kan wees nie.

Ons is nietemin baie bly om mnr John Maree, wat die opening van die Konvensie namens die Minister sal waarneem, hier te verwelkom.

It is with regret that I record the deaths of some of our former friends and colleagues:

Arthur Foden - Honorary Member and Past President;  
Jimmie Mitchell - Past President;  
RdJ prof P J Botha - Voormalige lid van die Uitvoerende Raad;  
Douglas Haigh-Smith - Past Member and previously Town Electrical Engineer of Queenstown; and  
Bill Rush - Past Member and Past Chairman of the Natal Branch.

Amongst our guests a special welcome to Mr Ken Maud, Deputy Chief Executive of Altech, who will present the Keynote Address. A special welcome also to a number of guests from organisations both in South Africa and from overseas. From the United Kingdom - Messrs Harris, Meakin and Alford. From Escom - Messrs Ackerman, Bacon, Griffin, Haasbroek, Harmse, Poulton, Reilly and Stoffberg. From the South African Bureau of Standards - Messrs Colhoun, Grant, Steyn and von Alphen. From the Department of Manpower - Mr Gus Weich who is attend-

Ds. C. L. W. van Coller het die verrigtinge geopen met skriflesing en gebed.

ing his last meeting of the AMEU in his capacity as Chief Inspector of the Department of Manpower, before retiring. His assistance to the engineer members over the years has been of inestimable value. Also from the same department - Messrs Agenbag and Pym. Van die SAUK - mnrre Kobus Meiring en Tiekie van der Linde. Van die Departement van Openbare Werke - mnrre Felix Prins en Adriaan van der Berg. Representing the Institute of Municipal Treasurers and Accountants is Mr George Large.

We are also very pleased to have here today, Mr Friede, from the Swaziland Electricity Control Board and Mr Stephen from the Transkei Electricity Supply Commission. We are proud to have with us today Honorary Members and Past Presidents, and, I ask them to stand up so that we may extend a special welcome to them.

Honorary Members :

Dr Ralph Anderson, Bill Beesley, Hennie Hugo, Chris Lombard (Past President), Terence March, Pat Middlecote, John Morrison, Dr Reinhart Straszacker, Gawie Theron (Past President), Jannie van der Walt (Past President), Jules van Ahlften (Past President) and the Town Electrical Engineer of Springs.

Past Presidents :

Eugene Pretorius - Elektrotegniese Stadsingenieur van Potchefstroom, Ken Robson - City Electrical Engineer of East London, Piet Botes - Elektrotegniese Stadsingenieur van Roodepoort, and Denis Fraser - City Electrical Engineer of Durban.

MAYOR OF BENONI

It is now my privilege to introduce to you the Mayor of Benoni. Councillor Sam Grolman was born and received his education in Benoni and has lived here all his life. Councillor Grolman is mayor of Benoni for the term 1985/1986. He served as Deputy Mayor in 1984/1985, and has been a Town



Councillor since 1982. The Mayor's extra-mural activities involves him almost exclusively in serving others. He had served for many years in various official capacities and the Committee of the Benoni Rotary Club, on the School board and on many other Civic Committees.

Mr Mayor, we thank you for inviting us to hold this Convention in your beautiful town, Benoni. Ladies and gentlemen, it is with great pleasure that I, now call on His Worship, the Mayor of Benoni, Councillor Sam Grolman, to address you.

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## MAYORAL WELCOME BURGEMEESTERLIKE VERWELKOMING

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### CLR S GROLMAN : MAYOR OF BENONI

Mnr die President, die voorsitter van Evkom, mnr John Maree, die aangewese president van die VMEQ, mnr Jan Loubser en mev Loubser, mede raadslede van Benoni, gades en afgevaardigdes, dit is vir my 'n eer en 'n voorreg om namens die Stadsraad en die inwoners van Benoni, u almal hartlik welkom te heet by die 49ste Konvensie van die VMEQ.

Benoni is 'n vriendelike stad en my raad en ek hoop julle gaan die tyd wat julle saam met ons deurbring baie geniet.

This is the 49th Convention of the AMEU, the first convention having been held 70 years ago. That is a long time for any organisation and the fact that the association has grown from 22 members, representing 16 municipalities at the 1st Convention to over 350 members representing over 200 municipalities, speaks for itself in stressing the importance of the organisation.

The stature and importance of the AMEU is well known and receiving recognition from the highest levels. We hope that this stature will grow over the next 3 days of your deliberations, Mr President.

Ek dink julle kan baie trots wees op wat julle al bereik het en die Stadsraad van Benoni, wens julle alle geluk en wysheid toe vir 'n suksesvolle konvensie.

Benoni is dankbaar vir u teenwoordigheid en ek hoop julle gaan ons gasvryheid geniet.

Mag die Here u almal sterkte gee vir die volgende 3 dae se besprekings.



*His Worship, Cllr. S Grolman*

# OPENING ADDRESS OPENINGSREDE

## MR WESSEL BARNARD : PRESIDENT

Dames en here, dit is jammer dat die Minister nie teenwoordig kan wees nie, nietemin is dit 'n geskiedkundige gebeurtenis om 'n minister en veral 'n Minister van Minerale- en Energiesake te hê wat 'n professionele elektrotegniese ingenieur is.

Danie Wynand Steyn is op 12 Mei 1923 in die distrik Heilbron gebore. Hy behaal die graad B.Sc. in 1946, 'n B.Sc. (Ing) (Elektronies) in 1948, albei aan die Universiteit van Stellenbosch, en in 1957 behaal hy die M.Com (Bedryfs en Administrasie) aan die Universiteit van Pretoria.

Vanaf 1948 tot November 1974 het Minister Steyn verskillende professionele poste beklee, onder meer:

- (1) Beplanningsingenieur – Hoofposkantoor, Pretoria.
- (2) Ingenieur – Stadsraad, Pretoria.
- (3) Bestuurder Telekom, en later Radar en Rekenaarsafdeling, Krygstuig-raad.

Miskien na hierdie ondervinding het die Minister besef dat ons ingenieurs nie baie geld verdien nie, en het hy tot die politiek toe getree toe hy verkies is as Volksraadlid vir Wonderboom.

In Oktober 1980 is hy aangestel as Adjunk-Minister van Finansiële- en Nywerheidswese, Handel en Toerisme. In 1982 as Minister van Onderwys en Opleiding, en op 21 November 1983, aangestel as Minister van Minerale- en Energiesake.

In the absence of the Minister, we are privileged to have Mr John Maree, chairman of Eskom, with us to deputise for the Minister. It is, therefore, with great pleasure that I ask him to present the Opening Address.

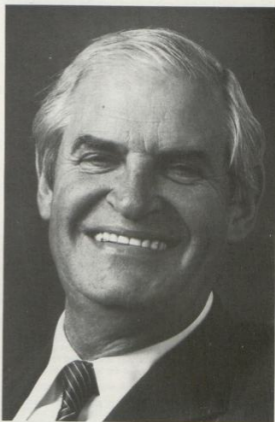
## MR JOHN B MAREE : CHAIRMAN OF ESCOM/ VOORSITTER VAN EVKOM

Mr D W Steyn, Minister of Mineral and Energy Affairs, was to have opened this 49th Convention of the AMEU today.

Unfortunately, due to circumstances beyond his control, he is unable to do so – and he has asked me to convey his sincere apologies to you.

Hy het my gevra om die gedagtes wat hy met u wou wissel, aan u oor te dra. Ek is bly om dit te kan doen. En hoewel 'n mens nou nie voordeel wil trek uit 'n ander se nood nie, is ek tog bly dat die geleentheid hom onverwags vandag voordoen dat ek, as nuwe voorsitter van Evkom, persoonlik met u kennis kan maak.

Soos u weet, word sowat een-derde van die elektrisiteit wat Evkom opwek deur munisipaliteite aangekoop. Gesamentlik is u nie net ons grootste verbruikersgroep nie – en inderdaad, Durban se Munisipale Elektrisiteitsonderneming is ons heel grootste klant – maar u verteenwoordig ook die derduisende eindverbruikers wat u, op u beurt, weer van elektrisiteit voorsien.



Mr John Maree

It is not surprising that there is a very special relationship between municipalities and Eskom. Over the years we have increasingly seen ourselves as the bulk supplier or wholesaler of electricity. By the same token we have increasingly seen you, the municipalities as the distributor of electricity to the end user.

Our relationship requires a sound understanding of each other. Since you are increasingly relying on Eskom to provide you with electricity, you would, for example want to know what the state of the electricity supply industry is.

All of us have to re-assess the situation around us, and there can be no doubt that the key to survival lies in our ability to adapt to new political, economic and social values.

The message that I want to bring you today, is that the electricity supply industry is not only aware of the need to change, but is in fact adapting very rapidly to meet the demands of the late 1980's, and the years beyond.

Die nodigheid vir die elektrisiteitsvoorsiening bedryf om aan te pas by veranderende omstandighede het gelei tot die

aanstelling, in Mei 1983, van die Kommissie van Onderzoek (onder voorsitterskap van Dr Wim de Villiers) na elektrisiteitsvoorsiening in die Republiek van Suid-Afrika.

Die opdrag van hierdie kommissie was om ondersoek in te stel en verslag te doen oor alle aspekte van elektrisiteitsvoorsiening in Suid-Afrika. Die ondersoek het nie net na Ekvom verwys nie, maar na die totale voorsiening situasie in Suid-Afrika.

Die ses vernaamste aanbevelings van die kommissie van ondersoek, wat met geringe wysigings deur die regering aanvaar is, en tans geïmplementeer word, het duidelik daarop gedui dat hier nie met kosmetiese reg drukwerk gespeel word nie, maar met wesenlike veranderinge wat daarop gemik is om te verseker dat Suid-Afrika van elektrisiteit voorsien word op die mees ekonomiese wyse moontlik.

Dit behels, onder andere, 'n nuwe beheerstruktuur vir Ekvom, in die vorm van die elektrisiteitsraad, wat verantwoordelik is vir beleidbepaling, strategiese beplanning en beheer. Gepaard hiermee is 'n bestuursraad aangestel wat moet sorg dat Ekvom op 'n sakegrondslag bestuur word.

'n Belangrike eienskap van die elektrisiteitsraad is dat sy lede gekies word uit die geledere van verbruikersgroepe en ander instansies wat belang het in, en betrokke is by, die elektrisiteitsvoorsieningsbedryf in Suid-Afrika. Op hierdie grondslag is die VMEO ook verteenwoordig, by name, deur mnr Piet Botes.

Ek wil ook aan u sê dat ons 'n sterk elektrisiteitsraad het, met bekwame mense wat daarop dien, en dat mnr Botes, Elektriese en Meganiese Ingenieur van die stad Rooodepoort en geërd lid van die VMEO, al klaar 'n baie belangrike bydrae tot die werksaamhede van die elektrisiteitsraad lewer.

Maar, en terug te keer na die kommissie van ondersoek. Van sy ander aanbevelings het gegaan oor die noodigheid van 'n eenvormige tariefstruktuur en konservasie van elektrisiteitsbesparing, twee sake wat sedertdien reeds verder gevoer is, en waarvan u meer in die loop van hierdie konsensie sal hoor.

Voorts is aanbevelings gedoen oor die beskikbaarheidsvlakke van kragstasies en die standardisering van kragstasie- en ander toerusting. Daar is ook verwys na lasvoorskatting en kapitaalbesteding, en die vlak van self-finansiering.

The commission of enquiry has emphasised the very important role of the municipal electricity undertaking - a view fully endorsed by the Minister. I want to record his, as well as my own appreciation for your indispensable role in respect of the effective distribution and reticulation of electricity, not only in areas of jurisdiction or urban local authorities, but also in certain surrounding peri-urban and country areas.

In recent years there has been a significant increase in the demand for electricity in these areas. This was caused by, among other things, the escalation in the cost of diesel and other fuels, greater mechanisation of farming activities and also the need of the farming community for the development of rural infrastructure.

Escom is experiencing serious difficulties in its efforts to keep abreast with the demand for the electrification of both rural and peri-urban areas. The Minister has asked me to convey his appreciation for the extended role that some municipalities, in conjunction with the electricity control board, are playing in this respect.

I mentioned earlier that the recommendations of the commission of enquiry, and the acceptance thereof, are not cosmetic. Similarly, the change now taking place within Escom is not cosmetic, but designed to provide the organisation with the means to perform its functions, in what is, for everybody, a trying economic environment.

I want to highlight three aspects which, I believe, are fundamental to the electricity supply situation today.

First to ensure that it performs optimally, Escom must be managed professionally and must be goal oriented with clear objectives.

During the past few months, Escom's top and senior management team have come together on a regular basis to re-define the organisation's mission and to set clear objectives. Clear work plans have been formulated, as well as time schedule. It is a case of knowing what is to be achieved - and who is going to do what and when - in order to reach the agreed objectives.

We are committed to managing the organisation in a professional, cost-effective manner, and also maintaining an acceptable quality of supply.

The second aspect I want to highlight, is that Escom is committed to a capital expansion programme which was launched some years ago and which was based on estimates formulated at that time. These estimates did not foresee the present recession and consequent lower growth in the demand for electricity. It is too costly and impractical to re-view this programme to bring it in line with present lower growth estimates. Certain projects have, of course, been delayed or deferred, but it is more cost-effective to continue with others.

So, Escom's current expansion programme is a slimmed-down version of what was originally planned.

The third aspect I wish to highlight, is the question of financing. Escom has only two sources of finance with which to pay its capital projects, namely surplus or revenue over expenditure and borrowings. Escom has, in the past, paid for its capital expenditure by using some 30% of its own money and borrowing the rest.

One of the recommendations of the commission of enquiry was that a new formula be adopted which stipulates to what extent Escom should cover its costs with income, and the level of internal financing that should be used. By virtue of the constitution of the electricity council, electricity users are involved in the making of tariff decisions.

We have to decide, ultimately, what is in the best interest, not of Escom, but of the electricity users in the country.

Traditionally, Escom obtained about 40% of its borrowings from overseas sources. I need not elaborate on the present political and economic environment, and their impact on South Africa's relationship with overseas lenders and investors. Suffice it to say that, for the time being, foreign finance will not be available to Escom, or any South African borrower for that matter.

The impact of this on Escom, and the electricity supply situation in South Africa, in general, is significant.

Escom, in order to finance its now much leaner capital expansion programme, will have to draw more heavily on the local capital market. But so will all borrowers who previously relied on foreign capital, and the local capital market has its limits.

With foreign borrowing severely restricted and the local capital market unable to meet our full requirement, we may

well have to rely more heavily on revenue to make ends meet.

In the light of the above, I am sure you will understand why we attach so much importance to Eskom being managed well, strictly along business lines. We need to ensure that adjustments to the price of electricity is fully justified and that the revenue earned is well controlled and carefully spent on properly budgeted operating costs and essential capital expenditure.

I need not remind you that, we are fortunate, still to have very cheap electricity, if judged by world standards.

As gevolg van een van die aanbevelings van die kommissie van ondersoek, het Evkom reeds by die elektrisiteitsbeheerraad aansoek gedoen om goedkeuring vir belangrike wysigings in sy tariefstruktuur. Hierdie wysigings van die tariefstruktuur sal geen invloed op Evkom se totale tariefinkomste, of op Evkom se gemiddelde elektrisiteitsprys hê nie. Vir sommige verbruikers sal dit egter 'n vermindering in elektrisiteitstariese meebring, maar vir ander 'n onvermydelike beskeie verhoging.

Ek wil graag enkele belangrike aspekte van die beoogde herstrukturering van Evkom se tariewe beklemtoon.

Eerstens word daar afgesien van die begrip van verskillende Evkom-ondernemings, sodat eenvormige tariewe vir Evkom landwyd vir die verskillende verbruikersklasse sal geld.

Tweedens is die nuwe tariefstruktuur doelbewus daarop

gemik om besparing van energie en elektrisiteit aan te moedig en om die hoë kapitaaliese wat die toenemende vraag na elektrisiteit aan die landse ekonomie stel, sover moontlik in bedwang te hou.

Dit is ook 'n doelwit van die nuwe tariefstruktuur om die gebruikerspatroon van elektrisiteit te beïnvloed in 'n rigting wat die optimale benutting van Evkom se kragbronne sal bevorder.

Energiebesparing is 'n belangrike oogmerk. Die kommissie het in hierdie verband 'n leidende rol aan Evkom opgedra, en Evkom het reeds 'n doelgerigte program in hierdie verband geïnisieer.

Energiebesparing is egter 'n doelwit wat byna elkeen raak, en byna almal moet betrek. Ek het vertroue dat noue samewerking en goeie koördinasie tussen die Departement van Minerale- en Energiesake, Evkom, die VMEQ, en elke ander betrokke instansie, groot vrug sal afwerp.

Ten slotte wil ek graag verwys na 'n konsepwitskrif oor energiebeleid, wat die Departement van Minerale- en Energiesake ook, onder andere, van VMEQ-lede vir voorstelle en kommentaar gestuur het. Ek glo dat die VMEQ hierdie aangeleentheid sal gebruik om ook ten opsigte van elektrisiteitsvoorsiening, dit wil sê verspreiding en die beste aanwending daarvan, met 'n goeie bydrae vorendag sal kom.

Die Minister het my gevra, om u sukses toe te wens met die verdere beraadslaging gedurende die Konvensie.

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## INDUCTION OF PRESIDENT INHULDIGING VAN PRESIDENT

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### MR W BARNARD: RETIRING PRESIDENT

Ladies and gentlemen, I would like to express my sincere appreciation for the support and assistance that I have received from members of the AMEU.

I refer specifically to the standing committee, the president elect, Jan Loubser and the secretary, Bennie van der Walt.

I have been privileged to serve as president during a most eventful period, both in the history of the AMEU and of the country.

Some of the important issues dealt with during this period are:

- (1) De Villier's Commission of Enquiry;
- (2) The establishment of regional service councils;
- (3) Amendments to the electricity act; and
- (4) The establishment of the electricity council, to which our colleague and past president, Piet Botes, was appointed by the Minister.

Also amendments to the regulations of the machinery and occupational safety act.

I was, during my term of office, also privileged to visit the

following AMEU branches: viz Cape Western, Northern Cape and OFS, Natal, and also attended meetings of the United Municipal Executive. The Institute of Municipal Treasurers and Accountants, the Transvaal Municipal Association and the International Electrotechnical Commission meeting in Montreal, Canada.

But for me probably the most important, and certainly the most happy experience of my term of office have been getting to know my fellow city and town electrical engineers. I, now know that this country is very fortunate to have in the electricity supply industry, a pool of engineers with expertise and a commitment equal to any to be found in the world. But, I must sound a word of warning, and I quote from EASA:

"In the mind of the public, our work is shrouded in mystery and our interests confined to a tunnel vision in which only highly technical matters are observed and discussed".

We as professional engineers, are frequently accused of not being concerned with issues such as the protection of the environment, the need for financial discipline and control and are in general not trained or, for that matter interested, in professional management. I believe such criticism is unfounded, but this image and lack of recognition must be laid on our own doorstep.

There are too many engineers who are satisfied and enjoy

being backroom boys, who are notorious for their lack of participation in public affairs.

Engineers are of the higher intellectual group and loss of their contribution to policy making over a wide spectrum, can only leave the country the poorer.

Let us, therefore, re-examine our role as a public service engineer, how we can better serve the community and improve the quality of life for all of mankind.

Finally, I must thank my city council and particularly the management committee including my own chairman, Raadslied Jan Burger, wat dit vir my moontlik gemaak het om die amp van president te aanvaar en vir die ondersteuning gedurende die laaste twee jaar. To my colleagues in the electricity department, a sincere word of thanks for their assistance and application beyond the call of duty.

To my other boss, my wife Iona, I am indebted to her for her forbearance and support during times when my many commitments made me virtually a stranger to my family.

My laaste en aangename plig as president, is om nou my opvolger, mnr Jan Loubser, professionele ingenieur en elektrotegniese stadsingenieur van Benoni, as president voor te stel en in te huldig. Piet Botes het ons daaraan herinner in Oktober 1983, dat Jan die 4de president sal wees wat 'n Matie is. Ons sal dit nie teen hom hou nie aangesien ons hom maklik vir 'n Witsie kan aansien.

Even though Jan Loubser was, at the time of his appointment as President Elect, introduced to us as a hard working and dedicated person, he has exceeded all expectations. His service to the AMEU has, during the last two years, confirmed that he is indeed well qualified to assume the exacting office of president.

En nou mnr Loubser, is dit my eer en voorreg, namens die VMEO, om u te versoek om na vore te kom om die presidentsampsketting in ontvangs te neem as President van die

VMEO, vir die volgende twee jaar.

#### **MNR J A LOUBSER : PRESIDENT**

Mnr die Burgemeester, eregaste, dames en here, vir my is dit 'n groot voorreg om as president van hierdie organisasie gekies te word. Aan al die lede van die VMEO wil ek my dank uitspreek dat hulle my in so 'n bevoorregte posisie geplaas het en ek onderneem hiermee om altyd my beste te probeer om die belange van die VMEO, te bevorder.

I am indebted to my council, the management committee, the town clerk and also Councillor Danie Taljaard, for the support they have given me to make it possible for me to accept the responsibility attached to this position.

Ek is seker dat die stadsraad saam met my geeënd en bevoorreg voel dat hulle as gashere van die konvensie kan optree.

Nou is dit my voorreg om namens die VMEO, mnr Wessel Barnard hartlik te bedank vir die onbaatsugtige manier waarop hy die afgelope twee jaar vir die VMEO gewerk het. As ons nou terugkyk op wat in die tydperk gebeur het, sal ons sien dat Wessel Barnard sy stempel baie duidelik afgedruk het. Die belangrikste, heelwaarsynlik, is die erkenning wat die VMEO in die Elektrisiteitsraad gekry het. Dit word betwyfel of enigeen van ons wat hom opvolg daarin sal slaag om sy voetspore vol te staan.

Wessel, I now wish you happy memories of the two years and also many years of more service to the AMEU, and to you and Iona, good luck and good health for the future.

Mnr Barnard, effens later in die program hoop ek om weer 'n kans te kry om met u te gesels en 'n oorhandiging aan u te maak.

Ten slotte, baie dankie vir die waardige wyse waarop u die amp van president beklee het.

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## **ELECTION OF PRESIDENT ELECT VERKIESING VAN AANGEWESSE PRESIDENT**

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#### **MNR J K VON AHLFTEN : SPRINGS : AANGEWESSE PRESIDENT**

Meneer die President, sy edelagbare die Burgemeester, sy Edele die Minister, eregaste, dames en here, dit is my aangename taak om vanoggend die voorstel in te dien vir die verkiesing van Aangewese President vir 1985/87.

Dit is eienaardig hoe die geskiedenis 'n manier het om homself te herhaal. Dit lê vir my nog duidelik voor die oog, tydens die 1969 Konvensie in Umtali, in die eertydse Rhodesië, toe ek onverwag as aangewese president verkies is in die plek van Arthur Frantz van Kaapstad, weens gevraagde aftrede. Nou het ons in 'n soortgelyke situasie belang met die voorgename gevraagde aftrede van Dennis Palsler, ook van Kaapstad, en was ons egter gelukkig om in Dennis se plek oor 'n persoon soos Alwin Fortmann van Boksburg, te beskik wie hom ook onverwags in dieselfde posisie bevind het toe die uitvoerende bestuur hom as aangewese president genomineer het.

Alwin is 'n produk van die piesangprovinsie en is op 14 Mei

1934 in Vryheid, Natal, gebore. Sy voorname, Alwin Hartwig Ludwig, dui ook op sy Duitse herkoms, net soos ek, waar baie van ons voorouers in hierdie mooi land 'n nuwe tuisde gevind het.

Alwin het sy hoërskoolopleiding in Vryheid en Pietermaritzburg ondergaan waarna hy 'n vakleerlingskap by die SA Vervoerdiens deurloop het en daarna etlike jare in die Toets- en Navorsingslaboratorium werksaam was.

In Junie 1961, het hy diens aanvaar as verspreidingsingenieur by die Stadsraad van Roodepoort, eers onder Derek Brown, en later onder Piet Botes, tans elektriese en meganiese stadsingenieur van die stad Roodepoort.

In Maart 1965, word hy as die adjunk-elektriese stadsingenieur van Boksburg aangestel onder Les Smith, en presies 4 jaar later word hy as die elektriese stadsingenieur aangestel en beklee tot vandag die pos.

Hy is 'n ingenieurslid van die VMEO sedert 1967, en dien op die uitvoerende bestuur sedert 1979, waar hy hom as



bekwame en hardwerkende lid op verskeie komitees onderskei het. Die VMEO is dan ook bevoorreg om oor sulke kaliber manne te beskik om die leisels oor te neem in die jare wat voorlê.

Alwin is a registered professional engineer, a fellow of the SA Institute of Electrical Engineers and a member of the Power Section Committee. His hobbies include rugby refereeing, of which he is a committee member of the Transvaal Rugby Referees Society and is chairman of the governing body of various sports clubs in Boksburg. As an active member of the Boksburg Athletic Club, he has participated in numerous road races including standard and 50 km marathons.

Alwin is married to Joy and they have three children, two boys and a girl and it is, therefore, obvious that with a charming and delightful person such as Joy, they will form an ideal vice-presidential couple of the AMEU which could not have been in more capable hands during their pending term of office and of great assistance to you Mr President.

It, therefore, gives me great pleasure in officially submitting the nomination of the executive council to this convention, that Alwin Hartwig Ludwig Fortmann be elected as president elect of the AMEU for 1985/87.

#### CLR BEN STEYN : BOKSBURG

Mr President, our town, Boksburg has never before had the honour of having its town electrical engineer as president elect of the AMEU, and that is why it is such a great honour today for me to second the motion to install our town electrical engineer as president elect of the AMEU. Mr Fortmann has been known to me for the past 18 years, and I as a person, have the greatest respect for his ability and expertise in his profession. My life has also been greatly enriched by being associated with him and his wife, Joy, for the past many years.

Mr President, it gives me great pleasure to second the formal proposal by Mr Jules von Ahlften.

#### MNR A H L FORTMANN : AANGEWESSE PRESIDENT

Mnr die President, eerstens wil ek u graag gelukwens met u verkiesing as president van hierdie vereniging. Dit sal vir my 'n voorreg wees om u vir die volgende twee jaar wat voorlê, by te staan en saam met u te werk.

Laat my dan ook toe om u en u gade Martie, 'n gelukkige twee jaar as presidentspaar toe te wens, en u reeds op hierdie vroeë stadium, met hierdie kongres, wat ek seker is 'n reuse sukses sal wees en wat vir u onvergeetlik sal wees, geluk te wens.

Mr President, it is indeed a great honour for me to stand here as president elect and I would like to express my appreciation to you, the executive council and members of this association for the honour they have bestowed upon me.

Words fail me in describing my feelings I had when the executive council proposed me for the position of president elect. I realise what a difficult task is in store for me, but with your guidance and with the assistance of the executive council, as well as the members of this association and with the assistance of my wife, Joy, who has always stood by me,



Mr Alwin Fortmann, Aangewese President

I am sure that the task that lie ahead will not become an unbearable burden.

Graag wil ek ook mnr Jules von Ahlften, vir die mooi woorde wat hy oor my gesê het, hartlik bedank. Ek ken Jules reeds baie jare en is ons ook so verlangs familie.

Raadslid Ben Steyn, ook vir u baie dankie vir wat u oor my gesê het, toe u mnr Jules von Ahlften se voorstel gesekondeer het.

Ek beskou die verkiesing as aangewese president as 'n besondere eer, nie net vir my persoonlik nie, maar ook vir Boksburg. U weet mnr die President, dit is die eerste elektrotegniese stadsingenieur van Boksburg wat die eer toekom om as aangewese president verkies te word. Mnr Les Smith, my voorganger en eredig van hierdie vereniging is hier teenwoordig, waaroor ek ook baie bly is.

Die verkiesing van 'n president of aangewese president van so 'n roemryke vereniging is vir daardie persoon 'n geskiedkundige gebeurtenis, en derhalwe is hierdie gebeurtenis vir my 'n besondere eer.

Mr President, I will do all in my power to be of assistance to you and also to carry out duties assigned to me. I trust, that I will be able to serve this association in the traditions of previous presidents elect, and that this association will accept me with my shortcomings.

Mr President, once again, to you, all my friends and colleagues, thank you for this great honour bestowed upon me.

## PRESIDENTIAL ADDRESS PRESIDENTSREDE



*Mr. Jan Louber, Elektrogniese Ingenieur van Benoni en nuutverkose President van die VMEU vir 1985/87.*

Before I commence with the actual theme of my presidential address, I would first of all wish to thank you, the members of the AMEU most sincerely for the honour by electing me as president of this organisation for the two year period 1985/1987. It has already be mentioned to me that I have "earned it". If a person enjoys something that he has to do, then the mere execution thereof is already rewarding enough and no further "remuneration" is in fact necessary.

On the other hand, it is now expected of me to present a presidential address which makes me feel that you are in fact punishing me because those of you who know me is also aware of the fact that I am not really "cut-out" for this type of thing.

My council also considers it an exceptional privilege that

Voordat ek begin met die werklike tema van my presidentsrede wil ek eer aan u, die lede van die VMEO baie dankie sê dat u my die eers aangedoen het om my as president van hierdie organisasie te kies vir die twee-jaar tydperk 1985/1987. Daar is al dikwels aan my genoem dat ek dit "verdien" het, maar ek stem nie saam met hierdie bewering nie. As dit vir iemand lekker is om iets te doen dan is die blote uitvoering daarvan vir hom genoeg beloning en geen verdere "vergoeding" is eintlik nodig nie.

Daarenteen word dit nou van my verwag om 'n presidentsrede te lewer wat my eintlik laat voel u is nou besig om my te straf, want u wat my goedgenoeg ken weet dat ek nou nie eintlik aangelê is vir so-iets nie.

Wat my raad betref beskou hulle dit ook as 'n besondere

you have acceded to the convention being held in Benoni. As I understand it, the last time that a president was elected from the ranks from Benoni, was in the year 1937. My only comment thereon is that nobody actually realises what fine colleagues I have here in Benoni, otherwise many more conventions would have taken place in Benoni.

Initially I expressed the opinion that the council should consider the idea of having this convention at one or other holiday resort, but they considered it their privilege to hold it right here and, I am honest when I say that I am now convinced that it was the correct decision. If there is possibly no holiday atmosphere ruling in our town, I can only say that in a growing town like Benoni, there is just no time for holidays. I nevertheless trust that our hospitality will make up for the deficit.

Whilst speaking about the council, I would like to thank them most sincerely that they were prepared to act as hosts for this convention. Right from the outset not a single voice of protest was recorded against the decision which made my task much easier than the case would have been otherwise.

Hotel accommodation is still a problem at present but if the convention took place two years hence, our town could possibly have provided the necessary accommodation as well as a conference centre. So please excuse the inconvenience of the bus trips from the hotels at the airport and rather look around and enjoy the environment.

## THE ROLL OF THE ELECTRICAL ENGINEER

With the compilation of the presidential address, I looked back at the proceedings of previous conventions of the association and it was prominent how many of the previous presidents dealt with the roll of the town electrical engineer in the local authority under different headings.

Furthermore all of them accentuated on one common objective, namely the rendering of service. But one person, namely our president of 13 years ago, then already stated that the time has arrived for municipal services in South Africa to be rationalised on a regional basis. I wonder whether Minister Heunes did not make use of the president concerned as a consultant! It is just a pity that it will take 14 years to come into effect!

## REGIONAL COUNCILS

I am convinced that one of the main reasons for the establishment of regional councils is the shortage of properly qualified technical personnel. In other words it is an attempt to utilise available manpower on a more effective basis. If it is further taken into account that the number of heavy current electrical engineers who qualify at local universities are still decreasing, then there is no other way in which to cope with the requirements of an ever increasing population than by means of increased productivity.

A number of years ago, an attempt was made to utilise qualified municipal electrical engineers more economically by for instance allowing them to accept responsibility for more than one municipal distribution system but for practical reasons the effort did not meet with much approval.

Slightly more than two years ago, a Commission to Investigate the Electricity Supply in the RSA was established and the executive council of the AMEU unanimously agreed to support the creation of so called regional electrical authorities. The idea was to create a supply authority similar to those in Australia. Such a supply authority would have been functioning completely independently from local authorities. Even the collection of monies for services render-

voorreg dat u ingewillig het om die konvensie in Benoni te laat plaasvind. Soos wat ek verneem was daar laas in 1937 'n president uit Benoni se gelede verkie. Al kommentaar wat ek daarop te lewer het is dat iemand nie werklik besef was se goeie kollegas ek hier in Benoni het nie anders was hier al heelwat meer konvensies in Benoni.

Aanvanklik het ek die gedagte uitgespreek dat die raad dit moet oorweeg om na een of ander vakansie-oord te gaan met hierdie konvensie, maar hulle het dit as hulle voorreg beskou om dit hier te hou en ek moet eerlik wees as ek sê ek is oortuig dit was die regte besluit. As daar moontlik nie 'n vakansie-atmosfeer in ons stad heers nie kan ek net sê dit is omdat in 'n groeiende stad soos Benoni, daar nie tyd is vir vakansies nie. Nietemin, hoop ek dat gasvryheid sal opmaak vir die tekort.

En terwyl ek nou van die raad praat, wil ek sommer begin deur aan hulle dankie te sê dat hulle bereid was om as gashere vir hierdie konvensie op te tree. Van die begin af was daar nog nooit 'n enkele stem wat daarteen opegegaan het nie en vir my was dit dus makliker as wat dit andersins die geval sou wees.

Hotelakkommodasie is tans nog 'n probleem, maar as hierdie konvensie moontlik twee jaar later gehou sou word kon ons stad dalk self al die akkommodasie sowel as 'n konferensiesentrum verskaf het. So verskou maar die oergerief van busritte vanaf die hotelle by die lughawe en kyk maar rond en geniet die omgewing.

## DIE ROL VAN DIE ELEKTROTEGNIËSE INGENIEUR

Met die opstel van die presidentsrede het ek so 'n bietjie teruggeblaai in die verrigtinge van vorige konvensies van hierdie vereniging, en dit was opvallend hoeveel van die vorige presidente die rol van die elektrotegniese stad-ingenieur in plaaslike bestuur onder verskillende opskrifte behandel het.

Verder het almal die gemeenskaplike doel, naamlik dienslewering of akseptuering. Maar een, naamlik ons president van 13 jaar gelede het al gesê dat dit tyd geword het om munisipale dienste in Suid-Afrika op streeksbasis te rasionaliseer. Ek wonder of Minister Heunes nie die betrokke president as raadgewer gebruik het nie! Dit is net jammer dat dit 14 jaar sal neem om tot uitvoer te kom!

## STREEKSDIENSTERADE

Ek is seker dat een van die vernaamste redes vir die stigting van streeksdiensterade die skaarsheid van behoorlik gekwalifiseerde tegniese personeel is. Dit is dus met ander woorde 'n poging om die beskikbare mannekrag op 'n meer effektiewe basis te gebruik. As daar verder inaggeneem word dat die aantal swaarstroom elektrotegniese ingenieurs wat aan plaaslike universiteite kwalifiseer steeds verminder, dan kan daar op geen ander manier aan die veristes van 'n steeds groeiende samelewing voorsien word as deur middel van verhoede produktiwiteit nie.

'n Aantal jare gelede is 'n poging aangewend om gekwalifiseerde munisipale elektrotegniese ingenieurs meer ekonomies te gebruik deur hulle byvoorbeeld verantwoordelikhed vir meer as een munisipale verspreidingsstelsel te laat aanvaar, maar om praktiese redes het die poging nie veel afrek gekry nie.

Ietwat meer as twee jaar gelede is 'n Kommissie van Oorsig na Elektrisiteitsvoorsiening in die RSA ingestel en die uitvoerende raad van die VMEU het eenparig besluit om die stigting van 'n sogenaamde streeks elektrisiteitsowerheid te ondersteun. Die gedagte was om 'n voorsieningsowerheid soortgelyk aan die in Australië daar te stel. So 'n voorsieningsowerheid sou heeltemal onafhanklik van plaaslike bestuurs funksioneer. Selfs die invordering van

ed, or units sold, would have been handled by the organisation themselves. The AMEU also submitted its report directly to the commission. The consequence thereof was nearly catastrophic, as the proposal, if accepted, would have meant that local authorities would have lost one of his biggest sources of income.

I do not wish to go into the merit of the matter, but one good consequence which stemmed from this is the fact that the AMEU became known. I sometimes wonder whether it was not this report which lead to the AMEU now being represented on the Electricity Control Board. This is an aspect for which we must naturally thank our Minister of Mineral and Energy Affairs, Mr Danie Steyn, sincerely.

Now to get back to regional councils:

At our previous convention the president outlined the possible duties of regional councils. It is so that at meetings which were held recently (political or otherwise) the composition of regional councils were explained to those present, but nowhere has the composition of staff been elaborated on. According to information, the first councils are to be appointed at the beginning of 1986 and one of the duties which are to be taken over initially is "the bulk supply of water and electricity". Up to the present, the latter was still the duty of Escom and it cannot be regarded as practical to design and build new systems to serve existing consumers but on the other hand overhead planning for future intake points could very well be beneficial. In the case of Benoni and our neighbouring black township, Daveyton, such overhead planning has already been done and one 132/33 kV substation has been established to supply electricity to both towns.

A further advantage of the regional councils is the establishment of a central workshop. If I may mention the towns of the East Rand as an example, I can honestly say that none of these are large enough to repair a 20 MVA transformer for example, but jointly they can erect workshops to do this. And it will work. The best example of such regional co-operation is the East Rand Training Centre for apprentices which were jointly established by 8 East Rand Town Councils.

## THE FUTURE

As far as the future is concerned, the establishment of regional councils is an accomplished fact and we will have to work together with them for the sake of productivity although the composition of staff is a matter where our voices may have to be raised. The electrical engineers battled for years to gain proper recognition and truthfully there are still certain smaller towns where the electricity department is considered to be a sub-department of the town engineer's department. At certain towns and cities their councils also adopted a recommendation to the effect that they will only employ one person as head of technical services.

I wonder whether this is the reason why so many competent electrical engineers have opted for early retirement rather than to work under someone who is not adequately qualified to take over the control of an electricity department. If this is the solution to the problem as far as the shortage of qualified heavy current electrical engineers is concerned, I will eat my hat. Civil engineers are not electrical engineers just as electrical engineers cannot be civil engineers, not to even mention other occupations. Why must the opinion of so called "Specialists" always be regarded as correct? It has become "fashion" amongst local authorities to re-organise and then describe themselves as "dynamic", but do they

gelde vir dienste gelewer, of eenhede verkoop sou deur die organisasie self behartig word. Die VME0 het ook sy verslag direk aan die kommissie gelewer. Die gevolge daarvan was bijna katastrofies en omdat so 'n voorstel tot gevolg sou hê (indien aanvaar) dat die plaaslike besture een van sy grootste bronne van inkomste sou verloor.

Ek wil nie nou op die meriete van die saak ingaan nie, maar die een goeie gevolg wat daaruit voortgespruit het is die feit dat die VME0 bekend geraak het. Ek wonder dikwels of dit nie hierdie verslag was wat daartoe gelei het dat die VME0 nou op die Elektriesiteitsraad verteenwoordig is nie. Daarvoor moet ons natuurlik vir die Minister van Minerale- en Energiesake, Minister Danie Steyn, hartlik bedank.

Om nou terug te keer tot streeksdiensterade:

By ons vorige konvensie het die president 'n uiteensetting gegee van die maatskaplike pligte van die streeksdiensterade. Dit is so dat daar in die afgelope tyd heelwat vergaderings (politiek en andersins) was waarin die samestelling van die streeksdiensterade aan die teenwoordiges verduidelik is maar nêrens is daar nog duidelike gegee oor die personeelsamestelling nie. Volgens inligting sal die eerste rade aangewys word in die begin van 1986 en een van die eerste pligte wat oorgeneem gaan word is "die grootmaat voorsiening van water en elektrisiteit". Tot dusver was laasgenoemde nog die plig van Evkom en daar kan nie gesien word dat dit prakties sal wees om nuwe stelsels te ontwerp en te bou om bestaande verbruikers te voorsien nie, maar oorhoofse beplanning vir toekomstige toevoerpunte kan wel 'n groot voordeel inhou. In die geval van Benoni en ons swart buurdorp, Daveyton, is daar reeds sodanige oorhoofse beplanning gedoen en een 132/33 kV substasie is daargestel wat krag aan beide dorpe kan voorsien.

'n Verdere voordeel wat streeksdiensterade kan inhou is die daarstelling van sentrale werksinkels. As ek die dorpe aan die Oos-Rand as voorbeeld mag gebruik kan ek noem dat nie een van ons groot genoeg is om byvoorbeeld 'n 20 MVA transformator self te herstel nie, maar gesamentlik kan ons wel werksinkels oprig om dit te kan doen. En dit sal werk. Die beste voorbeeld van sodanige streeksamewerking is die Oos-Randse Opleidingsentrum vir vakkeurlinge wat deur 8 Oos-Randse stadsrade gesamentlik daargestel is.

## DIE TOEKOMS

Wat die toekoms betref is die streeksdiensterade 'n veldtog feit en ons sal met hulle moet saamwerk terwyl van hoër produktiviteit, maar die personeelsamestelling is iets waarvoor ons dalk nodig sal hê om stem dik te maak. Ons elektrotegniese ingenieurs het vir jare gesukkel om behoorlik erken te word en om die waarheid te sê is dit nog op kleiner dorpe die geval dat die elektrisiteitsafdeling as 'n onder-afdeling van die stadsingenieursafdeling beskou word. Op sekere dorpe en stede het stadsrade ook 'n aanbeveling aanvaar dat daar slegs een hoof van tegniese dienste sal wees.

Ek wonder of dit die rede is waarom soveel baie bekwame elektrotegniese ingenieurs besluit het om lievers vroeg af te tree as om onder iemand te werk wat nie doelmagtig gekwalifiseer is om die beheer van 'n elektrisiteitsafdeling oor te neem nie. As dit die oplossing van die skaarsheid aan gekwalifiseerde swaarstroom elektrotegniese ingenieurs is dan eet ek my hoed op. Siviele ingenieurs is nie elektrotegniese ingenieurs nie, netsoos wat elektrotegniese ingenieurs nie siviele ingenieurs is nie om nie eers te praat van ander beroepe nie. Hoekom moet die opinie van sogenaamde "spesialite" altyd as korrek aangeneem word? Dit het "mode" geword onder plaaslike besture om te reorganiseer en hulself dan as "dinamies" te beskryf, maar



realise what they are doing to the profession of heavy current electrical engineers?

Something that councils must guard against is to allow political aspirations and views to dominate objective thinking.

The Ordinance of Local Government for the different provinces makes it clear that the town clerk holds the head of department responsible for the efficient administration of his department. Organising is an administrative function. In view of the fact that the town electrical engineer as the head of the department is responsible for the effective administration of his department in terms of the provisions of the Local Government Ordinance concerned, he must inevitably also ensure that the organising of services for the supply of electricity will be of such a nature that the goal which is set by council in this policy be strived after at all times.

Although it is not expected of the town electrical engineer to be skilful in the field of organisation, he should nevertheless be familiar with the requirements for efficient organisation to such an extent, so as to enable him to decide whether he will be in a position to do it himself or whether he should by means of mediation with the town clerk arrange for the acquisition of guidance and advice from a specialist in the field or organisation. These specialists are normally available as staff members in the larger local authorities.

Before elaborating on the duties of the town electrical engineer as manager of his department, it is necessary to first of all mention some aspects about the engineer (abbreviation for electrical engineer).

#### WHAT IS AN ENGINEER

The engineer is a person who possesses knowledge of the properties of building material, metals, plant, etc. He knows their properties, durability and he is therefore capable to utilise his knowledge economically, whether it is with the design of machinery, reticulation schemes or whatever the case may be. He is also supposed to have knowledge of the wholesome properties as well as the devastating effect of the elements of nature. He can therefore mobilise, curb or control these forces in the interest of mankind whether it be in the generation and distribution of power or otherwise.

The engineer therefore, does creative work and everything he does is aimed at the welfare of the human being, his health, convenience, protection and material prosperity. Relatively speaking, our country is still young and many of these services are still required in the immediate as well and further into the future. Unfortunately this is coupled with the spending of large sums of monies and not only will the engineer have to get things done with his skill and knowledge to make economic development possible, but he will also have to ensure that this is achieved with the minimum cost and with the attainment of the highest degree of efficiency. In this manner, his activity and creative power will be utilised in the interest of economic progress.

#### FOUNDATIONS ALREADY ESTABLISHED

In every field our electrical engineers have really made their mark in the development sphere in the past. If we start at the basic needs of every inhabitant of our country, namely housing, then one can imagine how many domestic and industrial townships have been established, how many housing schemes have been completed, etc., all of which require basic services such as electricity. One must also think what all is required to provide these services: Gigantic power stations, distribution systems right across the country by Escom, our own extra high tension substations, cable networks and smaller substations in our towns. These are

weet hulle werklik wat hulle besig is om aan die swaartstroom elektriese ingenieursberoep te doen?

Iets waarteen stadsrade moet waak is om toe te laat dat politieke ideale en sienswysse objektiewe denke oorheers.

Die Ordonnansies op Plaaslike Bestuur van die onderskeie provinsies laat egter geen twyfel daarentrent dat die stadsklerk, 'n hoof van 'n departement, vir die doeltreffende administrasie daarvan verantwoordelik hou nie. Organiserings is 'n administratiewe funksie. Aangesien die elektrotrengiese stadsingenieur as departementshoof ingevolgt die bepaling van die betrokke Ordonnansie op Plaaslike Bestuur vir die doeltreffende administrasie van sy departement verantwoordelik is, moet hy dus noodwendig ook toesien dat die organisering van dienste vir die voorsiening van krag sodanig sal verloop dat die doelwit wat deur die raad in sy beleid gestel is effektief nagestreef word.

Alhoewel dit nie van die elektrotrengiese stadsingenieur verwag word om 'n kundige op die gebied van organisasie-leer te wees nie, behoort hy egter in so 'n mate vertrouwd te wees met die vereiste vir doeltreffende organisering dat hy andersyds sal weet of hy dit self sal kan doen en of hy deur bemiddeling van die stadsklerk reëlings moet tref vir die verkryging van die leiding en advies van 'n spesialis op die gebied van organisering sodanige spesialiste is gewoonlik in die groter plaaslike besture as lede van personeel beskikbaar.

Voordat daar egter voortgegaan word om iets in verband met die pligte van die elektrotrengiese stadsingenieur as bestuurder van sy afdeling te sê is dit nodig om eers iets meer omtrent die ingenieur (as verkorting vir elektrotrengiese ingenieur) te sê.

#### WAT IS 'N INGENIEUR

Die ingenieur is die persoon wat die kennis dra van die eienskappe van boustowwe, metale, toerusting, ens. Hy ken hulle eienskappe en duursaamheid en is dus in staat om sy kennis ekonomies aan te wend, hetsy by die onderwerp van masjienne, verspreidingskemas of wat ookal. Ook is hy veronderstel om die heilsame eienskappe en ook die verwoestende uitwerking van natuurkragte te ken. Hy kan dus hierdie kragte in belang van die mensdom mobiliseer, tem of beheer hetsy in die opwekking en verspreiding van krag of wat ookal.

Die ingenieur doen dus skeppingswerk en alles wat hy doen is gemik op die welsyn van die mens, sy gesondheid, gerief, beskerming en materiële welvaart. Relatief is ons land egter nog jonk en soveel van hierdie dienste word nog in die onmiddellike en verdere toekoms benodig. Ongelukkig gaan dit gepaard met die besteding van groot somme geld en die ingenieur sal dus met sy vernuf en kennis nie alleen die dinge moet verrig wat ekonomiese ontwikkeling moontlik sal maak nie, maar hy sal ook moet sorg dra dat dit geskied teen die minimum koste en met die bereiking van die hoogste mate van doeltreffendheid. Op hierdie wyse word sy aktiwiteit en skeppingsvermoë in belang van ekonomiese vooruitgang ingespan.

#### FONDAMENTE REEDS GELE

Op elke gebied het ons elektriese ingenieurs inderdaad in die verlede diep spore in die ontwikkelingsveld getrap. As ons begin by die basiese behoefte van elke inwoner van ons land, naamlik behuising, kan ons dink aan hoeveel woon- en nywerheidsdorpe aangelê is, hoeveel behuisingkemas voltooi is, ens., almal items wat basiese dienste soos elektrisiteit behodig. Dink ook maar aan wat alles nodig sal wees om hierdie dienste te voorsien: Reuse kragstasies, verspreidingsnetwerke dwarsdeur die land deur Eskom, ons eie ekstra hoogs spanningssubstasies, kabelnetwerke en kleinere substasies in ons dorpe. Hierdie is almal fondasies



all foundation which have already been established and on which we must build.

## EXTENSION AND TECHNOLOGY DEVELOPMENT

In spite of the economic recession which is at present being experienced in our country, there is no doubt in my mind that a continuous strong expansion of the engineering profession is to be expected. The engineer must therefore not only possess a thorough knowledge but he must also be a planner who collects information as regards the pattern of national and local development. It is therefore obvious that he should not only be a specialist in his own field but that he should also take socio-economic factors into account.

Notwithstanding the ups and downs of the economy, the average person in our country is today far better off than his ancestors or even a decade ago. Not only does he have a choice of a greater variety of products, but he also enjoys better facilities as at that time.

One of the most important contributing factors which are responsible for the impressive improvement in our standard of living is technological development. Technology comprises the implementation of knowledge as well as experience, not only in the industries of our country, but on all physical activities.

It is beyond doubt that this technological development will compel those who occupy the most important executive posts in electricity undertakings to possess an engineering background. It will inevitably mean that the engineer will have to undertake managerial duties on even a larger scale than was the case up to present.

## THE ENGINEER AS MANAGER

One of the findings of the then Straszacker commission was that the qualified engineer spent approximately 15% of his time on managerial functions, 40% on more practical and 45% on the more theoretical engineering functions at the commencement of his professional career. At the end of his career these percentages change to 50%, 15% and 35%, respectively.

As a result of this the commission came to the following conclusion:

"The commission accordingly finds that it is clearly necessary for the majority of engineering graduates to be conditioned to accept and be prepared to fulfil managerial functions to an increasing extent throughout their careers. They might as well learn to like it".

In view of the foregoing, it should be obvious that courses in management for electrical engineers are to a certain degree symbolic of the important changes which are busy taking place. It is also a real effort to provide a fundamental requirement and to assist us of not being kept on a string as a result of the rapid development. There is no doubt in my mind that there is still ample opportunity for an increase in managerial efficiency. This holds good for the private as well as the public sector and small as well as large undertakings.

Mention is frequently made in the press as regards the big shortage of trained manpower in the country, but I wonder how many of these shortages can perhaps be attributed to inefficiency. Regardless of what profession he occupies, each responsible citizen has a duty towards himself and towards the community to make a contribution to the optimal utilisation of available manpower.

Here in my hometown a considerable number of these courses have been presented to heads of departments with

wat reeds gelê is en waarop ons sal moet voortbou.

## UITBREIDING EN TEGNOLOGIE ONTWIKKELING

Tensypte van die ekonomiese slapte wat ons land tans beleef is daar by my geen twyfel dat daar in die toekoms 'n aanhoudende sterk uitbreiding van die ingenieursbedryf verwag sal word nie. Die ingenieur moet dus nie alleen 'n grondige kennis hê nie, maar hy moet ook 'n beplanner wees wat gegewens inwin oor die patroon van nasionale en plaaslike ontwikkeling. Dit is duidelik dat hy nie alleen 'n spesialis moet wees op sy eie gebied nie, maar ook rekening moet hou met sosio-ekonomiese faktore.

Die gemiddelde persoon by ons is vandag ekonomies, tensypte van die wipplankryery van die landse ekonomie, baie beter daaraan toe as sy voorouers, of selfs as 'n dekade gelede. Nie slegs het hy 'n keuse uit 'n baie groter verskeidenheid produkte nie, maar hy geniet meer en beter geriewe as toentertyd.

Een van die belangrikste bydraende faktore wat verantwoordelik is vir indrukwekkende verbetering in ons lewensstandaard is tegnologiese ontwikkeling. Tegnologie behels die toepassing van kennis asook ervaring, nie alleen in die nywerhede van ons land nie, maar op alle fisiese aktiwiteite.

Dit ly geen twyfel dat hierdie tegnologiese ontwikkeling dit sal noodsaak dat diegene wat die vernaamste uitvoerende poste by elektrisiteitsondernemings beklee 'n ingenieurs-agtergrond sal moet hê. Dit sal noodwendig meebring dat die ingenieur bestuurspligte op selfs 'n groter skaal sal moet onderneem as wat tot dusver die geval was.

## DIE INGENIEUR AS BESTUURDER

Een van die bevindings van die destydse Straszacker kommissie was dat die gekwalifiseerde ingenieur aan die begin van sy professionele loopbaan ongeveer 15% van sy tyd aan bestuursfunksies, 40% aan meer praktiese en 45% aan die meer teoretiese ingenieursfunksies bestee. Aan die einde van sy loopbaan verander die persentasies na 50%, 15% en 35%, respektiewelik.

Na aanleiding hiervan het die kommissie tot die volgende gevolgtrekking gekom:

"The commission accordingly finds that it is clearly necessary for the majority of engineering graduates to be conditioned to accept and be prepared to fulfil managerial functions to an increasing extent throughout their careers. They might as well learn to like it".

In die lig van die voorafgaande behoort dit duidelik te wees dat kursusse in bestuur vir elektrotegniese ingenieurs in 'n sekere mate simbolies is van die belangrike veranderings wat besig is om plaas te vind. Dit is ook 'n daadwerklige poging om in 'n wesenlike behoefte te voorsien en om te help dat ons deur die snelle ontwikkeling moontlik op slechtop geneem word. Daar is by my geen twyfel dat daar nog ruim geleentheid is vir die verhoging van bestuursdoeltreffendheid. Dit geld ten opsigte van die private sowel as die openbare sektor vir klein sowel as groot ondernemings.

Daar word kort-kort in die pers melding gemaak van die land se groot tekort aan opgeleide mannekrag, maar ek wonder hoeveel van die sodanige tekorte dalk toegeskryf kan word aan ondoeltreffendheid. Ongeag watter beroep hy beklee het elke verantwoordelike landsburger 'n plig teenoor homself en teenoor die gemeenskap om 'n bydrae te lewer tot die optimale benutting van beskikbare mannekrag.

Hier in my tuisdorp is daar al heelwat sulke kursusse aan die hoofde van departemente aangebied met die uitsluitlike

the ultimate purpose of greater efficiency. These include courses such as effective management and improvement of productivity. A further factor which the manager must guard against is moderateness. In times of a surplus of manpower as we are experiencing at present, our electrical engineers do not have to be content with inferiority or moderateness. Prof P C Fourie once said that moderateness feeds itself and expands by itself just as excellence is the begetter of excellence. "How can nation nobleness survive if moderateness of performance has become and acceptable "fashion?" Why is there never sufficient time to initially carry out something thoroughly but always enough time to do it over again?

The responsibility to ensure that projects are carried out efficiently usually rests with the engineer. It is therefore for him of utmost importance that he possesses the necessary managerial ability and ingenuity. The rate of development however resulted in a big shortage of engineers who are also competent managers. It must also be kept in mind that efficient management and leadership per excellence go hand in hand.

Engineers who strive after top managerial posts must realise from the outset that they also will have to possess leadership qualities in order to qualify for these posts.

It is a pity that relatively few of our members form part of the South African Leader Corps.

It is an open question whether we are not responsible ourselves for this state of affairs. Is it not perhaps true that too many of us became entangled in the technological aspects of our work activities to such an extent that we have no or very little appreciation for the other aspects of our duty?

Why must there always be a lack of communication between us and the rest of the municipal personnel? It must be remembered that we are all members of one municipal undertaking who must ensure that through our actions we become members of the management team. Fortunately I can state that it will be difficult to beat the Benoni team consisting of the town clerk and departmental heads, insofar as co-operation is concerned. When one looks for an explanation for the gap, it was found that in more than one case it amounted to the engineers becoming frustrated and not motivated because, in their opinion, the members of the top management did not possess sufficient knowledge to reach sensible decisions.

Apart from the fact that this points to poor leadership in the undertaking, it also explains the necessity that we as engineers must display proper appreciation for the principles of efficient management.

One thing is certain and that is that knowledge of the theory and practice of management is not adequate to qualify as a competent manager. Ingenuity and the ability to be a master in the art of management are further requisites.

Allow me a further quotation from the report of the Straszacker commission:

- "(a) A good manager has exceptional qualities of leadership and organising ability and he is skilful in dealing with people. This postulates instructive acceptance of responsibility and authority and the ability to delegate both. It requires a man of strong personality, and character. The typical manager is an extrovert, with greater interest in men and money than in things.
- (b) Broad conceptual skills is essential. The manager should be able to visualise the enterprise in its en-

doel van groter doeltreffendheid. Dit sluit kursusse in soos doeltreffende bestuur en produktiwiteitsverbetering. 'n Verdere faktor waarteen die bestuur van 'n elektrisiteitsafdeling moet waak is middelmatigheid. In tye van 'n oorvloed van beskikbare mannekrag soos wat ons tans belewe hoof ons as elektrotegniese ingenieurs nie meer tevred te wees met minderwaardigheid of middelmatigheid nie. Prof P C Fourie het by geleentheid gesê dat middelmatigheid homself voer en op sy eie uitbrei netsoos uitmuntendheid die verwekker van uitmuntendheid is: "Hoe kan volksadel voortbestaan as middelmatigheid van werkverrigtinge 'n aanvaarde "mode" geword het?" Hoekom is daar nooit genoeg tyd om die werk aanvanklik behoorlik te doen nie, maar altyd genoeg tyd om dit oor te doen?

Die verantwoordelikheid om toe te sien dat projekte doeltreffend uitgevoer word rus gewoonlik op die skouers van die ingenieur. Vir hom is dit dus uiters noodsaaklik dat hy oor die nodige bestuursvermoë en vernuf beskik. Die tempo van ontwikkeling het egter meegebring dat daar tans 'n groot tekort aan ingenieurs wat ook bekwame bestuurders is, ondervind word. Daar moet altyd in gedagte gehou word dat doeltreffende bestuur en voortrefflike leierskap hand aan hand gaan.

Ingenieurs wat daarna strewende om topbestuursposte te beklee moet van meet af beseft dat hulle ook oor leierskappe sal moet beskik om daarvoor te kwalifiseer.

Dit is jammer dat relatief min van ons lede deel uitmaak van die Suid-Afrikaanse Leierkorps.

Dit is 'n ope vraag of ons nie self vir hierdie toedrag van sake verantwoordelik is nie. Is dit nie miskien waar dat te veel van ons in so 'n mate in die tegnologiese aspekte van ons werksaamhede vasgevang raak dat ons geen of min waardering het vir die ander aspekte van ons taak nie?

Hoekom moet daar altyd 'n gebrek aan goeie kommunikasie tussen ons en die res van die munisipale personeel bestaan? Onthou dat ons almal lede van een munisipale onderneming is en sorg dat ons deur ons optrede lid word van die bestuursplan. Gelukkig kan ek sê dat, wat samewerking betref, dit moeilik sal gaan om die Benoni span wat bestaan uit die stadsklerk en hoofde van departemente te klop. Wanneer 'n mens soek na 'n verklaring vir hierdie leemte, dan het dit in meer as een geval daarop neergekom dat die ingenieurs gefrustreerd geraak en ongemotieerd omdat, volgens hulle mening, die lede van die topbestuur nie oor voldoende kennis beskik om tot verstandige beslissings te kom nie.

Behalwe dat dit dui op swak leierskap in die onderneming verklaar dit ook die noodsaaklikheid daarvan dat ons as ingenieurs 'n behoorlike waardering vir die beginsels van doeltreffende bestuur aan die dag moet lê.

Een ding is seker, naamlik, kennis van die teorie en praktyk van bestuur is nie voldoende om as 'n bekwame bestuurder te kwalifiseer nie. Vernuftigheid en die vermoë om die kuns van bestuur te bemeester is verdere vereistes.

Veroorloof my nog 'n verdere aanhaling in die Straszacker kommissie verslag:

- "(a) A good manager has exceptional qualities of leadership and organising ability and he is skilful in dealing with people. This postulates instructive acceptance of responsibility and authority and the ability to delegate both. It requires a man of strong personality, and character. The typical manager is an extrovert, with greater interest in men and money than in things.
- (b) Broad conceptual skills is essential. The manager should be able to visualise the enterprise in its en-

tirety, the independence of its various functions and its relationship to industry as a whole and to the community in general. He is a generalist, with ability to plan in broad outline but who can refrain from personal involvement in detail. He is resourceful and versatile, with considerable initiative, and enterprise.

- (c) A good manager has a highly developed sense of judgement; he can weigh up and evaluate the technical and economic as well as the intangible human and social implications of possible decisions.
- (d) While a research worker should not make quick decisions, a manager must be able to do so, sometimes even on what is not more than an intelligent guess. He must possess a good sense of timing. While it is necessary in design to allow for the weakest link, it is fatal in management.

The manager must, therefore, be adventurous and prepared to take calculated risks.

- (e) A manager must be exceptionally skilled in the art of communication. He must be able to read and grasp essentials quickly and be an adept in communicating his own ideas clearly even outside his own field. He must be susceptible to new ideas, able to understand and use experts to the best advantage.
- (f) The average top executive in industry works a good deal harder than the average employee, and enjoys it".

You will agree with me that an engineer who strives after excellence is also someone who will be characterised by the purposeful steps which he takes to ensure that he complies with the aforementioned requirements per excellence.

## CONCLUSION

An analysis of the roll of the town electrical engineer as head of the department of electrical services leads to the conclusion that to manage the administrative functions of an electricity department, the town electrical engineer is saddled with numerous requirements for example:

- The ability to identify the relevant manifestations in the political, economical, social and techno-cultural fields, the significance thereof for the attainment of goals and in the light thereof, proposals in order for policies to be formulated and steps be taken in his department to ensure the continuation of the rendering of a service of quality.
- the continuous aspiration to broaden and deepen his knowledge of the theory and practice of policy determination, organisation, financing, provision of staff and utilisation and control;
- the ability to consume the values which are underlying to the recognition of the authority of the council and the town clerk and with a complete consciousness of the significance of inter-departmental co-operation as well as with the correct disposition, be able to strive after the joint objective in the roll in which he takes part;

the display of a willingness to obtain the skill of "specialists" through the instrumentality of the town clerk rather than to plod along as a result of ones own limited knowledge and perception; and

give guidance of quality on the grounds of functional ability and administration efficiency.

tirety, the independence of its various functions and its relationship to industry as a whole and to the community in general. He is a generalist, with ability to plan in broad outline but who can refrain from personal involvement in detail. He is resourceful and versatile, with considerable initiative, and enterprise.

- (c) A good manager has a highly developed sense of judgement; he can weigh up and evaluate the technical and economic as well as the intangible human and social implications of possible decisions.
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- (e) A manager must be exceptionally skilled in the art of communication. He must be able to read and grasp essentials quickly and be an adept in communicating his own ideas clearly even outside his own field. He must be susceptible to new ideas, able to understand and use experts to the best advantage.
- (f) The average top executive in industry works a good deal harder than the average employee, and enjoys it".

U sal met my saamstem dat 'n ingenieur wat strewre na uitmuntendheid ook iemand is wat gekenmerk word aan die doelgerigte stappe wat hy doen om te verseker dat hy by uitnemendheid aan die voorgenoemde vereistes voldoen.

## GEVOLGTREKING

Die ontleding van die rol van die elektrotegniese stadsingenieur as hoof van die departement elektrisiteitsdienste lei tot die gevolgtrekking dat, om die administratiewe funksies in 'n elektrisiteitsdepartement te kan behartig, stel aan die elektrotegniese stadsingenieur veelvuldige vereistes soos byvoorbeeld:

- die vermoë om relevante verskynsels in die politieke, ekonomiese, maatskaplike en tegno-kulturele omgewing uit te ken, die betekenis daarvan vir doelwitbereiking te kan vertolk, voorstelle vir beleid in die lig daarvan te kan formuleer, en maatreëls in sy departement te tref om die voortsetting van die lewering van 'n diens van gehalte te kan verseker;
- die voortdurende strewre om sy kennis vir die teorie en praktyk van beleidpaling, organisering, finansiering, personeelvoorsiening en benutting en beheer, te verriim en te verdiep;
- die vermoë om die waardes wat onderliggend is aan die erkenning van die gesag van die raad en die stadsklerk uit te leef en om met 'n volle bewustheid van die betekenis van interdepartementele samewerking, met die regte gesindheid die gemeenskaplike doelstelling in sy rolvervolking na te streef;
- die aan die dag lê, van 'n bereidwilligheid om die kundigheid van "spesialiste" deur die bemiddeling van die stadsklerk te verkry eerder as om op grond van eie beperkte kennis en insig voort te ploeter; en
- die gee van leiding van gehalte op grond van funksionele kundigheid en administratiewe vaardigheid.

From the foregoing it is clear that the head of department of electrical services in a local authority must not only possess expert knowledge and insight, but he must especially also be administratively efficient to enable him to fulfill his vocation.

## REFERENCES

1. Von Ahlften J K: Presidential Address : AMEU : Municipal Administration and Engineering - January 1972.
2. Fourie P C: "The Engineer as Manager" : Municipal Affairs - April 1968.
3. Botha N S: Series of articles on the "Roll of the Town Electrical Engineer in the Administration of Electricity Supply" : Municipal and Public Services - 1983.
4. Haak J: The roll of the Engineer : Municipal Affairs - June 1983.

By J A LOUBSER

Town Electrical and Mechanical Engineer, Benoni

Uit die voorgaande sal afgelei kan word dat die hoof van die departement elektrisiteitsdienste van 'n munisipale owerheid nie slegs oor vakkundige kennis en insig moet beskik nie, maar dat hy veral ook administratief vaardig moet wees om sy roeping te kan vervul.

## VERWYSINGS

1. Von Ahlften J K: Presidentsrede : VMEQ : Munisipale Administrasie en Ingenieurswese - Januarie 1972.
2. Fourie P C: "Die Ingenieur as Bestuurder" : Munisipale Aangeleentheid - April 1968.
3. Botha N S: Reeks artikels oor die "Rol van die Elektrotegniese Stadsingenieur in die Administrasie van Elektriese Kragvoorsiening" : Munisipale en Openbare Dienste - 1983.
4. Haak J: Die rol van die Ingenieur : Munisipale Aangeleentheid - Junie 1983.

Deur J A LOUBSER

Elektrotegniese en Meganiese Stadsingenieur, Benoni

## DISCUSSIONS - BESPREEKINGS

### DR NICO BOTHA : BLOEMFONTEIN

Mr President, your Worship the Mayor, Councillor and Mrs Grolman, ladies and gentlemen, I am deeply honoured that I have been given the privilege to speak on your address. I have known you for quite a number of years and once again I am proud to say, "you have done it again". It is evident that your address necessitated a great deal of research and thinking for which we wish to thank you.

Dames en here, die presidentsrede getuig van kundigheid, insig en 'n uitstekende aanvoeling vir die heersende omstandighede en werklikhede. Die president het onder andere in sy rede na streekdiensterade verwys. Streekdiensterade waaroor tans so baie gepraat en bespiegel word. So ver as 'n mens gaan is daar verskillende menings hieroor, wat natuurlik te verstaan is, aangesien streekdiensterade 'n onbekende terrein vir ons is. U is egter volkome korrek, mnr die President, as u daarop wys dat streekdiensterade groot voordeel vir ons land en volk kan inhou. Dat alle munisipale owerhede nie by streekdiensterade gaan inskakel nie, is seker waar, maar dat streekdiensterade aan elektrotegniese stadsingenieurs in die algemeen en aan u en u uitvoerende raad in die besonder sekere aanpassings en eise gaan stel, is doodseker. Juis hierom, mnr die President, is u onderwerp vandag so toepaslik. U het die rol van 'n elektrotegniese stadsingenieur deeglik beskryf en ons teruggewys daarop gewys dat dit hoofsaaklik gaan oor die verhoging van die lewenstandaard van mense. Dit gaan dus om die kundigheid, beskikbare hulpbronne en die tegnologie op effektiewe en doeltreffende wyse tot voordeel van elektrisiteitsverbruikers aan te wend.

U het ook in u presidentsrede daarop gewys dat verskeie faktore soos byvoorbeeld ekonomiese, maatskaplike, politieke en tegnologiese faktore die funksies van 'n elektrotegniese stadsingenieur beïnvloed. Derhalwe moet ons saamstem met 'n vorige stadsingenieur van Johannesburg as hy verklaar dat "The engineer will have to extend his engineering philosophy well beyond the limits of pure technology. He

will need a better understanding of the changing character of our society, an understanding of the behavioural patterns of people and the social and political implications of the country's efforts. Only by maintaining direct contact with his community can the engineer recognize the problems of the community and thus remain aware of the areas in which his education will be of greatest service".

Dit is nou vir my aangenaam, mnr die President, om u hartlik geluk te wens met 'n baie interessante en insiggewende presidentsrede. Ons wens u ook 'n suksesvolle ampstermyn toe.

### MR D C PALSER : CAPE TOWN

Mnr die President, die agbare Burgemeester, geëerde gaste, dames en here, ek kan nie met ons pas verkose president saamstem wanneer hy sê dat hy nie die eer wat vandag aan hom verleen is, verdien nie. Ek ken hom en werk nou al 'n mens jaar saam met hom en het hom nog net altyd hartlik en vriendelik ervaar. Maar hy is ook pligsgetrou, deeglik en absoluut toegewyd aan die ideale van die VMEQ, daarom is hy hierdie hoër amp wat hom vandag te beurt geval het volkome waardig.

In u rede, mnr die President, het u 'n paar aspekte van die rol van die munisipale elektrotegniese ingenieur en sy toekomstige betrokkenheid by die elektrisiteitsvoorsieningsbedryf behandel.

Een van die belangrikste punte wat u genoem het - en een wat vir ons 'n al hoe groter bron van kommer is - is die chroniese tekort aan sterkstroomelektrotegniese ingenieurs, veral in die plaaslike owerheidsfeer.

This chronic shortage was also highlighted last year in the annual survey of professional engineering manpower conducted by the Federation of Societies of Professional Engineers (FESPE) when attention was specifically directed to the growing problem in electrical engineering.

Because of the apparent attractiveness of the electronic industry, the rapid growth in this sector has been the expense of power engineering. The position is now so serious that the FESPE report concluded by noting that the demand-to-supply ratio for heavy current electrical engineers was approaching four-to-one, higher than that for any other engineering discipline.



Clearly if this is the national figure – representing as it does the average for the country as a whole – then the relevant figure at the municipal level must be considerably higher.

One does not have far to look for the reason why. It is common knowledge that salaries in the private sector are generally higher than those in the public sector, while within the public sector itself the salaries of municipal staff are further depressed by virtue of their position at the third tier of government. It is little wonder, therefore, that there is such a serious shortage of municipal electrical engineers?

Overseas the position is reversed with the public sector generally paying higher salaries than the private sector to ensure that they have the pick of the best staff available. Why cannot we do the same? Admittedly, the public service in recent years has made a most positive move in this direction. But why should the salaries of municipal staff be pegged at a lower level by virtue of their third tier position?

Mr President, I firmly believe that the time has come for serious attention to be given to the determination of a rational salary structure for municipal electrical engineers determined more in relationship to their opposite numbers in the public service, and not arbitrarily pegged relative to town clerk's salaries under the remuneration of the town clerk's act as they are at present. Unless something is done soon, the position will surely deteriorate further to the detriment of the country as a whole.

The importance of the electricity supply industry in the national economy is considerable, particularly when one considers that relatively large percentages of municipal budgets are attributable to the electricity undertakings.

This, Mr President, brings me to another and most important point you made in your address, namely the role of the engineer as a manager.

We are all too often inclined to view the municipal electrical engineer merely as a technocrat concerned primarily with engineering matters. But at the top level it is essential, as you mentioned, Mr President, that the municipal electrical engineer obtain some qualification in management or business administration. Our universities and technicons today, offer a number of excellent courses and there is accordingly no excuse for us to neglect this most important area.

A third point that I feel warrants attention, Mr President, is

whether or not all municipal electrical engineers should be registered professional engineers. I don't believe they should. Certainly for the cities and larger towns the head of the electricity undertaking should be a professional engineer. But for the smaller towns certificated engineers have competently fulfilled this role for many years now.

For this reason, I personally do not favour the proposal that has been made in certain quarters that the title of "electrical engineer" should be protected and reserved solely for professional engineers. I feel that for this latter category, the title "professional electrical engineer" would be more appropriate, with possibly a title such as "technical electrical engineer" being reserved for the non-graduate. In the municipal context, all should continue to be styled either "city electrical engineer" or "town electrical engineer", as may be appropriate.

Finally, Mr President, I fully agree with you that, relatively low salary levels aside, one of the most important reasons for the serious shortage of heavy-current electrical engineers in the electricity supply industry today is the lack of proper recognition. Something must be done – and done soon – to improve the status of the municipal electrical engineer to make municipal engineering a more attractive career path for young engineers to follow.

Ten slotte, mnr die President, glo ek dat u toespraak vandag baie aktueel en gepas was. Veral met die vinnige grondwetlike veranderinge wat vandag plaasvind en die naderende instelling van streeksdiensterade, verdien die verskillende punte wat u gestel het ons ernstige en doelbewuste aandag.

Dit is derhalwe vir my baie aangenaam, mnr die President, om die mosie van dank aan u vir u uiters interessante toespraak te sekondeer en om u alles van die beste vir 'n suksesvolle ampstermyn toe te wens.

**MNR JAN LOUBSER : PRESIDENT**

Mnr die Voorsitter, baie dankie vir die mooi woorde. Dr Nico Botha, wat ek nou wil sé is menere, hoeveel jare laas het ons onder onself 'n ingenieur gehad wat 'n doktorsgraad bekom het. Hy het dit pas twee weke gelede ontvang. Ek dink u sal met my saamstem dat hy goeie applous verdien.

Aan hom en mnr Palsler, baie dankie vir u gewaardeerde kommentaar.

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## CONFERMENT OF HONORARY MEMBERSHIP TOEKENNING VAN ERELIDMAATSKAP

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**MNR A A WEICH**

**MNR J K VON AHLFTEN : SPRINGS**

Mnr die President, dames en here, dit is voorwaar 'n aangename taak om vandag die voorstel in te dien dat erelidmaatskap aan 'n jarelange vriend van die VMEOT toegeken word in die persoon van *Gus Weich*, hoofinspekteur van fabriek.

Mr Weich matriculated from the Wolmaranstad High School and graduated from the University of Cape Town

with a B.Sc. degree in mechanical engineering in 1944. He joined the South African Railways and after completing a pupillage at Uitenhage served as an assistant engineer at Pretoria and Salt River Workshops until 1954. He entered the private sector as a maintenance engineer for a brief spell and in 1955, joined the department of defence to manage the first South African armaments factory to be commissioned after the war. He joined the department of manpower (labour) in 1965 as assistant chief inspector and was promoted to chief inspector in 1976.

Ek het miskien meer as enige ander lid van die uitvoerende raad die voorreg gehad om op talle terreine met hom saam te werk, eers as lid van die Registrasieraad van Elektro-



tegniese Draadwerkers en Aannemers en later op verskeie geleenthede met die hersiening van die regulasies onder die Fabriekswet en nou weer met die Wet op Masjinerie en Beveiligingswet. Ek het ook die voorreg gehad om 'n oorsese toer met hom mee te maak toe ondersoek ingestel is na elektriese installasie regulasies soos van toepassing in die Verenigde Koninkryk en Europa. Dit was dan ook as gevolg van hierdie toer dat baie van die beperkende regulasies en maatreëls uit die weg geruim kon word.

'n Ander saak waarvoor ons as elektrisiteitsvoorsiensers hom dank verskuldig is, is die objektieweit wat sy departement, onder sy leiding, openbaar het met die toegewing wat gemaak is vir die indiensopleiding van halfgeskoolde werkers in stede om gebruik te maak van geskoolde werkers soos vereis deur die Fabriekswet vir sekere herhalende take wat, vir ons, aansienlik finansiële voordele inhou afgesien van die meer doeltreffende aanwending van ons beskikbare mannekrag.

Dit is dan ook gepas dat die VMEO hom op hierdie wyse erkenning daarvoor verleen en sien ons uit daarna wanneer hy afgetree het, hy nog ons konvensies en tegniese vergaderings met sy teenwoordigheid en spitsvondigheid sal vereer.

Dit is met genoeë dat ek die voorstel aan hierdie konvensie voorlê dat erelidmaatskap van die VMEO aan Alfred Augustus Weich toegeken word en dat dit geskied terwyl hy nog in diens staan as die Hoofinspekteur van Fabriek van Suid-Afrika.



Mr A A Weich

#### MR GUS WEICH : CHIEF INSPECTOR : SAFETY OCCUPATION

Mr President, I am overcome. In the first place I would like to congratulate you with your induction as President of the AMEU. I trust that your two years of office will be fruitful and productive. I am quite sure that the association has given the reins of its organisation in good hands. Jules von Ahlfen, thank you very much for your kind words. I consider it an exceptional honour as a mechanical engineer to be made an honorary member of this association.

By next year this time when you have your technical meeting, I shall not be the chief inspector anymore. In the ten

years that I have had the privilege to have been associated with you in the administration of the Factories, Machinery and Building Work Act and now Machinery Occupation Safety Act, these ten years have been good years and I consider my association with the AMEU, as one of the highlights in that period. We have had our differences, but I think on the whole we have a great deal of realism to the administration of the Act. Safety legislation unfortunately is never popular, it is actsome because it lays restraints on people, but in the administration of those regulations one must consider that and make the load as easy as possible. This has been possible with your assistance, co-operation and help. I want to thank you from the bottom of my heart, once again for making me an honorary member of this association.

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#### MR KEN ROBSON

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#### MR A H L FORTMANN : BOKSBURG

Mr President, distinguished guests, ladies and gentlemen, Ken Robson is a dedicated electrical engineer, always endeavouring to improve the status of the AMEU and he has certainly left his mark on the association.

Except for an absence of two years from 1969 to 1971, Ken has served with distinction on the executive council of the AMEU, from 1968 to date, a total of fifteen years. From 1977 to 1979 Ken was president of this association.

In June 1977, while president, he was a member, on behalf of the AMEU, of the South African delegation to the 42nd General Meeting of the International Electrotechnical Commission in Moscow, USSR.

Going back a little further in time, after matriculating from Kimberley High School in 1938, Ken served a stint with the De Beers Consolidated Mines Limited in Kimberley, from 1939 to 1947, as apprentice electrician and electrician.

From 1944 to 1947, he also became a part time lecturer at the Griqualand West Technical Institute (Old School of Mines).

In 1947, Ken moved to Johannesburg where he was seconded to Anglo American Corporation for experimental work on industrial diamond applications with Boart Products South Africa Limited.

In 1950, Ken's career entered the municipal field when he became town electrical and waterworks engineer of Alwal North, where he stayed until 1952.

Then for fourteen years, until 1966, Ken was assistant town electrical engineer of Queenstown Municipality.

We all know Ken to be well versed and well spoken and from 1960 to 1967 he was part time book reviewer of the Queenstown "Daily Representative".

In 1966, Ken became deputy city electrical engineer of East London and followed Mr Percy Giles to become city electrical engineer of East London in 1968, which position he holds to this day.

Ken is a registered professional engineer, a fellow of the South African Institute of Mechanical Engineers and a member of the Institute of Certificated Mechanical and Electrical Engineers, South Africa.

Besides these achievements, I would like to highlight a few of his public activities.

From 1943 to 1947, he was a member of the Boy's High School Players, Kimberley (Amateur Theatre Company).

From 1960 to 1966, he was chairman of Queenstown Public Library.

From 1952 to this day, Ken has been a member of Toch H, Southern Africa of which he was chairman from 1966 to 1970.

He was also national chairman of the National Occupational Safety Association (NOSA) from 1975 to 1976.

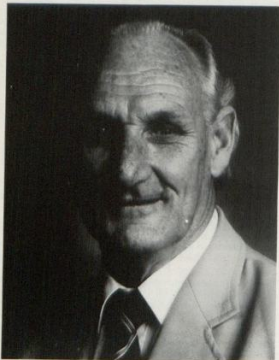
Ken held the position of honorary vice-president of The South African Institute of Electrical Engineers, 1976 to 1977.

Since 1983 to date, Ken has been a circuit steward of the Methodist Church of the East London Circuit.

I can therefore frankly say that Ken is highly respected and has earned the admiration and affection of all those who know him. He epitomises what an electrical engineer should be - highly professional in his approach to any problem, completely ethical in his decisions while at the same time retaining those human qualities which made him so popular with his colleagues.

We, the AMEU members, sincerely trust that both Ken and his charming wife, Maureen, will be in our midst for many years to come.

Mr President, ladies and gentlemen, it is indeed an honour and privilege for me to formally propose the conferment of honorary membership of the Association of Municipal Electricity Undertakings of South Africa on our friend and colleague, Ken Robson.



Mr Ken Robson

## MR KEN ROBSON : EAST LONDON

Mnr die President, Burgemeester, eregaste, dames en here, ek wil my opregte dank en waardering teenoor die Uitvoerende Raad van die VMEO betuig vir die besondere eer wat u my aangedoen het.

Hierdie besondere aangename plegtigheid sal altyd as 'n onverdiende maar onvergeetlike ondervinding in my geheue bly.

I feel especially privileged at having been proposed and honoured as an honorary member by two good friends of many years, Alwyn Fortmann and John Dawson to whom I express my sincere gratitude for the most generous words expressed.

The AMEU has meant much and done much for me in my career as a municipal electrical engineer.

Today I am especially conscious of friendships formed and strengthened down the years, with colleagues, councillors, affiliates, representatives of Escom, the CSIR, the SABS, state departments, electrical contractors and many others.

So many gifts have been lavished on me - encouragement and support, example the fruits of diverse and long experience, knowledge, guidance and leadership - I acknowledge them all with gratitude.

Thank you also for the affection shown to my wife, Maureen.

Mr President, it is with a sense of astonishment that I find myself being elected to so illustrious a company of honorary members.

In searching the honorary membership lists since the founding of the AMEU in 1915, I found that in the 70 years to 1985, honorary membership has been conferred on fifty eight distinguished men, the first three being Mr John Roberts and Mr E Poole of Durban - both founder members - and Dr H J van der Bijl.

On many occasions I have expressed the view that in the sphere of local government in this country, the AMEU holds a special and unique place.

Mr President, this remarkable association has attained a nationally recognised position of influence and standing and by electing me this day to the select company of honorary members, you have done me great honour.

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## RAADSLID ROBBIE DE LANGE

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### RLD J H G STRUWIG : SPRINGS

Meneer die President, van tyd tot tyd verleen die naam van 'n persoon luister en eer aan ons vereniging. Daarom koppel ons so 'n naam onlosmaaklik in erelidmaatskap van die vereniging.

Dit is my aangename taak en voorreg om vandag so 'n naam aan u vir u eenparige goedkeuring voor te lê, naamlik, Raadslid Robbie de Lange, Raadslid van die Stadsraad van Oos-Londen.

Meneer die President, u sal 'n dag by u kongrestyd moet

voeg as u wil hê dat ek 'n kort curriculum vitae moet gee en nog reg aan die mens en dienaar, Robbie de Lange, moet laat geskied.

Toe baie van u nog nie eers gebore was nie, naamlik, in September 1945 is mnr de Lange tot raadslid gekies, 'n taak wat hy sedert die datum met soveel ywer en toewyding verrig het dat hy verkiesing na verkiesing maar weer die heerlike juk van naastediens op sy skouers geneem het. Sy leierskap het gou opgeval en hy word in 1956 as burgemeester gekies. Ook die taak sou hy op so 'n bekwame wyse verrig dat hy altesaam ses jaar as burgemeester gedien het. Vir 19 jaar lank was hy trouens die enigste afrikaansspreekende lid van die raad.

Die diensmotief slaan sterk deur as ek enkele van die vele komitees vir u noem waarop hy namens die stadsraad gedien het.

- (a) Hawe Adviesraad - 27 jaar
- (b) Hospitaalraad - 37 jaar
- (c) Publisiteitsvereniging - 28 jaar (4 jaar voorsitter)
- (d) Tegniese Kollege - 38 jaar (26 jaar onder-voorsitter)
- (e) Huurraad - 32 jaar (meestal as onder-voorsitter)
- (f) Afdelingsraad - 26 jaar.

He served on the Cape Eastern Public Bodies for 21 years as member, vice-president, president and honorary life president since 1973.

He served in the same capacities on the Cape Province Municipality Association as executive for 28 years and since 1982 as elected honorary life vice-president.

He is the president of the Association of Divisional Councils and vice-chairman for the Road Transportation Board, East Cape Development Board, the Regional Development Advisory Committee and East Cape Administration Board.

Daar is baie *eerstes* in die lewe van Robbie de Lange.

- Hy was die eerste voorsitter van die eerste Afrikaanse Sakekamer van Oos-Londen.
- Hy was voorsitter van die eerste Afrikanerklub in Oos-Londen.
- He was the first district governor of Lions International in South Africa.
- He was the first president of the East London Lions Club.
- He was the first Government appointed Chairman Public Relations.

Vir 36 jaar lank was hy lid van die skoolraad van Oos-Londen en dit was seker toe dat hy daarin kon slaag om grond vir die Hoërskool Grens te bekom. In 1948 ontvang hy die eretoekenning, vriend van die Voortrekkers, en is hy daarvoor verantwoordelik dat die straat wat uit Oos-Londen lei die naam Voortrekkerstraat dra. Hy was in 1953, 1958 en in 1963 volksraadkandidaat vir die Nasionale Party, maar dit sal ons nie teen hom hou nie!

Maar, meneer die President, tussen al hierdie bedrywighede deur was daar ook vir die VMEO plek. Die eerste konfensie woon hy in 1948 by en sedert die dag en datum is hy 'n getroue lid van die VMEO en het hy saam met sy ingenieur op die uitvoerende raad gedien. Daarom is dit vir

my 'n eer om hierdie besondere mens nou te vra om na vore te kom sodat ek die eer kan hê om hom 'n handdruk te gee en u hom 'n staande ovassie kan gee.



*Rld R de Lange*

#### **RLD ROBBIE DE LANGE : OOS-LONDEN**

Mnr die President, dit is vir my vanmôre 'n besondere voorreg om hier te wees en na wat ek so gehoor het wil ek amper sê, dankie here, dit is min maar dis in. Weet u as ek so terugkyk kan ek vir u sê dat ek op 6 September 1985, 40 jaar agter die rug gehad het in plaaslike bestuur. Nou wil die mense ook soms sê, hoekom is 'n mens so mal om ook jou tyd daar te gee, dit is omdat ek dit geniet het. Ek dink daar is niks groter in die lewe as om vir jou medemens iets te kan doen nie, maar ek wil net vir u waarsku dit is maar min in die lewe wat daar ooit dankbaarheid betoon word vir wat jy in die wêreld doen. En weet u, vir my is vandag 'n besondere groot eer om die toekenning te kry, nie vir my nie, maar vir my vrou, my familie, my kinders.

Ek wonder hoeveel mense in die openbaar waardeer wat gedoen word vir die publiek, en wat die bydraes is van hulle vrou en die familie, dat hulle 'n man toelaat om dit te doen en daarom wil ek aan Raadslid Struwig sê baie, baie dankie vir die voorstel. Ek waardeer dit van 'n kollega want dit is alleenlik met samewerking tussen raadslede en amptenare wat daar 'n sukses kan kom.

I want to commend you, Mr President. I want to pay tribute to our electrical engineers, to our professional men for what they are doing. I sometimes want to ask myself and my colleagues, do we really appreciate what these people do for us. May I say to the executive council, thank you very much for making the recommendation, may I say to the convention, thank you very much.

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## MNR E DE C PRETORIUS

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### MNR P J BOTES : ROODEPOORT

Meneer die President, dames en here, dit is vir my 'n voorreg om 'n goeie vriend en mede-oud-Matie in 1973 as aangewese president van die VMEO voor te stel en dit is vir my weereens 'n voorreg om hom vir erelidmaatskap van die VMEO voor te stel. Alhoewel dit vir my 'n voorreg is om Eugene de Coligny Pretorius voor te stel vir erelidmaatskap, stem dit 'n mens tog weemoedig want dit beteken dat die eens jong en energieke kollega binnekort gaan aftree en daarmee dui dit dan ook aan dat Vader Tyd aanstap. As ons dan nog kyk na die gryswitkop, sal u vers-taan wat ek bedoel.

Eugene is egter nog jonk, in 1929 in die OVS gebore en op Brandfort in 1943 gematrikuleer waarna hy sy B.Sc. en later sy B.Sc. Ingenieursgraad in die rigting elektrotegniese swaarstroom aan die Universiteit van Stellenbosch in 1948 behaal het.

Hy was, nadat hy sy leering-ingenieurskursus by Evkom (Natal-sentraal-onderneming) voltooi het, elektrotegniese stadsingenieur van Stellenbosch en adjunk van Klerksdorp, onder die legendariese Koos Gerieke, voordat hy in 1960 elektrotegniese stadsingenieur van Potchefstroom geword het.

Mnr Pretorius is ook sedert 1952 ingenieurslid van die VMEO, dit wil sê 'n tydperk van 33 jaar. Sedert 1967 het hy op die uitvoerende raad gedien met uitsondering van 'n enkele kort onderbreking.

Mnr Pretorius was vir die termyn 1975 tot 1977 president van die VMEO. Hy het in 1975 die VMEO verteenwoordig in die SA Kontingent na die IEK algemene jaarvergadering in Den Haag.

Eugene het in verskeie komitees van die uitvoerende raad gedien, waarvan die belangrikste was, as sameroeper van die Koördinerende SABS-komitee, 'n komitee wat hy sedert 1979 met die uiterste nougesetheid gelei en beheer het. Hy is van plan om in die eerste helfte van 1987 met pensioen af te tree.

Eugene het groot belangstelling in klassieke musiek, hy speel viool en was konsertmeester van die Potchefstroomse Simfonie-orkes - dit wys net wat 'n elektrotegniese ingenieur alles kan vernag.

Mnr die President, dit is nie net oor die dienstydkerf van die diens wat hy vir die VMEO gelewer het, waarom ek hom wil voorstel vir erelidmaatskap nie. Eugene het baanbrekerwerk gedoen vir die bevordering van afrikaans in die VMEO-opset. U sal moontlik nog onthou dat in die omgewing van 1960, daar baie min afrikaans gebesig was op 'n VMEO konvensie. Sy kennis van afrikaans was van onskatbare waarde, nie net vir die uitvoerende raad nie, maar ook op takvergaderings waar hy altyd 'n leidende rol gespeel het.

Toegewydheid, stiptelikheid by vergaderings, tereg wysend as 'n kenner van die konstitusie, en sy besondere vriendelikhed, is kenmerke van Eugene Pretorius, maar bowenal as 'n vriend van elke lid van die VMEO. Hy het dit seker by Koos Gerieke aangeleer, maar Eugene staan reeds onder sy vriende bekend as 'n legendariese figuur. Sy doen en late by VMEO konvensies sal nog lank bly voortleef.

Mnr die President, dames en here, dit is my voorreg om formeel voor te stel dat erelidmaatskap van die Vereniging van Munisipale Elektrotegniese-ondernemings van Suid-

Afrika toegestaan word aan Eugene de Coligny Pretorius. Ek weet dat hierdie voorstel eenparig deur almal vandag hier teenwoordig, aanvaar sal word.



Mnr E de C Pretorius

### MNR E DE C PRETORIUS

Mnr die President, aan u baie geluk met u ampsbekleding as president. Dames en here, ek voel baie nielig en klein tussen die grootkoppe wat erelidmaatskap ontvang het, asook tussen die wat dit reeds vantevore ontvang het. Verskoon my as ek verwys na twee, my ou mentor Dr Straszaker en my goeie vriend, Pat Middlecote. Soos ek sê, ek voel baie nielig en klein tussen sulke uitgelese geselskap, daarom is dit vir my soveel te meer 'n besondere eer wat u aan my betoon. Baie, baie dankie aan my goeie vriend, mnr Botes, vir die mooi woorde.

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### MR WESSEL BARNARD

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#### MR D H FRASER : DURBAN

Mr President, Mr Mayor, distinguished guests, ladies and gentlemen, the constitution of the AMEU defines the qualifications for election as an honorary member as "A person who has distinguished himself and whom the Association desires to honour for outstanding services".

The Concise Oxford Dictionary indicates that the word "remarkable" might be used in place of "distinguished" and Mr President, I would like to put it to the Convention that in the person of Wessel Barnard we not only have someone who has distinguished himself in every way but who has on most occasions done this in a most "remarkable" way. Many will testify to this.

In the first place he has had a truly remarkable working career, from apprentice electrician to city electrical engineer of the Republic's second largest municipal electricity undertaking. (He probably won't agree with this ranking but he has lost this argument before.) After completing his apprenticeship, Wessel served in the Special Signals, 23 Air Squadron as a radar technician, during the latter part of World War II.

As a bursar of the Johannesburg City Council he completed

the B.Sc. degree in electrical engineering at Witwatersrand University in 1947. For two years thereafter, he followed a post graduate training course at English Electric in Stafford, England.

Returning to the Johannesburg Electricity Department in 1949, he progressed steadily up the ladder (they weren't using hydraulic platforms at that time) until March 1976 when he was appointed city electrical engineer.

In aspects of life outside the working environment, Wessel's accomplishments have been no less remarkable. You may remember how Ken Robson summed it up when he proposed him as president elect in Durban in 1981.

"A man of parts is our Wessel - husband, father, extrovert, raconteur, golfer, bowler, tennis player, bricklayer, gardener, photographer, reader, public speaker, wine expert, non-stop talker - and between times city electrical engineer".

Wessel has now stepped down from perhaps the pinnacle of his many successes in life from his two year term as presi-

dent of the AMEU. He has served the Association with great distinction and has led it to new areas of national recognition and influence.

Before the next AMEU Convention it is likely that he will have retired from his post of city electrical engineer of Johannesburg, and it is fitting and opportune at this point in time to bestow upon him the highest honour provided for in our constitution.

Mr President, ladies and gentlemen, it is my privilege and great pleasure to propose Mr Wessel Barnard for election as an honorary member of the AMEU.

#### MR W BARNARD : JOHANNESBURG

Mr President, its a lie, I do not talk a lot, and the other comments which Mr Fraser made, I accept them because having qualified at that college in Natal, he probably does not know the difference between demand and number of units sold. I have been very privileged to spend my whole working career in Johannesburg City Council, and I must express my thanks to the council who has given me a wonderful career and today this is really the highlight of a further dimension to my working career, and that is the time I have had in the AMEU and I would like to say to all my colleagues and friends in the AMEU, particularly engineers, councillors and to the president, thank you very much for this honour you have bestowed upon me.



Mr Wessel Barnard,  
Chief City Electrical  
Engineer and immediate  
Past President of the  
AMEU with his  
Honorary Membership  
Scroll.



## VENUES OF MEETINGS VERGADERPLEKKE

### 11TH TECHNICAL MEETING

Mr C Adams, City Electrical Engineer, extended on behalf of his Council an invitation to the AMEU, to hold its 11th Technical Meeting in 1986, in Port Elizabeth.

### MR JAN LOUBSER : PRESIDENT

Thank you very much, Mr Adams for this kind invitation to the friendly City of Port Elizabeth.

### 50TH CONVENTION

### CLR FRANK VAN DER VELDE : CAPE TOWN

Mr President, I have it on good authority that the spring of 1987 will be the finest that Cape Town would have seen in years. Those of you who have not been privileged or ventured south of the Hex River Valley, will not have seen the

beauty of the fields of the Namaqualand daisies or purple vygies or the splendour of the Cape doctor laying a table cloth on our magnificent mountain.

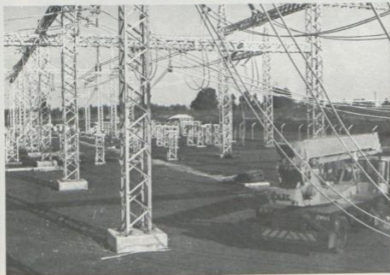
But whatever, Mr President, it is SF6 switchgear, the fine arts, the Vynbos bedekte Cape Peninsula, or merely the fruit of our abundant environment, you will be made most welcome in the mother city. Mr President, on behalf of my Mayor and City Council, I offer the hospitality and service of Cape Town the the AMEU Convention in 1987.

### MNR JAN LOUBSER : PRESIDENT

Baie dankie Raadslid van der Velde. Ek kan nou vir u sê die Uitvoerende Raad moet seker daaroor besluit, maar as ek enigsins seggenskap het, soos wat ek weet my voorganger seggenskap gehad het, dan sal hulle nooit anders besluit as om die uitnodiging te aanvaar nie. Baie dankie.

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# ELECTION OF EXECUTIVE COUNCIL VERKIESING VAN UITVOERENDE RAAD

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## UNOPPOSED NOMINATIONS / ONBESTREDE NOMINASIES

FOR / VIR

### EXECUTIVE COUNCIL 1985/1987 UITVOERENDE RAAD

#### EASTERN CAPE BRANCH – OOS-KAAPLAND-TAK

J D Dawson - Uitenhage

#### GOOD HOPE BRANCH – GOEIEHOOP-TAK

K J Murphy - Somerset West

D C Palser - Cape Town

#### HIGHVELD BRANCH – HOËVELD-TAK

M P P Clarke - Randburg

J E Heydenrych - Middelburg Transvaal

A J van den Berg - Krugersdorp

#### NATAL BRANCH – NATAL-TAK

E G Davies - Pietermaritzburg

#### FREE STATE/NORTHERN CAPE BRANCH – VRYSTAAT/NOORD-KAAPLAND-TAK

Dr N S Botha - Bloemfontein

#### PAST PRESIDENTS – VOORMALIGE PRESIDENTE

W Barnard - Johannesburg

P J Botes - Roodepoort

D H Fraser - Durban

E de C Pretorius - Potchefstroom

K G Robson - East London

J K von Ahlften - Springs

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## EXECUTIVE COUNCIL – UITVOERENDE RAAD

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### EXECUTIVE COUNCIL 1985/1987 UITVOERENDE RAAD

#### FIRST ROW – EERSTE RY L/R:

*Bennie van der Walt (Secretary/Sekretaris), Wessel Barnard, Alwin Fortmann (President Elect/Aangewese President), Jan Loubser (President), Ken Robson, Ctr/Rdl Robbie de Lange.*

#### SECOND ROW – TWEDE RY L/R:

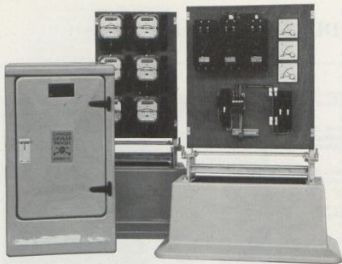
*Ctr/Rdl Jan Burger, Eugene Pretorius, Ctr/Rdl Mrs M A Cooke, Denis Fraser, John Dawson, Jules van Ahlften.*

#### THIRD ROW – DERDE RY L/R:

*Ken Murphy, Ctr/Rdl J C Landsberg, Dennis Palser, Ctr/Rdl Frank van der Velde, Ctr/Rdl C Peyper  
Ctr/Rdl Frans Lourens, Max Clarke.*

#### FOURTH ROW – VIERDIE RY L/R:

*Attie van den Berg, Gordon Davies, Ctr/Rdl Ben Steyn, Dr Nico Botha, Ctr/Rdl Prof R G Kriel  
Ctr/Rdl R G Feltham, J E Heydenrych.*

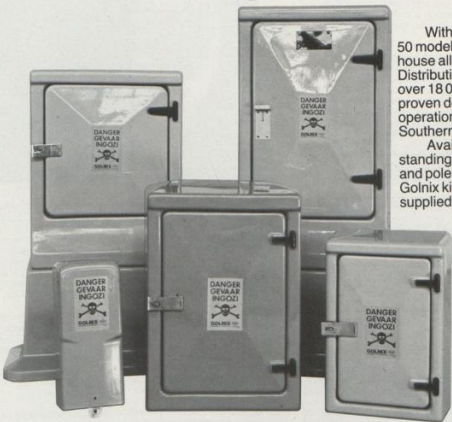


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## KEYNOTE ADDRESS – HOOFREDE

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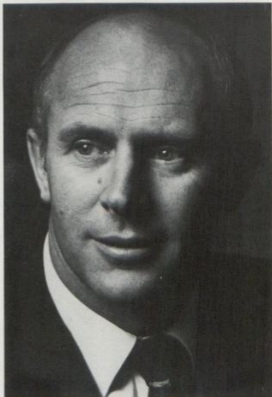
Mr Ken Maud joined the Altech Group in 1976 as Managing Director. He assisted in the development and growth of Altech since its inception and has been directly involved in most major developments.

During 1981 to 1983 he was appointed Chief Executive of Powertech. At this stage there were some ten subsidiary companies with annual sales approaching R20M; two years later the company recorded annual sales approaching R100M and the strategy had been set for the future.

To date he is the Deputy Chief Executive of the Altron Group with responsibility for Group operations including Components, Electronic Systems and the Powertech Group.

Altron today employs nearly 16 000 employees countrywide, has a turnover in excess of R720M a year and has a market capitalisation nearing R1-billion.

Ken Maud, Deputy Chief Executive of Altech.



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### BOYCOTTS AND EMBARGOES – THEIR EFFECT ON TECHNOLOGY IN SOUTH AFRICA

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Technology and progress are indivisible from each other. Taken quite loosely to denote the *scientific study* and subsequent *development* of the *practical arts*, technology is what separated civilised man from his pre-historic counterpart. Technology drawn on the world with the invention of the wheel and the control of fire. From the first curious experience of merely warming his hands over a product of spontaneous combustion in nature, man developed the skill of rubbing two sticks together to the point of ignition and later controlled that fire to wrest iron from its ore – an event so momentous in evolution, that an entire age was named after it – the Iron Age. It was the transition from the Stone Age to the Iron Age that made technology a yardstick by which progress is measured. Hence progress and technology go hand in hand. They are synonymous concepts.

The concept of boycotts and embargoes is not new either. The theory of subordinating, of manipulating a people through denial, and of supplanting their progression with retrogression, dates back many hundreds of years. In fact, three thousand years ago, when the Greeks laid siege to the city of Troy, they were doing little more than implementing an extravagant and "hands-on" style of embargo and boycott. The aim was to bring the Trojans to their knees by systematically depriving them to the point of surrender.

Off course, you will remember it didn't quite work out that way. Ultimately the Greeks resorted to the clever trick of theirs with the Wooden Horse (no doubt the classic forerunner of the Casper vehicle), but the message is plain – boycotts and embargoes are not entirely an invention of the anti-apartheid movement or even of the United States Congress. The example had been set by the Greeks as early as 1200 BC.

In summary, my introductory point is this: man has for centuries recognised deprivation of both knowledge and material goods as a weapon against his enemy and the more civilised that enemy, the more vulnerable he is to deprivation in the field of technological skill.

What effect will boycotts and embargoes have on South Africa and, particularly, how will they affect the development of technology in our country in the years that lie ahead?



For us to examine the situation meaningfully, I believe it is important first to sketch briefly the background of South Africa's industrial development and the role of technology in the process. If we go back 100 years or more, we find that South Africa was a predominantly agrarian society with more than 50 percent of the population engaged in agricultural production of one form or another.

Not only did we then produce sufficient food for ourselves, but we also provided food for export, primarily to the British Commonwealth. This situation persisted in the agricultural sector until the 1960s, but has unfortunately since then declined significantly. The decline in production and export can be ascribed only partly to the political situation. More importantly, we are no longer producing as *efficiently* as other world suppliers are.

While we have not kept up with technological development in the field of agriculture, the United States has. In 1885, 80 percent of the United States' population produced 100 percent of their total food requirement. One hundred years later, in 1985, 3 percent of the United States' population produces 110 percent of their national food requirement. It is technological development that has made this possible. In the case of South Africa, the contribution from this traditionally important sector of the economy to the positive side of our balance of trade has dwindled to a point of relative insignificance.

The inception of the mining industry dates back approximately 100 years to the discovery of diamonds in the Northern Cape. Subsequently we became a supplier of coal, chrome, vanadium, manganese and a host of other metals and minerals of varying levels of importance, not only to ourselves but to the entire industrialised world. In fact, 82 percent of our current exports comprise metals and minerals.

To enable us to continue extracting these metals and minerals from the bowels of the earth in economically viable quantities has demanded unceasing attention to more effective and more efficient methods of mining. The need accelerated in the late sixties when the fixing of the gold price on international markets compelled us to produce at highly competitive prices. This resulted in a vigorous commitment to research and development in the field of mining technology and reduced production cost. Necessity being the architect of invention, we became world leaders in the field.

I firmly believe that our unparalleled success in mining technology has not been brought about by the abundance of metals and minerals buried on this continent, but also by the determination and aggression with which we have been compelled to develop the skills that enable us to exploit our natural bounty and earn vital foreign exchange for South Africa. Today we export mining technology and products to many parts of the world. However, we must recognise that the extraction of metals and minerals from the ground is a terminal exercise and that, at some time in the not too distant future, we shall no longer be able to depend on revenues from our mining resources, certainly not to the extent that we have in the past!

Thus, two of our most significant areas of production, agriculture and mining, contain a cruel irony. In the case of agriculture, where the longevity of the industry is virtually unlimited, we have failed to keep technological pace and are no longer self-sufficient. Yet, in a terminal industry like the mining of dwindling resources, we lead the world to the point of our own demise.

Logically, this points to the urgent development of secondary industry in South Africa, not only to earn important foreign-exchange reserves but, vital to our survival, to create employment opportunities for the increasing hundreds of thousands of people who keep joining the queue of

job-seekers each year.

If we trace back the development of secondary industry in South Africa, we find that it initially evolved from the agricultural sector, through the importation of implements, and developed into the importation of capital equipment and various other products which were needed to establish and develop our mining industry. As volumes increased, so local manufacture became more important. Many of the more elementary products could be manufactured locally by copying what was imported.

As our economy developed alongside advances in world trade and the need to be competitive, so newer products were being invented by engineers abroad in search of greater efficiency. During this phase, which I shall call the second phase, some enterprising international companies and local entrepreneurs identified the opportunities which existed for manufacturing new products in South Africa. The quickest method for turning new ideas into products was to buy the technology or "know-how" from foreign sources.

In most instances the technology was available because a large number of the suppliers of the products had established plants and facilities in South Africa and recognised the need for the development of secondary industry. This second phase prevailed throughout the 50s, 60s, 70s and to a degree persisted into the 1980s. The development of secondary industry in any country is a long process requiring commitment, not only of capital, but also of human resources.

Of course, in certain sectors of the economy we were forced to develop our own technologies at a much earlier stage. A prime example of this is our defence requirement. In 1960, South African industry supplied only 5 percent of our country's defence requirements. The other 95 percent was imported. Today, in 1985, I am told that the position is totally reversed. We now produce 95 percent of the country's defence requirements locally and import only 5 percent. Most imports, which comprise the 5 percent, are of products where the technology is not beyond our grasp but the economies of scale just do not make it viable for us to manufacture the products economically.

More important, we are not only approaching complete self-sufficiency in the field of armaments but, despite world opposition and embargoes, South Africa is a significant exporter of military products.

Indeed, in the relatively short space of 15 years, the situation has been reversed and military exports are an important source not only of foreign exchange but also of many employment opportunities in the manufacturing, administrative, financial, marketing and - what concerns us here today - the engineering spheres. Armaments production has provided a much needed challenge to many engineers employed by both the public and the private sector.

It has given South Africa international standing, credibility and respect in the armaments trade where the customer is not a private individual but a foreign power. Locally, it has engendered confidence in our ability to match the resourcefulness and expertise of the South African mind with that of the international community. In the case of the armaments trade, the 1977 embargoes and boycotts slapped on South Africa by the international community backfired - productivity replaced impotence, inertia was overcome by drive and necessity unleashed forces of inventiveness hitherto dormant in our nation.

However, the triumph of our resourcefulness is not limited to the areas of mining and arms production. The research and development which lead to SASOL has made us world leaders in the production of petroleum products from coal.

Sasol's contribution to our own economy is of significance, not only directly through the petrol which it provides but also through the many splinter industries which have sprung up around this project.

Here, again, I believe it is safe to say that South Africans are regarded as world leaders in the field of technology. How many other opportunities are there still available to us in South Africa for the development of secondary industry? I believe there are many. I furthermore believe that the engineering community and the technology which it can generate play a major role in the development of secondary industry and, through that development, will create many thousands of jobs for people of all races. It is a proven fact in the United States, and in other developed countries, that technology has spawned as many as 7 or 8 times the number of jobs that traditional industry created.

I believe it would be irresponsible to claim that we in South Africa can be totally self-sufficient and that we can engineer products which will compete across the board with major industrially-developed countries around the world. Equally, I believe it would be wrong to concentrate on only exciting high-technology developments in the fields of electronics and bio-technology. I support the view that a great deal of development must take place in the less glamorous industries to enable us to produce our everyday requirements such as textiles, food, consumer products, and similar items, on a far more effective and competitive basis. In this regard, my own definition of technology is that it is simply "a way of doing things better". If we can grow our agricultural produce better, if we can manufacture our textiles better, if we can manufacture our consumer products better, we will be able to do so at lower prices and thus make ourselves more competitive with the rest of the world.

Regarding the more advanced technologies in the field of electronics, telecommunications, bio-technology and others, we will also need to develop our capabilities. However, I caution our entrepreneurs and engineers against trying to tackle the broad sphere of high-technology development and urge them to concentrate on niche or specialised products which, in the first instance, will not only assist the country but, in the longer term, create markets for these products outside South Africa and thereby become important contributors to our foreign exchange. The manpower resources which we have to assist us in these endeavours are obviously limited and they must not be wasted.

The effect that embargoes can have on the growth of technology in a developing country such as South Africa are, as I see it, the following:

- 1 First, virtually all sources of technology from abroad can be denied us. This would mean that, as a country, we would stagnate and not keep abreast with developments which are taking place elsewhere in the world. In the longer term it would mean that we would not be in a position to create employment opportunities for the people of South Africa, nor would we eventually be able to replace the foreign exchange which we currently earn from our mining industry.

The challenges which will be available for our engineers will be depleted and a large number of them will become disenchanted. These who are seeking the challenges which engineering inevitably offers will be seeking new pastures. They will be wanting to emigrate to countries where they can participate in technological growth that will keep them in the forefront of developments and present them with a continuing challenge that is so essential. This is the extreme, negative view and certainly a situation which I hope will not develop in South Africa.

- 2 Secondly, there can be the recognition by engineers, en-

trepreneurs and government of the opportunities which will present themselves in the event of an embargo on technology. South Africa will have to become more reliant on its own industry. We will have to copy and adapt imported products to meet our local requirements and resources. The contact with overseas principals which we have enjoyed in the past has given us the opportunity of acquiring enough high-technology and advanced processes of manufacturing used abroad to enable us to develop our own products, services and systems. However, the concern that we have had in South African industry to survive and make attractive profits for shareholders, has dissuaded us from building up research and development groups to levels where they could be effective in designing, manufacturing and supplying home-grown products.

Sanctions will cut off many of our traditional suppliers and principals and really, in the final analysis, the only protection that South African industry has against this is the capability of its own research and development groups. In my opinion we have, until now, failed to encourage small research and development teams sufficiently. It is clear then that one of the urgent requirements in this country is to further strengthen and promote industrial research and development. When we talk about research and development in industry we are talking, not about abstract research, but about product-oriented research and development. We must be completely realistic about our understanding of what needs to be done. To achieve this, I believe that the following are necessary:

- (a) First, South African engineers need to take stock of themselves and they must understand that they have a far more significant role to play in the development of this country and the solution of its problems than they have hitherto realised. They need to stand shoulder to shoulder with the accountants, with lawyers, with professional managers, with marketing people and production people, to be counted among the vital contributors to our industrial society. We, in industry, will be depending more and more on them in the years that lie ahead. They themselves must become more aware of this; they must adapt to the changing demands which will be made upon them.
- (b) Secondly, South African industry will to some extent have to spend more of its turnover on research and development but it must also look to Government to supply it with resources, albeit limited, for funding such programmes in industry. One of the natural vehicles for this flow of funds to industry is the South African Inventions Development Corporation - SAIDCOR. Compared with equivalent organisations overseas, such as in Israel, one finds that SAIDCOR's only defect is that the funding that it has available for research and development in industry is too severely limited. SAIDCOR has something like R3,5 million per year available to assist industry in joint development projects.

In Israel the Office of the Chief Scientist of the Department of Industries, which operates on very much the same lines as SAIDCOR, spends in joint ventures with industry 50 million US \$ per year, which is equivalent at today's rate of exchange to nearly R140 million. Are South Africa and Israel really that dissimilar? This type of support in Israel began in earnest only 12 years ago and has been instrumental in Israel's success as a major exporter of high technology and electronics products.

- (c) Thirdly, the Government should consider the introduction of tax incentives to stimulate industrial re-

search and development. Recently, we instructed one of the firms of auditors who are employed by us to survey R & D Tax Incentives in other parts of the world. Of the five countries surveyed (Australia, Canada, the Netherlands, South Africa and USA), only Canada and the USA offer the type of incentive calculated to spur industrialists and entrepreneurs to take on research and development programmes. These tax incentives amount to:

First, the deduction of all research and development expenditure, whether of capital or running nature, according to one of the following methods:

Either the full amount may be deducted in the tax year in which it was incurred;

or the amount may be capitalised and written off over a period of several years.

Secondly, a tax credit (in our terminology, and "investment allowance") of the R & D costs in the year of expenditure.

In the South African situation an investment allowance for R & D of 50 percent, coupled with a full deduction, would greatly accelerate R & D. The Receiver of Revenue would lose little by allowing this, as the amount spent by the whole of South African industry on R & D would, on average, be only a few percent of its turnover. The tax revenue would increase markedly as industry development, creating new jobs and opening up export opportunities.

- (d) Fourthly and finally, we need to encourage more people in South Africa, from whatever racial group, to enter the fields of engineering. We need, as a country, to provide not only for the universities and the places of higher education, but also the development and support of the Technikon so that we can develop the people who will be able to take us into the 21st Century.

I am not implying that this is neglected at present, but I do question whether Government and the private sector realise the gravity of our situation and the urgent need to support investment in awareness and education in these fields.

I further believe that we, as a country, are sometimes guilty of over-engineering products. Should we not also look at the de-engineering of many products and technologies which we have in this country? Should we not try to gear down to the level of the people who are expected to assemble and manufacture products? Should we not gear down to the market which uses the products? In other words, should we not cut our coat according to our cloth and not try to emulate the United States or other world leaders in technological development?

In conclusion I would say that, given a change in circumstances in South Africa, there are many new challenges and opportunities which will open up to us. The engineering fraternity and the entrepreneurs of this country are going to be relied upon as never before, to develop local, secondary industry; to create new employment opportunities, and to uplift all the people of Southern Africa so that we can take our place alongside other developing and developed countries on a *competitive* basis, not looking to them for handouts. I call upon the engineering fraternity to take up the challenges that lie ahead.

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## DISCUSSIONS – BESPREKINGS

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MR JAN FOUCHE : DEPARTMENT OF TRADE AND INDUSTRY



Mr Jan Fouché

There is hardly a country in the world which does not have the urge to be independent and self sufficient. This has indeed always been, and will always be, the cause of international conflict and clashes.

From this urge stems a pride to satisfy all domestic needs from own natural resources and to assist, in the second place, in satisfying the needs of other countries. Usually surplus goods are exported to other countries at competitive prices after the requirements of the domestic market have been met. This, in turn, always results in keen competition between a country's own local products and imported goods.

In countries like the Republic of South Africa, with its relatively small population and limited markets, unreasonable competition is usually experienced by local industries from the bigger foreign countries.

It goes without saying that local industries must be accorded a measure of protection in order to enable them to meet this competition. The protection is effected in the form of tariff levying and the granting of preferences when purchases are considered by the Government.

Tariff protection is normally instituted, after due consideration of all aspects, to place industrialists on a fair competitive basis *vis-a-vis* overseas manufacturers, without causing necessarily an adverse effect on the cost of living. Tariff protection can also as a result of various factors, such as GATT binding, only be applied to certain goods while no tariff protection whatever can be granted to certain industries.

In the light hereof and to encourage industrialists to manufacture a greater variety of goods with a higher local content, the State has in the respect of its own requirements

and those of Semi State.

Organisations, Provincial Administrations and Local Authorities decided that in the consideration of tenders, preference should be accorded to goods manufactured or assembled locally. The extent of preferences that may be claimed, viz, one to ten per cent, depends on the local content.

The Government visualised that industrialists should start with assembly and then gradually increase the local content until complete local manufacture has been achieved. It is, however, a matter for regret that there are still so many local manufacturers in our country who are satisfied with assembly only.

Further, I would like to speak to you on the considerable savings and other benefits to be derived from standardisation by the Government of a young industrial country such as ours.

Let me start by giving you an example of what has been achieved by means of standardisation many centuries ago. It is the story of the earliest recorded standardised assembly line created in 1463 in Venice, the world's first modern state. Life in those days was perhaps more romantic, but just as difficult and dangerous as it is today and throughout the 15th and 16th centuries, a venetian water basin called the Arsenal, where 16 000 men were employed and everything from cannon to nails were manufactured, was the world's then largest industrial complex. In the basin Venice built a standardised trading vessel which could be quickly converted into a war galley. We all know, of course, that history has the habit of repeating itself.

When completed, this Galley was towed slowly down a canal and as it passed, workmen reached out of windows on either side and loaded the equipment. By the time the vessel reached the end of the canal all necessary equipment was on board, including cordage, oars, armaments, food and a full complement of men. Actually in 1570 during the war between Venice and the Turks, the Arsenal turned out a hundred fully fitted war galleys in a hundred days - a fact that could hardly be equalled anywhere in the world even today. This could only have been achieved through standardisation.

#### 1 THE GOVERNMENT'S ATTITUDE TO THE STANDARDIZATION AND CO-ORDINATION OF PURCHASES.

As the State is the biggest buyer in the country, the government realized many years ago that if these purchases could be rationalized so that all buyers could use the same specifications to purchase the same goods, big financial profits could be obtained for both the State and industry. The advantages would be even greater if national South African specifications were used wherever possible.

These advantages may be summarized as follows :

##### 1.1 FOR THE MANUFACTURER. Rationalization means that the consumer purchases less quality variations of the various products but larger quantities of the smaller varieties.

For the manufacturer this means longer production runs of a smaller variety, less time wasted in changes between runs, smaller variety in the purchase of raw materials, less storage space, the keeping of less stock, better inspection and quality control, in short : higher productivity.

##### 1.2 FOR THE CONSUMER. The above-mentioned benefits for the manufacturer result in more direct competition and consequently in lower prices for the con-

sumer. As the consumer makes use of national standard specifications, wherever possible, which have been drafted by committees of experts, he gets optimum quality and consequently the best value for his money.

## 2 CENTRAL STANDARDIZATION COMMITTEE

In order to take full advantage of the above-mentioned benefits, the policy of standardization and co-ordination of purchases was adopted by the cabinet during 1958. During that year the Central Standardization Committee was appointed with instructions to implement this policy on the following basis:

- 2.1 All buyers were to use SABS standard specifications where these were available.
- 2.2 If a specification was urgently required and no SABS standard specification was available, a government purchasing specification, called a CKS specification, was to be prepared for use by all buyers.
- 2.3 In the event of one or the other above-mentioned specifications being unacceptable to the buyer, the buyer should take steps to have the specification revised rather than using his own specification or revision of such specification.
- 2.4 In the event of neither type of specification being available, the buyer should ascertain which products were manufactured and available in South Africa and buy these products rather than drawing up his own specification for a product not yet available.

#### STANDAARDISERING VAN OWERHEIDS-BEHOEFTES EN KOORDINERING VAN AANKOPE

Die Departement van Handel en Nywerheid wys daarop dat aankoopspesifikasies wat deur verbruikersinstansies opgestel word baie keer op bekende oerse fabrikante of katalogusse gebaseer is met die gevolg dat dit vir plaaslike vervaardigers onmoontlik gemaak word om ooreenkomstig sodanige spesifikasies mededingende plaaslik vervaardigde produkte aan te bied. In baie gevalle ver dit dan spesiale vervaardiging en 'n gejaagdgaande hoër eenheidsprys.

Weens die beperkte omvang van die binnelandse mark en gejaagdgaande relatiewe hoë kostestruktuur word plaaslike vervaardigers genoodsaak om hulle produksie te beperk tot daardie groottes/kapasiteite ens, waarvoor daar 'n redelike groot vraag bestaan ten einde op 'n vaste produksiebasis te kan vervaardig. Dit stel hulle in staat om eenheidskoste so laag moontlik te hou, ten einde met gevestigde oerse fabrikante, wat 'n groot omset geniet, mee te ding.

Die daarstelling en toepassing van SABS- en CKS-spesifikasies het veel daartoe bygedra om die probleem die hoof te bied. Daar is egter baie items waarvoor daar nog nie standaard-spesifikasie bestaan nie, met die gevolg dat dit uiters noodsaaklik geword het om in daardie gevalle daadwerklike stappe te doen, om, veral wat dimensionele veristes betref, of wat ekonomies plaaslik vervaardig word, te standaardiseer.

Die Departement wys daarop dat die probleem tot bevrediging opgelos kan word indien opstellers van spesifikasies eers vasstel wat werklik plaaslik vervaardig en aangebied word, en dan die spesifikasies met inagneming van die produk-sievermoe van ons plaaslike fabrieksywerheid opstel.

Aangesien standaardisasie van die behoeftes van die owerheidssektor veel daartoe kan bydra om produksie-, distribusie- en ander kostes te verlaag en dus finansiële voordele ook vir plaaslike owerhede inhou, is dit die Regering se beskouing dat dit 'n belangrike middel teen inflasie is.



Bygevoeg is die Sentrale Standaardisasiekomitee versoek om voort te gaan om die hoogste mate van standaardisasie van goedere deur owerheidsliggame op al drie die bestuursvlakke (dit wil sê Sentrale Regering, die Provinsiale Administrasie en die Plaaslike Owerhede) te bevorder.

Ingelyks vorm standaardisasie 'n baie belangrike element van die Regering se beleid met betrekking tot invoervervanging ten einde die betalingsbalans te versterk, 'n beter besetting van die land se bestaande produksiekapasiteit te bewerkstellig, werkgeleentheid te skep en die strategiese weerbaarheid van die land te verhoog. Ten einde betekenisvolle uitvoering te kan gee aan die beleid van invoervervanging, het die Kabinetskomitee van Ekonomiese Beleid die onderstaande *Gedragskode in verband met invoervervanging*, soos deur die Ekonomiese Adviesraad voorgestel, aanvaar. Sy Edele die Eerste Minister het vervolgens versoek dat al die aankoopinstansies van die owerheidssektor hoë prioriteit daaraan moet gee en dat personeel wat met tender- en aankoopprosedures gemoed is (dit wil sê ook diene wat vir die opstel en wysiging van spesifikasies verantwoordelik is), opdrag moet ontvang om die riglyne soos in die Gedragskode verrat, so noukeurig as wat moontlik is na te volg.

#### GEDRAGSKODE IN VERBAND MET INVOERVERVANGING

“Wanneer die nuwe spesifikasies opgestel word moet die strategiese implikasies asook die korttermyn ekonomiese aspekte vir die hele land wat daaruit voortspruit indien plaaslike nywerars nie in staat sou wees om die goedere te vervaardig nie of dit slegs teen buitensporige hoë koste sou kon vervaardig, oorweeg word. Die hoër dra-koste ten opsigte van ingevoerde goedere wat die gevolg is van die groter reserwevoorraad wat in stand gehou moet word, moet geweeg word teen enige kwaliteits- en/of kosteverskille wat mag bestaan tussen ingevoerde en plaaslike vervaardigde goedere.

Spesifikasies moet dus, sover moontlik, aangepas word dat binnelandse nywerars in staat sal wees om mee te ding. Oorleg moet met hulle gepleeg word met die doel om hulle tegniese vaardigheid en vermoëns uit te brei en aan te vul in die lig van die langtermynvoordele wat dit vir die land inhou.

Bestaandespesifikasies waarvan die bepaling van so 'n aard is dat slegs aanbiedings vir ingevoerde goedere as 'n reël ontvang word, moet hersien word waar dienlik (in oorleg met die georganiseerde nywerheid indien nodig), om sodoende plaaslike nywerars in staat te stel om mee te ding.

Waar daar nog instansies is wat eiesoortige spesifikasies mag gebruik moet daar in samewerking met die Suid-Afrikaanse Buro vir Standaardse spesifikasies opgestel word om eenvormigheid te verkry. Waar geskikte SABS- en CKS-spesifikasies bestaan moet dit by spesifikasies ingelyf word.

Wanneer tenders aangevra word moet die ontwikkeling en uitbreiding van plaaslike inhoud benadruk word, onder andere waar doenlik deur identifisering van plaaslike voor-sienings- en vervaardigingsbronne.

Indien Suid-Afrikaanse produkte wel beskikbaar is maar daar nogtans aanbeveel word dat ingevoerde produkte gekoop word, moet die redes ook skriftelik (aan Tender-rade/Tenderkomitees) verstrek word. Indien dit om kwaliteitsverskille gaan moet aangedui word watter stappe gedoen is om die Suid-Afrikaanse vervaardiger te help om aan die spesifikasies te voldoen indien dit nie moontlik of wenslik is om die spesifikasies aan te pas by sy vermoëns nie”.

Aangesien die gebruik van volledige en korrekte spesifikasies by die aankoop van benodigdhede dus van die uiterste belang is en 'n direkte invloed op die land se nywerhede het, word 'n beroep op alle plaaslike besture ge-

doen om, waar enigsins moontlik, die prosedure te volg wat deur die Departement aanbeveel word. Hierdie Departement en die Suid-Afrikaanse Buro vir Standaardse sal al te graag verdere inligting en hulp verleen.

Om die hele betekenis van standaardisasie duidelik te stel wil ek die geval van die gewone kruuiwa noem :

Toe daar besluit is om die kruuiwa te standaardiseer was daar op ons beperkte plaaslike mark nie minder nie as 57 verskillende soorte of modelle van kruuiwags gevind – iets wat 'n land soos, die van ons, kwalik kan bekostig.

Daar was samesprekings gereël met die grootste verbruikersdepartemente, die SA Spoorwee, Provinsiale Administrasies, en Munisipaliteite tesame met die vervaardigers van kruuiwags. Ons het daarin geslaag om een kruuiwa, dit wil sê 'n raam, twee uitruilbare bakke (een vir beton en een vir gewone gebruik) met drie uitruilbare wiele – een lugband, een soliede rubberband en een staalband – te spesifiseer en daarin is ingesluit 'n verseelde koëllaer (sealed for life bearing). By die eerste aanvra van tenders vir kruuiwags was daar reeds 'n vermindering in prys van naastenby 20%. Ons koop vandag 'n baie beter kruuiwa teen 'n heelwat goedkoper prys.

Daar is tot datum reeds 615 CKS-spesifikasies opgestel en beskikbaar gestel.

Soos u weet die jaarboek van die SA Buro vir Standaardse bevat 'n beknopte lys van SABS- en CKS-spesifikasies en dit word noodsaaklik gegag dat u hierdie publikasie beskikbaar het en op datum hou.

Om die voorgaande doelwitte te verwesenlik het die Kabinet, gedurende Junie 1984, besluit om 'n nuwe voorkeur sisteem vir elektronika in die lewe te roep. Die voorkeur is eerstens 'n gylskaal van 1% tot 25% beginnende by 25% plaaslike inhoud, en tweedens 'n voorkeur van tot 10% vir ontwerp. 'n Staande komitee vir elektronika onder voorsitterskap van die NOK is in die lewe geroep om die doelwitte te verwesenlik.

U as elektriese ingenieurs kan ook 'n groot bydrae lewer in die sin dat tyd meer produktief aangewend kan word indien daar groter samewerking is. Pleks dat byvoorbeeld 200 ingenieurs van verskillende plaaslike owerhede elkeen sy eie spesifikasies gaan opstel vir byvoorbeeld nuwe skakelstuig sal dit heelwat tyd bespaar as 'n tegniese komitee saamgestel word om spesifikasies op te stel in samewerking met die SABS. Dit het die voordeel dat slegs 'n paar mense se tyd gebruik word (nie al 200 sin nie) maar dat die spesifikasies dan tot beskikking is van alle plaaslike owerhede. Die ander ingenieurs kan hul tyd dus meer produktief gebruik om tegnologie te verbeter.

Dit hou ook die voordeel in dat plaaslike vervaardigers die spesifikasies kan bestudeer en, of die kundigheid van oorse bekom of die kundigheid self kan verwerf, of selfs met behulp van die Ontwerpinstituut van die SABS nuwe ontwerp en/of tegnologie verkry.

Om die effek van boikotte of sanksies op tegnologie teen te werk kan aankoopinstansies aandring, by die verkryging van ingevoerde toerusting, dat volledige planne van elke stuk toerusting saam met die toerusting verskaf word. Op die manier kan, indien sanksies toegepas word, onderdele vanaf die planne gemaak word of selfs nuwe toerusting vervaardig word indien uitbreidings moet plaasvind. Yskor byvoorbeeld dring meeste van die tyd aan dat planne verskaf word indien ingevoerde toerusting aangekaf word en ek sal alle plaaslike owerhede aanraai om dieselfde te doen.

MR P J MULLER : AFFILIATE

Mr Ken Maud has presented a subject that is as topical as it



is unfortunate; but one, we in the southern half of Africa will have to cope with.

There have been countless examples of boycotts, throughout the ages.

The Oxford Dictionary defines "boycott" as - punish, coerce, by systematic refusal of social or commercial relations.

In South Africa today, we face the antagonism of the East and Third World, the indifference of the West and total ostracism by virtually the whole world.

We live in an area that is part first world and part third world. We face a tremendous challenge of bringing all the population of this region into the 20th and the 21st century.

In order to do this, we need to bring the benefits of the capitalist economy and modern technology to all the people in our country. The last thing we need in South Africa is a boycott by the rest of the world.

While the withholding of technology will undoubtedly hurt our country, we have other factors that can materially influence our future. Perhaps more than the benefits of new technology, we need to "get it right" in "quality and productivity".

In South Africa we have an uphill battle. In an FSA survey carried out in 1980 - industrial relations and manpower development survey - 46% of black employees in industry had no orientation towards western business practices.

Of black employees in industry 43% had a lack of literacy. In the same period less than 0.5% of the Japanese people were considered illiterate. This highlights the need for education for all our people. This need has been repeatedly identified in recent months. In order to improve the standard of living of all our people in South Africa we must improve the standard of education of all our people.

Despite the need for new technology we have an even greater need to "do it right". That is do it right first time and do it right efficiently. We need to be quality conscious and more productive.

In a productivity survey, September 1985, carried out by Finance Week the following was evident.

In the period 53 - 71 Japan adds resources of 55% and production gains were 45%.

In the period 50 - 62 UK adds resources of 52% and production gains were 48%.

In the period 50 - 62 West Germany adds resources of 62% and production gains were 38%.

In the period 61 - 83 South Africa adds resources of 94% and production gains were 6%.

But in the period 70 - 83 South Africa adds resources of 118% and production gains were (18%).

This highlights a desperate shortcoming in our society.

In the long run we need new technology, but in the short term we need improved productivity and efficiency - we need to do it right and do it better.

MR KEN MAUD : DEPUTY CHIEF EXECUTIVE OF ALTECH

What Mr Muller said is only too true. Our productivity has gone down, has gone backwards, and no longer are we as a country able to compete. We are not doing things right the first time. We have to re-do them and inevitably so often when they are done they are not done to the requirements of

the customer which inevitably is yourselves or the electrical industry.

It causes us to have excessive costs built into the product and quality problems which we are having. As Mr Muller said, I believe a lot of this goes back beyond just the shop floor, because, before you can educate people, before you train them to do a particular function, we have to educate them in schooling first. They have to become literate, only once when literate, can we then start to do something with them.

We have taken the initiative and established fairly extensive training facilities in our group who started training people, of all races, because we found that we have a tremendous shortage of skilled manpower in this country.

I would agree with you, we do have a tremendous shortage, and I believe that the shortage will become even greater as we develop this economy of ours. I am no economist but if we have to grow at a rate of some 4% to 5% per annum, we need fairly substantial sources from a financial point of view, initially to enable us to grow at that sort of rate. As I understand it again from our economist friends, right now we are faced with the situation where most of the foreign countries have frozen their investments in South Africa. To raise new sources of funds from abroad is in fact not happening. I believe certain of the parastatal heads of departments have actually been overseas. I also believe, Mr Maree was here a little while ago, and I believe they are having very little success in raising funds from overseas and what effect does that have on our economy. If we do not attract foreign investment our growth rate in this country, as I believe, are only going to be of the order of 1% to 2%. There is going to be a tremendous shortage in funds to enable us to grow at a healthy rate.

What is going to happen if there is a shortage of funds. Lets follow this through on a logical conclusion. If you take the parastatal bodies, they need a certain amount of funds to enable them to proceed with the development of their own infrastructure development, to provide the services, be it electricity, be it transport services or be it telecommunication services. Now many of these parastatal bodies have relied very heavily on overseas finance, possibly too heavy and we in the private sector must be to blame as well. If that finance is no longer available, what is going to happen? As I see it, three things can happen.

Firstly they can turn to the local market for financial resources, here within South Africa, and there is only a certain limited amount of funds available in a country like South Africa as there is in any country. Once those funds have been re-apportioned or re-allocated there is going to be no more funds.

The second alternative is that they are going to have to look at increasing their tariffs. If they are proceeding with the development of their infrastructures and that means, ladies and gentlemen, that you and I are all going to have to pay much more for our electricity, our train fares, our telecommunications and various other services we get from these bodies.

The third alternative is obviously that there will be tremendous reduction in the programmes which have been instituted by Escom, the post office, the railways, the military and many other such bodies.

All of those reductions are going to affect all of us here today. It is going to affect you as municipalities and going to affect us the private sector. The demand for our products will not be there. We will have fewer job opportunities. We will have to put more and more people on the streets, and I therefore ask you, can we afford to support imports at a time like this?

If we look at a country like Japan, they comply with that and many of the other requirements that are there, but you try

and export products into Japan, here we are in the seige economy, we are battling right now with the simply largest problem we have ever had in the history of this country from an economic as well as a political point of view, creating more and more unemployment and we are still importing a

large number of goods. I do not believe we as a country can afford that, I believe we ought to support local industry but in saying that, I do agree with what Mr Muller said. We have got to be far more competitive, be far more productive, far more efficient, and far more cost effective in doing it.

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## PAPERS – REFERATE

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*Mnr Nantes Botha is in Johannesburg gebore en het sy skoolopleiding in Pretoria ondergaan, waar hy in 1956 aan die Afrikaanse Hoër Seunskool gematrikuleer het.*

*Deur buitenuurse studie aan die Universiteit van Pretoria behaal hy die B.Com. graad. Hy is ook 'n aktiewe lid van beide die Instituut van Stadsklerke van Suidelike Afrika en die Instituut vir Organisasie en Metode.*

*Hy begin sy munisipale loopbaan in 1965 by die Windhoek Munisipaliteit en word in 1979 in Benoni aangestel as Stadsklerk van Benoni.*



*Mnr Nantes Botha, Stadsklerk van Benoni*

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### THE ROLE THAT A TOWN CLERK PLAYS IN THE MANAGEMENT OF AN ELECTRICITY DEPARTMENT

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From the outset it will be necessary for me to attempt to give a definition of "management". The manager attempts to do the work for which he is responsible by means of the people and equipment at his disposal. This concept may be more comprehensively formulated by, inter alia, the following definition, especially by those that manage an electricity department:

To organize people and equipment into units that attain their objectives to the satisfaction of those served whilst

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### DIE ROL WAT 'N STADSKLERK SPEEL IN DIE BESTUUR VAN 'N ELEKTRISITEITS DEPARTEMENT

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Ten aanvang is dit nodig dat ek 'n poging aanwend om 'n definisie te gee van wat "bestuur" is. Die bestuurder poog om die werk waarvoor hy verantwoordelik is gedoen te kry deur middel van die mense en toerusting waaroor hy beskik. Meer volledig gestel kan dit dus onder meer soos volg gestel word, veral by dié wat 'n elektrisiteitsdepartement bestuur:

Om mense en toerusting te organiseer in eenhede wat hulle doelwitte bereik, tot die bevrediging van dié wat

themselves experiencing a high degree of satisfaction.

All this really means is that the manager gets things done through other people. This job of management will, of course, vary from manager to manager, as each manager is attempting a different objective through the utilization of his people and equipment.

In defining the task of the manager, the level of management also plays a very important role. What comprises the entire objective and thus the description of the managerial task at hand for one manager can only comprise a small part of the responsibility of the manager at a higher level. So, for example, the entire managerial task of a forman electrician will only be a part of the responsibility of the superintendent, and a smaller part still of the responsibility of managerial task of the town electrical engineer.

Likewise, the task of the town clerk and the town electrical engineer will tend to be along similar lines, but they will differ in detail, because the department of the town electrical engineer fulfills a specialist function of the broader task of the town clerk.

Top management is responsible for the entire undertaking, and especially for long-term planning and for the organization of, and the giving of direction to, the undertaking as a whole.

Middle management has the more limited responsibility for specific sections of the undertaking and for medium and short-term planning, the organization of functional areas, the giving of direction to departmental head and the regulation of the departments' results.

The town clerk, the town council, the management committee and the departmental head play a very important role in the work and duties of the municipal functionary, and I would thus like to take a closer look at this aspect.

## THE TOWN CLERK AND DEPARTMENTAL HEAD

In Natal and the Free State, the town clerk is in very express terms, charged with the execution of all the instructions of the council and its committees, the co-ordination of the various operations of the administration, as well as the organization and management of the various departments, divisions or branches of the council and its committees and departments, divisions or branches.

In Natal further duties are placed on the town clerk, namely, that he may, after consultation with a departmental head and without derogating from the personal responsibility of the departmental head as head of a department, hold an inspection and investigation into the workings and administration of such department and may make recommendations in this regard to the council or to the committees of the council in order to improve the finances, co-ordination or, other workings of the department.

The town clerk in Natal also has the duty to ensure that the officers of the council are carrying out their statutory duties, and in the event of a disruption in the execution of such duties, where he regards it as being serious, he must inform the administrator accordingly and also inform him of such steps as he has taken in this regard, if any.

When a councillor transgresses the prohibition on a councillor taking part in a meeting at which a matter is discussed in which he has a financial interest, the Natal Ordinance placed a further duty on the town clerk to report the matter to the administrator provided that it is not a trifling matter.

bedien moet word, terwyl hulle wat die diens lewer, self 'n hoë mate van bevrediging ervaar.

Al hierdie woorde beteken waarskynlik maar net dat die bestuurder dinge gedoen kry deur ander mense. Hierdie bestuurstaak aan en moet natuurlik van bestuur tot bestuur anders wees omdat elke bestuurder immers besig is om 'n ander doelwit te probeer bereik deur die aanwending van sy mense en toerusting.

Die vlak van bestuur speel ook 'n baie belangrike rol in die omskrywing van die taak van die bestuurder. Die volledige doelwit, en dus die omskrywing van die bestuurstaak van een bestuurder, kan slegs 'n klein onderdeel van 'n ander bestuurder op 'n hoër vlak uitmaak. So byvoorbeeld sal die volledige bestuurstaak van 'n voormalige elektrisies slegs 'n deel wees van die verantwoordelikheid van die Superintendent, en nog 'n kleiner deel van die verantwoordelikheid van die bestuurstaak van die elektrotegniese stadsingenieur.

Insiglyks sal die taak van die stadsklerk en die elektrotegniese stadsingenieur in dieselfde rigting geneig wees, maar in detail verskil, omdat die departement van die elektrotegniese stadsingenieur 'n spesialisiefunksie vervul van die breër taak van die stadsklerk.

Topbestuur is vir die hele onderneming verantwoordelik en veral vir langtermynbeplanning en vir die organisering van, en rigtinggewing aan die onderneming in die geheel.

Middelbestuur is meer bepaald verantwoordelik vir spesifieke afdelings van die onderneming en vir medium- en korttermynbeplanning, die organisering van funksionele gebiede, rigtinggewing aan afdelingshoofde en kontrolering van die afdelings se resultate.

In die werk en pligte van die munisipale funksionaris speel die stadsklerk, die stadsraad, die bestuurskomitee en die departementshoof ek 'n baie belangrike rol en ek kyk dus 'n bietjie daarna.

## DIE STADSKLERK EN DEPARTEMENTSHOOF

In Natal en die Vrystaat is die stadsklerk in uitdruklike terme belas om uitvoering te gee aan al die opdragte van die raad en sy komitees, die koördinasie van die werksaamhede van die raad en die algemene toesig, beheer en doeltreffendheid van die administrasie, organisasie en bestuur van die raad se departemente, afdelings of vertakings. Hy is verder verantwoordelik vir alle kommunikasie tussen die raad en sy komitees en die raad se departemente, afdelings of vertakings.

In Natal word verdere pligte op die stadsklerk gelê, naamlik, dat hy na konsultasie met 'n departementshoof en sonder om afbreuk te doen aan die departementshoof se persoonlike verantwoordelikheid as hoof van 'n departement, 'n inspeksie en ondersoek kan hou na die werkinge en administrasie van sodanige departement en aanbevelings in hierdie verband aan die raad of aan die raad se komitees kan maak, ter verbetering van die finansies, koördinasie of ander werkinge van die departement.

Verder het die stadsklerk in Natal die plig om te verseker dat die amptenare van die raad hulle statutêre pligte uitvoer en, in die geval van verbreking van die uitvoering van sodanige pligte en waar hy dit as ernstig beskou, moet hy die administrateur dienooreenkomstig in kennis stel en ook meedeel van welke stappe hy in hierdie verband gedoen het, indien enige.

Die Natalse Ordonnansie plaas 'n verdere verpligting op die stadsklerk om enige oortreding deur 'n raadslid van die verbod op deelname aan 'n vergadering ten opsigte van 'n saak waarin hy 'n finansiële belang het, te rapporteer aan die administrateur indien dit nie 'n beuselagtigheid is nie.

This stipulation in the Natal Ordinance makes a town clerk the watchdog over the behaviour of the councillors, whilst in the Transvaal the town clerk is, in fact, made the watchdog over the council in its administration of local affairs.

The Municipal Ordinance of the Cape, 20 of 1974, is vague in its description of the function and duties of the town clerk. The Administrative Ordinance of the Municipality of Cape Town, 24 of 1965, does, however, stipulate that the chief executive and administrative officer is responsible for:

- (i) The execution and carrying into effect of council resolutions;
- (ii) All communication between the council, organs of council and its departments;
- (iii) The control and co-ordination and general supervision over all the council's departments, with the power to hold inspections, to institute investigations and to make recommendations to the management committee for the improvement of the council's finances and the co-ordination and improvement of the proceedings of the council, without in any way derogating from the personal responsibility of his department.

In the Transvaal, the ordinance regulating the duties of the town clerk (ordinance 40 of 1960) reads as follows:

#### "Functions, powers and duties of a town clerk.

65 (1) In addition to any other functions, power or duty conferred or imposed upon him in terms of the ordinance or any other law, a town clerk -

(a) in respect of a council for which a management committee has been established -

(i) shall be charged with and be responsible to the management committee for the proper carrying out of all directions of the council and the management committee, the co-ordination of activities of the council and the general supervision, control and efficiency of the administration, organisation and management of the council's departments, sections or branches; and

(ii) shall be responsible for all communication between the management committee and the council's departments, sections or branches;

(b) in respect of a council for which a management committee has not been established -

(i) shall be charged with and be responsible to the council for the proper carrying out of all directions of the council, the co-ordination of the activities of the council and the general supervision, control and efficiency of the administration, organization and management of the council's departments, sections or branches; and

(ii) shall be responsible for all communication between the council and its departments, sections or branches.

(2) Every head of a department, shall, except in respect of such functions, duties or powers as are conferred or imposed on him by virtue of any other law, be subordinate and responsible to the town clerk and where a deputy town clerk has been appointed in terms of section 63A(1), also to the deputy town clerk, for the proper management of the department entrusted to such head."

Statutory regulations indicate that in the Cape Province, Cape Town and Natal, departmental heads remain person-

Hierdie bepaling in die Natalse Ordonnansie maak die stadsclerk die wagbond oor die gedrag van die raadslede waar, in die geval van die Transvaal, die stadsclerk inderwaarde die wagbond gemaak word oor die raad in sy administrasie van die plaaslike aangeleenthede.

Die Minisipale Ordonnansie van die Kaap, 20 van 1974, is vaag oor die omskrywing van die funksie en pligte van die stadsclerk. Die Administratiewe Ordonnansie van die Minisipaliteit van Kaapstad, 24 van 1965, bepaal egter dat die hoof uitvoerende en administratiewe amptenaar verantwoordelik is vir:

- (i) Om uitvoering en gevolg te gee aan raadsresolusies;
- (ii) Alle kommunikasie tussen die raad, die raadsorgane en raadsdepartemente;
- (iii) Die kontrole en koördinasie en algemene toesigging oor al die raad se departemente met die bevoegdheid om inspeksie te hou, ondersoek in te stel en aanbevelings te maak aan die uitvoerende komitee vir die verbetering van die werksaamhede van die raad sonder om afbreuk te doen aan die persoonlike verantwoordelikheid van die betrokke departementshoofde vir die behoorlike bestuur van sy departement.

In Transvaal lees die ordonnansie (Ord 40 van 1960) oor die pligte van die stadsclerk soos volg:

#### "Funksies, bevoegdhede en pligte van stadsclerk.

65 (1) Benewens enige ander funksie, bevoegdheid of plig aan hom opgedra of opgelê ingevolge hierdie ordonnansie of enige ander wet is die stadsclerk -

(a) ten opsigte van 'n raad waarvoor 'n bestuurskomitee ingestel is -

(i) belas met en verantwoordelik aan die bestuurskomitee vir die behoorlike uitvoering van alle opdrigte van die raad en die bestuurskomitee, die koördinasie van die werksaamhede van die raad en die algemene toetsing, beheer en doeltreffendheid van die administrasie, organisasie en bestuur van die raad se departemente, afdelings of vertakkings; en

(ii) verantwoordelik vir alle kommunikasie tussen die bestuurskomitee en die raad se departemente, afdelings of vertakkings;

(b) ten opsigte van 'n raad waarvoor 'n bestuurskomitee nie ingestel is nie -

(i) belas met en verantwoordelik aan die raad vir die behoorlike uitvoering van alle opdrigte van die raad, die koördinasie van die werksaamhede van die raad en die algemene toetsing, beheer en doeltreffendheid van die administrasie, organisasie en bestaan van die raad se departemente, afdelings of vertakkings; en

(ii) verantwoordelik vir alle kommunikasie tussen die raad en die raad se departemente, afdelings of vertakkings.

(2) Elke hoof van 'n departement is, uitgenome ten opsigte van sodanige funksies, pligte of bevoegdhede wat ingevolge enige ander wet aan hom toevertrou of opgelê is, ondergeskik en verantwoording verskuldig aan die stadsclerk en waar 'n adjunk-stadsclerk ingevolge artikel 63A(1) aangestel is, ook aan die adjunk-stadsclerk, vir die behoorlike bestuur van die departemente, aan sodanige hoof toevertrou."

Statutêre bepalings toon aan dat in die Kaap Provinsie, Kaapstad en Natal, departementshoofde persoonlik ver-



ally responsible for the management of their departments, while in the Orange Free State and Transvaal the head of a department is totally subordinated to the town clerk except where legislation gives such a departmental head charge of a certain duty. This is a fundamental difference which can strongly influence the roles that each of these functionaries play. It must also affect the role that each plays, in the work of the other, but in the light of what is to follow in this paper, it is my considered opinion that this does not bring about any material change in the role that the town clerk plays in the managerial task of the town electrical engineer and vice versa.

The responsibility of the town clerk to supervise the execution of council resolutions in common to all the provinces, although in the Transvaal, this duty is subject to the umbrella supervisory function of the management committee.

The responsibility to ensure communication is basically the same in all the provinces, with the exception of the Transvaal where, by implication, it would seem that as a result of the other powers of the town clerk, it is unnecessary to make specific provision for a statutory duty of communication.

There is a more fundamental difference in principle in the various provinces as regards to co-ordination and controlling function of the town clerk. In Cape Town and Natal the regulations are identical. Coupled to the independence of the departmental heads, the control, co-ordination and general supervisory function of the town clerk is diminished by reason of the fact that he must work through a body of councillors. In contradistinction thereto, the town clerk in the Free State and Transvaal exercises control and supervision over the various departments and also supervises their effective administration, organisation and management.

Whatever similar provisions or differences there may be between the various systems, all of them require from the town clerk special leadership qualities, qualifications, diplomacy, planning, clarity of thought, good communication and public relations, to name but a few.

The job description of the town clerk can be seen as follows:

- 1 To serve as chief management and administrative officer of the municipality;
- 2 To determine policy for the reaching of determined objectives;
- 3 To manage the personnel of the municipality through the head of department;
- 4 To see that the municipality and each department is properly organised;
- 5 To institute procedures and methods to ensure the effective execution of the municipal functions;
- 6 To ensure that suitable personnel are acquired and retained;
- 7 To co-ordinate the various operations of the municipality;
- 8 To institute the necessary regulatory measures (controls) in respect of all municipal operations;
- 9 To be responsible to the management committee for the proper execution of all instructions of council and the management committee;
- 10 To be responsible for all communication between the management committee and the municipal departments, divisions or branches; and
- 11 To provide the town council and management committee with information in the process of decision taking and policy formulation.

## THE TOWN ELECTRICAL ENGINEER

The overriding objective of the town electrical engineer is

antwoordelik bly vir die bestuur van hul departemente terwyl in die Oranje-Vrystaat en Transvaal die hoof van 'n departement totaal ondergeskik is aan die stadsleer, behalwe waar wetgewing 'n besondere plig aan sodanige departementshoof opdra. Hierdie is 'n kern verskil en kan die rolle wat elk van hierdie funksionaris speel sterk beïnvloed. Netso kan dit die rol wat elk van die persone in die ander se werksaak speel beïnvloed, maar in die lig van wat later in hierdie referaat volg, is dit my oorwoë mening dat dit nie 'n weselike verandering in die rol wat die stadsleer in die bestuurstaak van die elektrotegniese stadsingenieur het, en omgekeerd, te weeg bring nie.

Die verantwoordelikheid van die stadsleer om toe te sien tot die uitvoering van raadsresolusies is algemeen in al die provinsies, alhoewel in Transvaal, hierdie plig onderworpe is aan die oorkoepelende toesighoudende funksie van die bestuurskomitee.

Die kommunikasieverpligting is bykans dieselfde in alle provinsies, met die uitsondering in die Transvaal waar dit by implikasie blyk dat, as gevolg van die ander bevoegdhede van die stadsleer, dit onnodig is om spesiefk voorsiening te maak vir 'n statutêre verpligting van kommunikasie.

Daar is 'n meer diepgaande beginsel verskil in die koördinerende, en kontrolefunksie van die stadsleer in die verskillende provinsies. In Kaapstad en Natal is die bepalings identies. Gekoppel aan die onafhanklikheid van departementshoofde, word die kontrole, koördinasie en algemene toesighoudende funksie van die stadsleer afgewater, aangesien hy moet werk deur 'n liggaam van raadslede. Daarteenoor, koördineer en oefen die stadsleer kontrole en toesighouding uit oor die onderskeie departemente in die Vrystaat en Transvaal en sien verder toe tot hul doeltreffende administrasie, organisasie en bestuur.

Welke gelykluidende bepalings of verskille daar tussen die stelsels oorkal bestaan, vereis dit almal, van die stadsleer besondere leierskappe, kwalifikasies, diplomatie, beplanning, nutgerheid van denke, goeie kommunikasie en publieke verhoudings om maar slegs 'n paar te noem.

Die taakomsyrywing van die stadsleer kan gesien word:

- 1 om as hoofuitvoerende- en administratiewebeampte van die munisipaliteit te dien;
- 2 om beleid te bepaal vir die bereiking van gestelde doelwitte;
- 3 om die personeel van die munisipaliteit te bestuur deur die hoofde van departemente;
- 4 om toe te sien dat die munisipaliteit en elke departement na behore georganiseer is;
- 5 om prosedures en metodes daar te laat stel om die doeltreffende uitvoering van die munisipale funksies te verseker;
- 6 om sorg te dra dat geskikte personeel bekom en behou word;
- 7 om die werksaamhede van die munisipaliteit te koördineer;
- 8 om die nodige beheermaatreëls (kontroles) in te stel ten opsigte van al die munisipale werksaamhede;
- 9 om aan die bestuurskomitee verantwoordelik te wees vir die behoorlike uitvoering van alle opdragte van die raad en die bestuurskomitee;
- 10 om verantwoordelik te wees vir alle kommunikasie tussen die bestuurskomitee en die munisipale departemente, afdelings of -vertakings; en
- 11 om die stadsraad en bestuurskomitee van inligting te voorsien in die proses van besluitneming en beleidformulering.

## DE ELEKTROTEGNIÛSE STADSINGENIEUR

Die oorkoepelende doel van die elektrotegniese stadsinge-



to manage the electrotechnical engineering services efficiently and effectively. The functions which he must exercise to reach this objective are:

- 1 The management of the personnel in the department of electrotechnical engineering services;
- 2 Serve as a consultant engineer in respect of electrotechnical infrastructure;
- 3 The execution of tasks delegated to him by the town council and town clerk;
- 4 He is the officer who must ensure that the requirements of the Factories, Machinery and Buildings Act are met; and
- 5 Ad hoc tasks as are referred to him from time to time.

Functions 2 and 4 above are purely professional tasks, and the town clerk has no role to play in them. As regards functions 3 and 5, whether the town clerk would have a role to play would depend on the nature of the delegated power or ad hoc task. If the instruction is of a purely technical nature, the town clerk has no role to play in its accomplishment, but if it tends towards the management or administrative side, the town clerk has a pertinent role to fill. However, as regards function 1, the town clerk has a very pertinent role to play.

### THE MANAGEMENT COMMITTEE

The management committee system has until now only been instituted in Cape Town, the Orange Free State and Transvaal. The functions of the management committee in Cape Town and the Orange Free State are similar in the following respects.

- (i) The control over income, both its collection and expenditure;
- (ii) The preparation of the annual budget;
- (iii) The laying of reports with recommendations before the council in respect of matters that have been considered and dealt with by the committee; and
- (iv) The laying of reports with recommendations before the council in respect of matters that have been referred to the committee by the council.

In the Cape, there is a stipulation that the committee must give a report with recommendation to the council in respect of any matter that affects the municipality. In the Orange Free State the committee is given the further responsibility to ensure that all council decisions are carried out.

In the Orange Free State, just as in the Transvaal, the management committee considers all matters except those matters for which the competency of the management committee has been expressly excluded. In the Free State as well as in the Transvaal, the council may not consider the increase or reduction of rates, tariffs or fees or the obtaining of loans, unless it has first been considered and dealt with by the management committee and the recommendations has been made to the council by the committee.

### THE TOWN COUNCIL

In all four provinces, the town council is the final authority and policy making body. However, in the management process the majority of decisions are taken by the departmental head, the town clerk and the management committee, inside the framework of the policy decisions laid down by the town council.

### THE MANAGEMENT PROCESS

Now that we have looked at management generally, we must take a look at the basic elements of the management process, namely, planning and control.

nier is om die elektrotegniese ingenieursdienste doeltreffend en effektief te bestuur. Die funksies wat hy moet uitvoer om hierdie doelstelling te bereik is:

- 1 die bestuur van die personeel in die departement elektrotegniese ingenieursdienste;
- 2 dien as raadgevende ingenieur rakende elektrotegniese infrastrukture;
- 3 die uitvoering van gedelegeerde take soos opgedra deur die stadsraad en stadsclerk;
- 4 hy is die amptenaar wat moet toesien dat die vereistes op die Wet op Fabriek, Masjienerie en Bouwerk nagekom moet word; en
- 5 ad hoc take soos van tyd tot tyd opgedra.

Funksie 2 en 4 hierbo is suiwer professionele take, en die stadsclerk het geen rol daarin te vervul nie. Ten opsigte van funksies 3 en 5 sal dit afhang van die aard van die gedelegeerde bevoegdheid, of die ad hoc taak, of die stadsclerk daarin 'n rol te speel het. Indien die opdrag 'n suiwer tegniese opdrag is, het die stadsclerk geen rol te vervul in die volvoering daarvan nie, maar indien dit neig na die bestuurs- of administratiewe kant toe, het die stadsclerk 'n pertinente rol daarin te vervul. Ten opsigte van funksie 1 egter, het die stadsclerk 'n baie pertinente rol om te vervul.

### DIE BESTUURSKOMITEE

Die bestuurskomiteestelsel is tot op hede nog slegs ingestel vir Kaapstad, die Oranje-Vrystaat en Transvaal. Die funksies van die bestuurskomitee te Kaapstad en die Oranje-Vrystaat is in die volgende opsigte dieselfde.

- (i) die kontrole oor inkomste, die invordering daarvan en uitgawes;
- (ii) die voorbereiding van die jaarlikse begroting;
- (iii) verslagdoening met aanbevelings aan die raad ten opsigte van aangeleenthede deur die komitee oorweeg en behandel;
- (iv) verslagdoening met aanbevelings aan die raad ten opsigte van sake deur die raad, na die komitee verwys.

Ten opsigte van Kaapland is daar 'n bepaling dat die komitee verslag moet doen met aanbevelings aan die raad betreffende enige aangeleentheid wat die munisipaliteit mag raak. In die Oranje-Vrystaat word die komitee die verdere verpligting opgelê om toe te sien dat alle raadsbesluite uitgevoer word.

In die Oranje-Vrystaat, net soos in die Transvaal, oorweeg die bestuurskomitee dus alle sake behalwe daardie aangeleenthede wat uitdruklik uitgesluit is van die bestuurskomitee se bevoegdhede. In die Vrystaat sowel as in Transvaal mag die raad nie enige oorweging skenk vir die verhoging of vermindering van belasting, tariewe of foefe of die verkryging van lenings, tensy dit eers deur die bestuurskomitee behandel en oorweeg is en 'n aanbeveling deur die komitee aan die raad gemaak is nie.

### DIE STADSRaad

Die stadsraad is in al vier die provinsies die finale gesag en beleidsmakende instansie. In die bestuursproses egter word die meerderheid van die besluite deur die departementshoof, die stadsclerk en die bestuurskomitee geneem, binne die raamwerk wat deur die beleidsbeslissings van die stadsraad neergelê word.

### DIE BESTUURSPROSES

Noudat ons 'n bietjie gekyk het na bestuur in die algemeen, moet ons 'n slag kyk na die basiese elemente van die bestuursproses naamlik, beplanning en kontrolering.

## Management



### Planning

Planning can be described as:

- a description of the action to be taken in reaching an objective;
- the design of the method for reaching a specified goal; and
- the development of a specific method for achieving a desired result.

Planning can also be described as the activity of management that determines the results that an undertaking wishes to achieve in the future, and it makes a choice between alternative routes in order to reach that result. The process is approximately as follows:

- 1 Set objectives;
- 2 Describe the procedures; and
- 3 Delegate the responsibilities.

Planning has to do with efficacy. It tries to find an answer to the question "What are the right things to do?".

For the town clerk this implies the identification of the long-term objectives of the municipality and the manner or strategy of reaching those objectives. He is thus mainly responsible for long-term strategic planning.

The departmental head plays a most important role in this task, and he is an integral part of the top management team that surrounds the town clerk and perform this task.

For the sectional head (middle management), planning implies the taking of decisions in respect of a specific area (eg. what type of equipment to use in order to further the municipality's long-term objectives). Such plans are usually aimed at the medium-term and are also more specific in nature.

The planning done by a supervisor or foreman has to do with the decisions concerning the right things to do on a daily basis. This includes a choice or priorities concerning the best manner of doing the work. He must thus plan for the wheelbarrow and the cables to be in the right place at the right time. Planning by junior management is thus often named "operational planning".

The town electrical engineer forms part of top management, but because he is also practice-orientated, he participates in short-term problem solving. As a member of the town clerk's top management team, he needs to look not only at the long-term goals of his own department, but also at the strategic or long-term goals of the whole municipality of which his department forms an indivisible part. He must thus, at times, walk with his head in the clouds and dream about abstract things such as a vision for the future, and the next moment, concern himself with the day to day problems such as how to discover a fault in a cable.

A very unenviable spectrum of tasks. He must definitely be a very special sort of person.

### Control

The basic elements of control are organization and supervision. The description of management can thus be seen as follows:

## Bestuur



### Beplanning

Beplanning kan omskryf word as:

- beskrywing van die handelswyse om 'n doelwit te bereik;
- ontwerp van 'n metode om 'n doelpunt te behaal;
- ontwikkeling van 'n spesifieke metode om 'n begeerde uitslag te verkry.

Beplanning kan ook omskryf word as die bestuursaktiwiteit wat die resultate bepaal wat 'n onderneming in die toekoms wil behaal en wat 'n keuse maak tussen alternatiewe weë om die resultate te behaal. Die proses is min of meer soos volg:

- 1 Stel die doelwitte;
- 2 Omskryf die prosedures; en
- 3 Deel die verantwoordelikhede toe.

Beplanning het met doelmatigheid te doen. Dit probeer 'n antwoord kry op die vraag: "Wat is die regte dinge om te doen?".

Vir die stadsklerk impliseer dit die identifisering van die munisipaliteit se langtermyn doelwitte en die wyse of strategieë om daardie doelwitte te bereik. Hy is dus hoofsaaklik vir strategiese beplanning oor die langtermyn verantwoordelik. In hierdie taak speel die departementshoof 'n uiters belangrike rol, en is hy 'n integrale deel van die topbestuurspan wat die stadsklerk omring en hierdie taak verrig.

Vir die afdelingshoof (middelbestuur), impliseer beplanning die besluit oor wat die regte dinge is om op 'n spesifieke gebied te doen (bv. watter tipe toerusting om te gebruik ten einde tot die munisipaliteit se langtermyn doelwitte by te dra). Sulke planne is gewoonlik op die mediumtermyn gemik en is ook meer spesifiek van aard.

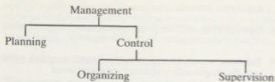
Die beplanning wat deur die toesighouer of voorman gedoen word, het te make met besluite oor die regte dinge om op 'n daaglikse basis te doen. Dit behels 'n keuse van prioriteite oor die beste manier om die werk gedoen te kry. Hy moet dus beplan dat die kruise en die kabels op die regte tyd op die regte plek is. Beplanning deur die junior bestuur word dus dikwels operasionele beplanning genoem.

Die elektrotegniese stadsingenieur is deel van topbestuur, maar ook so praktjgerig dat hy deelneem aan korttermyn probleem oplossings. As lid van die stadsklerk se topbestuurspan moet hy kyk, nie net na die langtermyn doelwitte van sy eie departement nie, maar ook na die strategiese of langtermyn doelwitte van die hele munisipaliteit, waarvan hy en sy departement onafskeidbaar deel is. Hy moet dus by tye met sy kop in die wolke loop en droom oor abstrakte dinge soos toekomsvisies, en die volgende oomblik, hom met die dag tot dag probleme, soos hoe om die fout in 'n kabel op te spoor.

'n Baie onbenydenswaardige spektrum van take. Hy moet beslis 'n baie spesiale soort van mens wees.

### Kontrolering

Kontrolering se basiese elemente is organiserend en toesighouding. Die beskrywing van bestuur kan dus nou soos volg daar uitsien:



### Organizing

Organization can in turn be described as:

- the bringing about of a structure for the plan;
- the arrangement and correlation of tasks, and
- the delineation of a framework for the task.

Organization is the creation of the organizational structure, the implementation of systems and work procedures and the designing of tasks. The task or organization is to give to each post a separate task and to ensure that these tasks are co-ordinated in such a manner that the undertaking reaches its objectives.

To organize successfully, one needs a plan. The plan must take into consideration the following principles or organization:

- Each post must have a specific objective which must also be the reason why the post exists;
- The principle of co-ordination whereby each post must have clearly identifiable official channels of communication;
- Authority, such as the authority that flows downwards through the organisation's communication channels. This tells the manager what decisions he may take;
- Responsibility that the manager receives so as to use such authority;
- Each task must be defined in writing in a job description.

The last three principles deal with the quality of the organization, and are:

- **Span of control**, which refers to the number of key result areas for which a position is accountable;
- **Unity of command**, which means that each position is to have no more than one boss in each key result area;
- **Delegation**, which means that the authority for decision making should be delegated to the lowest point in the organization where the decision can be made effectively.

All these deal only with the creation of a structure of posts in order to accomplish the work plan.

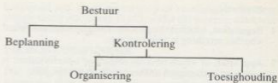
### Supervision

As opposed to what has gone before, supervision concerns the people in the posts and how they function.

Supervision is a process or procedure that is used to ensure that people achieve results that are commensurate with the plan within the organization.

The following five steps describe the usual process of personal supervision:

- 1 **Selection**, which means that a person must be found to fill the position who is the best qualified to do the job;
- 2 **Training**, at which time the selected person is taught all he needs to know to do the job correctly.
- 3 **Motivation**, which includes the help that a person is given to do his job willingly and well with a high degree



### Organisering

Organisering kan op sy beurt omskryf word as:

- die totstandbring van 'n struktuur vir die plan;
- rangskikking en korrelasie van take; en
- omskrywing van 'n raamwerk vir die take.

Organisering is die daarstelling van die organisasiestruktuur, die implementering van stelsels en werkprosedures en die ontwerp van take. Die doel van organisering is om aan elke pos 'n aparte taak te gee en om te verseker dat hierdie take op so 'n manier gekoördineer word dat die onderneming sy doelwitte bereik.

Om suksesvol te organiseer moet ons 'n plan hê, en die plan moet die volgende beginsels van organisasie in ag neem:

- Elke pos moet 'n spesifieke doelwit hê, wat die rede moet wees waarom die pos bestaan;
- Die beginsel van koördinasie waarvolgens elke pos duidelik geïdentifiseerde amptelike kanale van kommunikasie moet hê;
- Gesag, soos die gesag wat afwaarts vloei deur die organisasie se kommunikasie kanale. Dit sê vir die bestuurder welke besluite hy mag neem;
- Verantwoordelikheid wat 'n bestuurder kry om die gesag wat hy verkry het te gebruik om sy doelwit te bereik;
- Elke taak moet op skrif gedefinieer word in 'n taakbeskrywing.

Die laaste drie beginsels handel met die kwaliteit van die organisasie, en is:

- **Spanwydte van kontrole**, wat beteken die aantal sleutelprestasie areas waarvoor 'n pos rekenpligtig is;
- **Eenheid van bevel**, wat beteken dat elke pos slegs een baas moet hê ten opsigte van elke sleutelprestasie area;
- **Delegasie**, wat beteken dat die gesag vir besluitneming gedelegeer moet word aan die laagste punt in die organisasie waar die besluit effektief gemaak kan word.

Al hierdie het slegs te doen met die skepping van 'n struktuur van poste om die werk in die plan te verrig.

### Toesighouding

In toesighouding het ons in teenstelling met bogenoemde, te doen met die mense in die poste en hoe hulle funksioneer.

Toesighouding is 'n proses of prosedure wat gebruik word om seker te maak dat mense resultate behaal wat ooreenstem met die plan binne die organisasie.

Die volgende vyf stappe beskryf normaalweg die proses van persoonlike toesighouding:

- 1 **Keuring**, wat beteken dat 'n persoon gevind moet word vir die aanstelling in die pos, wat die beste gekwalifiseer is om die werk te kan doen;
- 2 **Opleiding**, waartydens die gekleurde persoon alles wat hy nodig het om die werk te kan doen geleer word;
- 3 **Motivering**, wat behels die hulp wat 'n persoon gegee word om sy werk gewilliglik en goed te doen, met 'n hoë

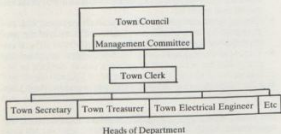
of morale;

- 4 Regulation**, which is the process whereby it is established whether anything is going wrong;
- 5 Appraisal**, at which time an employee's performance is reviewed with regard to the standards for the job.

There is thus in every municipality a formal line of authority that runs from the town council to each functionary. This formal line of authority is accompanied by a formal line of communication. This comprises the formal structure within which all functioning must take place.

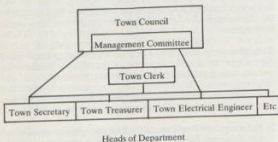
However, just as important, if not more important, is the informal structure which includes those parts of the authority structure, the communication structure and the spheres of influence which exist in every organisation and which often differ from municipality to municipality despite of similar official legislation. It is so important that it usually determines whether a person achieves success or experiences failure in his management task. Naturally, it never replaces the sound principles of management which I have dealt with earlier, but must nevertheless be taken into account as an almost invisible catalyst, as it plays a quiet, but significant role in the manner in which decisions are taken.

Normally, the official structure in a municipality would usually look as follows:



This representation is factually correct, but does not take into account the differences in personality of the various functionaries. An especially strong figure as chairman of the management committee, or a dominant town treasurer or town secretary, or a weak town clerk, or any other particular characteristic of the particular organization can radically influence the working of the management progress by bringing into existence many new and totally different spheres of influence.

The normal structure can thus become totally distorted, and take on the following appearance:



However, for the purposes of this lecture, I have accepted that the "normal" power structure, communication channels and spheres of influence exist in the organization, but in practice it will be found that the abovementioned information structure can play a very important role, and should therefore be taken into consideration. However, where it

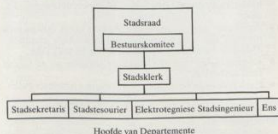
graad van moraal;

- 4 Kontrolering**, wat die proses is waarmee vasgestel word of iets verkeerd gaan, en of alles reg loop;
- 5 Taksasie**, waartydens die werksprestasie vergelyk word met die standaard wat daarvoor gestel word.

Daar is dus in elke munisipaliteit 'n formele gesagslyn wat strek van die stadsraad tot by elke funksionaris. Hierdie formele gesagslyn word begelei deur 'n formele lyn van kommunikasie. Dit is die formele struktuur waarbinne daar gefunksioneer moet word.

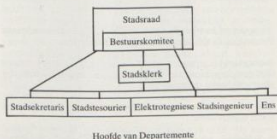
Niet so belangrik, indien nie meer belangrik nie, is egter die informele struktuur, wat daardie gedeelte van die gesagsstruktuur, die kommunikasiestruktuur en die invloedssfeer behels, wat in elke organisasie bestaan en wat heel dikwels van munisipaliteit tot munisipaliteit verskil ten spyte van dieselfde amptelike wetgewing. Dit is so belangrik dat dit meestal bepaal of 'n persoon sukses behaal of mislukkinge op die lyf loop in sy bestuurstaak. Dit vervang natuurlik nooit die gesonde beginsels van bestuur wat ek vroeër behandel het nie, maar moet nogtans soos 'n amper onsigbare katalisator in ag geneem word, en speel 'n stille maar veesleggende rol in die wyse waarop besluite geneem moet word.

Normaalweg sou die amptelike struktuur in 'n munisipaliteit in die meeste gevalle soos volg daar uitsien:



Hierdie voorstelling is feitlik korrek, maar neem nie verskille in persoonlikheid van die onderskeie funksionarisse in ag nie. 'n Besonder sterk figuur as voorsitter van die bestuurskomitee, of 'n dominante stadtesourier of stadsekretaris, of 'n swak stadsklerk, of ander besondere eienskap van die betrokke organisasie, kan die werking van die bestuursproses radikaal beïnvloed, deurdat dit baie nuwe en totaal ander invloedssfeere tot stand kan bring.

Die normale struktuur kan dan heeltemal verwronge raak en kan dan soos volg daar uitsien:



Vir doeleindes van hierdie referaat het ek egter aanvaar dat die "normale" gesagsstruktuur, kommunikasielyne en invloedssfeer in die organisasie geld, maar in die praktyk egter sal gevind word dat die voorafgaande informele struktuur 'n baie belangrike rol kan speel, en deurgaans in ag geneem moet word. Waar dit egter die formele struktuur nie net



not only influences the formal structure but actually subverts or destroys it, drastic steps are necessary to set it right so that the formal structure can again become of paramount importance.

## THE MANAGERIAL FUNCTION

The general managerial function that the town electrical engineer fulfills in his department can be subdivided into the following functions:

- 1 **The creation of a functional organizational structure that corresponds with the objectives of the department, and the regular revision of the organizational structure.**

Before any work can be done, the organization necessary to do the work (posts, responsibilities, hierarchy, etc), must be determined.

If there is a need in a town to provide street lights, the process would be something like the following:

- The need must be identified and delineated.

The identification of the problem may come from many quarters, for example, a councillor, the town clerk, the town electrical engineer or one of his personnel, etc. The town electrical engineer and his personnel will now research the matter and compile a report. The investigation and report will probably cover several political aspects such as the history of the matter in the town or city, the financial implications, the standard of a possible service and alternatives, etc.

The town electrical engineer will inform the town clerk of these aspects in depth, and the town clerk plays a great role in the final report that is laid by him before the town council or its committee. The report will also deal with the personnel and structure, equipment and other practical matters to which attention must be given and the town clerk will provide assistance here through his experts such as the organization and work study and personnel departments, to ensure that the correct personnel and structures are recommended. This will ensure that neither too many nor too few personnel and the right quantity of equipment is requested.

- Obtain a complete policy decision.

The town clerk must now lay the matter before the decision-taking bodies and ensure that all necessary information is included so that a meaningful decision can be taken. The personal relationship between the town clerk and the decision-makers often plays a very important role.

The town clerk has a primary responsibility to ensure that the municipality and each department is properly organized, and he will thus liaise very closely with the town electrical engineer as regards this function, and ensure that management principles are being properly applied. The town clerk will also have to be intimately involved at the time of periodic revision of this function.

The management functions of planning and organization in particular are very pertinent to this question.

- 2 **The compilation of procedures and methods to ensure the effective execution of the work of the department, division or section, and the regular revision of procedures and methods.**

With the decision to, for example, install street lights

beïnvloed nie, maar omverwerp of vernietig, is drastiese stappe nodig om dit reg te stel, sodat die formele struktuur weer van deurslaggewende belang word.

## DIE BESTUURSFUNKSIE

Die oorkoepelende funksie van die bestuur van die departement deur die elektrotegniese stadsingenieur kan verdeel word in die volgende funksies:

- 1 **Die daarstelling van 'n funksionele organisasiestruktuur wat korrespondeer met die doelwitte van die departement, en die gereelde hersiening van die organisasiestruktuur.**

Voordat enige werk gedoen kan word moet die organisasie (poste, pligte, hiërargie, ens.), wat nodig is om die werk gedoen te kry, bepaal word.

As daar 'n behoefte is om in 'n dorp straatligte aan te bring, sal die proses min of meer soos volg verloop:

- Die behoefte moet geïdentifiseer word en omskryf word.

Die identifisering kan van vele oorde af geskied, soos bv. 'n raadslid, die stadsklêr, die elektrotegniese stadsingenieur of een van sy personeellede, ens. Nou sal die elektrotegniese stadsingenieur en sy personeel navorsing oor die saak doen en 'n verslag opstel. Heelwaarskynlik sal die ondersoek en verslag heelwat politieke aspekte dek soos - wat is die geskiedenis van die saak in die dorp of stad - finansiële implikasies - die standaarde van 'n moontlike diens en alternatiewe, ens.

Hierin sal die elektrotegniese stadsingenieur die stadsklêr indringend moet ken, en speel die stadsklêr 'n groot rol in die uiteindelige verslag wat deur hom aan die stadsraad of sy komitee voorgeleë word. Die verslag sal ook handel oor die personeel en struktuur, toerusting en ander praktiese sake waarvan aandag gegee moet word, en die stadsklêr sal hier hulp verleen deur sy deskundiges soos organisasie en werkstudie en die personeelafdelings, om te verseker dat die korrekte personeel en struktuur aanbeveel word. Nie te veel of te min personeel en toerusting moet aangevaar word nie, ens.

- Kry 'n volledige beleidsbesluit.

Die stadsklêr moet nou aan die besluitnemende instansies die voorlegging maak en verseker dat alle inligting wat nodig is, deurgegee word om 'n sinvolle besluit te verkry. Die stadsklêr se persoonlike verhouding met die besluitnemers speel hier meer dikwels 'n belangrike rol.

Die stadsklêr het 'n primêre verantwoordelikheid om te verseker dat die munisipaliteit en elke departement na behore georganiseer is, en hy sal dus in hierdie funksie van die elektrotegniese stadsingenieur baie nou moet skakel met hom, en verseker dat die bestuursbeginsels deeglik toegepas word. By die periodieke hersiening van hierdie funksie, sal die stadsklêr ook intiem gemoed moet wees.

Die bestuursbeginsels van veral beplanning en organisering is baie pertinent hier ter sprake.

- 2 **Die opstel van prosedures en metodes om die doeltreffende uitvoering van die werk van die departement, afdeling of seksie te verseker, en die gereelde hersiening van die prosedures en metodes.**

Met die besluit om bv. straatligte te installeer en die



taken and the creation of the necessary post structure completed, the town electrical engineer must, with the help of the town clerk, compile detailed procedures and methods for each post to ensure that each functionary is performing his work in the correct, most efficacious and effective means possible.

Besides a complete duty sheet, each post must thus also have a manual to ensure that each task will be carried out in the best possible way.

The creation of procedures and methods to ensure the effective execution of the municipal functions is again a primary task of the town clerk and he will also have a direct interest in this function. He will also, together with the town electrical engineer, see to it that the procedures and methods are regularly revised.

The management principles of planning and organization especially, are again of special importance here.

**3 The co-ordination of the activities of the division and sections of the department to bring about a smooth-running and goal-orientated unit.**

Very few functionaries fail to liaise with their colleagues in some or other manner in the execution of their work, and the town electrical engineer must ensure that this liaising works smoothly and is not a hindrance in the performance of each person's work.

The co-ordination of the work of the municipality is one of the basic tasks of the town clerk and he is thus intimately interested in co-ordination with the town electrical engineer to ensure that the co-ordination of the work reaches a high standard.

The management principles of organization especially play a very important role here, with the emphasis on communication.

**4 Ensuring that suitable personnel are acquired and retained.**

With the standardization of salaries and employment benefits there is very little that the town electrical engineer can do to ensure that he draws suitable applications for his posts. However, through the town clerk he can ensure that pressure is brought to bear on the authoritative structure and so ensure that, in the long-term, competitive remuneration can be offered.

Furthermore, in co-operation with his town clerk, the town electrical engineer can ensure that suitable selection methods are applied by the personnel manager, thus ensuring that the best possible appointments are made from the available material.

Good inter personal relationships and healthy management practises can also ensure that good personnel are retained. Adequate opportunities for promotion and a policy that sees to it that the right people are promoted regularly, is also a prerequisite. Again, the town clerk will prove to be an indispensable ally to the town electrical engineer in establishing this healthy climate.

Making sure that suitable personnel are both acquired and retained is again a task of the town clerk, and he thus has a great interest in this function of the town electrical engineer. Together, they must constantly keep a watchful eye over the situation.

The management principles of, especially supervision,

skipping van die nodige postestruktuur nou afgehandel, moet die elektrotegniese stadsingenieur met die hulp van die stadsklerk in die vorm weereens van die organisasie en werkstudie en personeeldepartemente gedetailleerde prosedures en metodes vir elke pos laat opstel sodat daar verseker kan word dat elke funksionaris sy werk op die korrekte, mees doeltreffende en die mees effektiewe wyse verrig.

Daar moet dus vir elke pos benewens 'n volledige pligtestaatsaak, ook 'n handleiding wees wat verseker dat elke taak op die beste wyse verrig sal word.

Om prosedures en metodes daar te stel om die doeltreffende uitvoering van die munisipale funksies te verseker, is weereens 'n primêre taak van die stadsklerk en hy sal ook by hierdie funksie direkte belang hê. Saam met die elektrotegniese stadsingenieur sal hy ook moet toesien dat die prosedures en metodes gereeld hersien word.

Die bestuursbeginsels van veral beplanning en organisasie is weereens hier van besondere belang.

**3 Die koördinerings van die werksaamhede van die afdelings en seksie van die departement om 'n gladwerkende en doelgerigte eenheid te weeg te bring.**

Baie min funksionaris skakel nie op een of ander wyse met kollegas in die uitvoering van hulle werk nie, en die elektrotegniese stadsingenieur moet verseker dat hierdie skakeling glad verloop en nie 'n hindernis vorm by die uitvoering van elke persoon se werk nie.

Koördinerings van die werk van die munisipaliteit is een van die basiese take van die stadsklerk en hy het dus ook hier 'n intieme belang om in samewerking met die elektrotegniese stadsingenieur te verseker dat koördinerings van die werk 'n hoë standaard bereik.

Die bestuursbeginsels van veral organisasie, speel hier 'n baie belangrike rol, met die klem op kommunikasie.

**4 Die versekering dat geskikte personeel bekom word en behoue bly.**

Met die standardisering van salarisse en diensvoordele is daar min wat die elektrotegniese stadsingenieur kan doen om te verseker dat hy geskikte applikante vir poste trek. Deur sy stadsklerk kan hy egter wel verseker dat druk uitgeoefen word op die gesagstruktuur, en so op die langtermyn verseker dat markgerigte besoldiging wel aangebied kan word.

In samewerking egter met sy stadsklerk, kan die elektrotegniese stadsingenieur wel verseker dat geskikte keuringsmetodes toegepas word deur die personeelbestuurder, en kan daar verseker word dat uit die beskikbare materiaal, telkens die beste moontlike aanstellings gemaak word.

Goëe menserverhoudings en gesonde bestuurspraktyke kan verder daarvoor sorg dat goeie personeel behoue bly. Voldoende bevorderingsgeleenthede en 'n beleid wat sorg dat die regte mense gereeld bevordering kry, is ook 'n voorvereiste. Weereens sal die stadsklerk 'n onontbeerlike bondgenoot vir die elektrotegniese stadsingenieur wees om hierdie gesonde klimaat te skep.

Om sorg te dra dat die geskikte personeel bekom en behoue bly, is weereens 'n basiese taak van die stadsklerk en hy het dus 'n groot belang by hierdie funksie van die elektrotegniese stadsingenieur. Saam moet hulle voortdurend 'n wakende oog oor die saak hou.

Die bestuursbeginsels van veral toesighouding speel hier

play a very important role here.

**5 The institution of regulatory measures (controls) in respect of all work done.**

After a properly functional organizational structure has been set up, and after good methods and procedures have been determined, the various operations have been properly co-ordinated and suitable personnel have been obtained, the town electrical engineer must now ensure that each functionary performs well according to set standards. This will ensure that those who are not pulling their weight will be shown up, and those who are doing their duty and those who are accomplishing more than is required of them, will receive their well-earned recognition.

The town clerk is responsible for the control and effectiveness of the departments of the council and thus has a more than usual interest in this facet of the town electrical engineer's job. The town clerk will thus have to satisfy himself that this staff functionaries will have to fill a very important role.

The management principles of, especially supervision, play a very important role, but the full spectrum of planning and control must be brought to bear throughout.

**6 To be answerable to the town clerk for the proper execution of all instructions from the council and the management committee which have been received from the town clerk.**

This function of the town electrical engineer is of great importance, especially where the town clerk is required to do a report from his side to the town council and management committee. However, even where this is not the case, this function is still important in enabling the town clerk to properly perform his managerial function.

The principles of good communication are of paramount importance here.

**7 To determine the policy for the reaching of the department's objectives and to periodically revise those objectives taking into account the normal channels therefore.**

The decision-making of the town clerk and the decision-making of the town electrical engineer are so inextricably bound together, that the town clerk cannot fulfill his role as a maker and influencer of policy without a great deal of input from the town electrical engineer, and the reverse is also true. The two functionaries are totally dependent on each other.

From the above it is thus evident that the town clerk takes a close interest in the managerial function of the town electrical engineer, and that the managerial tasks of these two functionaries are in fact intertwined to a great extent. However, it is necessary to look at the mechanisms and practice of how they liaise.

The town electrical engineer must actually perform the task of managing.

The town clerk has the job of ensuring that the management actions in the department of the town electrical engineer are taken. He does not do it himself, but he must ensure that the town electrical engineer is doing it, and he must give the help necessary to ensure that it is done.

The town electrical engineer has the task of acquiring and applying the correct wherewithal for production.

The town clerk has the task of ensuring that the town electrical engineer does acquire what is necessary for

'n baie belangrike rol.

**5 Die instelling van beheermaatreëls (kontroles) ten opsigte van alle werk wat gedoen word.**

Nadat 'n behoorlike funksionele organisasiestruktuur opgestel is, goeie metodes en prosedures vasgestel is, die werksaamhede behoorlik gekoördineer is, en geskikte personeel verkry is, moet die elektrotegniese stadsingenieur nou verseker dat elke funksionaris presteer volgens neergelegde norme. Dit sal verseker dat die wat lyl wegsteek uitgewys sal word, die wat hul deel bring en die wat beter presteer as wat nodig is, hulle verdiende erkenning kan ontvang.

Die stadsklerk is verantwoordelik vir die beheer en doeltreffendheid van die raad se departemente en het dus 'n meer as normale belangstelling in hierdie fase van die elektrotegniese stadsingenieur se werk. Die stadsklerk sal dus tot sy eie tevredenheid moet toetsen dat hierdie aspek na behore aandag geniet, en weereens sal sy staf-funksionarisse 'n baie belangrike rol moet vervul.

Die bestuursbeginsels van veral toesighouding, speel 'n baie belangrike rol, maar die volle spektrum van beplanning en kontrolering, moet deurgaans bygebring word.

**6 Om aan die stadsklerk verantwoording te doen vir die behoorlike uitvoering van alle opdragte van die raad en die bestuurskomitee, wat van die stadsklerk ontvang is.**

Veral waar dit van die stadsklerk verlang word om op sy beurt aan die stadsraad en bestuurskomitee verslag te doen, is hierdie funksie van die elektrotegniese stadsingenieur van groot belang. Selfs waar dit egter nie die geval is nie, is hierdie funksie nog steeds belangrik om die stadsklerk in staat te stel om sy bestuursfunksie te kan uitvoer.

Die beginsels van goeie kommunikasie is hier van deurslaggewende belang.

**7 Om beleid te bepaal vir die bereiking van die departement se doelwitte, en om die doelwitte periodiek te hersien met inagneming van die normale kanale daarvoor.**

Beleidsbepaling by die stadsklerk en beleidsbepaling by die elektrotegniese stadsingenieur is so inmekaar verweef dat die stadsklerk nie sy rol as beleidsmaker en beleidbeïnvloeder sal kan vervul, sonder 'n groot inset van die elektrotegniese stadsingenieur nie, en omgekeerd is net so waar. Die twee funksionarisse is in totaal op mekaar aangewese.

Uit voorafgaande is dit dus duidelik dat die stadsklerk 'n in-tieme belang het by die bestuursfunksie van die elektrotegniese stadsingenieur en dat die twee funksionarisse se bestuurstake eintlik tot 'n groot mate inmekaar verweef is. Dit is egter nodig dat ons kyk na die meganismes en praktyk oor hoe hulle die skakeling doen.

Die elektrotegniese stadsingenieur het die taak om die bestuurskassies toe te pas. Hy moet dit dus doen.

Die stadsklerk het die taak om te verseker dat die bestuurskassies in die departement van die elektrotegniese stadsingenieur toegepas word. Hy doen dit nie self nie, maar moet verseker dat die elektrotegniese stadsingenieur dit wel doen, en hy moet die hulp wat nodig is om dit te doen verskaf.

Die elektrotegniese stadsingenieur het die taak om die korrekte produksiemiddele te bekom en aan te wend.

Die stadsklerk het die taak om te verseker dat die elektrotegniese stadsingenieur wel die korrekte produk-

production and must satisfy himself that whatever mediums are being used, are being properly applied.

One could similarly take each of the functions of management that we have already identified and one would find that a similar distinction could be made between the task of the town electrical engineer and the task of the town clerk.

The relationship between the town clerk and the town electrical engineer is thus one that has very specific organizational lines, and requires specific and deliberate action on both sides to bring about what each wishes to achieve therefrom. However, what is most important is that this relationship must be cordial and open.

What the town clerk and what the town electrical engineer are striving to do are closely related to each other, but where they take hands and work together, the community that they serve must be the winner.

siemiddele bekom en homself tevrede stel dat die middele wel korrek aangewend word.

Netso kan ons elk van die funksies van bestuur wat ons geïdentifiseer het neem en sal ons vind dat daar 'n soortgelyke onderskeid gemaak kan word tussen die take van die elektrotegniese stadsingenieur en die stadsklerk.

Die verhouding tussen die stadsklerk en die elektrotegniese stadsingenieur is dus een wat baie spesifieke lyne het, en verg pertinentente en doelbewuste aksies van albei kante om elkeen se mikpunt daarin te verwesenlik. Die belangrikste egter is dat hierdie verhouding hartlik en openlik moet wees.

Die stadsklerk en elektrotegniese stadsingenieur se strewes is intiem aanmekeer gekoppel. Waar hulle hande vat en saam werk, moet die gemeenskap wat hulle dien, die wenner wees.

hierdie beslissing en beplanning berus op beleidsdoelwitte. Die beleidsdoelwitte waarna verwys word is hoofsaaklik die taak van die stadsklerk om hierdie doelwitte tussen departemente te koördineer. Hy behoort aan die elektrotegniese stadsingenieur alle ondersteuning te gee om relevante inligting te verkry wat beleidsdoelwitte en dus sy beplanning sou kon beïnvloed. Die stadsklerk is immers die persoon met die oor op die grond, met meerdere kennis van byvoorbeeld heersende politieke faktore.

Die referent het verder in sy referaat spesifiek aandag gegee aan kontroliering, organisering en toesighouding as bestuursfunksies. Klem was veral gelê daarop dat die stadsklerk 'n pertinente rol vervul in die bestuur van die personeel in die departement van die elektrotegniese stadsingenieur. In hierdie verband is ek egter die mening toegedaan dat die departement van die elektrotegniese stadsingenieur speel 'n deurslaggewende rol in die voorsiening, benutting en behoud van geskikte personeel. Voorsiening in die sin van opleiding en beeldbou, benutting en behoud in die sin van motivering, aanspooring, werkverryking en dies meer.

Die waarde van die referaat vir my, is saamgevat in die laaste paar paragrawe van mnr Botha se referaat, te wete:

Eerstens, dat dit die rol van die stadsklerk is om 'n intieme belangstelling by die bestuursfunksies van die elektrotegniese stadsingenieur te hê;

Tweedens, dat hy alle hulp, van water aard ookal, moet verskaf; soos byvoorbeeld die koördinerer van werksaamhede en die leiding in beleidsbepaling.

Derdens, dat daar 'n spesiale verstandhouding moet ontstaan; en

Laastens en die belangrikste van alles is dat die stadsklerk moet aanvaar dat 'n elektrotegniese stadsingenieur nie slegs 'n professionele en vakkundige persoon is nie, maar ook in staat is om insetting te kan lewer tot voordeel en die verhoging van die welvaart van sy gemeenskap.

Mr President, on behalf of the delegates at this convention, I wish to thank Mr Botha for both preparing the paper and addressing us today. Mr President, I formally move that a vote of thanks to Mr Botha be recorded.

MNR L FERREIRA : STADSKLERK BOKSBURG

Mnr die President, eregaste, kongresgangers en vriende, in die eerste instansie laat my toe om namens die Instituut van

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## DISCUSSIONS – BESPREKINGS

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### DR NICO BOTHA : BLOEMFONTEIN

Ek hoop en vertrou dat die elektrotegniese stadsingenieurs ook endag die geleentheid gegun sal word om aan die stadsklerke te verduidelik watter bydrae ons kan maak om die "bestuur" in munisipale rade te kan verbeter. Ek sê dit omdat ek weet in ons geleedere is ook "pasaangeërs".

Meneer die President, wanneer 'n goeie referaat gelewer word, is dit eintlik onnodig om 'n inleier te hê. Dit sal derhalwe nie vandag vir my nodig wees om 'n lang relaas oor mnr Botha se referaat te lewer nie.

Die referent het op 'n wetenskaplike wyse te werk gegaan en het in die eerste plek sekere begrippe definieer en gesê wat hy daarmee bedoel, wat natuurlik noodsaaklik is om enige semantiese verwarring te voorkom. Hieroor gaan ek nie met mnr Botha debateer nie.

Tweedens het die referent kortliks aan die hand van sekere van die generiese administratiewe prosesse, onderskeidelik die funksies van die stadsklerk en die elektrotegniese stadsingenieur, bespreek.

Heeltemal tereg ook, want 'n mens sou nie die rol wat 'n stadsklerk speel, in die bestuur van 'n elektrisiteitsdepartement kon bespreek sonder om die funksies van die elektrotegniese stadsingenieur volledig te ontleed, te verklaar en te begryp nie.

Meneer die President, ek is bekommerd dat die stadsklerke van vandag nie begryp wat die rol van die elektrotegniese stadsingenieur is nie en dus gevolglik ook nie hulle rol in die bestuur van 'n elektrisiteitsdepartement daarby kan aanpas nie (soms lyk dit vir my hulle verstaan die rol van stadsingenieurs beter as die van elektrotegniese stadsingenieurs). Ek is dan ook teleurgesteld met die funksies wat die referent aan 'n elektrotegniese stadsingenieur toedig. Ek verwys spesifiek na pp 5 en 6 van die referaat. Ek het gedink ons doen heelwat meer as net dit. Moontlik kan mnr Botha hierop uitbrei. Ek huldig die mening dat 'n stadsklerk ook 'n rol te speel het selfs in die professionele taak van die elektrotegniese stadsingenieur. Ek sê dit omdat die meeste van

Stadslerke, mnr Jan Loubser geluk te wens met sy verkiesing as President van hierdie belangrike Vereniging en ook die goeie wense van ons Instituut aan u oor te dra. Sterkte vir die twee jaar wat voorlê, mnr Loubser, ek is seker dit sal goed gaan.

Aan die Aangewese President wat gekies is, mnr Alwin Fortmann van Boksburg, hy is taamlik bekend in Boksburg, veral aan sy Stadslerk, ek wil aan hom ook sê, ek is baie trots en ek is seker die Stadsraad van Boksburg ook. Veels geluk Alwin.

Dan kom ons by my goeie vriend en kollega, mnr Nantes Botha, en sy referaat wat hy vandag gelewer het. Ek wil hom veels geluk wens met wat ek beskou as 'n uitstekende en insiggewende referaat. Ek is egter net jammer en spyt, dat daar nie meer stadslerke hier vandag teenwoordig is om te kon luister na hierdie referaat nie. Ek dink dit is 'n referaat wat elke stadslerk ter harte kan neem. U het vir ons 'n belangrike boodskap gebring en soos 'n goue draad uitgewys van hoe belangrik dit is dat die stadslerk as leier van 'n span optree. 'n Span bestaan uit baie departementshoofde maar veral die elektrotegniese stadsingenieur, vir wie ek baie respek het.

I would like to refer to page 6, item 4, where Mr Botha says of the town electrical engineer, he is the officer who must ensure that requirement of the factory and machinery buildings act are met. I agree with him full heartedly. Until a few years ago when both Mr Bortmann the Town Electrical Engineer and myself as Town Clerk of Boksburg, faced ourselves with a charge of culpable homicide. It arose out of the death of one of our municipal employees in a transformer house whilst painting inside. There was an accidental explosion and the two of us found ourselves charged and we had to appear in a magistrates court.

I want to tell you, I don't know about Mr Fortmann, but that day my knees were really shaking. Fortunately we had a very good advocate, and he managed to put our case very clearly and after the considering factors, the magistrate came to the conclusion that neither Mr Fortmann or myself as town clerk were negligent and we were discharged. What arose out of this unfortunate incident was that Mr Fortmann and I got to know each other much better, even if it was in the Magistrates Court of Boksburg.

#### CLR BARRABLE : BENONI

Mr President, I want to go a bit further on the theme that the town clerk has touched upon, this team management style. I do know that there are certain chairmen of management committees here. From my side as chairmen of M C in Benoni, I heartily endorse the style of management which Mr Botha has brought in, and that is the formal team effort which so many businesses run on today. A board of directors if you like.

At 8h15 on a Monday morning you cannot obtain anyone of our heads or the town clerk, they are involved in their weekly session. This is excellent, I believe many towns can perhaps learn from this style of management for the benefit of not only the heads and the town clerk but the management committee itself. The reason why I say that, Mr President, and I am sure that other chairmen would agree, that the only basis in which we sometimes have to make a decision is those words of motivation given in the reports of the various heads of departments. The town electrical engineer and all the other heads must surely realise the great importance, they have the knowledge, they are the experts, they are the fundies, no councillor would be that foolish not to admit that we are not experts in every field, we are merely there to try and take the final decision. For that guidance, we lean very heavily on the reports and the information provided in those reports. Therefore, it is important that all heads not only have the knowledge in their heads but be able to expand it on

paper so that the right decision can be made eventually by the councillors.

To me it is vital that the line of communication as Mr Botha has pointed out, is maintained on the basis that the management committee has the direct link with the town clerk and so on. But I would like to pose a question to Mr Botha if he has the time to answer it, and that is that I am sure that many councillors has this problem that from time to time the informal line is taken, I will pose the question that is this expedient, does it save unnecessary phone calls to the town clerk or then moves it on to the various heads who might be involved. I am referring to particularly a request which comes from a member of the public. To that specific town councillor, does Mr Botha believe that he would like all those calls to come to his office and then he moves it onto his head of the department, or does he see any advantage on the one to one basis between say the town engineer and a councillor?

I take his point that he stressed this afternoon, but I am a bit concerned that if the direct line is always maintained, on the informal matters, that the town clerk will be inundated with phone calls which could be answered very swiftly by the particular head of department, and unnecessarily put further burden upon the town clerk.

If perhaps Mr Botha could answer that question, I would be interested in his reply.

Mr President, in closing let me say this, that the management committee system in the Transvaal, I believe, work successfully and many towns have found it wise policy to have the M C there for at least a term of 4 to 5 years or maintain themselves right through the period, particularly the chairman. I think the reason for that has been expounded in Mr Botha's paper this afternoon, that the chairman and certainly in most cases, the total management committee has to grow into the function of their function with the town clerk and heads and continuity in my opinion is of vital importance for the future growth of any town.

#### MR N BOTHA : BENONI

Ek sal baie kort wens. Op dr Nico Botha se kommer wat hy uitgespreek het oor die rol wat die stadslerk en die elektrotegniese ingenieur moet vervul, maar veral oor die kommer wat hy uitgespreek het oor die rol wat die elektrotegniese stadsingenieur moet vervul in die top bestuur van die dorp, stem ek met hom een honderd persent saam.

Ek wil graag aansluit by wat mnr Leon Ferreira gesê het. Ek dink dit is 'n skande dat stadslerke nie in massas by 'n kongresse opdaag nie. Hoe is dit moontlik vir 'n man om 'n inspraak te hê in minstens vyftig persent van u taak sonder om 'n aktiewe deelname te hê in wat u taak is. En waar beter word u taak omskryf en bedryf as by 'n kongresse. Ek wil pleit, aansluit by mnr Ferreira, pleit dat u druk op u stadslerke moet uitoefen dat hulle u kongresse moet bywoon. Die anderkant van die saak, die anderkant van die munt, is netso belangrik. Mnr Loubser het vir u aanvanklik gesê, dat ons in Benoni, die stelsel het dat hy 'n intieme inspraak het in die bestuur van al ander 11 departemente wat ons in Benoni het. Dan praat ek nie net oor ditjies en datjies nie. Elke beleidsbesluit, selfs detail besluite, wat in ander departemente geneem word, het hy 'n inspraak in. As daar een ding is, en hy kan daaroor getuig, waaroor ek hulle aanspreek is dat hulle daardie rol van hulle moet vervul, ons moet 'n top bestuur wees wat nie net spesialis geneid is nie. Dus stem ek saam met dr Botha, ek dink dat die stadslerk moet kennis neem daarvan dat hulle op 'n magtige bron van kennis sit, in die vorm van ander departementshoofde waaronder die elektrotegniese stadsingenieur is. Dat hulle benut moet word, nie net vir die spesialis funksie nie.

Mnr Ferreira, ek is net so bly dat u vandag hier is. Baie dankie dat u as President van my Instituut vir my vandag hier



kom ondersteun het. Dankie dat u as Stadsleer soveel belangstel in daardie aspek van die take, ek weet dat u oral by hierdie soort van geleentheid is.

Councillor Barrable, thank you for your constructive remarks. You are one of the reasons why the system in Benoni is functioning so excellently. You are allowing myself and heads of departments breathing space. You have defined your roll.

You asked the question, does the informal line sometimes work? Yes, it does work sometimes. You asked the question whether the heads of department can be approached by a councillor with a specific question? I would like to define it this way, if the question arises out of him being a ratepayer,

then he has the right of any other ratepayer, he can approach whosoever he wants.

But as a councillor, assuming that he has the power of the whole council behind him when he does negotiate with a head of a department. I would like a councillor to search his own soul, if in fact he is trying to achieve something that a normal ratepayer would not like succeed in, then I would like him to do it through the channels of the town clerk. If he has a normal question, by all means get the information from the head of the department. That is the way I think we work in Benoni.

Mr President, thank you very much for the opportunity I had today, I really enjoyed addressing you.

*John Dirk van Niekerk is gebore in Kroonstad op 8 Desember 1930.*

*Hy ontvang 'n B.Sc. Ing.-graad van Stellenbosch Universiteit in 1953 en die M.B.L.-graad van die Universiteit van Suid-Afrika in 1969.*

*Vanaf 1954 tot 1956 ontvang hy na-graadse opleiding in die fabriek van Metropolitan Vickers Electrical Company in Manchester, Engeland waar hy ook 'n kursus in Power System Engineering by die Manchester College of Technology bygewoon het en ook 'n tyd lank in die Metrovick Kragstelsel Analise Departement. Na 'n tydperk in Munisipale diens, eers in Germiston en toe Alberton Stads Elektrotegniese, asook in die vervaardigingswyerheid, stig hy die raadgevende ingenieurs maatskappy, J D van Niekerk & Genote Ing. in 1973.*

*Mnr van Niekerk is 'n lid van die Suid-Afrikaanse Instituut van Elektriese Ingenieur en is 'n Geregistreerde Professionele Ingenieur.*

*Mnr van Niekerk is getroud en het drie kinders en is woonagtig in Randburg.*



*Mnr J D van Niekerk*

## OUTDOOR SUBSTATIONS UP TO 132kV MODERN TENDENCIES AND NOVEL SOLUTIONS

### 1 INTRODUCTION

Hippocrates said in the year 400 BC "The life so short, the art so long to learn, opportunity fleeting, experience treacherous, judgement difficult". The design of substations present many pitfalls for the inexperienced. The subject of substations is so vast that in a paper only the

## BUITENHUISE SUBSTASIES TOT 132kV MODERNE NEIGINGS EN UNIEKE OPLOSSINGS

### 1 INLEIDING

Hippokrates het die jaar 400 voor Christus gesê "Die lewe so kort, die kennis so lank om te leer, geleentheid vlugtig, ervaring verraderlik, oordeel moeilik" sonder ervaring kan die ontwerp van substasies problematies wees. Die ontwerp van substasies is so wyd dat slegs



main aspects can be touched upon but the intention is the stimulation of thoughts and the exchange of experience.

The ever increasing loads supplied by Munciple Electrical Undertakings have resulted in the undertakings to upgrade bulk supplies with increasing supply voltages of up to 132kV for the smaller Municipalities and even 275kV for the large Municipalities. At the same time munciple undertakings with more than one supply point are forced to consolidate the supply points to one. This brings about a complete reappraisal of the existing networks.

The planning of supply points and primary distribution must be such as to ensure that an adequate supply is available to meet the estimated load of the consumers in both the near and the more distant future.

The supply points, with the resultant outdoor substations are major items in the capital expenditure budget for the undertakings. The long expected life of the equipment makes it imperative that care shall be taken to provide stations using the latest available equipment in a layout which not only allows flexibility, satisfactory reliability but simple ways for future extensions and ease of maintenance with adequate safety. The best technical solution shall be obtained at the minimum possible cost.

Due to the increasing demands to protect and preserve the environment the design of stations shall aesthetically blend in with the surroundings.

The same problem of substation design also applies to large industries and mines.

Many approaches to the detailed design of substations are possible but the factors to be considered are numerous before a satisfactory and economic result is achieved. The paper presents an overview of design requirements which should be considered in establishing new substations.

The same design principles will basically apply to indoor substations where a decision to construct will mainly be dictated by centre town aesthetics and availability of land. The choice of equipment will depend on the voltage level. Equipment available are Metalclad equipment for voltage up to 66kV (72kV), cell type construction and completely gas insulated switchgear.

## 2 GENERAL DISCUSSION

### 2.1 TERMINOLOGY

In the paper the term substation will be used in a way to include distribution and switching stations as well as stepdown stations.

The terminology will be otherwise standard acceptable terms.

As an integral part of transmission system, the substation functions as a connection and switching point for transmission lines, feeders and step up and step down transformers.

It can be described as a system comprising various sub systems so arranged to achieve all the required clearances, protection, flexibility and operating arrangements. The design philosophy remains a matter of the individual designer's choice but can have a considerable effect on the ultimate cost of a substation.

The cost of substations can be divided in approximately equal parts as follows:

hoof aspekte aan geraak kan word in hierdie referaat wat die gedagte is die stimulasie van gedagtes en die uitruiling van ervaring.

Die voortdurende vermeerderde laste wat deur munisipale elektrisiteits ondernemings voorsien moet word, veroorsaak dat die grootmaat voorsiening vergroot moet word met verhoogde toevoerspannings van tot 132kV vir die kleiner munisipaliteite en self 275kV vir die groter munisipaliteite. Terselfdertyd moet munisipale ondernemings met meer as een voorsieningspunte dit konsolideer tot een toevoerpunt. Gevolglik moet die bestaande netwerke ook geheel en al herondersoek word.

Die beplanning van voorsieningspunte en primêre verspreiding moet sulks wees dat voldoende voorsiening beskikbaar is om die beaamde las van die verbruikers huidiglik en toekomstiglik te voorsien.

Die voorsieningspunte, met die gevolglike buitenhuise substasies vorm groot items in die kapitaalkuitgawes van 'n onderneming. Die lang verwagte lewe van die toerusting verg dat slegs die jongste toerusting met 'n uitleg wat elastisiteit, bevredigende betroubaarheid en eenvoudige uitbreikbaarheid behels met maklike onderhoudevereistes en genoegsame veiligheid. Die beste tegniese oplossing moet teen die minimum moontlike koste verkry word.

Omgewingsbewaring verg dat substasies so ontwerp moet word dat dit inpas en aanpas by die omgewing.

Dieselfde probleem is ook toepaslik vir substasie ontwerp in die nuwerheid en myne.

'n Verskeidenheid van benaderings is moontlik vir die detailontwerp van substasies maar 'n veelvoud van faktore moet in ag geneem word voordat 'n ekonomiese resultaat verkry word. Die referaat bied 'n oorsig van ontwerpvereistes wat in ag geneem moet word in die daarstelling van 'n nuwe substasie.

Dieselfde ontwerpbeginsels is toepasbaar op binnenshuise substasies waar die besluit hoofsaaklik dikteer word deur sentraal stad estetika en beskikbaarheid van grond. Die keuse van toerusting word hoofsaaklik bepaal deur die spanningsvlak. Toerusting beskikbaar is metaalohulde toerusting vir spannings tot 66kV (72kV), seltpie konstruksie en geheel gas geïsoleerde skakeltuig.

## 2 ALGEMENE BESPREKING

### 2.1 WOORDOMSKRYWING

In die referaat sal die term substasie hoofsaaklik gebruik word om verspreidings- en skakelstasies asook afstapstasies in te sluit. Andersins sal die terme standaard aanvaarde terme wees.

Die substasie, as integrale deel van die elektriese stelsel, funksioneer as 'n verbindings- en skakelpunt van transmissielinee, voerders en opstap en afstap transformators. Dit kan beskryf word as 'n samestelling van 'n verskeidenheid van substasies om al die vereiste vryruimtes, beskerming en elastisiteit en bedryfvereistes te bereik. Die ontwerpfilosofie bly die individuele ontwerper se keuse maar kan 'n groot invloed op die finale koste hê.

Die koste van substasies kan in benaderde gelyke dele verdeel word;

- (a) Civil work which includes ground work for foundations and buildings etc.
- (b) Switchgear, structures, control panels, earthing, surge diverters, insulation, busbars, battery systems, etc.
- (c) Step down transformers with control panels (automatic tapchanger).

2.2 Eskom normally provide bulk supplies in outdoor yards on the outskirts (at the Municipal Boundary) of towns and cities leaving the internal distribution of the power to the undertaking.

This paper will only relate to outdoor substations but certain of the principles can be applied to indoor stations. Indoor substations, however, could on its own be the possible subject for a separate paper. It, however, shifts the work content to the factories which are mainly overseas.

### 2.3 SUPPLY VOLTAGES

The choice of supply voltage is governed by the following factors:

- (a) The available Eskom Voltage(s)
- (b) The future load – a load growth investigation for short term of up to 5 years and long term up to 25 years shall be made.
- (c) The distance of the supply point to the internal distribution.

Preference shall be given to standards for which equipment is available. The following table (Table I) illustrates the evolution in voltages which also explains why different voltages are still in use.

TABLE I

Voltages in use in South Africa kV	Preferred Voltages Acc. BSS 77:1958 kV	IEC Rated Voltages. (IEC 38)* kV
11	11	12 17,5
20/22		24
33	33	36
42/44		52
66	66	72,5
88		100
		123
132	132	145
220		300
275	275	362

\* Definition of Rated voltage to IEC indicates the upper limit of the highest voltage of systems for which the equipment is intended.

The insulation co-ordination which results from the choice of voltage and is in itself an extensive subject. In this paper the subject will not be covered in detail, however, choices shall be made by referring to IEC Publications 71-1 and 71-2 as well as the Draft Code of Practice for insulation co-ordination (at present withdrawn).

### 2.4 RATED NORMAL CURRENTS

IEC lay down that; the rated normal current is the r.m.s. value of current which the equipment shall be able to carry continuously without deterioration within temperature rise limits and rated frequency, as

- (a) Siviele werk wat die grondwerke, fondasies en geboue insluit.
- (b) Skakeltoeg, strukture, beheerpanele, aarding, stuwingsafleiers, isolasie stamme, battery stelsels, ens.
- (c) Afstaptransformators met beheerpanele.

2.2 Evkom se grootmaat voorsiening is noraalweg in buitehuise substasie by die buitewyke (munisipale grens) van dorpe en stede geleë en die interne retikulasie word oorgelaat aan die munisipale onder-neming.

Hierdie referaat bepaal slegs by buitehuise substasies maar sekere beginsels is toepasbaar op binnehuise substasies. Binnehuise substasies kan die onderwerp wees van 'n aparte referaat. Dit skuif egter die werkinhoud na die fabriek wat hoofsaaklik oorsese geleë is.

### 2.3 TOEVOERSPANNINGS

Die keuse van toevoerspanning word vasgelê deur die volgende faktore:

- (a) Beskikbare Evkom spannings.
- (b) Die toekomstige las – 'n lasgroei ondersoek vir korttermyn van sê tot 5 jaar en langtermyn van sê tot 25 jaar moet gemaak word.
- (c) Die afstand tussen die toevoerpunt en die interne verspreiding.

Voorkeur moet aan standaard gegee word waarvoor toerusting beskikbaar is.

Die volgende tabel (Tabel I) toon die evolusie van spannings en dit verklaar hoekom sekere spannings nog in gebruik is.

TABEL I

Spannings in gebruik in Suid Afrika kV	Voorkeur-spanning volgens BSS 77:1958 kV	IEK kenspannings (IEK 38)* kV
11	11	12 17,5
20/22		24
33	33	36
42/44		52
66	66	72,5
88		100
		123
132	132	145
220		300
275	275	362

\*Die definisie van kenspanning volgens IEK dui die boonste limiet van die hoogste spanning van die stelsel waarvoor die toerusting benodig word.

Die isolasie koördinasie wat voortvloei uit die keuse van die spanning is self 'n uitgebreide onderwerp. In hierdie referaat word die onderwerp nie in detail behandel nie maar keuses kan gedoen word deur te verwys na IEK publikasies 71-1 en 71-2 sowel as die konsep gebruikskode van SABS (wat tans teruggetrek is).

### 2.4 NORMALE STROOMAANSLAG

IEK spesifiseer dat die normale aangeslane stroom die w.g.k. waarde is van stroom wat toerusting in staat stel om deurlopend te voer sonder verswakking

specified and selected from standard values chosen from the R10 series as follows:

400; 630; 1250; 1600; 2000; 3150; 4000A etc.

## 2.5 RATED SHORT-CIRCUIT BREAKING CURRENT

The rated short-circuit breaking current relates to the circuit-breakers and is defined in IEC 56-2, but the concern in this paper relates only to what are acceptable standard ratings. The r.m.s. value of the a.c. component of the rated short-circuit breaking current shall be selected from the following against values in the R10 series:

6,3; 8; 10; 12,5; 16; 20; 25; 31,5; 40; 50; 63; 80; 100kA.

The selection of a **minimum** short circuit rating in a bulk supply substation will depend on the present and the anticipated fault levels of Escom. It is advisable to discuss and obtain the fault levels from Escom bearing in mind the possible future levels. The choice of too high a level can lead to unnecessary initial expense whereas a too low value could lead to restraints and future costly re-equipping of substations.

## 2.6 TRANSFORMERS

It is necessary with the view to standardisation and thus cost benefits that stepdown transformers be specified according to the ratings and parameters laid down by the IEC. (This applies to ratings larger than 315kVA according to SABS 780). In South Africa the largest user of stepdown transformers, Escom, have deviated from certain of the IEC requirements, escom being the largest user of transformers in south Africa is therefore setting a guide which should be followed to avoid paying a premium for non-standard designs. It will be advantageous to specify transformers which generally comply with Escom and IEC requirements.

Feeding into secondary (11kV) systems it will be advisable to equip the transformers with on load tap-changers to facilitate voltage regulation.

For further reading in this connection reference 1 is applicable.

## 2.7 SELECTION OF SUBSTATION SITES

### 2.7.1 BULK SUPPLY POINT AND MAIN SUBSTATION

The position of the bulk supply point will depend on the position where Escom can make the required power available and could be at the present supply point but will however normally be on the Municipal boundary.

If the above restrictions do not exist, a supply point shall be chosen with the following factors in mind:

- The existing reticulation and future reticulation and centres of load and how the distribution will take place. This means that the planning of the secondary system (i.e. 11kV) should be done before a final position is chosen.

binne die temperatuurstygings perke, die aangeslane frekwensie, soos gespesifiseer en geselekteer van standaard waardes gekies van die R10 series:

400; 630; 1250; 1600; 2000; 3150; 4000A ens.

## 2.5 AANGESLANE KORTSLUITONDER-BREKINGSTROOM

Die aangeslane kortsluitonderbrekingstroom in stroombrekers word gedefinieer in IEC 56-2, maar in hierdie referaat word slegs verwys na die aanvaarde standaard aanslae. Die w.g.k. waarde van die w.s. komponent van die aangeslane kortsluit onderbrekingstroom word gekies uit die volgende waardes van die R10 series:

6,3; 8; 10; 12,5; 16; 20; 25; 31,5; 40; 50; 63; 80; 100kA

Die keuse van die **minimum** kortsluitanslag vir 'n grootmaat voorsieningspunt sal afhang van die huidige verwerpte foutvlakke van Evkom. Dit is noodsaaklik dat die foutvlakke met Evkom bespreek word en die huidige en toekomstige waardes verkry word. Indien te hoë waardes gekies word sal dit lei tot onnodige uitgawes terwyl 'n te lae waarde beperkings plaas en later tot toekomstige duur vervanging in die substasie.

## 2.6 TRANSFORMATORS

In die lig van standaardisasie met gevolglike koste voordele is dit noodsaaklik dat afstaptransformators spesifiseer word deur die IEC. (Hierdie is van toepassing op aanslae groter as 3150kVA volgens SABS 780). In Suid Afrika is Evkom die grootste verbruiker van transformators en hulle het afgewyk van sekere van die IEC vereistes. Evkom as die grootste verbruiker van transformators in Suid-Afrika stel daardeur 'n gids wat gevolg moet word om sodoen die maontlike betaling van premiums van die standaard transformators te vermy, dit is gevolglik voordelig om transformators te spesifiseer wat in die algemeen voldoen aan die vereistes van Evkom en IEC spesifikasies.

Met die toevoer na die sekondêre (11kV) stelsels sal dit goed wees indien die transformators met oplaas takpwiesselaars toegerus word om die spanningsreëling te help.

Vir verdere besonderhede van hierdie aangeleentheid is die verwysing nr 1 van toepassing.

## 2.7 KIES VAN SUBSTASIE-TERREINE

### 2.7.1 GROOTMAAT TOEVOERPUNT EN HOOFSUBSTASIE

die posisie van die grootmaat toevoerpunt sal afhang van welke posisie Evkom die aangevraagde krag beskikbaar kan stel. Dit kan weliswaar ook by die huidige toevoerpunt wees maar Evkom verkies dit op die munisipale grenslyn.

As bogenoemde beperkings nie bestaan nie, dan moet die grootmaat toevoerpunt so gekies word met die volgende faktore in gedagte:

- Die bestaande retikulering en toekomstige retikulering en swaartepunte van las asook op welke wyse die verspreiding sal plaasvind. Dit beteken dat die bepaling van die sekondêre stelsel (d.i. 11kV) gedoen moet word voordat die finale posisie gekies word.

(b) Availability of a suitable piece of land of adequate size and as level as possible to provide for the Escom substation as well as the main municipal substation. Not only must the topography and drainage be investigated but also the subsurface soil. In the case of poor soils, additional subsurface tests will be necessary before the foundations can be designed. The soil resistivity shall also be ascertained.

(c) Accessibility to roads.

(d) Acceptance by Escom. (This is necessary to limit extension charges and/or minimum accounts and also that the site accessible to the Escom lines).

(e) Sites shall be chosen so that their position does not represent an unnecessary security risk.

## 2.7.2 OTHER SUBSTATIONS

In a municipal undertaking it will be necessary due to load and distance requirements to establish several substations in various localities with step down facilities.

The position of the step down stations shall again be chosen with the following factors in mind:

(a) The existing and future reticulation and centres of load. Again the planning of the secondary reticulation shall blend in with the position of the substation.

(b) Availability of suitable piece of land of adequate size and as level as possible. Again topography, drainage, etc. must be investigated.

(c) Accessibility to roads.

(d) Sites shall be chosen so that their position does not represent an unnecessary security risk.

## 8 STANDARDS

In purchasing equipment for substations the equipment shall comply with internationally accepted standards i.e. SABS, BS and IEC with the latter prevailing. Care shall however be taken that the equipment really fulfil the requirements for the prevailing site conditions i.e. especially the highveld altitude.

## 2.9 RELIABILITY

In the design of a Substation the degree of desired reliability have a large influence on the cost of the installation.

The reliability (or is it availability) depends on the bus switching arrangement as well as the various components (sub systems) of the substation. The switching arrangement shall generally suit the following requirements:

(a) System Security.

(b) Operational flexibility.

(c) Simplicity of protection arrangements.

(d) Ability to limit short circuit levels.

(b) Die beskikbaarheid van 'n geskikte stuk grond van voldoende grootte en so gelyk as moontlik om te voorsien aan die vereistes vir die Evkom toevoerstasie sowel as vir die munisipale hoofsubstasie. Nie alleen moet die topografie en dreinerings van die grond, ondersoek word nie, maar ook die grond onder die oppervlak. In die geval van swak grond sal bykomende ondergrondse toetse uitgevoer word voordat die fondasies ontwerp kan word.

Die grond weerstandsvermoë moet ook vasgestel word.

(c) Toegang na paaie.

(d) Aanvaarding deur Evkom. (Dit is nodig om die uitbreidingsgelde te minimaliseer en ook vir minimum rekenings van Evkom dat die terrein toeganklik is vir die Evkom lyne).

(e) Terreine moet ook so gekies word dat die posisie daarvan nie 'n onnodige sekuriteitsrisiko meebring nie.

## 2.7.2 ANDER SUBSTASIES

In 'n munisipale onderneming sal dit nodig wees om as gevolg van las - en afstandvereistes verskeie substasies te vestig in verskeie posisies waar die afstand fasiliteite beskikbaar moet wees. Die posisie van die afstapstasies moet gekies word met die volgende faktore in gedagte:

(a) Die bestaande en toekomstige verspreiding en las sentrums. Weer eens moet die beplanning van die sekondêre verspreiding in ag geneem word sodat dit aanpas by die posisie van die substasie.

(b) Beskikbaarheid van 'n geskikte stuk grond van voldoende grootte en so gelyk as moontlik. Weer eens moet die topografie, dreinerings, ens. ondersoek word.

(c) Toeganklikheid vanaf paaie.

(d) Terreine moet so gekies word dat hulle posisie nie 'n onnodige sekuriteitsrisiko skep nie.

## 2.8 STANDAARDE

In die aankoop van toerusting vir substasies moet hierdie toerusting aan internasionale standaarde voldoen d.i. SABS, BS, en IEC met laasgenoemde as die eerste keuse. Daar moet egter noukeuring gekyk word dat die toerusting werklik aan die vereistes van die terrein omstandighede d.i. soos hoogte bo seepeël gekyk word.

## 2.9 BETROUBAARHEID

In die ontwerp van 'n substasie het die verlangde betroubaarheid 'n groot invloed op die koste van die installasie.

Die betroubaarheid (of is dit beskikbaarheid) hang veral saam met die stamskakeel uiteensetting sowel as die verskeie komponente (substasies) van die substasie. Die skakeltoerusting samestelling moet in die algemeen aan die volgende vereistes voldoen:

(a) Stelsel Sekuriteit.

(b) Bedryf Elastisiteit.

(c) Eenvoudigheid van beskermingsamestelling.

(d) Vermoë om die kortsluitvlakke te beperk.

- (e) Maintenance – effect on system security.
- (f) Ease of extension.
- (g) Total land area.
- (h) Cost.

It must be borne in mind that a substation or power system are not mass produced so that it is impossible to use the reliability techniques of industrial mass production resulting that the substation and system shall be "well built" from the very start to make it "fit for use" as intended in the design. Failure data listed during their lifetime as statistical data may not be relevant to foresee the behaviour of similar new systems.

Statistics, however, have indicated for example that the security of busbar zones should be improved especially the insulation security. Interestingly, causes of faults are approximately equally divided between insulation flashover, failure of primary equipment and failure of secondary equipment. Further information on the subject of reliability can be found in 2, 3 and 6 of the reference list.

## 2.10 SAFETY ASPECTS

A substation must be so designed that maintenance can be performed on circuits or components without endangering the lives of the maintenance personnel. The establishing of maintenance zones with its safety clearances are described in Appendix K of BS 162 and amplified in Chapter 2 of Reference 2.

## 2.11 ECONOMICS

At present time, expenditure, especially on public projects has to be well justified so that every means be explored to reduce the cost of substations while preserving or improving their security or reliability.

Possible ways of reducing costs:

- (1) Limiting maintenance zones to reduce space and their substation area.
- (2) Reducing the number of insulators.
- (3) Combining current transformers into transformers and switchgear.
- (4) Combining current and voltage transformers.
- (5) Using welded structures which facilitate erection.

First cost should however not be reduced for the sake of reduction without evaluating the possible cost of maintenance, outages and repair work during the lifetime. Therefore experience of factors to improve reliability shall be considered in economising.

## 3 DESIGN OF OUTDOOR SUBSTATIONS

### 3.1 PRELIMINARY STUDIES

The basic steps in designing a sub station follows a set pattern and should follow the extensive network

- (e) Onderhoud – die effek daarvan op die stelsel sekuriteit.
- (f) Gemak van uitbreiding.
- (g) Totale grond beskikbaar.
- (h) Koste.

Dit moet in ag geneem word dat 'n substasie of 'n kragstelsel nie massa geproduseer word nie, sodat dit onmoontlik is om die betroubaarheidsteknieke van industriële massaproduksie toe te pas met die gevolg dat die substasie en stelsel goed gebou moet wees vanaf die begin dat dit geskik te maak vir gebruik soos voorgestel in die ontwerp. Onderbrekingsdata wat gelys word deur die leeftyd van die toerusting as statistiek mag glad nie toepasbaar wees om die toekomstige gedrag van soortgelyke nuwe stelsel te beoordeel.

Statistiek het egter aangedui dat byvoorbeeld die sekuriteit van die stam sones verbeter moet word veral die isolasiesekuriteit. Dit is interessant dat die oorsake van foute ongeveer gelyk verdeel is tussen isolasie oorvonking, onklaarraking van primêre toerusting en ook van sekondêre toerusting. Verdere inligting kan verkry word oor betroubaarheid in die Verwysings 2, 3 en 6 van die verwysingslys.

## 2.10 VEILIGHEIDSASPEKTE

'n Substasie moet so ontwerp word dat die onderhoud daarvan op alle stroombane uitgevoer kan word of komponente uitgevoer kan word sonder dat die lewe van die onderhoudspersoneel in gevaar gestel word. Die vasstelling van onderhoudsonees met veiligheidsafstande is beskryf in Aanhangsel K van BS 162 en verder ook in Hoofstuk 2 van Verwysing nr 2.

## 2.11 EKONOMIE

In die huidige tydsgewrig is uitgewees veral van publieke projekte onder die soeklig en alle wese moet ondersoek word om die kostes van substasies te verminder terwyl die sekuriteit en betroubaarheid behou of verbeter word.

Moontlike wyses om koste te verminder is soos volg:

- (1) Beperkings op die onderhoudsonees om die spasie vereistes te verminder en so die substasie area.
- (2) Vermindering van die aantal isolatore.
- (3) Kombinerende van stroomtransformators in transformators en skakeltoeg.
- (4) Kombinerende van stroom en spanningstransformators.
- (5) Die gebruik van gesweldde strukture wat oprigting help.

Dit is egter belangrik dat die eerste koste nie verminder moet word net om 'n vermindering daar te stel nie sonder dat 'n waarde geplaas word op die moontlike koste van onderhoud, onderbrekings en herstelwerk gedurende die leeftyd van die toerusting. Dit is dus noodsaaklik dat ervaring van die faktore om die betroubaarheid te verbeter in ag geneem word wanneer kostevermindering plaasvind.

## 3 ONTWERP VAN BUITENHUISE SUBSTASIES

### 3.1 VOORLOPIGE STUDIES

Die basiese stappe in die ontwerp van 'n substasie volg 'n vasgestelde patroon en volg gewoonlik nadat



studies, area and load investigations.

The network studies should include projections to the future requirements so that the substation could be designed to allow for future extensions to be added within the original plan and so to minimise down time and to ensure that extensions will be fully compatible.

The logical starting point in developing a substation layout is the schematic which when drawn as a 3 phase diagram will indicate the points where the basic electrical separations and phase clearance will occur. Different ways of achieving the separations can be obtained by drawing the schematic differently and in 2 planes.

Preliminary dimensions of the area required for the substation can thus be obtained so that the position of the substation can be finalised. In addition the factors as described in 2.7.1 and 2.7.2 shall be considered and the final choice of the site is made, the necessity for terraces determined by cut and fill methods (computer studies). The schematic shall be applied as a preliminary layout on the available piece of land. Drainage shall be achieved by a fall of 1 in 200 but the costs of retaining walls, revetments, additional depth of foundations in newly consolidated soil shall be considered and if necessary alternative sites shall then be considered to achieve the best overall economy.

### 3.2 SITE PREPARATION

As mentioned above the site may not be level and it may be necessary to cut and fill the substation area to the necessary level and fall. All fill shall be compacted to acceptable standards. When filled, suitable stone pitching shall be applied to prevent erosion of the fill and at the same time to add to the appearance of the substation.

Every effort shall be made to minimise the cost of the site preparation without impairing the quality of the end product.

The steps of the site preparation:

- (1) Removal of all vegetation and turf to minimum depth of about 200mm.
- (2) The levelling to a fall of 1 in 200. If cut and fill, it will be necessary to consider terracing where dictated by the fall of the land.
- (3) In order to avoid flooding of the substation the surrounding areas shall be adequately graded with the possible addition of stormwater trenches. Soak pits may have to be added if natural drainage is not adequate.
- (4) To prevent future growth of vegetation within the substation weedkiller shall be applied.

### 3.3 FOUNDATIONS, BUILDINGS, TRENCHES AND KERBING

#### 3.3.1 FOUNDATIONS

Standardisation of foundations can play an important role in the substation economics. The emphasis must be on simplicity and compatibility with the steel structures.

As mentioned the depth of foundations shall take

uitgebreide netwerkstudies gedoen is en area en las ondersoek plaasgevind het.

Die netwerkstudies moet vooruitsskattings van toekomstige vereistes bevat sodat die substasie reeds in die ontwerp stadium daarvoor toelaat.

Die logiese beginpunt om 'n substasie uitleg te ontwikkel is die skematiese diagram wat wanneer dit geteken word as 'n driefase diagram, die punte aandui waar die basiese elektriese spasies en fase ruimtes sal ontstaan. Verskeie wyses om dit te behaal is om die skematiese diagram verskillend te teken en ook in twee vlakke te teken.

Voorlopige afmetings van die area benodig vir die substasie kan so verkry word sodat die posisie van die substasie finaliseer kan word. Bykomend moet die faktore soos beskryf in 2.7.1 en 2.7.2 oorweeg word en die finale keuse van die terrein gemaak word asook die noodsaaklikheid van terrasse vasgestel deur sny en opvol metodes (rekenaar studies). Die skematiese diagram sal toegepas word as 'n voorlopige uitleg op die beskikbare grond. Dreinerings moet verkry word deur 'n val van ten minste 1 in 200 maar die koste van keurmure, bykomende diepte van fondasies in nuut vasgestampte grond, moet oorweeg word en indien nodig alternatiewe terrein gekies word om die beste geheel ekonomie te verseker.

### 3.2 TERREINVOORBEREIDING

Soos gemeld hierbo mag dit wees dat die terrein nie gelyk is en dat daar gesny en opgevol moet word om die substasie area tot die verlangde vlak en val te kry. Alle opvolwerk moet gekompakteer word tot aanvaarde standaard. Die sykanne moet met klip en beton beskerm word teen erosie wat ook terselfder tyd aan die voorkoms van die substasie sal bydra.

Pogings moet aangewend word om die koste van die terrein voorbereiding te minimaliseer sonder om die kwaliteit van die eindproduk te beïnvloed.

Die stappe van terrein voorbereiding is soos volg:

- (1) Verwydering van alle plante en kleigrond tot 'n minimum diepte van 200mm onder die natuurlike grondoppervlakte.
- (2) Die gelykmaak tot 'n val van 1 in 200. Indien daar gesny en gevul word, is dit nodig dat oorweeg word om terrasse daar te stel wat gedikeer sal word deur die val van die grond.
- (3) Ten einde vloedwater uit die substasie te hou is dit nodig dat die omgewing met die nodige val daargestel word asook waar nodig, stormwater vore. Sugslope moet voorsien word indien natuurlike dreinerings nie voldoende is nie.
- (4) Om toekomstige plantegroei te voorkom in die area moet onkruidodders aangewend word.

### 3.3 FONDAMENTE, GEBOUE, VORE EN RANDSTENE

#### 3.3.1 FONDAMENTE

Standaardisasie van die fondamente kan 'n belangrike rol speel in die ekonomie van die substasiekonstruksie. Die nadruk moet egter op eenvoudigheid en aanpasbaarheid by die staalstrukture geplaas word.

Soos gemeld moet die diepte van die fondasies be-

into consideration the ground conditions and shall be increased for any fill.

Transformer foundations shall be adequately sized so that when jacks are used a sufficient surrounding area of concrete is available underneath the jacks. The necessary apron shall be provided for the moving of the transformer. Depending on the particular circumstance, towblocks can be provided to be used as anchor points in moving the transformer.

paal word volgens die grond kondisies en/of enige opvulwerk plaasgevind het.

Transformator fondamente moet van voldoende grootte wees sodat indien domkragte gebruik word daar genoegsame dra oppervlakte op die beton beskikbaar sal wees onder hierdie domkragte. Die nodig verleg stoke moet voorsien word om die transformator te kan inskuif. Afhange van die besondere omstandighede kan toublokke installeer word om te gebruik as ankerpunte vir die verkuifing van die transformator.

### 3.3.2 BUILDINGS

Buildings shall be of a simple design to house the control panels, battery systems and secondary system switchgear (11kV and 380V). The possible maintenance shall be minimised by pressurization to prevent dust problems. The appearance shall be aesthetic and preferably the buildings shall be single storey, built of face bricks with IBR roof (brown built) and provided with ceilings.

The floor level shall be at least 600mm above the natural ground level and cable entries shall be prepared to slope upwards into the substation. See figure number 1.

In order to facilitate erection of switchgear, unistrut channels can be cast into the floor at the correct dimensions thereby avoiding grouting and line up problems. See figure number 2.

The building cable trenches shall be preferably finished with angle iron pieces so welded that chequered plating can be placed in a neat way onto the trenches. See figure number 3.

### 3.3.2 GEBOUE

Die geboue moet van 'n eenvoudige ontwerp wees en moet die beheerpaneel, battery sisteme, sekondêre stelsel skakelting kan huisves. Die geboue moet onder druk geplaas word deur waaiers sodat stoftoegang geminimaliseer word en so ook die gevolglike onderhoudsprobleme. Die voorkoms van die gebou moet esteties wees en verkieslik moet die geboue slegs 'n enkel verdieping behels. Dit moet gebou word met sierstene en 'n IBR dak. Plafonne moet voorsien word.

Die vloervlak moet ten minste 600mm bo die natuurlike grondvlak wees en kabel toegange moet voorberei word om skuins opwaarts in die substasie voor te gaan. Sien figuur nommer 1.

Die oprigting van die skakelting kan vergemaklik word deur unistrut kanale in die vloer te giet in die korrekte posisies sodat daar nie agterna gate ingesny hoef te word en belyngings probleme ontstaan nie. Sien figuur nommer 2.

Die gebou kabelvore moet afgewerk word met 'n hoekyster so geswis dat die plaatstaal deksels op 'n netjiese wyse daarin gevoeg kan word. Sien figuur nommer 3.

### 3.3.3 TRENCHES

It is necessary that control, protection and power cables be laid in specially constructed cable trenches with minimise or avoid crossovers. The trenches shall be shallow and asbestos cement sheet cover or concrete covers can be used to provide the necessary protection. The trenches could add to the appearance of the substation but the layout thereof shall be optimized to reduce costs without affecting the proper routing on separation of cables.

A typical section through a cable trench is shown in figure number 4.

Drainage slots and cable exits openings shall be allowed for in the trenches.

### 3.3.3 KABELVORE

Die gebou kabelvore moet afgewerk word met 'n hoekyster so geswis dat die plaatstaal deksels op 'n kabelvore gelê moet word met apparate vore vir die tipe kabels en so uitgelê dat kruisings vermy of geminimaliseer word. Die kabelvore moet vlak wees en voorsien met asbesement deksel of beton deksel om die nodige beskerming te voorsien. Die kabelvore voeg ook tot die voorkoms van die substasie by en die uitleg daarvan moet so wees dat die koste geminimaliseer word sonder dat die behoorlike roetes of spasies tussen kabels beïnvloed word.

'n Tipiese snit deur so 'n kabel voor word gewys in figuur nommer 4.

Gleuwe vir dreinerings en openinge vir die uitneem van kabels moet toegelaat word in die vore.

### 3.3.4 KERBING AND CRUSHERSTONE

Kerbs shall be laid on the outside perimeter, for example one metre from the fence bordering the road to form a border for the crusherstone and to complete the substation.

The crusherstone shall cover the substation to a depth of at least 100mm at a level of a minimum of 50mm below the kerbing and foundation. The crusherstone not only serves as a neat finish but is a safety measure for maintenance and operating staff

### 3.3.4 RANDSTENE EN GEBREEKTE KLIP

Randstene moet op die buite rand gelê word ten minste een meter vanaf die heining en ook langs die pad om 'n grenslyn te vorm vir die gebreekte klip en om die substasie af te werk.

Die gebreekte klip sal die hele oppervlakte van die substasie bedek tot 'n diepte van ten minste 100mm op 'n vlak van 'n minimum 50mm onderkant die randstene en fondasies. Die gebreekte klip dien nie net as 'n netjiese afwerking nie maar is ook 'n veiligheidsmaatregel vir die onderhouds- en bedryfspersoneel en stap en aanraking spannings. Dit is

against step-and-touch voltages. It is in fact an insulating material with resistivity of greater than 300 ohm meters when wet.

### 3.3.5 ROADS

It is necessary to bring heavy loads on vehicles into the substation area and possibly move them about, therefore a suitable gravel road with adequate compaction and drainage is essential for the operation of the substation.

### 3.3.6 BLAST WALLS AND SOAKING PITS

Concrete or brick walls between transformers serve as a protection against burning oil which could result from an explosion.

Pits for oil with french type drains away from the transformer pit serves as a sump for oil spillage and has a way of quenching fires due to the crusher stone layer.

## 3.4 STRUCTURES

Reinforced concrete and steel have been used most commonly for substation structures, aluminium alloy and in limited circumstances wood can also be used.

### 3.4.1 CONCRETE

The only advantage of concrete structures lies in its durability. When compared with steel structures larger foundations are required, it takes longer to erect and is difficult in respect of corrections and alterations, and has little scrap value.

There are however advantages in a well planned design and concrete structures could have a useful life (at least that of the substation) and could add to the appearance of the substation.

### 3.4.2 STEEL

Steel is better than concrete in all respects, except in its durability. Protection is normally by means of hotdip galvanising which may outlive the lifespan of the substation. In polluted atmospheres it may be eventually necessary to paint the structures.

There are at least three types of structures which could be used i.e.

Standard large sections, such as channels or I-beams.

Tubes – square or round.

Lattice – consisting of light angles and strips.

The latter i.e. lattice structures entails extensive site work on erection and the design thereof is specialised. The multiplicity of edges make it more susceptible to corrosion. Using channels, I-beams and tubes in welded structures have advantage of easy design, manufacture and erection as well as facilitating galvanising. In the case of tubular struc-

inderdaad 'n isoleringsmateriaal met 'n weerstandvermoë van groter as 300 ohm meter wanneer dit nat is.

### 3.3.5 PAAIE

Dit is noodsaaklik dat swaar vragte op voertuie in die substasiearea ingebring kan word ook beweeg word in die substasiearea. Dit is dus noodsaaklik dat 'n geskikte gruispad met voldoende kompaksie en dreinering in die substasie aangebring word as 'n noodsaaklikheid vir die bedryf van die substasie.

### 3.3.6 PLOFMURE EN DREINERINGSPUTTE

Beton of baksteenmure moet opgerig word tussen die transformators om te dien as 'n beskerming teen brandende olie wat kan ontstaan as gevolg van 'n ontploffing of andersins.

'n Put vir die olie met 'n sugslote tipe dreinering vanaf die transformatorput dien as 'n reservoer vir olie wat gemors word en as 'n wyse om brand te blus as gevolg van die vergruisde kliplaag bo-op.

## 3.4 STRUKTURE

Gewapende beton – en staalstrukture word algemeen gebruik vir substasie strukture, maar aluminium aliooi en in beperkte omstandighede, hout kan ook gebruik word.

### 3.4.1 BETON

Die enigste voordeel wat beton strukture het is die duursaamheid. Wanneer dit vergelyk word met staalstrukture moet groter fondamente daar geplaas word, dit neem langer om op te rig en dit is moeilik om enige stelling of foute reg te maak en dit het geen skrot waarde nie.

Daar is egter voordele in 'n goed beplande ontwerp sodat die beton strukture 'n bruikbare lewende (ten minste die van die substasie) en dit verleen ook 'n goeie voorkoms aan die substasie.

### 3.4.2 STAAL

Staal is beter as beton in alle opsigte behalwe in die geval van die duursaamheid. Beskerming is normaalweg by wyse van warm gedompelde galvanisering wat moontlik die lewensduur van die substasie sal oorleef. Waar egter besoedelde atmosfere teenwoordig is kan dit noodsaaklik word om die strukture eventueel te verf.

Daar is ten minste drie tipe strukture wat gebruik kan word:

Standaard groot seksies soos kanale en I-balke.

Buise – vierkantig en rond.

Traliestrukture wat saamgestel is deur ligte hoekyster en stroke.

Die laasgenoemde d.i. traliestrukture verg uitgebreide terreinwerk tydens die oprigting en die ontwerp daarvan is baie gespesialiseer. Die veelvoud van kante maak dat dit baie makliker roes.

Die gebruik van I-balke en buise in geswiste strukture het die voordeel van maklike ontwerp, vervaardiging en oprigting sowel as dat die galvanisering help. In die geval van buis strukture moet die interne oppervlakte beskerm word deur teen korrosie.

tures care shall be taken of internal corrosion. In addition to hotdip galvanising the internal shall be well ventilated and provide for drainage.

With the welded structures cleaner lines are obtained.

### 3.4.3 ALUMINIUM ALLOYS

Where extreme corrosive atmospheres dictate this could be used but it will be an exception in south Africa.

### 3.4.4 WOOD

At lower voltages in rural areas treated wood could be used but unavailability of other materials may also dictate this.

## 3.5 EARTHING

### 3.5.1 EARTH MAT AND CONNECTIONS

The earth mat comprises of a counterpoise 10mm diameter annealed copper buried to a depth of one metre extending over the whole station to one metre beyond the fence. The dimensions of the mesh will depend on the position of the equipment to be earthed and the mesh voltages and possible step-and-touch voltages. Any increase in mesh voltage can be offset at the fence by having the mesh closer in the areas concerned.

All connections in the earth mat is brazed and flat copper straps 50 x 2,5mm are used to connect all steel structures, fences, gates, piping and buildings to the earth mat. The number of connections to a particular structure or equipment will depend on the particular expected fault level.

A typical substation earth mat layout with connections can be seen in figure number 5.

It is not the intention in this paper to go into the detail of the earth mat design but further reading can be done in references 4 and 5.

The earthing of the secondary neutrals of transformers shall be solid or by means of earthing resistors. The grading of insulation give economic advantages and shall be considered against the limiting earth fault currents. Earthing compensators to limit earth fault currents are used when the transformers has delta connected secondary windings.

### 3.5.2 EARTH MAT RESISTANCE

The resistance of earth mats are proportional to soil resistivity which in turn depends on moisture content and thus varies widely throughout the year and at different locations.

The effective earth mat resistance may be lowered by means of rods driven into the ground to a reasonable depth. Ideally values of overall resistance of smaller than one ohm should be obtained but in practice it has been found that values of larger than one ohm up to 7 or 8 ohms will be measured and further lowering will not be cost effective or cannot be practically achieved. However from the safety

Bykomend tot die warm gedompelde galvanisering moet die interne oppervlakte goed geventileer word en voorsien wees van dreineringsopeninge.

Met die gesweiste strukture kan skoner lyne verkry word.

### 3.4.3 ALUMINIUM ALLOOI

Waar uiterste korrosiewe atmosfeer bestaan kan dit gebruik word maar dit is die uitsondering in Suid-Afrika.

### 3.4.4 HOUT

By laer spannings in plattelandse areas kan behandelde hout gebruik word maar waar die nie beskikbaarheid van ander materiale ook die gebruik daarvan dikteer.

## 3.5 AARDING

### 3.5.1 AARDMAT EN VERBINDINGS

Die aardmat is saamgestel uit 10mm deursnee uitgegloeide koper in 'n teenwrig posisie wat gegrawe is op 'n diepte van een meter oor die hele substasie terrein asook tot een meter aan die buitekant van die draadheining. Die afmetings van die maas is afhanklik van die posisie van die toerusting wat geaard moet word asook die maasspanning en moontlike stap - en aanraakspannings. Enige vermeerdering in maasspanning kan by die heining verminder word deur die maas nader aan mekaar in die areas te bring.

Alle verbindings in die aardmat word hard soldeer en plat koper band 50 x 2,5mm word gebruik om die verbindings na alle staal strukture, heinings, hekke, pype en geboue aan die aardmat te verbind. Die aantal verbindings aan besondere struktuur of toerustings hang af van die besondere verwagte foutvlak.

'n Tipiese substasie aardmat uitleg met verbindings kan in figuur nommer 5 gesien word.

Dit is nie die bedoeling in hierdie referaat om in detail tot aardmatontwerp te gaan, maar verdere naslaanwerk kan gedoen word in verwysings 4 en 5.

Die aarding van die sekondêre neutraalpunt van transformators kan solied wees of deur middel van aardingsweerstande. Die gradering van die isolasie gee ekonomiese voordele en moet oorweeg word teenoor die beperking van aard foutstrome. Aardingskompenseerders om die aardfoutroute te beperk word gebruik waar die transformators delta verbinde sekondêre windings het.

### 3.5.2 AARDMATWEERSTAND

Die weerstand van die aardmat is in verhouding tot die grond weerstandsvermoë wat weer afhang van die voginhoud en redelik wyd skommel deur die jaar en by verskillende plekke.

Die effektiewe aardmatweerstand kan verlaag word deur middel van stawe wat ingedryf word in die grond tot 'n redelike diepte. Ideaal moet waardes van die geheel weerstand van kleiner as een ohm verkry word maar in die praktyk word gevind dat waardes groter as een ohm tot 7 of 8 ohms gemeet word en dat verdere verlagings glad nie koste effektief is of prakties bereik kan word. Van die veiligheidshoek van stap-en aanraakspannings kan die

angle the step-and-touch voltages shall be within the safety limits if the mesh apertures are relatively small. See reference 4 and 5 for further reading.

### 3.5.3 EARTHING FOR LIGHTING SCREENING

Aerial earth conductors forming a screen is considered the most effective way to protect against lightning strikes, however, high masts without aerial earth conductors (but with spikes) are used in low profile stations. In comparison of costs it is necessary to offset the greater number of height of spikes against the more substantial masts plus the cost of the wires and fittings.

Aerial conductors entering the station with overhead lines should be separated by means of spark gap insulators reducing the problem of galvanic action.

## 3.6 BUSBAR SYSTEMS AND LAYOUT

### 3.6.1 CHOICE OF SWITCHING ARRANGEMENT

Many types of switching arrangements are available and in the design the available arrangement shall be evaluated to choose the best arrangement in the short- and long-term.

The following general requirements guide the choice busbar systems:

- 1 System security
- 2 Operational flexibility with simplicity of the electrical protection arrangements
- 3 Easy extensions (already planned on)
- 4 Ease of maintenance and routine testing
- 5 Low cost

The arrangements are shown in figure nr 6.

The types of available switching arrangement:

- (a) Single busbar without bus section (limitation busbar fault puts station out of action).
- (b) Single busbar with bus section (allows greater security especially when busbar protection is installed.)
- (c) Three switch system (100% standby facilities provided the system is commonly used in the UK).
- (d) 1½ Breaker system (this is used extensively in North America) Each circuit breaker must be able to carry the combined load current of two circuit of the busbar system.
- (e) Duplicate busbar system is perhaps the most commonly used system in the world (maintenance of busbars or busbar isolators can be performed without losing more than one circuit).
- (f) Mesh system (Ring bus system)

In this arrangement the breakers are in the bus-

veiligheidsperke van die maas openinge redelik klein gehou word. Sien verwysings 4 en 5 vir verdere naslaanwerk.

### 3.5.3 AARDING VIR WEERLIG

Lug-aardeleiers vorm 'n skerm en word beskou as die mees effektiewe wyse om teen weerlig te beskerm hoewel hoëmaste sonder lug geleiers (maar met vertikale stawe) gebruik kan word in lae profiel substasies. Indien 'n koste vergelyking gedoen word is dit noodsaaklik dat die groter aantal pale en hoogte asook stawe opgeweeg word teen die meer robuuste maste met die koste van draad en toebehore.

Lug geleiers wat die substasie saam met die oorhoofse lyne ingaan moet geskei word deur vonkaping isolators om die werking van galvaniese verwerking teen te werk.

## 3.6 STAMSTELSLS EN UITLEGTE

### 3.6.1 KEUSE VAN SKAKELUITLEG

Verskeie tipes skakeluitlegte is beskikbaar en die ontwerp van die beskikbare samestellings moet opgeweeg word vir die beste rangskikking vir die kort sowel as die lang termyn.

Die volgende algemene vereistes geld in die keuse van stam stelsels:

- 1 Stelselsekureitit.
- 2 Bedryfselastisiteit met eenvoudigheid van die elektriese beskermingsamestelling.
- 3 Maklike uitbreidings (dit moet alreeds beplan wees).
- 4 Gemak van onderhoud en roetine toetse.
- 5 Lae koste.

Die uitlegte word aangedui in figuur nummer 6.

Die tipes beskikbare skakelsamestellings is soos volg:

- (a) Enkel stam sonder stamseksie (beperking van 'n stamfout sit die hele substasie uit bedryf).
- (b) Enkel stam met stam seksieskakelaar (laat groter sekureitit veral wanneer stam beskerming installeer is).
- (c) Drie skakelaarsstelsel (100% bystand fasiliteite word voorsien en hierdie stelsel word algemeen gebruik in die Verenigde Koninkryk).
- (d) 1½ Stroombreker stelsel (hierdie stelsel word uitsluitlik gebruik in Amerika). Elke stroombreker moet in staat wees om die gekombineerde las stroom van twee stroombane van die stamstelsel te kan dra.
- (e) Dubbele stamstelsel is die mees algemeenste stelsel wat gebruik word in die wêreld (onderhoud van stamme of van stam skeiskakelaar kan onderneem word sonder dat meer as een stroombaan nie beskikbaar is nie).
- (f) Maassisteem (Ring stamstelsel)

In hierdie samestelling is die stroombrekers in



bars instead of the T-offs (the system ensures that a fault in any part of the busbar will cause loss of only one circuit breaker, but a circuit breaker fault causes the loss of two circuits whilst any circuit breaker can be maintained without loss of supply or protection).

For further reading reference can be made to reference no 6.

With reasonable economics the decision to build a particular design of a busbar system shall be taken purely on technical requirements. Any saving to reduce the initial expenditure may be found to be unfortunate in the future.

### 3.6.2 BUSBAR

Substation can be built with strung conductor busbars, rigid (tubular busbars) or a mixture of the two.

When aesthetic low profile stations are to be built the solution is normally for tubular busbars with interconnections of flexible conductors and feeders on different levels.

In section 2.9 it was mentioned that the causes of failures were insulation flash-over. The number of support insulators can be reduced and the length post insulators can be increased according to a method described in Appendix A.

### 3.6.3 EQUIPMENT

#### A CIRCUIT BREAKERS

The basic requirements of a circuit breaker are as follows:

- 1 It should have the ability to handle a wide range of switching conditions.
- 2 It shall have a simple but reliable operation.
- 3 Ease of erection is essential.
- 4 It must be easy to maintain.
- 5 Proper documentation shall be available for erection, operation and maintenance.

The required switching performance shall be considered in the light of:

- (a) Out of phase switching.
- (b) Switching unloaded transformers.
- (c) Switching unloaded lines.
- (d) Switching capacitors.
- (e) Switching evolving faults.

#### B ISOLATORS

The most common designs of isolators comprise of the following:

- 1 Centre rotating post.
- 2 Single side break.

die stamme in stede van die T-aansluitings (die stelsel verseker dat 'n fout in enige deel van die stam slegs die een stroombaan uit bedryf stel maar 'n stroombreker fout sal die verlies van twee stroombane beteken terwyl die stroombrekers onderhou kan word sonder verlies van die toevoer of beskerming).

Vir verdere naslaanwerk word verwysing nommer 6 aanbeveel.

Met redelike ekonomie moet die besluit om 'n sekere ontwerp te bou van 'n stamstelsel slegs op tegniese gronde geneem word. Enige besparing om die aanvanklike uitgawes te beperk kan in die toekoms blyk 'n ongelukkige besluit te wees.

### 3.6.2 STAMME

Substasies kan gebou word met gestringde geleiers as stamme of met vaste (buis stamme) of 'n mengsel van die twee.

Wanneer die meer estetiese lae profiel substasies gebou word is die oplossing gewoonlik met buisstamme terwyl die tussen verbindings met elastiese geleiers geskied en voerders sal ook op verskillende vlakke uitgaan.

In seksie 2.9 was dit gesê dat die oorsake van foute by isolasieoorvlonking is. Die aantal ondersteunings isolatore kan verminder word en die lengte tussen die isolatore kan vermeerder word volgens 'n metode soos beskryf word in Aanhangsel A.

### 3.6.3 TOERUSTING

#### A STROOMBREKERS

Die basiese vereistes van 'n stroombreker is soos volg:

- 1 Dit moet die vermoë hê om 'n wye reeks van skakel omstandighede te kan hanteer.
- 2 Dit moet eenvoudig maar betroubare werking besit.
- 3 Dit moet maklik wees om op te rig.
- 4 Dit moet maklik wees om te onderhou.
- 5 Behoorlike dokumentasie moet beskikbaar wees vir oprigting, bedryf en onderhoud.

Die verlangde skakelwerkverrigting moet oorweeg word in lig van:

- (a) Uit faseskakeling.
- (b) Skakeling van onbelaste transformators.
- (c) Skakeling van onbelaste lyne.
- (d) Skakeling van kapasitore.
- (e) Skakeling ontwikkelende foute.

#### B. SKEISKAKELAARS

Die mees algemene ontwerpe van skeiskakelaars is soos volg saamgestel:

- 1 Sentraal roterende pool.
- 2 Enkelsydige breek.

- 3 Centre break.
- 4 Racking centre post.
- 5 Pantographs.

Except for the pantograph earth switches could be fitted to all the units and must be capable of withstanding the same thorough fault current as the main isolator. The centre rotating and single part isolator are the most commonly used in substations up to 132kV whilst the racking centre post isolators are used for rural systems. The centre break and pantograph isolator are mainly in substations with voltages above 132kV

## C CURRENT TRANSFORMERS

The current transformers shall be separate except where for economics they form an integral part of equipment.

The current transformers must be capable of, withstanding the expected through fault conditions of the substation and can be mounted on the same structure as the circuit breaker.

Due to the relative longer connection to various equipment current transformers normally have 1A secondaries.

The current transformers can also form part of circuit breakers, or transformers or could be integrated with voltage transformers to achieve economies of cost.

## D VOLTAGE TRANSFORMERS

Voltage transformers for voltages up to 132kV normally are of the electromagnetic type and thereafter of the capacitor type.

It may be possible to combine voltage transformers with current transformers.

## E INSULATORS

The choice of insulators will be subject to the insulation co-ordination and the remarks in 2.3 and 2.9 apply. It has, however, been found that careful consideration shall be given to the creepage distance of the insulators for the altitudes of the Highveld.

## F SURGE DIVERTERS

The choice of surge diverters shall take cognisance of the insulation co-ordination and preferably modern ZnO or similar unit shall be used.

## G PROTECTION

Many protective systems have to be employed in the substation in order to protect the equipment associated with the station, the most important being:

- 1 Feeders out of the station.
- 2 Step up and step down transformers.
- 3 Station busbars.

- 3 Senter breek.
- 4 Senter breek met skommelende senter pool.
- 5 Pantograaf.

Behalwe vir die pantograaf kan aardskakelaars aan alle eenhede verbind word. Aardskakelaars moet in staat wees om dieselfde deurfoutstrome te weerstaan as die hoofskakelaar. Die sentraal roterende en enkel pool isolator word die mees algemene gebruik in substasies tot 132kV terwyl die skommelende sentrale pool skeiskakelaars op buitestedelike stelsels gebruik word. Die senter breek en pantograaf skeiskakelaar is hoofsaaklik in substasies met spannings by 132kV.

## C STROOMTRANSFORMATORE

Die stroomtransformatore moet apart wees behalwe waar vir koste besparing dit 'n integrale deel vorm van toerusting.

Die stroomtransformators moet in staat wees om die verwagte deurfoutstrome te weerstaan van die substasie en kan monteer word op dieselfde strukture as die stroombrekers.

As gevolg van relatiewe langer verbindings na verskeie toerusting is dit noodsaaklik dat die stroomtransformators 1A sekondêre windings moet besit.

Die stroomtransformators kan deel vorm van stroombrekers of transformators of dit kan geïntegreer word met die spanningstransformators om ekonomie te verseker.

## D SPANNINGSTRANSFORMATORS

Spanningstransformators vir spannings tot 132kV is gewoonlik van die elektromagnetiese tipe daarna word kapasitor tipe gebruik.

Dit kan moontlik wees om die spanningstransformators met stroomtransformators te kombineer.

## E ISOLATORS

Die keuse van isolators is onderworpe aan die isolasie koördinasie en die opmerkings in 2.3 en 2.9 is van toepassing hier. Daar is egter gevind dat versigtige oorweging gegee moet word aan die kruip afstande van die isolatore vir die hoogte bo seespieël op die hoëveld.

## F STUWINGSAFLEIERS

Die keuse van stuwingsafleiers moet die isolasie koördinasie in ag neem en verkieslik moet die moderne ZnO of soortgelyke eenhede gebruik word.

## G BESKERMING

Verskeie beskermingsstelsels moet aangewend word in die substasie om die toerusting van die substasie te beskerm. Die belangrikste is die volgende:

- 1 Voerders uit die substasie.
- 2 Opstap – en afstaptransformators.
- 3 Stasiestamme.

#### 4 Breaker failures.

The protective relays could be electromagnetic or static with the tendency moving more and more towards the latter but where cognisance of the standing loads and drain on the batteries shall be taken. Again protection is a vast subject and in designing the protection systems, care shall be taken to design a simple adequate system for the requirements of the distribution system.

### H TRANSFORMERS

It is necessary to plan the positioning of the substation in such a way that the removal of a transformer could take place with a minimum of disturbance to main connections and control cables.

In figure number 7 this is shown and also illustrated on the slide number.

Transformers up to 20 MVA is available with the radiators so constructed that the transformer can be moved without removing or draining the radiators. This is a feature which could help to limit the number of standby transformers kept.

#### 3.6.4 BATTERY SYSTEMS

If the battery system in a substation fails, the whole station becomes inoperative with consequent disastrous results.

Maintenance of the battery system is therefore an essential part of the operation of substations. In order to assist the maintenance staff, proper alarms shall be installed to warn of conditions like:

- (a) Mains fail.
- (b) Charge fail.
- (c) Battery fail.
- (d) Battery high voltage.

An automatic test facility shall be provided to monitor the battery condition, continuously ensuring that the battery is capable of providing the required output under all circumstances. This device shall automatically measure the internal resistance of batteries and connectors in say 12 hour intervals. This shall be backed up by a cell monitoring system which scans the cell conditions continuously and indicates which group of cells are faulty.

In addition the doubling up of battery sets in a substation shall be considered.

#### 3.6.5 EMERGENCY POWER

During the advent of total power failures at night lighting would be required at the substations for any work to be done. Such power can be supplied by means of a portable generator which can be connected into a section of the main LV board. For this reason essential lighting and other circuits can be separated in the board with a changeover switch and a flexible conductor with a plug provide permanently to facilitate the connection of the portable generator.

#### 4 Stroombreker onklaarraking.

Die beskermings relés kan van die elektromagnetiese of die statiese tipe wees met die neiging deesdae om meer en meer in die rigting van statiese eenhede te beweeg. Die staande las en dreinerings op die batterye van statiese relés moet in ag geneem word. Weereens kan gesê word dat beskerming 'n onderwerp op sy eie is en dat versigtig ontwerp moet word om 'n eenvoudige maar genoegsame stelsel van beskerming daar te stel vir die verspreiding stelsel.

### H TRANSFORMATORS

Dit is noodsaaklik om die posisie van die substasie so te beplan dat die verwydering van 'n transformator kan plaasvind met 'n minimum versteuring van die hoof verbindings- en heerkabels.

Die word geïllustreer in skyfie en figuur 7.

Transformators van tot 20 MVA is beskikbaar met die verkoeler so gekonstrueer dat die transformator beweging kan word sonder dat die verkoelers verwyder of gedreineer hoef te word. Dit is 'n eienskap wat kan help om die aantal bystands transformators wat gehou word te beperk.

#### 3.6.4 BATTERYSTELSLS

As die batterystelsel in die substasie onklaar raak word die hele substasie onaktief met gevolglike rampspoedige resultate.

Die onderhoud van 'n batterystelsel is derhalwe 'n belangrike deel van die bedryf van substasies. Ten einde onderhoudspersoneel by te staan moet behoorlike alarmreine daar gestel word om te waarsku teen omstandighede soos:

- (a) Toevoer onklaar.
- (b) Lading onklaar.
- (c) Battery onklaar.
- (d) Battery te hoë spanning.

'n Outomatiese toetsfasiliteit moet voorsien word om die battery toestand na te gaan en voortdurend te verkeer dat die battery in staat is om die vereiste uitset onder alle omstandighede te lewer. Hierdie apparaat moet outomaties die interne weerstand van die batterye en verbindings meet in sê 12 uur intervalle. Daarbenewens moet 'n selmonitor stelsel wat die sel toestand aftas op 'n deurlopende basis en aandui watter groep van selle foutief is. Bykomend moet die verdubbeling van batterystelsels in substasies oorweeg word.

#### 3.6.5 NOODKRAG

In die geval waar daar 'n totale kragonderbreking is gedurende die nag kan beligting verskaf word by die substasies vir enige werk wat onderneem word deur 'n draagbare generator wat verbind word in 'n seksie van die hoof laagspanningskakelbord. Vir hierdie rede kan daar 'n verdeling plaasvind in die skakelbord van stroombane vir ligte ens. wat deur middel van 'n omtakskakelaar en 'n buigsame kabel met 'n prop permanent verbind om dit so maklik te maak om die draagbare generator in te prop.

### 3.6.6 FLOOD AND SECURITY LIGHTING

Flood and security lighting shall be provided so that work could be performed at night in the yard.

The question of the method of security lighting will differ depending on the risk and other methods of protection.

### 3.7 NOVEL SOLUTIONS

From time to time an undertaking is faced with an emergency due to accidents, sabotage, etc. to provide power to keep a section of their system going, while repairs are being done.

Certain manufacturers have designed a compact mobile unit with transformers and switchgear on a trailer for such a requirement.

These units can also be used in the interim where a final position for a substation cannot be available before power is required.

For mining applications such a substation can be built on slides.

Figure 7 and figure 8 show two views of such a substation.

Another novel method which also has a cost advantage is to eliminate the gantries and place the end tower within the yard. The line is then dropped down to anchor blocks with string insulators at a height providing the designed safety clearance. Connection can then be easily made to the various circuits.

### 3.8 MODERN METHODS TO DESIGN SUBSTATIONS

#### 3.8.1 DESIGN CALCULATIONS

With the advent of computers the possibilities of performing numerous calculations required in the substation design speedily and accurately came about i.e. short circuit forces on three dimensional assembly of conductors, earthing systems, etc.

#### 3.8.2 DRAWING

Modern methods of overlay and scissor draughting with the facility of a flat bed printer do help that various configurations of the layout can be speedily accomplished and so optimisation of space on cost achieved.

The next step is using the same techniques but with aid of a computer in a CAD system.

#### 3.8.3 CAD AS A DRAUGHTING AID

With the use of a specifically designed software package, a computer can be used as a draughting machine. In its simplest form this means that drawing symbols such as straight lines, circles, etc. can be reproduced graphically on the screen with the aid of a menu and stored away on a magnetic medium such as floppy discs in data format.

The menu, which is described as a flat menu, enables

### 3.6.6 SPREI – EN SEKURITEITSBELIGTING

Sprei – en sekuriteitsbeligting moet voorsien word sodat werk gedurende die donker ure in die sub-stasie werf uitgevoer word.

Die metode van sekuriteitsbeligting sal verskil afhange van die risiko en ander metodes van beskerming.

### 3.7 UNIEKE OPLOSSINGS

Van tyd tot tyd moet 'n onderneming in geval van nood as gevolg van ongelukke, sabotasie, ens. die kragvoorsiening aan 'n deel van hulle stelsel behou terwyl herstelwerk gedoen word.

Sekere vervaardigers het 'n kompakte mobiele eenhede met transformators en skakeltoeg op 'n sleepwa ontwerp vir so 'n gebruik.

Hierdie eenhede kan ook gebruik word as 'n tussen-tydse maatregel totdat finale posisies van substasies bepaal is wanneer kragvoorsiening vooraf reeds benodig is.

Vir myntoepassings kan sulke substasies op 'n sleep gebou word.

Figuur 7 en figuur 8 wys twee aansigte van so 'n sub-stasie.

'n Verdere unieke metode wat ook 'n koste voordeel het is om die steunkolom met dwarsbalk te illumineer en die eindtoring van die lyn binne in die sub-stasie perseel te plaas. Die lyn word dan afgemaak na ankerblokke met gewone string isolatore op 'n hoogte om die veiligheidsafstande te verseker en aansluiting kan dan maklik gedoen word na die verskeie stroombane.

### 3.8 MODERNE METODES VAN SUBSTASIES ONTWERP

#### 3.8.1 ONTWERP BEREKENINGS

Met die koms van rekenaars het die moontlikheid ontstaan om verskeie berekings wat nodig is in substasies daarmee te doen in 'n kort tyd asook baie akkuraat soos die kortsluitkragte op drie dimensionale samestellings van geleiers, aardstelsels, ens.

#### 3.8.2 TEKENINGE

Moderne metodes van oorleg en skêrtekening met 'n fasiliteit van 'n platbed afdrukmasjien help dat verskeie samestellings van uitgelegte vinnig te bereik kan word en sodie optimisasie van spasie en koste bewerkstellig word.

Die volgende stap is om dieselfde tegnieke te gebruik maar met behulp van 'n rekenaar in 'n CAD stelsel.

#### 3.8.3 CAD AS 'N TEKENHULPMIDDEL

Met die gebruik van 'n spesifieke ontwerpde sagteware pakket kan 'n rekenaar gebruik word as 'n tekenmasjien. In die eenvoudigste vorm beteken dit dat tekensimbole soos reguit lyne, sirkels, ens. grafies reproduseer kan word op die skerm met behulp van 'n menu en dit kan gebêre word op 'n magnetiese medium soos slapskywe in die normale data formaat.

Die menu wat beskryf word as 'n plat menu be-

the computer to perform certain predetermined functions by using certain sections of the main program by simply indicating on the menu the function which you would like to perform.

The fact that the graphical information on the screen can be stored on a magnetic medium provides the ability to create files with specific information on the drawings.

In order to use the machine as effective as possible, one has to break the drawing down into patterns. The patterns can take the form of symbols, a few symbols grouped together in a typical arrangement or even a part of the complete drawing. These patterns are then stored away separately.

By combining patterns a drawing is "assembled" in much the same way as the manual "cut and paste" or scissor drawing method.

An added advantage is however the systems' ability to create electronic overlays which can be switched on or off and thus be printed or not. Fig 9a, 9b and 9c serves as an illustration of this technique.

Using this facility when making up patterns, one is able to recall a pattern and add it to the drawing with all the sub-patterns on the correct layer.

Making up patterns and creating a library containing symbols, patterns and typical drawings is an ongoing process which although it is very time consuming, enhances the versatility and speed with which drawings can be put together.

#### 3.8.4 THE USE OF CAD DURING THE DESIGN STAGES OF A SUBSTATION

During the initial stages of design and layout, typical bay arrangements are assembled, i.e. a transformer circuit, incoming circuit and feeder circuit. When these layouts are finalised, the bays are duplicated, rotated and arranged on the grid as required.

The building which was drawn completely separately is now transferred onto the drawing in the correct position. Cable trenches and other small details can now be positioned onto the drawing.

When the 1 : 100 drawings are completed certain layers are transferred, rescaled to 1 : 200 and added to the site plan which was previously digitised into the computer. Levels are determined and the excavation/backfilling can now be indicated.

Sections, schematics and protection diagrams are also assembled by using standard existing patterns from the library.

### 4 ERECTION TESTING AND COMMISSIONING

#### 4.1 ERECTION

Proper quality assurance shall be kept during the erection process to ensure that the site work is of acceptable standards.

#### 4.2 TESTING AND COMMISSIONING

The substation must be properly tested and commis-

werkstellig dat die rekenaar sekere vooraf bepaalde funksies uitvoer met gebruikmaking van sekere dele van die hoofprogram deur die funksie wat uitgevoer moet word eenvoudig aan te dui.

Deurdad grafiese inligting op die skerm op magnetiese medium gebere kan word skep dit die vermoë om leers van spesifieke inligting vas te lê.

Ten einde die masjien so effektief as moontlik te gebruik moet die tekening in patrone verdeel word. Die patrone kan die vorm aanneem van simbole, 'n paar simbole kan saam gegroepeer word in 'n tipiese samestelling of deel van die volledige tekening. Hierdie patrone kan dan apart gebere word.

Deur die patrone te kombineer kan 'n tekening saamgestel word op 'n soortgelyke wyse soos die skêr tekening.

'n Verdere voordeel is die stelsel se vermoë om elektroniese oorlegtekening te bewerkstellig wat in en uit geskakel kan word met ander woorde wat af gedruk kan word of nie. Figuur 9a, 9b en 9c dien as 'n illustrasie van hierdie tegniek.

Deur hierdie fasiliteit te gebruik wanneer patrone gemaak word kan 'n patroon herroep word en in 'n tekening verwerk word met al die sub-patrone op die korrekte laag.

Die maak van patrone en die skepping van 'n biblioteek wat al die simbole patrone en tipiese tekening bevat is 'n deurlopende proses wat hoewel dit tyd intensief is, help dit om die veelsydigheid en die spoed waarmee tekening saamgestel kan word.

#### 3.8.4 DIE GEBRUIK VAN CAD GEDURENDE DIE ONTWERP STADIUMS VAN 'N SUBSTASIE

Gedurende die begin stadiums van ontwerp en uitleg kan tipiese samestelling byeengebring word soos 'n transformator stroombaan, inkomende stroombaan en voerder stroombaan. Met hierdie uitlegte gefinaliseer, kan dit gedupliseer word, geroteer word en saamgestel word op 'n rooster soos vereis.

Die gebou wat geheel en al as 'n aparte tekening saamgestel is, kan nou op die hele uitleg oorgeplaas word en in die korrekte posisie geplaas word.

Kabelvore en ander klein details kan ook geplaas word op die tekening.

Met 'n skaal van 1 : 100 voltooi kan sekere lae dan oorgeplaas word en herskaal word tot 1 : 200 en op die terreinplan geplaas word. Terreinplanne kan ook in die rekenaar verstip word. Vlakke kan vasgestel word en uitgrawings en terugvulling kan aangedui word.

Snitte, skematiese en beskermingsdiagramme kan ook saamgestel word deur die standaard bestaande patrone te gebruik uit die biblioteek.

### 4 OPRIGTING, TOETS EN INGEBRUIKSTELLING

#### 4.1 OPRIGTING

Behoorlike kwaliteitsversekering moet voortdurend gedurende die oprigtings proses uitgevoer word om te verseker dat die terreinwerk van aanvaarde standarde is.

#### 4.2 TOETS EN INGEBRUIKSTELLING

Die substasie moet behoorlik getoets en ingebruik



sioned to ensure that all operations will occur as intended. Time spent on this will be well spent as it will eliminate possible costly outages due to incorrect wiring or mechanical alignment. It also gives the final check on all the manufactured equipment and could prevent possible malfunctioning.

## 5 CONCLUSION

Municipal electrical undertakings are more and more facing the problem to upgrade to higher voltages and the key element in such an upgrading will be outdoor substations.

The paper provides an overview of substation design and also describes the modern methods of CAD applied to substation design.

In tackling such projects the best technical solutions at the most economical cost can be achieved but a large input of experience and knowledge are necessary.

## 6 ACKNOWLEDGES

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## APPENDIX A

The common way to join busbar tubes is to place the joint immediately above the top of the post-insulator, see arrows in fig A1.

To enable the length between post-insulators, to be increased and to reduce the size of the joint clamp, the joint shall be moved away from the post-insulator.

Since the maximum positive moment in the tube occurs right above the post-insulator and the maximum negative moment is in the middle of the span, the moment must pass zero at one spot.

The joint of the busbar should be placed at that spot or close to it.

Depending on the number of post-insulators for a complete busbar, the neutral point for the moment is 20% to 25%, calculated from one post-insulator, see fig A2.

The transverse force is also lower at the point 20% to 25% from the post-insulator. The maximum transverse force is on the top of the post-insulator and zero in the middle.

When the length between the post-insulators increases it is usually the deflection, or the mechanical strength of the busbar that determines the dimension not the electrical parameters.

A common rule is that the deflection of the busbar tube should not be more than the length between two post-insulators, divided by 150.

In fig A1, the maximum deflection in each bay is calculated as:

$$d = 0.013 \cdot C \cdot L^4$$

where: L = length between post-insulators  
C = constant

gestel word ten einde te verseker dat die bedryf daarvan sal geskied soos dit gespesifiseer is. Tyd hieraan gespandeer sal goeie tyd wees want dit kan die maontlike toekomstige onderbrekings elimineer wat kan ontstaan as gevolg van foutiewe bedrading en meganiese belyning. Dit gee ook 'n finale nagaan van alle vervaardigde toerusting en kan die maontlike verkeerde werking voorkom.

## 5 GEVOLGTREKKING

Munisipale elektriese ondernemings word meer en meer met die probleem van hoë spannings gekonfronteer en die gevolglike buitenshuise substasies.

Die referaat het 'n oorsig gegee van substasie ontwerp en 'n kort beskrywing van moderne metodes van CAD tot die ontwerp van substasies.

Wanneer sulke projekte aangepak word moet die beste tegniese oplossings teen die mees ekonomiese koste bereik word, maar 'n groot inset van ervaring en kennis is nodig.

## 6 ERKENNINGS

Dank word betuig aan die personeel van JD van Niekerk & Genote Ing in die voorbereiding van hierdie referaat. 'n Spesiale woord van dank word aan Mnr Asea Electric (Edms) Bpk gerig vir die toestemming om die inligting van hulle mobiele en sloop substasies te gebruik asook aan Mnr Anderson vir sy kontribusie van Aanhangsel A.

## AANHANGSEL A

Die mees gebruikelike wyse om stambuis te las is om die las van die buis direk bokant 'n isolator te plaas, sien die pyltjies in figuur A1.

Om die lengte tussen die dra isolatore te vermeerder en ook die grootte van die lasklamp te verklein is dit nodig om die las weg te beweeg van die isolator.

Aangesien die maksimum positiewe moment in die buis plaasvind reg bokant die isolator en die maksimum negatiewe moment in die middel van die span moet hierdie moment deur nul gaan op 'n besondere punt.

Die las van die span moet so geplaas word by hierdie punt of naby dit.

Afhangende van die aantal isolatore vir die hele stam, is die neutrale punt 20% to 25% bereken vanaf een isolator, sien figuur A2.

Die dwarskragte is ook laer by 'n punt 20% tot 25% vanaf die isolator. Die maksimum dwarskrag is bokant die isolator met die nulpunt in die middel.

As die lengte tussen die isolatore vermeerder word is dit normaalweg die afwyking of die meganiese sterkte van die stam wat die afmetings vasleë en nie die elektriese deel nie.

'n Gebruikelike reël is dat die afwyking van die stambuis nie meer sal wees as die afstand tussen twee isolatore gedeel met 150.

In figuur A1 is die maksimum afwyking in elke nis soos volg te bereken:

$$d = 0.013 \cdot C \cdot L^4$$

waar: L = lengte tussen isolatore  
C = konstante

The deflection in the middle bay in fig A2 is calculated as:

$$d = 0,0068 \cdot C \cdot L^4$$

The difference in deflection, for the same length between supports, is 90%.

Another question is, how much can the length, between the supports in fig A2 compared to fig A1, be increased within the limit of deflection.

The deflections for fig A1 respective fig A2 are:

$$d_1 = C^{0,013} \cdot L_1^4 \cdot C$$

$$d_2 = C^{0,0068} \cdot L_2^4 \cdot C$$

$$\text{where: } d^1 = \frac{L_1}{150}$$

$$d_2 = \frac{L_2}{150}$$

$$L_1 = 150 \cdot C \cdot 0,013 L_1^4$$

$$L_2 = 150 \cdot C \cdot 0,0068 L_2^4$$

$$\frac{L_1}{L_2} = 1,912 \cdot \left(\frac{L_1}{L_2}\right)^4$$

$$\frac{L_1}{L_2} = 0 \text{ not significant}$$

$$\frac{L_1}{L_2} = 1,912 \left(\frac{L_1}{L_2}\right)^3$$

$$L_1 = 0,806$$

$$L_2 = 1,24 L_1$$

In other words it is possible, in fig A2 to increase the length between the supports with 24% compared to the arrangement in fig A1.

## REFERENCES

1. H.B. Norman: Proposed parameters for Standard power transformers for the Electricity Supply Commission. "Transactions of the S.A. Institute of Electrical Engineers October 1972".
2. R.L. Giles: Layout of EHV substations Cambridge University Press.
3. Reliability of Power Supply Systems: Conference Publication No 225 IEE London.
4. Lonnie E. Crawford and Shaw M. Griffith: "A closer look at "the facts of life" in Ground Mat design" Transactions on Industry applications Vol 1 A-15 No 3 May/June 1979.
5. E.F. Raynham: Major Aspects in equipment requirements design and construction of the Electricity Commissions 400kV a.c. distribution stations. Transactions of the SA Institute of Electrical Engineers October 1971.
6. F.W. Davenport, E.M. Magidson, Yu A Ya kur: Substation Bus-Switching arrangements CIGRE Report by Working group 05 at Study Committee No 23.

Die afwyking in die middelste nis in figuur A 2 is bereken soos volg:

$$d = 0,0068 \cdot C \cdot L^4$$

Die verskil in afwyking vir die dieselfde lengte tussen ondersteuningspunte is 90%. 'n Ander vraag is met hoeveel kan die lengte vermeerder word binne die beperkings van die afwyking van figuur A1 en 2A.

Die afwyking vir figuur A1 ten opsigte van A2 is:

$$d_1 = C^{0,013} \cdot L_1^4 \cdot C$$

$$d_2 = C^{0,0068} \cdot L_2^4 \cdot C$$

$$\text{waar } d^1 = \frac{L_1}{150}$$

$$d_2 = \frac{L_2}{150}$$

$$L_1 = 150 \cdot C \cdot 0,013 L_1^4$$

$$L_2 = 150 \cdot C \cdot 0,0068 L_2^4$$

$$\frac{L_1}{L_2} = 1,912 \cdot \left(\frac{L_1}{L_2}\right)^4$$

$$\frac{L_1}{L_2} = 0 \text{ is nie belangrik nie}$$

$$\frac{L_1}{L_2} = 1,912 \left(\frac{L_1}{L_2}\right)^3$$

$$L_1 = 0,806$$

$$L_2 = 1,24 L_1$$

Dit is dus moontlik om die lengte soos figuur A2 te vermeerder met 24% in vergelyking met die samestelling soos in A1.

## VERWYSINGS

1. H.B. Norman: Proposed parameters for Standard power transformers for the Electricity Supply Commission. "Transactions of the S.A. Institute of Electrical Engineers October 1972".
2. R.L. Giles: Layout of EHV substations Cambridge University Press.
3. Reliability of Power Supply Systems: Conference Publication No 225 IEE London.
4. Lonnie E. Crawford and Shaw M. Griffith: "A closer look at "the facts of life" in Ground Mat design" Transactions on Industry applications Vol 1 A-15 No 3 May/June 1979.
5. E.F. Raynham: Major Aspects in equipment requirements design and construction of the Electricity Commissions 400kV a.c. distribution stations. Transactions of the SA Institute of Electrical Engineers October 1971.
6. F.W. Davenport, E.M. Magidson, Yu A Ya kur: Substation Bus-Switching arrangements CIGRE Report by Working group 05 at Study Committee No 23.

FIGURE No. A1 / FIGUUR Nr. A1

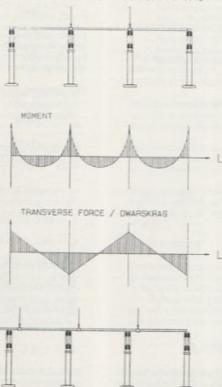
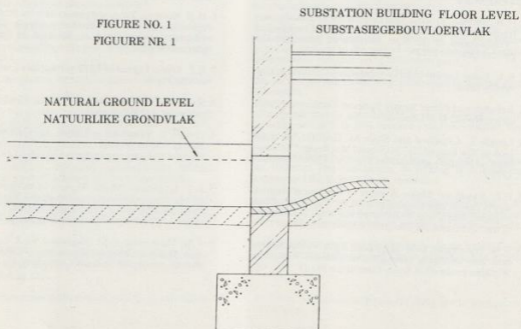


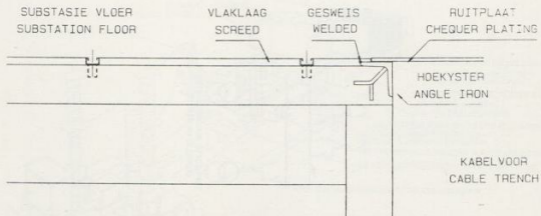
FIGURE No. A2 / FIGUUR Nr. A2

FIGURE NO. 1  
FIGURE NR. 1



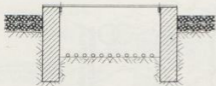
TYPICAL CABLE ENTRY INTO SUBSTATION BUILDINGS  
TIPIESE KABELTOEGANG IN SUBSTASIE GEBOU

FIGURE No.2 & 3  
FIGURES No.2 & 3



SNIT WAT UNISTRUT BEVESTIGING  
TOON VIR SKAKELTUIG  
SECTION SHOWING UNISTRUT FIXING  
FOR SWITCHGEAR

FIGUR No.4  
FIGURE No.4



TIPIESE BUITENHUISE KABELVOOR  
MET DEKSEL  
TYPICAL OUTSIDE CABLE TRENCH  
WITH COVER

FIGUR No.5 / FIGURE No.5

TYPISKE AARHMAT DETAIL / TYPICAL EARTHMAT DETAILS

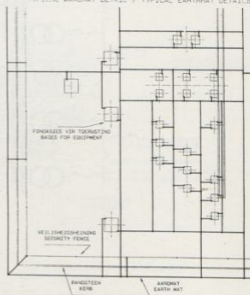
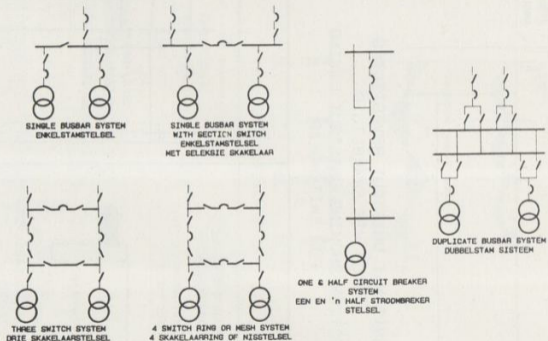


FIGURE No.6  
FIGUUR Nr.6

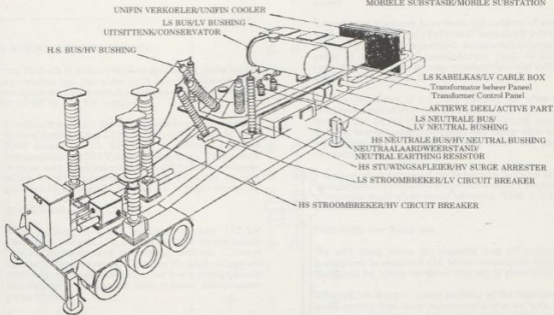


VARIOUS BUSBAR SYSTEMS  
VERSKEIE STAM STELSLS



FIGUUR NR 7/ FIGURE 7

MOBIELE SUBSTASIE/MOBILE SUBSTATION



FIGUUR NR 8/FIGURE NO 8

MOBIELE SUBSTASIE/MOBILE SUBSTATION

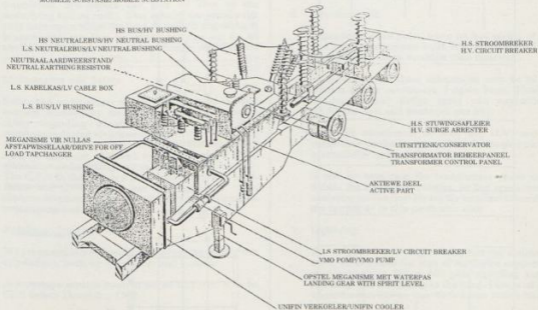


FIGURE No.9a  
FIGUR Nr.9a

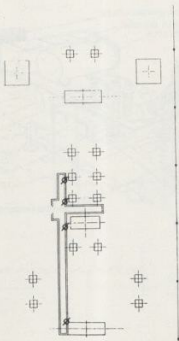


FIGURE No.9b  
FIGUR Nr.9b

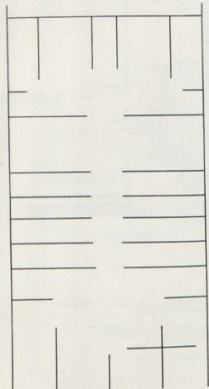
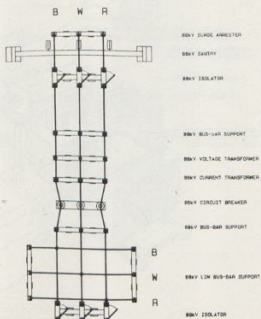


FIGURE No.9c  
FIGUR Nr.9c



## DISCUSSIONS - BESPREKINGS

### MR GERRY BOWEN: ESCOM

Mr van Niekerk is to be complimented on his paper which in my opinion has put some light into dark corners and shown up all the points which go into an outdoor substation in the 33 kV to 132 kV bracket.

1. I believe that 22 kV for underground systems could be in for a revival. After all the V.F.P. reticulated the local Reef mines at 22 kV and, I believe, supplied Johannesburg at 22 kV some 60 years ago. Today there is some very good economical distribution switchgear which is price attractive and 22 kV cable is only glorified 11 kV after all, be it XLPE or paper insulated.
2. Rated Short Circuit Current

With modern Sf 6 gas insulated outdoor 132 kV switchgear one gets 31,5 kA just because the gas is such a good insulator and quenching medium. Current ratings just follow along. Costs for the high ratings are relatively not much more than for lower ratings. Costs and ratings are attractive from a lower maintenance point-of-view.

3. Transformers

From a load point-of-view I would like to see 132/22 kV transformers with ratings of 2 to 3 MVA for rural suppliers. Enquiries reveal that 3 MVA transformers will have a 5 MVA winding and be almost the cost of a 5 MVA unit which is almost the cost of a 10 MVA unit.

4. Soil resistivity

This I believe should be an item to really be considered. It's values can give an idea of the underlying soil on rocks. Sites offered are usually the only ones upon which the land owner will negotiate. It is certainly a test that we intend carrying out on all chosen or offered sites before finally deciding on purchase.

5. Maintenance and Safety

Safety and maintenance can very well go hand-in-hand because accessibility means space and space means safety regarding working clearances. Item 2.11 mentions reducing maintenance zones to reduce space and land area. This could possibly mean that two feeders must be taken out of service for maintenance if safety clearances and working spaces are reduced too much. The C.T.'s in the C.B. is a good space saver in a yard. Rand and OFS Region has H.V. and L.V. surge arrester brackets fitted to transformers in an attempt to save money and space.

6. Buildings, Trenches, etc.

We are constantly pressurised to reduce the costs of our substations, both by consumers and Escom.

A prototype control room at about R275/m<sup>2</sup> is to be built before December 1985.

It is on the basis of a prefabricated block principle. There are no cable trenches as we know them, but there is adequate cable access.

A feasibility study has been done to use the building for switchgear.

The screen shows the basic idea of providing cable access.

Trenches in the yard have been the subject of much soul-searching but I'm afraid that I have to tell you that the cost, in our eyes, is justified. From a safety/security point of view, in an establishment yard, to install secondary cables can damage existing ones laid solid in spite of good records and carefully digging.

Just as important is the yard stoning, for after the installation of cables it can, and will, and does get into a mess. After all the stone, as Mr van Niekerk says, is there to improve step potentials, and safety after all is paramount and is a bonus at reasonable cost where neatness is concerned.

I can't agree about gravel roads because the ones that I have seen tend eventually to become a mess. I think that a concrete road gives peace of mind. That is why I specify them.

7. Blast walls and Soak pits

We add them when (a) security and oil pollution prevention is required (b) when consumers request them and (c) when we think they are a good idea.

After all, we have so many stations of the medium to small variety that these items would cost us, and our consumers, a fortune and the vast majority will never be needed. The best deterrent for sabotage or damage, in my opinion is to restore supplies rapidly. This demoralises the terrorist, when applicable, and raise morale for consumers.

Some of you will no doubt have seen that our soak pits are placed on ground level with our concrete base and a low wall around them to reduce costs. Our policy is to let the transformer "stew in its own juice" and possibly burn itself out safely.

8. Structures, etc.

I have tried wood poles, when we had plenty of poles, and here is the last one built. It is at Pontdrift. Lattice structures are more versatile than concrete.

From the screen these substations may be of some interest to our consumers, I again hope. Firstly the tubular bus-bar design saves you approximately R8 000 in civil and steelwork per bay.

Note the attachment of both the H.V. and L.V. conductors to the structures in order to give plenty of accessibility around the site.

It will be seen that the transformer phase colours dictate the line phase colours, so line cross-overs are necessary on one line. Hence the terminal tower right in the station as in this particular case.

9. Lightning

The original Escom high strung bus-bar stations had earth wires across the tops of earthwire supports and gave something like a 60° plus shielding angle to anything and everything in the yard. I know of a case when the bus-bar on one station was struck twice.

So my first tubular bus-bar station had 4 x 23 metre tall masts giving a  $\pm 30^\circ$  shielding angle over 95% of the yard.

After discussion with our Dr Stringfellow he recommended no lightning protection as he calculated that a low profile station could expect one strike in 70 years. Perhaps that is why he is now overseas.

I will draw a veil over the short intermediate time when I provided an earthed grid over the station. I shuddered at the thought of this lot falling onto the bus-bar.

#### 10. Switching arrangement

We normally supply a single H.V. bus-bar but, I suppose that with agreement and a contribution we can supply anything you require.

#### 11. Switching unloaded transformers

As you know we specify an air-break switch to control the transformer on the H.V. side. After suffering unknown transformer failures it was thought that the opening of these isolators on un-loaded transformers caused high impulse voltages. I can assure you that nothing happened when we had tests done to examine the theory. Spikes of twice normal voltage were difficult to create. Rapid on-off switching of the C.B. gave 2.8% to 3.2 times normal voltage in 1-2 cycles, but no arrester "went over".

This is believed to be due to the fact that modern transformers have such a small no-load current.

#### 12. Insulators

I prefer an aerodynamic profile even though we don't install them in all cases.

#### 13. Conclusion

Batteries are usually Cinderellas but the number of problems though few, that we have experienced due to our batteries and those of our consumers, falling, are to say the least embarrassing. The automatic test facility for each cell is a very good idea.

As a matter of policy we do not install or connect any emergency D.C. lighting to batteries used for tripping purposes where there is only one battery.

I am even thinking, as a cost saving measure, to replace bus-section isolators with a bolted removable tube section in the smaller rural/urban stations as well as consumer's stations. Operation requirements will of course have to be appeased as well as cost justified.

#### MNR GENE HEYDENRYCH: MIDDELBURG TVL

Mnr die President, ek wil mnr van Niekerk gelukwens met sy referaat wat ek as 'n betroubare en byderwetse handleiding vir die ontwerp van buitemuurse substasies beskou. Ek is oortuig dat dit vir baie jare as 'n naslaanwerk gebruik sal word.

Vergun my enkele opmerkings en vrae:

1. Omdat substasies normaalweg deel van langtermyn-bepanning vorm, dws tot 25 jaar, is die keuse van kortsluitingbreekvermoë in die ontwerp stadium 'n wesenlike probleem. Weens die onvoorspelbaarheid van Evkom se toekomstige verspreidingsstelsel oor so 'n lang tydperk, is dit wenslik om op 'n hoër foutvlak as wat onmiddellik bepaalbaar is te besluit, veral omdat die aanvanklike koste van toerusting nie direk in verhouding tot die foutvermoë staan nie.

2. By die bepaling van substasieterraine, word die ontwerper dikwels gedwing om van uitvalgrond, wat nie

vir ander doeleindes geskik is nie, gebruik te maak. Rotsagtige randjies en grond met 'n skuins helling is selfs vir substasieterraine vanuit 'n ekonomiese oogpunt onbruikbaar, wat die keuse dan laat val op beskikbare laagliggende gelyke grond. Sulke grond is egter dikwels onderhewig aan oorstroming en swak dreinerig.

Terreinvoorbereiding behoort dus in hierdie gevalle besondere aandag te geniet volgens die riglyne in mnr van Niekerk se referaat uiteengesit.

3. Wat die kabeltoegange na geboue betref, word gemerk dat alhoewel die vloervlak minstens 600 mm bokant natuurlike grondvlak gespesifiseer word, die vloer van die kabelkanale steeds laer as grondvlak aangetoon word in figuur 1. Dit het tot gevolg dat stormwater wel toegang tot die kabelkanale kan vind, en weens die aanwesigheid van kabels op die kanaalbod, opdam.

Die blootstelling van die skakeltuig wat direk bokant sulke kabelkanale gepaas is, aan die vottige toestande, veroorsaak kondensering binne die skakelpaneel, met rampspoedige gevolge. Die blote aanbring van elektriese verwarmers binne die skakeltuig kon nie die probleem oplos nie en daar moes van permanente uitsuiwelaars gebruik gemaak word wat direk met die lugruim in die kabelkanale verbind is en wat 'n negatiewe druk binne die kabelkanale veroorsaak.

Dit sou dus raadsaam wees om die vloer van die kabelkanale bokant grondvlak te spesifiseer.

4. Alhoewel die gebruik van asbessementplate as kanaalbedekking aanvanklik sinvol voorkom, word in die praktyk gevind dat die aanhoudende blootstelling van een oppervlakte aan die son en die ander aan vogtigheid in die kanaalruimtes, die plate laat verbuig. Instandhoudingspersoneel gebruik ook hierdie kanaaloppervlaktes as loopgange met gevolglike verbrotting daarvan. Betonblaie blyk meer suksesvol te wees.

5. 'n Interessante aspek wat mnr van Niekerk aanraak, is die voorsiening van vangputte om olie uit beskadigde transformatore op te vang en sodoende die omvang van brandskade te beperk. Alhoewel hierdie aspek reeds standaardpraktyk in sommige Europese lande is, blyk dit nog nie algemene inslag in Suid-Afrika te vind nie. Ek sal graag mnr van Niekerk se kommentaar hieroor wil verneem asook oor sy siening oor die gebruik van olie-vrye epoksie-geïsoleerde transformatore om hierdie voorsorgmaatreef onnodig te maak.

6. Die gebruik van rekenaargesteunde ontwerpstelsels hou besliste voordele in waar herhalende ontwerpwerk gedoen word en waar die tyd wat aan die opbou van standaard-simbole en tekeningtipes bestee is, verhaal kan word. Myns insiens kan die omvang van hierdie aspek van ontwerpwerk in slegs enkele munisipale elektrisiteitsondernemings die bykomende koste daarvan gerugdig.

#### MR M P P CLARKE — RANDBURG

One of the most significant comments relating to substation design appears at the end of the paragraph 2.11 "Economics".

Inter alia it says that the evaluation of possible maintenance, outages and repair cost must be considered before the reductions in first costs by innovative design are finally accepted.

This cannot be too highly stressed.

It is an unfortunate fact that most of us here are so "electricity conditioned" that we do not remember or

sometimes fail to recognise that the difference between 20th century living in all its facets and 1st century living, can be ultimately ascribed to one factor and one factor only. And that is, electricity.

The implication is clear, if 20th century living is what society requires then a reliable supply of electricity is THE priority and it is incumbent on us to see that it is available.

Which of course bears directly on the effects and costs of supply failures and/or outages and repair times.

We ignore this or underestimate its importance at our peril and to the detriment of the communities we serve.

And let us not forget that by the very nature of the commodity, ie electricity — its uses escalate in variety and importance almost daily and therefore, the substitution which we may be designing to serve a relatively conventional load today will in fact be supplying a much more sophisticated need tomorrow or the day after.

Who amongst us supply engineers present, have not experienced the wrath of consumers using sophisticated computer and other devices, elaborate manufacturing and other processes, and so on, when a few second supply interruption occurs, or when there is a shut-down of only a few minutes duration?

Do we seriously sit down and analyse the costs to consumers or do we shrug our shoulders and withdraw behind the protection of "the by laws"?

I submit that the importance of reliability-of-supply, ease of operation, maintenance and repair are hopelessly underestimated and that we do our consumers and therefore the community as a whole — dare I say "civilisation"? — a grave dis-service by so doing.

My plea is that we should all re-think these factors and evaluate them very carefully before finally deciding on a particular design — especially one that looks highly attractive in terms of low first cost. Let us not forget that there is always a trade-off and a "cheap buy" is very often "expensive" in the long run.

Please do not misunderstand me, I am not advocating grand or luxury schemes. What I advocate is designs that are reliable and easy to operate and maintain even if they require high capital inputs at the first cost stage.

I thank Mr van Niekerk for a very interesting and stimulating paper.

#### MR T GAUNT: AFFILIATE

As much as we would all like to design a standard 132 kV substation and apply it to every situation, in reality this is rarely possible due to numerous influencing factors. In effect most substation designs therefore become novel designs in one way or another.

There are two points, however, which I feel are relevant to the design and timing of 132 kV substations.

#### 1. STANDARD CAPACITY

Power Engineers are continually assessing the firm transformer capacities available on their reticulation network against the predicted maximum demand of

their utility. The cost of installing 100% standby capacity is sometimes difficult to justify, especially to Town Clerks and Councils. One positive solution is to adopt the two out of three principle, where the installation of three transformers allows the outage of any one unit while retaining 66% of the installed capacity, compared to the loss of one unit in a two transformer installation leaves only 50% of the installed capacity. The installation of three slightly smaller transformers over two or three phases of development also assists in spreading the capital outlay over many years.

2. A second novel solution may be not to install the step down transformer at all. In some situations it may be possible to build the 132 kV line to the new load centre area but to operate the new line at the existing medium voltage level until the power demand requires the installation of the transformers.

This solution, when it can be applied, can again spread the capital investment requirement over many years. This method of system planning is sometimes referred to as "leap-frogging" into the new load centre area and I would suggest that you "look before you leap".

#### MR J D VAN NIEKERK: AFFILIATE

Mr President, Ladies and Gentlemen, I would like to thank Mr Max Clarke for highlighting the very important aspect of the design of anything electrical. I have a saying if a person has not had to get up in the middle of the night because of a bad design or get scolded by a consumer he does not know what design is about because sometimes failures and unnecessary tripping can be due to bad designs. An aspect to add to that I do think that sometimes in certain load conditions we do not consider enough the overload capabilities of transformers for example of cables for short periods and sometimes one should bring that in the design.

I agree with Mr Gaunt in the respect that every sub-station is a novel design on its own and one has got to bring about the features, but the principles of design remain the same. If one adapts that to the various conditions one should get to a satisfying solution. The aspect of the standby capacity I do agree with. One could start with smaller transformers but sometimes you find that a 20 mva transformer cost say about R1 700 per mva as against a 10 mva transformer which cost R2 800 per mva and bringing about the cost difference between the transformers at present day prices is only about R30 000 in say R170 000 and then one has to weigh up what these long term advantages are.

In areas where you have load build up we have often used smaller transformers which are shifted then to another load position when it gets to full load condition and then replaced with a larger transformer. It depends entirely on how much capacity one has got available in spare transformers and how one could shift them around.

The other suggestion which I have made in the paper is the question of having at different sub-stations similar transformers and having only one virtually as a spare which one could move at very short notice and very short time into a position and therefore this particular layout we do in feeding the transformers.

Spreading capital investment could also have the problem that inflation comes about in the future. We have to pay so much more for a particular item. We all know it is relative but one has got to weigh that up.



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# REPORTS – VERSLAË

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*Mr Bennie van der Walt*

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## REPORT OF THE SECRETARY FOR THE YEARS 1983 AND 1984

## VERSLAG VAN DIE SEKRETARIS VIR DIE JARE 1983 EN 1984

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On behalf of the Executive Council of the Association of Municipal Electricity Undertakings of South Africa, I take pleasure in submitting the following condensed report of the activities of the AMEU for the financial years of 1983 and 1984.

### EXECUTIVE COUNCIL

**MR W BARNARD – President**

Together with their Councillor Members who are nominated by their respective Councils, the following Engineer Members were elected to the Executive Council at the 48th Convention held in Johannesburg in 1983:

Messrs/Mnre J A Loubser  
NS Botha  
MPP Clarke

### 1. UITVOERENDE RAAD

**MNR W BARNARD – President**

Tesame met hul Raadslede wat deur die betrokke Elektrisiteitsondernemings genomineer word, is die volgende Ingenieurslede tydens die 48ste Konvensie gehou in Johannesburg in 1983 gekies tot die Uitvoerende Raad:

(a)  
– Benoni President Elect/Aangewese President  
– Bloemfontein  
– Randburg

E G Davies	-	Pietermaritzburg
J D Dawson	-	Uitenhage
A H L Fortmann	-	Boksburg
K J Murphy	-	Somerset West/Wes
G J Nortjé	-	Germiston
D C Palser	-	Cape Town/Kaapstad

Pursuant to the Constitution the following past presidents together with their Councillors are also members of the Executive Council:

Messrs/Mnre D H Fraser	-	Durban
P J Botes	-	Rodepoort
E de C Pretorius	-	Potchefstroom
K G Robson	-	East London/Oos-Londen
J K von Ahlften	-	Springs

The Executive Council held four meetings, and the Standing Committee four meetings.

(b) Ingevolge die Grondwet is die volgende voormalige presidente met hul raadslede ook lede van die Uitvoerende Raad:

Die Uitvoerende Raad het vier keer vergader en die Dagbestuur vier keer.

## BRANCHES 2. TAKKE

The five Branches have held regular meetings to discuss matters of mutual interest. Their office bearers for 1984 were as follows:

Die vyf Takke het gereeld bymekaar gekom om sake van gemeenskaplike belang te bespreek. Hul ampsdraers vir 1984 was soos volg:

### HIGHVELD BRANCH 2.1 HOËVELDTAK

Chairman/Voorsitter - M van der Spuy, Johannesburg  
 Vice-Chairman/Ondervoorsitter - G F Rautenbach, Klerksdorp  
 Secretary/Sekretaris - G C Theron, Vanderbijlpark

### GOOD HOPE BRANCH 2.2 GOEIEHOOPTAK

Chairman/Voorsitter - W P Rattey, Strand  
 Vice-Chairman/Ondervoorsitter - S A Mostert, George  
 Secretary/Sekretaris - A C T Frantz, Cape Town

### NATAL BRANCH 2.3 NATALTAK

Chairman/Voorsitter - E B Pike, Vryheid  
 Secretary/Sekretaris - E G Davies, Pietermaritzburg

### EASTERN CAPE BRANCH 2.4 OOS-KAAPTAK

Chairman/Voorsitter - C E Jelliman, Fort Beaufort  
 Vice-Chairman/Ondervoorsitter - J T F Nel, King Williams Town  
 Secretary/Sekretaris - I L Hobbs, Uitenhage

### FREE STATE/NORTHERN CAPE BRANCH 2.5 VRYSTSTAAT/NOORD-KAAPTAK

Chairman/Voorsitter - J Grobler, Bethlehem  
 Vice-Chairman/Ondervoorsitter - C Vosloo, Kimberley  
 Secretary/Sekretaris - N S Botha, Bloemfontein

## COMMITTEES 3. KOMITEES

The following subcommittees were appointed by the Executive Council.

Die volgende onderkomitees was benoem deur die Uitvoerende Raad.

### STANDING COMMITTEE 3.1 DAGBESTUUR

W Barnard plus councillor/raadslid  
 J A Loubser plus councillor/raadslid  
 D C Palser  
 A H L Fortmann

With right co-opt the convenor of the Finance Committee.

Met reg om die saamroeper van die Finanskomitee te koöpteer.

### PAPERS COMMITTEE 3.2 REFERATEKOMITEE

W Barnard, Convenor/Saamroeper  
 J A Loubser

**FINANCE COMMITTEE 3.3 FINANSKOMITEE**

J K von Ahlften, Convenor/Saamroeper plus Councillor/Raadslid  
W Barnard  
B van der Walt

**RECOMMENDATIONS COMMITTEE FOR NEW ELECTRICAL COMMODITIES 3.4 AANBEVELINGSKOMITEE VIR NUWE ELEKTRIESE VERBRUIKSWARE**

G J Nortjé, Convenor/Saamroeper  
M P P Clarke

**ELECTRICITY SUPPLY COMMITTEE 3.5 ELEKTRISITEITSVOORSIENINGSKOMITEE**

P J Botes, Convenor/Saamroeper  
N S Botha  
M P P Clarke  
D H Fraser  
D C Palsler  
K G Robson

**SABS CO-ORDINATING COMMITTEE 3.6 KOÖRDINERENDE KOMITEE : SABS**

E de C Pretorius, Convenor/Saamroeper  
J A Loubser  
J K von Ahlften

**TECHNICAL TRAINING COMMITTEE 3.7 KOMITEE : TEGNIESE OPLEIDING**

J D Dawson, Convenor/Saamroeper  
N S Botha  
E G Davies  
A H L Fortmann  
G J Nortjé  
D C Palsler

**COMMITTEE : REGULATIONS FOR ELECTRICAL INSTALLATIONS 3.8 KOMITEE : REGULASIES VIR ELEKTRIESE INSTALLASIES**

J K von Ahlften, Convenor/Saamroeper

With right to co-opt.

Met reg om te koöpteer.

**SATEPSA MAIN POWER SUBCOMMITTEE 3.9 SATEKG HOOF-KRAGONDERKOMITEE**

P J Botes, Convenor/Saamroeper  
W Barnard  
G J Nortjé

**AMEU/ECA LIAISON SUB-COMMITTEE 3.10 VME0/EKV : SKAKELKOMITEE**

J K von Ahlften, Convenor/Saamroeper  
W Barnard  
A H L Fortmann  
C Venter, Alderman/Raadsheer

**HIGH VOLTAGE CO-ORDINATING COMMITTEE 3.11 KOÖRDINERENDE HOOGSPANNINGSKOMITEE**

Representative/Verteenwoordiger  
W Barnard

**WORLD ENERGY CONFERENCE 3.12 WÊRELDKRAGKONFERENSIE**

Representatives/Verteenwoordigers  
D C Palsler  
M P P Clarke

**ELECTROLYTIC CORROSION COMMITTEES 3.13 KOMITEES : ELEKTROLITIESE KORROSIE**

**MAIN COMMITTEE 3.13.1 HOOFKOMITEE**

Representatives/Verteenwoordigers  
G J Nortjé  
A H L Fortmann

**WITWATERSRAND REGION 3.13.2 WITWATERSRANDSE STREEK**

Representatives/Verteenwoordigers

G J Nortjé  
A H L Fortmann

**NATAL REGION 3.13.3 NATALSTREEK**

Representatives/Verteenwoordigers

E G Davies  
D H Fraser

**NORTHERN CAPE REGION 3.13.4 NOORD-KAAPLANDSE STREEK**

Representative/Verteenwoordiger

N S Botha

**WESTERN CAPE REGION 3.13.5 WES-KAAPLANDSE STREEK**

Representatives/Verteenwoordigers

K J Murphy  
D C Palser

**EASTERN CAPE REGION 3.13.6 OOS-KAAPLANDSE STREEK**

Representatives/Verteenwoordigers

J D Dawson  
R G Robson

**NBRI WORKING SUB-COMMITTEE FOR ELECTRICAL DISTRIBUTION 3.14 NBNI WERKE-ONDERKOMITEE VIR ELEKTRIESE DISTRIBUSIE**

Representative/Verteenwoordiger

J K von Ahlften

**NBRI STEERING COMMITTEE ON RATIONAL NORMS FOR TOWNSHIP SERVICES 3.15 NBNI LOODSKOMITEE VIR RASIONELE NORME VIR STEDELIKE DIENSTE**

Representative/Verteenwoordiger

J K von Ahlften

**THE NBRI STEERING COMMITTEE ON SOLAR ENERGY AND ENERGY CONSERVATION ON BUILDINGS AND BUILT ENVIRONMENT 3.16 DIE NBNI LOODSKOMITEE OOR SONENERGIE EN ENERGIE BEWARING IN GEBOUE EN DIE BEBOUEDE GEBIEDE**

Representatives/Verteenwoordigers

D C Palser  
K J Murphy

**THE NBRI STANDARDISED CONDITIONS OF CONTRACT FOR ELECTRICAL/MECHANICAL ENGINEERING WORKS CONSULTATIVE COMMITTEE 3.17 DIE NBNI GESTANDAARDISEERDE VOORWAARDES VAN KONTRAK VIR DIE ELEKTROTEGNIENE/MEGANIESE INGENIEURSWERKE ADVISERENDE KOMITEE**

Representatives/Verteenwoordigers

A H L Fortmann  
D H Fraser

**CSIR/NEERI ADVISORY COMMITTEE 3.18 WNNR/NNEL-ADVIESKOMITEE**

Representatives/Verteenwoordigers

W Barnard  
G J Nortjé

**SANCI 3.19 SANKV**

Representative/Verteenwoordiger

A H L Fortmann

**SANCI/LESA/AMEU STREET LIGHT ADVISORY COMMITTEE 3.20 SANKV/IVISA/VMEO STRAATLIG ADVIESKOMITEE**

Representatives/Verteenwoordigers

A H L Fortmann  
J K von Ahlften



**AMEU PUBLICITY 3.21 VME0 PUBLISITEIT**

Representatives/Verteenwoordigers  
M P P Clarke  
A H L Fortmann

**STANDARD ELECTRICITY TARIFFS 3.22 STANDAARD ELEKTRISITEITSTARIEWE**

Representative/Verteenwoordiger  
D C Palser

**SA NATIONAL COMMITTEE OF THE IEC 3.23 SA NASIONALEKOMITEE VAN DIE IEK**

Representatives/Verteenwoordigers  
E de C Pretorius  
J K von Ahlfen

**INTERIM COMMITTEE FOR REGISTRATION OF TECHNOLOGISTS AND ENGINEERS 3.24 INTERIM-KOMITEE VIR REGISTRASIE VAN TEGNOLOË EN INGENIEURS**

Representatives/Verteenwoordigers  
J D Dawson  
N S Botha  
M P P Clarke

**MEMBERSHIP 4. LIDMAATSKAP**

The membership of the AMEU as at 31st December 1984 was as follows:

Die ledetal van die VME0 op 31 Desember 1984 was soos volg:

Honorary Members/Erelede .....	31
Past Members/Voormalige Lede .....	37
Engineer Members/Ingenieurlede .....	145
Associate Members/Assosiatlede .....	32
Local Authorities/Plaaslike Besture .....	190
Affiliates/Geaffilieerdes .....	138
<b>Total Membership/Totale Lidmaatskap .....</b>	<b>573</b>

**MEMBER MEETINGS 5. LEDE-BYEENKOMSTE**

The 48th Convention held in Johannesburg from 11-13 October 1983 was attended by 725 delegates and ladies.

5.1 Die 48e Konvensie is in Johannesburg gehou van 11-13 Oktober 1983 en 725 afgevaardigdes en dames het dit bygewoon.

This was a record attendance exceeding the previous record of 654 by 71.

Hierdie was 'n rekord bywoning wat die vorige rekord van 654 oorskry met 71.

The papers and discussions were printed in the 48th Convention Proceedings which was posted to all members and delegates.

Die referate en besprekings is vervat in die gedrukte 48e Konvensie Verrigtinge wat aan al die lede en afgevaardigdes gepos is.

**TECHNICAL MEETING 5.2 TEGNIESE VERGADERING**

The 10th Technical Meeting was held in Bloemfontein from the 10th to 11th September 1984.

Die 10e Tegniese Vergadering het plaasgevind in Bloemfontein 10-11 September 1984.

I wish to extend our sincere thanks and appreciation to all Affiliates who have sponsored advertisements for the Proceedings and social functions at these national meetings.

5.3 Ek wil graag ons besondere woord van dank en waardering betuig teenoor die Geaffilieerdes wat die advertensies van die Verrigtinge geborg het asook vir sosiale funksies tydens die nasionale byeenkomste.

**INTERNATIONAL CONFERENCES 6. INTERNASIONALE KONFERENSIES**

Mr N S Botha, Bloemfontein, attended the C64 meeting in Berne, Switzerland from the 14th to 18th May 1984.

Mnr N S Botha, Bloemfontein, het die TK64 vergadering in Berne, Switzerland bygewoon van 14 tot 18 Mei 1984.

**LOCAL CONGRESSES 7. PLAASLIKE KONGRESSE**

The President and members of the Executive Council have attended various local congresses and conferences during the period under review.

Die President en lede van die Uitvoerende Raad het verskeie plaaslike kongresse en konferensies gedurende die twee jaar bygewoon.

The AMEU is well recognised by other Institutes and Organisations.

Die VME0 word goed erken deur ander plaaslike Institute en Organisasies.

## COMMISSION OF INQUIRY INTO ELECTRICITY SUPPLY IN THE RSA

The AMEU submitted a memorandum to the United Municipal Executive and to the Commission of Inquiry under the Chairmanship of Dr W de Villiers. The recommendations of the Commission were accepted by the Government and incorporated in the Electricity Amendment Act. In terms of this Act the AMEU is one of the constituent institutions which had to nominate 4 persons to enable the Minister to appoint one person to serve on the newly created Electricity Council. The Minister appointed Mr P J Botes.

### BURSARIES AWARDS

The AMEU paid out R13 250 for the advancement of training as follows:

#### UNIVERSITY SCHOLARSHIP

A Abrahams - Cape Town/Kaapstad .....	1 000
W M Humphries - Port Elizabeth .....	1 000
M S O Mohamed - Durban .....	1 000
	<u>R3 000</u>

#### MUNICIPAL TRAINING CENTRES

Eight municipal training centres received a total of R3 400.

#### TECHNIKONS

A total of R5 250 was paid to 7 Technikon students as merit awards for the student with the best results in T4 Electrical Engineering.

#### TECHNICAL COLLEGES

A total of R1 600 was paid to 16 Technical Colleges as merit awards.

#### SUMMARY

This report should be read in conjunction with the report of the various committees and/or representatives. The considerable time sacrificed by the representatives and the appreciable amount of work put in by them must specially be mentioned. The aid given in this way is of incalculable value to the AMEU and its members and, on behalf of the members, we express our gratitude for the selfless service.

The Executive Council at all times endeavoured to serve the interests of its members to the best of its ability.

We would like to extend our thanks to all organisations with whom the AMEU maintains close contact for their goodwill and collaboration.

## 8. KOMMISSIE VAN ONDERSOEK NA DIE ELEKTRISITEITSVOORSIENING IN DIE RSA

Die VME0 het 'n memorandum voorgelê aan die Verenigde Munisipale Bestuur sowel as aan die Kommissie van Onderzoek onder Voorsitterskap van dr W de Villiers. Die aanbevelings van die Kommissie is deur die Regering aanvaar en in die Wysigingswet op Elektrisiteit geïnkorporeer. Daarvolgens is die VME0 een van die konstituerende liggame wat 4 persone moes nomineer waaruit die Minister een persoon benoem om op die nuut ingestelde Elektrisiteitsraad te dien. Die Minister het mnr P J Botes benoem.

## 9. BEURSTOEKENINGS

Die VME0 het 'n totaal van R13 250 uitbetaal ter bevordering van opleiding soos volg:

### 9.1 UNIVERSITEITSBEURSE

A Abrahams - Cape Town/Kaapstad .....	1 000
W M Humphries - Port Elizabeth .....	1 000
M S O Mohamed - Durban .....	1 000
	<u>R3 000</u>

### 9.2 MUNISIPALE OPLEIDINGSENTRUMS

Agt munisipale opleidingsentrums het in totaal R3 400 ontvang.

### 9.3 TECHNIKONS

'n Totaal van R5 250 was oorbetal aan 7 Technikon studente as meriete toekennings vir die student wat die beste gepresteer het in die T4 Elektrotegniese Ingenieurswese.

### 9.4 TEGNIESE KOLLEGES

'n Totaal van R1 600 was betaal aan 16 Tegniese Kolleges as meriete toekennings.

## 10. SAMEVATTING

Hierdie verslag moet saamgelees word met die verskillende komitees en/of verteenwoordigers se verslae. Daar dien vermeld te word dat 'n aansienlike hoeveelheid tyd deur die verteenwoordigers opgeoffer en heelwat werk gelewer is. Die hulp wat aldus verleen word, is van onskatbare waarde vir die VME0 en sy lede en ons betuig namens die lede dank vir daardie onbaatsugtige dienste.

Die Uitvoerende Raad het te alle tye getrag om die belange van sy lede na die beste van sy vermoë te dien.

Graag bedank ons alle instansies met wie die VME0 'n noue verbintenis het vir hulle goeie verstandhouding en samewerking.

## FINANCIAL REPORT 1983/84

Die VMEO se finansiële sake bly kern gesond ondanks stygende kostes in 'n knellende ekonomiese klimaat danksy die knap finansiële bestuur van die sekretaris waarvoor die vereniging hom besondere dank verskuldig is.

Volgens die geouditeerde state soos op 31 Desember 1984, beloop die opgehoopde fondse R151 848 en die beleggingsfondse R140 000 wat as volg toegeedeel is – R30 000 vir die Universiteitsbeursfonds – R30 000 vir toekennings aan Technikon, Tegniese Kolleges en Opleidingsentrums – R80 000 vir werksgroepe, subkomitees en internasionale konferensies.

Die VMEO doen dus meer as sy deel ten opsigte van tegniese opleiding, nie net tot voordeel van die VMEO en sy lede nie, maar ook in nasionale belang waarvan met waardering kennis geneem behoort te word en waaraan besondere publisiteit verleen behoort te word.

As algemene oorsig kan die volgende punte uitgelig word:

- 1 Die Uitvoerende Raad het dit nie nodig geag dat ledegedel verhoog hoef te word nie, ondanks die feit dat ledegedel laas in 1981 aangesuiwer was, gebaseer op die jaarlikse maksimum aanvraag van lidondernemings volgens drie basiese kategorieë.
- 2 Die Uitvoerende Raad was in 'n posisie om takke, wie finansiële probleme mag ondervind, by te staan tot 'n bedrag van R1 000 per tak, per jaar.
- 3 Die Uitvoerende Raad was in 'n posisie om die werklas van die sekretaris te verlig deur voorsiening te maak in die salarispos vir addisionele administratiewe hulp.
- 4 Die Uitvoerende Raad bly steeds in die posisie om voorsiening te kan maak vir die bywoning van internasionale konferensies en werkgroepe deur VMEO verteenwoordigers om die belange van sy lidondernemings en van sy verbruikers in nasionale belang verder uit te bou.
- 5 Daar word met dank kennis geneem dat in baie gevalle die lidonderneming self die uitgawes bybring waar die ingenieurslid namens die VMEO op verskeie subkomitees en werkgroepe dien.
- 6 Die uitvoerende raad was in staat om die bywoningsgelde vir die 1985 konvensie onveranderd te laat in die lig van die bevredigende finansiële posisie van die VMEO.

Die vereniging se inkomste vir die twee-jaar tydperk, geëindig 31 Desember 1984, was dus soos volg saamgestel:

Ledegelde, konvensies en tegniese vergadering bywoningsgelde .....	R159 160
Rente en dividende ontvang op beleggings .....	R 71 063
Publikasies, advertensies en diverse .....	R 35 397

Nieteenstaande die gesonde finansiële posisie van die VMEO, bly streng finansiële dissipline nog nodig veral gesien in die lig van die voortgesette swak ekonomiese

## FINANSIËLE VERSLAG 1983/84

klimaat, en moet ek, as sameroeper, die ander lede van die komitee bedank vir hulle volgehoue ondersteuning om dit moontlik te maak dat 'n positiewe finansiële verslag aan u voorgelê kon word.

Afskrifte van die ouditeure se verslag en finansiële state is op versoek verkrygbaar van die sekretaris.

## DISCUSSIONS – BESPREEKINGS

### MNR J K VON AHLTEN : SAMEROEPER

Ek wil graag verwys na die hydrae wat die VMEO maak vir tegniese opleiding. Ruim 43% van die opbrengs uit die VMEO se beleggings word aangewend vir hierdie doel by wese van beurse en toekennings, en ek dink dat ons besonder publisiteit hieraan behoort te verleen sodat alle belanghebbende instansie hiervan kennis neem.

Dan het die Uitvoerende Raad opdrag gegee dat 'n opname gemaak word van die jongste maksimum aanvraag van alle lidondernemings, sodat ledegedel daarvolgens aangesuiwer kan word. Die rede hiervoor is dat alhoewel sekere lidondernemings self die kostes dra vir hulle ingenieurs om namens die VMEO op verskeie komitees te dien, die tendens hom in die jongste tyd al hoe meer voordoen dat die VMEO self die kostes sal moet dra en die nodige fondse sal dus hiervoor gevind moet word. Die VMEO neem egter steeds met dank kennis van daardie lidondernemings wie nogtans hierdie kostes betaal in belang van die elektrisiteitsvoorsieningsnywerheid in geheel.

Graag lê ek dan die finansiële verslag voor vir aanname. Enige verdere vrae oor die VMEO se finansiële state sal deur die Sekretaris beantwoord kan word wie ook as die Finansiële Bestuurder van die VMEO beskou kan word.



Mr J K von Ahlten

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## REPORT ON PUBLICITY

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During the past year extensive coverage of AMEU activities has been obtained in the monthly journal "Local Government in South Africa" and "Municipal Engineer".

The Bloemfontein Technical Meeting was covered in both journals by way of reports and extracts from papers and in addition "Local Government" have published news reports of activities of the various branches and undertakings as these have been made available.

Both journals have changed hands in recent times but the contracts which have been built up are continuing and coverage of our activities should be maintained.

*M P P CLARKE  
Convenor / Sameroeper*

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## DISCUSSIONS - BESPREKINGS

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MR M P P CLARKE : RANDBURG

Delegates will have received a brief report on the past year's attempts to publicise the activities of the AMEU.

Some of you may regard the results as reasonable, others as poor. What I would like you to know is that the material published does not represent *all* the work that has gone into the committee attempts to obtain publicity for the Association.

While the two journals mentioned have responded favourably to our efforts - and I am happy to report that the Local Government Journal is represented here today, which is in itself a breakthrough for us - it is important to realise that articles and releases have been given to various *other* publications and only limited success has been achieved.

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## PUBLISITEITSVERSLAG

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In die afgelope jaar was VME0 aangeleenthede in beide maandelike publikasies "Plaaslike Regering in Suidelike Afrika" en "Munisipale Ingenieur" gepubliseer.

Verslae en uittreksels uit referate van die Bloemfonteinse Tegnieise Vergadering was in beide tydskrifte en bykomend het "Plaaslike Regering" 'n verskeidenheid van nuusbroskies van verslae vanaf takke en elektrisiteitsondernemings gepubliseer.

Beide tydskrifte het in die laaste tyd 'n verandering van eienaar gehad maar kontakte wat met die verloop van tyd opgebou was, is behou en dekking van ons aktiwiteite sal voortgeset word.

We need to realise that more often than not "news" in some quarters is taken to be breakdowns, accidents, power failures, tariff increases, etc.

Such mundane things as technical training, and other committee reports don't receive a high "newsworthy" rating in many quarters.

What you should know is that the Executive Committee did give consideration - a year ago - to the possibility of an "official" AMEU Journal of some sort.

It was decided not to proceed with such a concept for a variety of reasons but some of these are worth re-stating:

- (a) Economic viability (this is tied to potential advertising revenue);
- (b) Availability of materials by way of news and articles;
- (c) Editorial staffing and organisation.

I would appreciate having comments from delegates on this subject, if not right at this moment, then perhaps during tea or lunch breaks when you have had a chance to consider the matter.

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## REPORT OF THE RECOMMENDATIONS COMMITTEE FOR NEW ELECTRICAL COMMODITIES

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### REPRESENTATION

The following organisations are represented on the committee:

AMEU

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## VERSLAG VAN DIE AANBEVELINGSKOMITEE VIR NUWE ELEKTRIESEWARE

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### VERTEENWOORDIGING

Die volgende organisasies is op die komitee verteenwoordig:

VME0

Department of Manpower  
 S A Bureau of Standards  
 Department of Post and Telecommunications  
 S A Institute of Electrical Engineers  
 Escom  
 Electrical Contractors Association of S A  
 Electrical Engineering and Allied Industries  
 Association  
 S A Association of Consulting Engineers  
 Johannesburg Electricity Department

Mr Clarke, Randburg, is vice-chairman of the committee.

Departement van Mannekrag  
 S A Buro vir Standaard  
 Departement van Pos- en Telekommunikasiewese  
 S A Instituut van Elektrotegniese Ingenieurs  
 Evkom  
 Elektrotegniese Aannemersvereniging van S A  
 Vereniging van Elektrotegniese Ingenieurswese en  
 Verwante Industrieë  
 S A Vereniging van Raadgewende Ingenieurs  
 Johannesburgse Elektriesiteitsdepartement

Mnr Clarke, Randburg, is vise-voorsitter van die komitee.

## ACTIVITIES

Seven meetings were held, and the following recommendations were made:

Recommended for authorization	: 21 Applications
Not recommended for authorization	: 3 Applications
Recommended as suitable for use	: 10 Applications
Not recommended as suitable for use	: 1 Application
Recommended for approval by supply authorities pending authorization	: 1 Application

Test reports and recommendations compiled by the SABS are essential requirements when applications are considered by the committee. These reports are invariably of a high standard, and the contribution of the personnel concerned is acknowledged with gratitude.

## AUTHORIZATION

At the time of writing this report, certain matters remain to be resolved:

- (a) In terms of clause 3.2 of SABS Code of Practice 0142-1981, each item of electrical equipment comprising an electrical installation (with certain exceptions) shall comply with the applicable specification, or shall have been authorised. This obviously implies that only equipment which does not comply with the applicable specification must be authorized.

However, in terms of Appendix G, specifically clauses G 2.3.1 and G 2.3.2, as well as Figure G-1, all electrical equipment forming part of an electrical installation and not bearing the SABS mark, requires to be authorized.

The committee supports the amendment of Appendix G, so that the latter does not impose more stringent requirements regarding equipment and techniques to be authorized than required in terms of clauses 3.1.1 and 3.2 of the Code. This aspect is being pursued by the SABS.

- (b) In terms of clause G 2.3.4 of Appendix G, batch compliance testing of authorized equipment is required if more than one batch is involved. It has been suggested that each item in the batch should also be marked so as to be readily identifiable after installation in an electrical installation. This procedure may impose a heavy burden on the SABS, and the course to be adopted has not yet been finalised.

- (c) With reference to clause 3.2 of the Code, a question which arises is what constitutes proof of compliance with the applicable specification for equipment not bearing the SABS mark. If batch compliance testing is to be applied in the case of authorized equipment, it would appear to be equally justified here. The SABS is presently investigating the implementation of such a

## WERKSAAMHEDE

Sewe vergaderings is gehou, en die volgende aanbevelings is gemaak:

Aanbeveel vir magtiging	: 21 Aansoeke
Nie aanveel ver magtiging	: 3 Aansoeke
Aanbeveel as geskik vir gebruik	: 10 Aansoeke
Nie aanbeveel as geskik vir gebruik	: 1 Aansoek
Aanbeveel vir goedkeuring deur voorsiensowerhede in afwagting van magtiging	: 1 Aansoek

Toetsverslae en aanbevelings saamgestel deur die SABS is 'n voorvereiste wanneer aansoek deur die komitee oorweeg word. Hierdie verslae is deurgaans van 'n hoë gehalte, en die bydrae deur die betrokke personeel word met dank erken.

## MAGTIGING

Ten tye van die opstel van hierdie verslag is daar sekere sake wat nog opgelos moet word:

- (a) Ingevolge artikel 3.2 van SABS Gebruikskode 0142-1981 moet elke item van elektriese uitrusting wat deel uitmaak van 'n elektriese installasie (met sekere uitsonderings) voldoen aan die toepasslike spesifikasie, of moet gemagtig wees. Die implikasie is dat segs uitrusting wat nie aan die vereistes van die toepasslike spesifikasie voldoen nie, gemagtig moet wees.

Ingevolge Aanhangel G, en spesifiek artikels G 2.3.1 en G 2.3.2 asook Figuur G-1, moet alle elektriese uitrusting wat deel uitmaak van 'n elektriese installasie en wat nie die SABS merk dra nie, egter gemagtig word.

Die komitee is ten gunste van die wysiging van Aanhangel G, sodat laasgenoemde nie strenger vereistes stel ten opsigte van uitrusting en tegniek wat gemagtig moet word as dié in artikels 3.1.1 en 3.2 van die Gebruikskode nie. Hierdie aangeleentheid word deur die SABS opgevolg.

- (b) Artikel G2.3.4 van Aanhangel G bepaal dat indien meer as een besending van 'n gemagtigde item betrokke is, monsters uit elke toekomstige besending getoets moet word. Daar is voorgestel dat elke item in elke besending ook gemerk moet word sodat dit maklik identificeerbaar is nadat dit in 'n elektriese installasie installeer is. Hierdie prosedure kan moontlik 'n swaar las op die SABS plaas, en daar is nog nie uitsluitel op hierdie aspek nie.
- (c) Met betrekking tot artikel 3.2 van die Gebruikskode ontstaan die vraag, wat is aanvaarbare bewys van voldoende aan die vereistes van die toepasslike spesifikasie ten opsigte van uitrusting wat nie die SABS merk dra nie. Indien aanvaar word dat monsters uit alle besendings van gemagtigde uitrusting getoets moet word, skyn dit ook gereverdig te wees dat dieselfde



# **“We’re trying to hold down costs in our business. Why can’t Escom do the same?”**

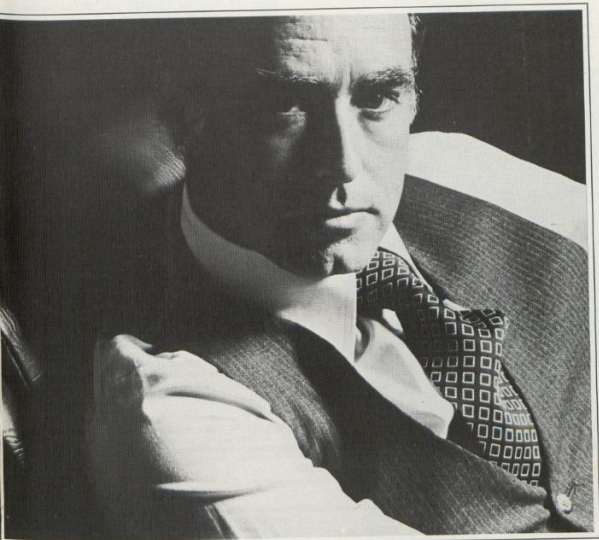
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**Paul de Villiers, Pinetown.**

Most businesses today are making an effort to hold down rising costs. And many of the more efficiently managed are succeeding.

At the same time, it's a rare company that hasn't had to raise its prices, despite cost-saving efforts. That's the inevitable result of high inflation and interest rates.

Escom's case provides a good example of the way in which even the best-administered organisations are caught in the inflationary spiral. In 1984 tariff increases were substantially less than were necessary to meet projected costs to supply electricity and we are trying to make good the shortfall by savings in other areas which, in normal times, would have been regarded as spectacular.



Engineering and design improvements, with an associated raising of operating and maintenance standards, for example, have resulted in a 50% saving in water consumption per kilowatt-hour of electricity generated, compared to 1950. In the same period the quantity of coal that has to be burnt to produce a kilowatt-hour of electricity decreased by more than 30% — from 0,869 kg kW.h in 1950 to 0,546 kg kW.h in 1983.

Similar, if smaller, cost reductions have been achieved elsewhere by the introduction of streamlined methods and better plant.

Yet, at the rate costs are rising, even such savings are not enough to keep the price of electricity down. The struggle against rising

costs continues.

But the problem is too great to be overcome by a single company, no matter how central to the economy of the country. A cooperative effort is essential.

At Eskom, we're proud to be leading the way. And we're happy that businesses like Mr. de Villiers' are moving in the same direction.

Together, we can build a great future. For further information write to the Public Relations Officer at Eskom, P.O. Box 1091, Johannesburg 2000.



**The power behind tomorrow.**

procedure for circuit breakers not bearing the SABS mark, but which comply with the applicable specification.

- (d) Electrical equipment is normally purchased and installed by electrical contractors, who are very often one-man, or very small undertakings. It appears to be essential that they should be able to readily identify equipment which complies with the basic requirements of the Code regarding authorization or compliance with the applicable specification. At present only equipment bearing the SABS mark can be readily identified in this respect. A system of batch inspection and individual marking of all the other items of equipment which have either been authorized or which comply with the specification would solve this identification problem. Depending upon quantities involved, this could, however, prove to be a very expensive procedure, both financially and in terms of manpower.

#### APPROVAL PENDING AUTHORIZATION

Approval pending authorization is an interim measure. In this connection attention is directed to clause G - 3 of Appendix G, which makes it clear that such approval is subject to the importer or manufacturer submitting proof that the authorization procedure has been initiated. It is suggested that such approval should be granted for a specific installation only, or for a limited period, and then only if there is proof that an application for authorization has been submitted and is being processed.

Approval pending authorization can obviously only be granted in the case of equipment or techniques which are required, in terms of the Code, to be authorized.

#### CONCLUSION

It is desired to thank the members of the committee for their active participation and valuable contributions to its deliberations.

*G J NORTJE*  
*Representative / Verteenwoordiger*

vereiste hier van toepassing moet wees. Die SABS ondersoek die toepassing van so 'n prosedure ten opsigte van stroombrekers wat nie die SABS merk dra nie, maar wel aan die vereistes van die toepaslike spesifikasie voldoen.

- (d) Elektriese uitrusting word gewoonlik aangekoop en geïnstalleer deur elektriese kontrakteurs, wat dikwels een-man, of baie klein ondernemings is. Dit skyn noodsaaklik te wees dat hulle in staat moet wees om geredelik uitrusting te kan identifiseer wat voldoen aan die basiese vereistes van die Gebruikskode, betreffende magtiging of voldoening aan die toepaslike spesifikasie. Huidig kan slegs uitrusting wat die SABS merk dra geredelik as sulks identifiseer word. 'n Stelsel waarvolgens monsters uit elke besending van daardie ander uitrusting wat gemagtig is of wat aan die spesifikasie voldoen getoets word, en alle items individueel gemerk word, sal hierdie identifikasie-probleem oplos. Afhangende van die hoeveelhede betrokke kan hierdie egter 'n baie duur prosedure wees, beide finansiël en in terme van mannekrag.

#### GOEDKEURING IN AFWAGTING VAN MAGTIGING

Goedkeuring in afwagting van magtiging is 'n tussentydse maatreël. In hierdie verband word aandag gevestig op artikel G - 3 van Aanhangsel G, waar dit duidelik gestel word dat hierdie goedkeuring daaraan onderworpe is, dat die invoerder of vervaardiger bewys lewer, dat die magtigingsprosedure in werking gestel is. Daar word aan die hand gedoen dat hierdie goedkeuring slegs verleen word ten opsigte van 'n spesifieke installasie, of vir 'n bepaalde tydperk, en dan slegs indien bewys gelewer word dat 'n aansoek om magtiging ingedien is en geprosesseer word.

Goedkeuring in afwagting van magtiging kan ooglopend slegs toegestaan word ten opsigte van uitrusting of tegnieke wat ingevolge die Gebruikskode gemagtig moet word.

#### SLOT

Graag wil ek die lede van die komitee bedank vir hulle aktiewe deelname aan en waardevolle bydraes tot die werksaamhede van die komitee.

*Mr Piet Botes, Elektrotegniese Ingenieur van Roodepoot  
en Sameroeper van hierdie Komitee*



### **1 Algemeen**

In die afgelope twee jaar het daar baie water in die see geloop. Heelwat aandag is gegee aan verskillende aspekte van elektrisiteitsvoorsiening, veral aan die veranderings wat plaasgevind het en wat nog voor die deur staan.

Hierdie verslag sal met die lees daarvan by die Konvensie reeds nie meer op die hoogte van alle gebeure wees nie en meer inligting sal tydens die Konvensie beskikbaar gestel word. Hier moet melding gemaak word van die feit dat ons president, mnr W Barnard, groot insette gelewer het by die komitee waarvan hy nie 'n verkose lid was nie. Dit is dan ook te danke aan sy groot entoesiasme dat so baie vermag is. Mnr J K van Ahlften en die president was ook grootliks verantwoordelik dat die VME0 baie pertinent onder die aandag van hoër gesag gekom het. Eintlik was dit ook 'n spanpoging van baie lede van die Uitvoerende Komitee wat by elke geleentheid 'n lansie vir die VME0 gebreek het.

### **2 Droogtoestand en Lasafwerping**

Die Ad Hoc komitee wat onder voorsitterskap van dr R Fochema, op 1 Junie 1983 in die lewe geroep was om die droogtoestand te bespreek, het as gevolg van 'n verbetering in die reënval asmede die stand van damme

opgehou om te funksioneer, met die voorbehoud dat die Randse Waterraad die toestand sal monitor en verdere vergaderings sal reël met die betrokke instansies indien dit nodig sou blyk te wees. Baie min lasafwerping was inderdaad nodig gewees, en tot dusver voorsien Evkome geen probleme in die onmiddellike toekoms nie, alhoewel die stand van die damme nog baie kommer wek.

### **3 Plaaslike en Streeksbestuursisteme**

Dit is moeilik om tred te hou met die vordering van die konsep wetgewing wat tans dien en wat as 'n dringende aangeleentheid nog tydens die huidige sessie van die Parlement goedgekeur mag word. 'n Verslag sal eerder aan die Konvensie voorgelê word nadat die Elektrisiteitsvoorsieningskomitee die aangeleentheid deeglik bestudeer het.

### **4 Protection of Low Voltage Overhead Lines**

This guideline, prepared by the ESC/AMEU Ad Hoc Subcommittee, was approved by the Executive Council in April 1985, and has subsequently been issued as an official AMEU document, copies of which are available from the Secretary.

I wish to thank all members of the Electricity Supply Committee for their efforts while dealing with this mat-

ter. The initial spade-work was done by Messrs Scholes of Johannesburg, J K von Ahlften, J Loubser and myself.

I want to thank the ESC, and in particular Mr Nero, for their work that brought this achievement. It is essential that we combine our resources in bringing about documents and guidelines of this nature.

WESPO has asked the UME, inter alia, to make representations for relaxations of certain requirements under regulation C56 for lines constructed before  $\pm$  1960. The committee took notice of this approach and the exact request was made to the Chief Director of Manpower on our deliberations and he was not interested in such a request and the committee has seen no reason for further negotiations. It may be of interest that C56 was included in the regulations in 1963. If any exemptions should be made, it should be backdated to 1963 and one wonders whether the request is of any significance.

## 5 Standard Electricity Tariffs

Mr Palser, will no doubt submit his report on "Standard Electricity Tariffs" to the convention, and should there be any comments from the Electricity Supply Committee on his report, it will be tabled at the convention.

In the interim, Escom has restructured its tariffs in line with the recommendation of the de Villiers Commission, and will come into operation as from 1 January 1986.

With the kind permission of the President, Messrs Stoffberg and Reilly of Escom will make a presentation to the Convention on this subject and therefore I will not go into details.

Mr Palser has done a great job for which we are very thankful.

## 6 Die Kommissie van Onderzoek na Elektrisiteitsvoorsiening in die Republiek van Suid-Afrika

Die verslag van die de Villiers-kommissie van Onderzoek is deur die Regering aanvaar en gevolglik is die Elektrisiteitswet, No 40 van 1958, gewysig om onder andere uitvoering te gee aan die aanbevelings van die kommissie en is die wet op 24 Mei 1985 in werking gestel.

Dr C A Merz het in April 1920 'n verslag ten opsigte van die toekomsvoorsigte van elektrisiteit in Suid-Afrika aan die Regering voorgelê waarin hy onder andere aanbeveel dat 'n wet gemaak moes word om:

- die voorsiening van elektrisiteit oor die hele land te beheer en te verenig;
- die ontwikkeling van elektrisiteitsvoorsiening en die opstel van standaardfrekwensies en -spannings te beheer en voorsiening te maak vir regulasies vir die daarstelling van geleidelike eenvormigheid;
- die uitbreiding van bestaande ondernemings en die stigting van nuwes om te beheer en te bevorder;
- voorsiening te maak vir beperkings op en die pryse van elektrisiteitsondernemings, die aangaan van lenings, die opstel van statistiek en die verskaffing van jaarlikse opgawes op 'n eenvormige grondslag;
- die daarstelling van 'n liggaam om die wet te administreer en te magtig.

Die Elektrisiteitswet, No 42 van 1922, asook Wet No 40 van 1958, wat voorafgaande wet vervang het, het 'n regs-

persoon genaamd die "Elektrisiteitsvoorsieningskommissie" in die lewe geroep wat nou deur die regspersoon "Eskom" in die wysiging van laasgenoemde wetgewing vervang word.

Die Wysigingswet maak verder ook onder andere voorsiening daarvan:

A Dat 'n liggaam bekend as die Elektrisiteitsraad ingestel sal word wat op 'n deurlopende grondslag:

- in verband met werksaamhede, bevoegdheid en pligte van Eskom, beleid en doelwitte moet bepaal en die nodige beplanning moet doen;
- in die algemeen beheer moet uitoefen oor die rigting van sy werksaamhede, die uitoefening van sy bevoegdheid en die nakoming van sy pligte deur Eskom; asook
- ander werksaamhede in die Wet aan hom opgedra en wat met die Minister van tyd tot tyd oorleg moet pleeg oor die nasionale beleid in verband met die ontwikkeling en voorsiening van elektrisiteit in die Republiek.

Die Elektrisiteitsraad bestaan uit:

- 'n Voorsitter deur die Minister aangestel;
- die Voorsitter van die Bestuursraad;
- die Direkteur-Generaal - Finansies;
- 'n Beampte van die Departement Mineraal en Energiesake;
- 'n Beampte van die Suid-Afrikaanse Vervoerdienste, en agt lede deur die Minister aangestel uit die Afrikaanse Handelsinstituut, Association of Chambers and Commerce of SA, SA Gefedereerde Kamer van Nywerhede, SA Federasie van Staal en Ingenieurswese, NAFCOG, Kamer van Mynwese, SA Landbou-Unie en VMEGO, tesame met nie meer as 5 lede deur die Minister aangestel van persone wat op grond van hulle opleiding en ervaring oor besondere kennis beskik.

B Dat 'n Bestuursraad vir Eskom ingestel word wat bestaan uit 'n voorsitter deur die Elektrisiteitsraad aangestel, en soveel ander lede as wat die Elektrisiteitsraad nodig ag, en wat deur hom aangestel word.

Die VMEGO is versoek om 4 persone aan te wys waarvan die Minister een kandidaat sou aanstel. Die VMEGO het mnr W Barnard van Johannesburg, mnr D Fraser van Durban, mnr D Palser van Kaapstad en mnr P J Botes van Roodepoort aangewys.

Mnr P J Botes is deur die Minister aangestel. Die eerste vergadering was op 19 Junie 1985 gehou en dit is vir my duidelik dat die VMEGO in die toekoms nog baie insette gaan lewer. Ek is daarvan oortuig dat die Minister die regte besluit geneem het met die benoeming van die VMEGO om op hierdie Raad te dien in plaas van ander plaaslike bestuursinstansies.

Mnr John Marce, is deur die Minister as voorsitter van die Elektrisiteitsraad aangestel en die Elektrisiteitsraad het op sy beurt, mnr Ian McRae, aangestel as voorsitter van die Bestuursraad. Albei here sal moontlik die Konvensie bywoon.

## 7 ESCOM/AMEU Safety Committee

The AMEU Executive Council indicated their willing-



ness to participate in a combined effort with Escom to educate people in the safety aspects and conservation of electricity. Further developments will be reported verbally at the Convention.

#### 8 Nasionale Forum van Elektrisiteitsverbruikers

Die Elektrisiteitsvoorsieningskommissie het 'n stigtingsvergadering van 'n nasionale forum van elektrisiteitsverbruikers op 21 Maart 1984 gehou.

Mnr P J Botes met mnr N S Botha van Bloemfontein as sekondus is benoem om die VMEO op hierdie vergadering te verteenwoordig.

Die vergadering is ook bygewoon deur verteenwoordigers van verskeie instansies, institute en liggare. Die doel is om 'n forum daar te stel vir besprekings tussen Evkom en sy verbruikers.

Die volgende punte is bespreek:

- (a) Die verkryging van kapitaal om uitbreiding daar te stel, lewer probleme op as die invloed van die droogte en die verkryging van kapitaal in die huidige hoogs inflasioneëre tydskip in gedagte gehou word.
- (b) Driekwart van Evkom se groei kom van bestaande verbruikers.
- (c) Die noodsaaklikheid dat kapitaal bekom moet word wat bepaal word deur die kwaliteit van die toevoer wat vir die verbruiker aanvaarbaar sal wees.
- (d) Evkom het ook sy openbare skakeldiensafdeling uitgebrei en besoekersentra is daargestel, byvoorbeeld Koeberg en Braamfontein, asook by verskeie kragstasies. Daar word ook toere na kragstasies gereël.
- (e) Die skadelafdeling kan deur die nasionale of streeksbeheersentra van Evkom gekontak word wanneer hulp van hulle benodig word, soos om die media te aktiveer vir hulp wanneer 'n lyn verstoort is, of in tye van sabotasies.
- (f) Mnr McRae en ander lede van Evkom het die vergadering toegelig oor die probleme wat ondervind word met vooruitskatting vanaf die gegewens van verbruikers waar beter en noukeuriger insette noodsaaklik is.
- (g) Indien Evkom sou beplan vir 'n effektiewe 5% groei per jaar en die werklike groei koers sou 7% per jaar wees, dan sal Evkom teen 1991 'n tekort aan opwekingsvermoë van 1 400MW hê en teen 1994 5 500MW.

Die volgende vergadering wat op 21 November 1984 gehou was, kon nie bygewoon word nie aangesien die Elektrisiteitsvoorsieningskomitee op dieselfde dag vergader het.

Tydens die vergadering is 'n vereenvoudigde aanbieding van Evkom se state vir die afgelope 5 jaar gelewer. 'n Baie interessante aanbieding oor die reserwevermoë en die gehalte van toevoer. Evkom se grootste kapitale projekte is ook toegelig.

Die volgende vergadering moes alreeds plaasgevind het maar sal seker nou na die inwerkingstelling van die nuwe bedeling aandaag kry.

#### 9 Symposium : Standby and Interruptible Power Supplies

The South African Institute of Electrical Engineers approached the AMEU to arrange a joint AMEU/SAIEE symposium on Standby and Uninterruptible Power Supplies.

Two meetings were held, attended by Mr M P P Clarke, where it was pointed out that the total estimated cost is R40 000 and the AMEU's consent to sponsor R20 000, which may be recovered from attendance fees, is required.

The committee recommended participation and appointed Mr M P P Clarke as our representative with Mr Algeria as alternate.

The AMEU involvement is of importance to keep abreast of the requirements of consumers, and acquires the technical developments in this field, and it will also afford the AMEU the opportunity to expand its image in a technical field.

#### 10 Government National Energy Policy

The NEP includes the following clause which is of interest to the convention:

"ELECTRICITY - The possibility of daylight saving in South Africa has been investigated against the background of overseas experience. It appears that the use of summer time (daylight saving would be feasible in South Africa only during the summer months) would not make any significant contribution to energy and electricity saving.

The commission of enquiry into the Supply of Electricity in the RSA recommended in 1984 that energy conservation in general and electricity conservation in particular, should be regarded as future priorities in order to reduce Escom's load growth.

This is to prevent electricity tariffs from rising too quickly and to reduce the excessive demand on the Country's economy due to high capital cost of additional generating capacity. The aim is therefore the optimum utilisation of energy sources, and capital, through the most efficient utilisation of energy. The optimum use of generating equipment naturally contributes towards this objective.

The Cabinet accepted the recommendations of the Commission and instituted a Working Group for the optimisation of peak demand of electricity to ensure the most effective use of electrical generating capacity".

#### 11 General

The committee members held only four meetings during this term of office but it is anticipated that this committee shall meet more often to give effect to its scope of operation.

My thanks to all the members of the Committee for their wonderful co-operation and support and also to Mr M P P Clarke for his excellent secretarial work.

## DISCUSSIONS – BESPREKINGS

### MNR P J BOTES : ROODEPOORT

Mnr die President, dames en here, die Elektrisiteitsvoorsieningskomitee het heelwat werk gedoen die afgelope 2 jaar, soos u uit die verslag voor u kan sien. Die Komitee het heelwat diverse items onder sy vleuels geneem, naamlik :

- (a) Droogtoestand Ad Hoc komitee verteenwoordiging
- (b) Beveiliging van laagspanningsoorhoofselyne
- (c) Standaard Elektrisiteitstariewe (Mnr Palsar sal apart hieroor verslag doen)
- (d) Voorlegging aan die Kommissie van Ondersoek na Elektrisiteitsvoorsiening in die Republiek van Suid-Afrika
- (e) EVKOM-VMEQ Veiligheidskomitee
- (e) Verteenwoordiging op die Nasionale Forum van Elektrisiteitsverbruikers wat deur Evkom in die lewe geroep is.

Mr President, also

- (g) AMEU involvement Symposium : Standby and Uninterruptible Power Supplies
- (h) Comments on the Draft White Paper on the Energy Policy of the Republic of South Africa
- (i) Comments on Regional Services Councils
- (j) Load Management and Energy Conservation
- (k) Electricity Amendment Bill
- (l) Restructure of Escom's Tariffs.

Quite a number of meetings were held and the work also resulted in a special Executive Council Meeting held on 19 September 1985.

I will only deal with certain specific items where developments have taken place since the compilation of the report.

At the special Executive Council Meeting which was convened to comment on the Draft White Paper on the Energy Policy of the Republic of South Africa, the following recommendations were adopted on the following items :

#### 1 THE GENERATION OF ELECTRICITY BY LOCAL AUTHORITIES

It is proposed that working group should be established, with representation from Escom and those local authorities operating their own generating plant, to evaluate the use of generating plant which is not under the control of Escom and to consider how this plant could best be utilized.

#### 2 ELECTRICITY AMENDMENT BILL

The draft Electricity Amendment Bill requires that the approval of tariffs be granted by the electricity control board and not by the provincial authority and that tariffs be approved and gazetted annually. The AMEU proposed "that the Electricity Control Board should have

control over surpluses derived by Local Authorities from the retailing of electricity but that it should not be a requirement that individual tariffs be approved and gazetted annually.

It is further proposed that the determination and amendment of Local Authorities' tariffs should be dealt with as is at present laid down in the Transvaal Local Government Ordinance (No 17 of 1939, Section 80B)".

#### 3 LIABILITY OF THE UNDERTAKER FOR DAMAGE OR INJURY UNDER SECTION 50 OF THE ACT

The AMEU considered the draft amendments unsuitable and vague and proposed that Section 50 be amended along the lines of the previous submission by the United Municipal Executive. This submission by the UME was arrived at in close consultation with the AMEU. A copy of this amendment is available to any member requiring further details.

#### 4 REGIONAL SERVICES COUNCILS

The AMEU considers that :

- (a) There is a role for Regional Services Councils in the supply of electricity.
- (b) Regional Services Councils should be responsible only for the co-ordination of all major engineering and financial planning.
- (c) Section 3(c) of the Regional Services Councils Bill, permitting the function of the retailing of electricity to be undertaken by regional services councils, should be invoked only in exceptional circumstances. In general, retailing should be undertaken only by local authorities.

#### 5 EVKOM-VMEQ ELEKTRISITEITSVEILIGHEIDSKOMITEE

Evkom het 'n strategie beplan vir publieke en verbruikersveiligheid wat in 1986 van stapel gestuur word. Die VMEQ het ingewillig om 'n komitee daar te stel (huidiglik verteenwoordig deur myself en mnr Clarke van Randburg), wat na verbruikers- en elektrisiteitsveiligheid omsien. Daar sal gepoog word om deur middel van die takke op 'n gedesentraliseerde basis te werk. Daar sal beskikbare publisiteitsmateriaal, rolprente en video's beskikbaar gestel word, wat by takvergaderings gebruik kan word.

Evkom en die VMEQ sal gesamentlik besluit op die bruikbaarheid, korrektheid en aanvaarbaarheid van publisiteitsmateriaal voordat dit uitgegee word in alle gevalle waar dit 'n gesamentlike poging is.

Vyf video's is al deur Evkom ontwikkel met die titels :

- |                                  |                     |
|----------------------------------|---------------------|
| (a) Elektrisiteit in die huis    | Sotho en Zoeloe     |
| (b) Elektrisiteit op die plaas   | Sotho en Zoeloe     |
| (c) Elektrisiteit op konstruksie | Sotho en Zoeloe     |
| (d) Veiligheid landwyd           | Sotho en Zoeloe     |
| (e) Speel veilig                 | Afrikaans en Engels |

Die komitee ondersoek die moontlikheid om ongelukbesonderhede en ongelukstatistieke landwyd van plaaslike bestuurs te bekom en daarvolgens te besluit om plakkaat, video's en lesings vir verspreiding op te stel. In hierdie bestek sal ook 'n veldtog oor besparing van elektrisiteit geleids word.

Die Elektrisiteitsvoorsieningskomitee sal hierdie sameprekings verder voer en takke sal ingelig word met die vordering.

## 6 SYMPOSIUM : STANDBY AND UNINTERRUPTIBLE POWER SUPPLIES

This symposium will be held on 17 and 18 September 1986, and as it will provide members the opportunity to expand their knowledge in this field and consequently to be able to advise consumers on such matters, members are requested to support this symposium.

## 7. EVKOM TARIEFSTRUKTUURVERANDERING

Mnr die President, soos met u gereë sal mnr Reilly van Evkom 'n voorlegging doen oor die nuwe tariefstruktuur en gaan ek eger eers kommentaar lewer op een bepaalde aspek van die tariefstruktuurverandering.

Mnr die President, een van die groot kontroversiële vrae was hoekom die Transvaal die ander provinsies soos die Kaap, moet subsidieer en die bewering dat die 3% toeslag vir die Kaap nie genoegsaam is nie. Met die prys van brandstof moet ons in die Transvaal meer betaal as aan die kus. Daar is gewag gemaak dat die tariefstruktuurverandering onregverdig is, dat die Kaap en ander plekke bevoordeel word of as sulks gesubsidieer word. Die Algemene Bestuurder : Krag Bemaking, het 'n verslag hieroor uitgebring waarvan die hoofpunte van die berekening as volg is :

Soos u weet sal die verbruiker tussen 301-600 km vanaf Johannesburg 1%, tussen 601-900 km 2% en verder as 900 km 3% meer betaal as die verbruiker binne die 300 km sirkel vanaf Johannesburg as senter.

Die beleid van Evkom, reeds voor die publikasie van die Kommissie van Ondersoek se verslag, was om die toesegging van transmissiekoste aan die individuele ondernemings te elimineer.

Hierdie toedrag van sake het ontstaan omdat die geïntegreerde sisteem al meer kompleks word en dit al moeiliker maak om die invoer en uitvoer van krag vanaf die Westelike Kaap, die Noordelike Kaap, Natal en ook tot in kleiner mate van die Oos-Kaap te bepaal. Die eens radikale transmissielyste is vervang deur 'n komplekse stelsel en in die Koeberg in bedryf is, kan daar feitlik geen verlies plaasvind nie maar daarteenoor kan die afskakeling van Koeberg vir instandhouding net die teenoorgestelde uitwerking hê.

Die Kommissie van Ondersoek se aanbeveling oor die tariefstruktuur (aanbeveling 6) maak verwysing na die wenslikheid om die koste van transmissie te bepaal vanaf sekere verwysingspunte en die vordering van hierdie kostes deur middel van die tarief van die verantwoordelike verbruikers. Hierdie verwysing kon op verskillende maniere vertolk word en in oorlegging tussen 'n lid van die Kommissie van Ondersoek, die Minister van Minerale- en Energiesake en Evkom, is besluit dat in die tarief vir verbruikers ver van die hoofsentrum van las en energie-opwekking geleë, die geraamde koste van verliese betrokke in die transmissie van elektrisiteit na afgeleë plekke gereflekteer moet word.

Dit word dus noodsaaklik om verliese te beraam per kilometer van die optimale ontwerpte transmissielyn, wat bedryf word teen die mees ekonomiese lading.

Vir 'n 765 kV lyn kan dit bereken word dat vir elke 300 km die koste van verliese volgens die tariefheffing nagenoeg 0,994% is.

## MR R REILLY : ESCOM

Mr President, ladies and gentlemen, this short presentation will cover the progress which Escom has made to date on two of the recommendations of the Commission of Enquiry into the supply of electricity in the Republic of South Africa.

## 1 TARIFF STRUCTURE

Recommendation 6 covers the subject of tariff structure and the salient points from this recommendation are :

- That Escom should discard the concept of undertakings.
- Escom's tariff structure should distinguish between demand and energy costs, where applicable.
- Escom should determine the costs of transmission to agreed reference points.
- Escom should pool the costs for similar groups of consumers and recover these costs through a small number of standard tariffs.
- Escom should create tariff structures which satisfy load management requirements.

I shall briefly describe the proposed tariff structure, which Mr Botes has already mentioned.

The proposed structure consists of five standard tariffs :

TARIFF A - For large power users (generally above 100 kV.A)

TARIFF B - For urban small power users.

TARIFF C - For urban domestic consumers.

TARIFF D - For rural small power users.

TARIFF E - For off-peak large power users.

### 1.1 TARIFF A

The monthly charges for tariff A consist of:

- A basic charge.
- A demand charge per kV.A differentiated by voltage into four voltage classes.
- An energy charge per kW.H.
- A transmission percentage charge.
- A monthly extension charge which is rebated per kV.A of demand charged.

Mr Botes has already described the background and operation of the transmission charge so, I shall not deal with this item other than to show a slide on the screen depicting the various zones.

The map shows that the majority of Escom's power stations, a significant portion of the interconnected system and the most likely coal fields all lie within the zone where no transmission charge will be applied.

The area bounded by a radius of 300 km centred in Johannesburg can thus be described as the centre of gravity of the Escom power system.

## 1.2 TARIFF E

Some of the major features of this tariff are:

- Demand recorded during off-peak periods will not be charged.
- A basic charge, higher than that of tariff A, will be applied to cover the additional costs of metering and administration.
- The demand charges which will be applied to the peak demand will be those that apply in the appropriate tariff A voltage category.
- The kW.H charge will be the same as that applicable in tariff A.
- An account based on the above will be determined and this will be compared with the amount payable on the basis of the total kW.H consumption being charged at a minimum average kW.H charge. The higher amount will be payable.
- The minimum average kW.H charge will reflect the average kW.H price payable by a 100 load factor customer on the highest voltage.

Essentially, the new off-peak tariff enables the customer, who can use it, the opportunity to achieve the lowest possible average price payable on tariff A. Because Escom's daily load factor is high by world standards, we have not offered an incentive which will encourage very large customers to exceed a 100 percent load factor as this could lead to a possible shift in the daily peak.

The proposed tariff parameters have already been published in the Government Gazette and sent to each municipality.

It is inevitable that a restructuring of tariffs will lead to a redistribution of costs. Some customers will experience increases and there will be a price advantage to others. Generally speaking, those who will pay more will object and we seldom hear from those who will pay less.

The tariff has been restructured in such a way as to achieve the same revenue and have no effect on the average C/kW.H price charged by Escom. However, the average price in different undertakings has been affected. The average customer in Rand and Orange Free State, Eastern Transvaal and Natal undertaking will pay slightly more while the average price in the Eastern, Northern and Western Cape undertakings will decrease.

For the bulk supplies to municipalities, the same pattern applies.

To summarise – the differences between the existing and proposed tariffs for large users are:

- Uniform structure as opposed to a different structure.
- Uniform structure as opposed to a different structure for each individual distribution undertaking.
- 4 voltage differentiated related demand charges as opposed to the general lack of voltage differentiation.
- An explicit transmission related charge compared to no explicit transmission charge.
- No quarterly adjustment of kW.H charges based on

- An off-peak tariff.

The above briefly describes the proposed standard tariff structure, and I should now like to address the load management and energy conservation issues mentioned by Mr Botes.

## 2 CONSERVATION

The salient points arising from recommendation 2 of the Commission of Enquiry report are:

- Escom should play a leading role in the conservation of energy and electricity.
- Escom should prevent prices from rising too rapidly and generation capital costs from making excessive demands on the economy.
- Escom's objective should be the maximum utilisation of resources and capital in the economy through the optimum use of energy and electricity.
- Escom's objective of providing an abundant supply of electricity at cost price wherever a demand exists should be discarded.
- The efficient use of electricity as well as the efficient use of generating plant could result in a more modest expansion plan.

In essence, Escom's mission has been radically altered: we no longer have to supply under all circumstances, and we must take steps to improve our efficiency of operation through the encouragement of the wise use of electricity.

As from November 1984, our perception of our role has been drastically altered. We previously saw ourselves as suppliers and the customer as being responsible for conservation.

However, the situation in many overseas countries is that utilities have been heavily involved in electricity conservation for many years as a result of the oil crises in 1973 and 1979. We therefore, visited the UK and the USA, and found that in the USA the twelve years of conservation activities had been examined and synthesised by the Electric Power Research Institute (EPRI). The experiences of many utilities have been researched by EPRI and they have synthesised their findings into what they have called "demand side management".

Escom has decided to base its efforts on conservation on the demand side management approach for three reasons.

- (a) It avoids "re-inventing the wheel".
- (b) The approach has standard definitions and a logical framework for conservation strategies.
- (c) Future developments by EPRI can be incorporated which enables Escom to benefit from extensive research as it is published.

Briefly, the demand side management approach involves:

- The determination of broad objectives.
- The identification of alternative strategies to achieve these objectives.
- The evaluation of the alternatives in terms of the cus-

tomers and the impact on the power system.

- Cost benefit analysis of the alternatives.
- The implementation of cost effective alternatives.
- The monitoring of the achievements versus the objectives of alternative programmes.

This is a basic management approach but the essence of this system is the concentration on load shape objectives.

Any demand side strategy must have one or more load shape objectives.

These are :

(a) Peak Clipping –

Which involves cutting peak demand.

(b) Valley Filling –

Which retains peak demand but requires additional energy sales in the off-peak periods.

(c) Load Shifting –

Which is a combination of the above.

(d) Strategic Conservation –

This objective involves the reduction of future growth in demand and energy through the introduction of strategies to influence the customer's usage of electricity.

(e) Strategic Growth –

A utility with excess capacity will attempt to improve the sales of electricity through encouragement of energy efficient processes based on electrification.

(f) Flexible Load Shape –

In this alternative the utility can attempt to contract load which can be treated as interruptible under certain circumstances.

Escom's application of the demand side management approach has progressed to the stage where we have identified certain broad objectives, operational objectives and load shape objectives to be achieved in both the short and longer terms.

The broad objectives are :

- To encourage the efficient use of energy.
- To reduce the capital demands on the economy.
- To optimise the utilisation of the generating plant in the country.
- To keep the rise in electricity prices below the inflation rate.

There is an element of conflict between certain of these objectives in that conservation could result in a reduction in revenue causing higher prices.

The operational and load shape objectives must be carefully formulated to avoid this situation.

The operational objectives are :

- Alter the system load shape to improve operational efficiency.
- Reduce demand and energy growth.
- Increase plant availability.
- Purchase power.

As far as the load shape objectives are concerned, the above objectives could be achieved by aiming at the following :

#### SHORT TERM

- Valley filling.
- Load shifting.
- Strategic growth.

The need in the short term would be to retain our increase energy sales in order to prevent excessive increases in the price of electricity.

#### LONG TERM

- Peak clipping.
- Load shifting.
- Strategic conservation.
- Flexible load shape.

The need in the long term is to reduce demand and energy growth with a view to reductions in capital expenditure. It is also pertinent to note that the historical reasons for the American and European utilities introducing conservation measures were energy related. In our case we have no looming energy crisis but rather a capital crisis.

In implementing demand side management we must be careful not to raise undue expectations of massive savings. We must learn to crawl before we walk and programmes must be carefully evaluated in terms of cost/benefit analyses.

Within Escom we have to develop our own energy policy, increase employee awareness, improve the organisation so that we can reach our smaller customers with advice on electricity usage.

Training will be a high priority in the initial stages of introducing demand side management.

Looking outwards, Escom must work within the national energy policy and future programmes will be in terms of this policy.

Our aim is to examine the following possible programmes.

- Productivity, the efficient use of electricity can contribute to improved productivity in the national economy. We would liaise with the National Productivity Institute in this regard.
- Public awareness, increase public awareness of the benefits of conservation will also be tackled. The AMEU can probably assist us in the campaign in much the same way as we have co-operated on safety.
- Co-generation, a policy for encouraging co-generation is being formulated.



Other areas under investigation include : energy audits, promotion of energy efficient processes, tariff development, small power generation and alternative technologies.

Various methods of marketing these programmes are also under review.

Thank you Mr President.

#### MNR PRETORIUS : POTCHEFSTROOM

Ek wil net 'n vraag vra in verband met die nuwe aanvraag tariewe van Evkom. Daar is die verskillende kategorieë van 380 volt tot 66 kV, maar waar word 66 kV ingedeel?

#### MNR BOTES : ROODEPOORT

Sover die 66 kV ingedeel word, wat bedoel u met ingedeel mnr Pretorius?

#### MNR PRETORIUS : POTCHEFSTROOM

Ek bedoel watter kategorie, want daar is nou 4 kategorieë van aanvraag te wete, tot 380, 380 volt tot 66 kV, dan sê hulle 66 kV tot 132 kV, en bokant 132 kV. Nou 66 kV kom by twee kategorieë voor, waar word hy ingedeel?

#### MNR STOFFBERG : EVKOM

Mnr die President en mnr Pretorius, dit is miskien nie duidelik in die tarief nie, maar die vier kategorieë is 380 volt, hoër as 380 volt maar laer as 66 kV, 66 kV met inbegrip van 132 kV, en dan hoër as 132 kV wat basies net die 275 kV spanning is.

#### MNR PRETORIUS : POTCHEFSTROOM

Gaaf, dan wil ek 'n ander vraag vra wat daarmee saamhang, dit los nou een probleem op, 'n onderneming wat toevoer neem teen 11 kV en 66 kV, en dit word gesommeer, teen watter tarief sal hy aangestaan word?

#### MNR STOFFBERG : EVKOM

Ons plan is om vir so 'n toevoer die komponente te meet, ook die komponente van die gelyktydige maksimum aanvraag, byvoorbeeld 11 kV en 66 kV en die rekening sal vir daardie twee aparte komponente van die gelyktydige maksimum aanvraag teen sy regte pryse bereken word.

#### MNR LOUBSER : PRESIDENT

Mnr Stoffberg, dit beteken dus dat u elke verbruiker individueel beoordeel?

#### MNR STOFFBERG : EVKOM

As 'n verbruiker toevoer het teen twee spannings in omstandighede waar die maksimum aanvraag vir die gelyktydige totale maksimum aanvraag bereken word, sal daardie totale rekening komponente hê, een teen 66 kV byvoorbeeld, en een teen 33 kV en die diversiteit wat die verbruiker nou het met sy eenvoudige toevoerpunt sal hy behou maar die komponente van die verskillende spannings toevoere sal bereken word teen die pryse teen sy spannings.

#### MNR BOTHA : WELKOM

Mnr die Voorsitter ek het net 'n vraag in verband met die tariewe, sal die tarief A en die tarief E saamloop vir een verbruiker?

#### MNR STOFFBERG : EVKOM

Die keuse is vir die verbruiker tussen tarief A en tarief E.

#### MNR LOUBSER : PRESIDENT

Dit lyk so half en half vir my asof tarief E baie moeilik gebruik gaan word deur plaaslike besture.

#### MNR FRASER : DURBAN

Mr President, will the next increase as from 1 January 1986 be applicable on the present tariff structure or on the new structure and will we be advised on the increase?

#### MR BOTES : ROODEPOORT

Mr President, the new tariff structure was advertised and a few objections were received and the Electricity Control Board will consider the new tariff structure at their meeting scheduled for 8 October 1985. If approved the new tariff structure will be operational as from 1 January 1986. If not the present tariff structure will be applicable and the general surcharge/discount percentages will be adjusted accordingly.

Mnr die President, die Elektrisiteitsraad het aan die Kabinet voorgestel dat 'n substantiewe verhoging ingestel moet word met ingang 1 Januarie 1986. U sal onthou dat een van die aanbevelings van die Kommissie van Ondersoek was dat daar net eenkeer per jaar 'n verhoging ingestel moet word en wel in Januarie van elke jaar. Die Elektrisiteitsraad het dan ook by die Kabinet aanbeveel dat hierdie substantiewe verhoging liewer ingefaseer behoort te word deur 3 kleiner verhogings in te stel, te wete een met ingang September 1985, een met ingang Januarie 1986 en die derde teen Julie 1986.

Die Kabinet het hierdie aangeleentheid oorweeg en besluit dat 3 verhogings ingestel moet word en met ingang 1 September 1985 is 'n verhoging van presies 10% in werking gestel. As gevolg hiervan is 'n baie kort kennisgewing aan die verbruikers gegee. Die Kabinet het egter nie die volgende verhoging in Januarie 1986 goedgekeur nie en verwag 'n voorlegging van Evkom teen die middel van November 1985 oor sy algehele finansiële opset alvorens die volgende verhoging goedgekeur kan word. Ons, dit is die Elektrisiteitsraad en Evkom is dus nou in 'n posisie dat ons nie verbruikers vroegtydig in kennis kan stel van die verhoging in Januariemaand nie, maar eers aan die begin van Desember 1985.

In oorleg met die Hoofbestuurder (Finansies) moet ek u nou meedeel dat die voorgename verhoging nie anders kan wees as weer 'n 10% op die huidige verhoging van 10% nie. Indien die nuwe tariefstruktuur van toepassing sal wees, sal die nasionale toelag met ingang 1 Januarie 1986 dus 21% wees. Indien die struktuur nie goedgekeur word nie, en ek kan nie sien waarom nie, sal die 3,2% afslag, wat huidigeg van toepassing is, vervang word met 'n toelag van 6,48% in die Rand en OVS Streek.

#### 8 ENERGY CONSERVATION

The AMEU Executive Council fully supports a policy of load management and energy conservation. All efforts in this direction should be fully co-ordinated by Escom, and the AMEU is prepared to serve on any committee.

Mr Palsler, our representative on the Alternative Technology National Programme for Energy Research Co-operative Scientific Programme, so kindly arranged with you, Mr President, that Dr J A Basson addresses us on this subject.

#### MNR J A BASSON : ADJUNK-BESTURDER, NASIONALE PROGRAM VIR ENERGIENAVORSING NAVORSING OOR ELEKTRISITEITSBESPARING DEUR DIE NASIONALE PROGRAM VIR ENERGIENAVORSING

## INLEIDING

Min mense kan vandag twyfel aan die rol van kapitaal in die ontwikkeling van die RSA of aan die skaarsheid en hoë koste daarvan. Van elke Suid-Afrikaner, veral dié in verantwoordelike posities, kan tereg rekenskap ge vra word oor sy bydrae tot die 'skepping' van kapitaal deur kapitaalbehoefte te optimaliseer sonder om ontwikkeling te strem.

Hierdie referaat meld hoe die elektrisiteitsbedryf in die algemeen en die Vereniging van Munisipale Elektrisiteitsondernemings (VME0) in die besonder hulle bydrae kan maak en hoe dit die land by implikasie kan baat. Ons weet dat ons elektrisiteitsbedryf een van die grootste verbruikers van kapitale fondse in die land is, daar meer as R4 000 miljoen per jaar vir dié doel aangewend word. Daar sal aangehoort word wat groot afnames in kapitale belegging in elektrisiteitsopwekkingsfasiliteite in ander lande teweeg gebring is deur middel van spitsvrag en elektrisiteitsbesparingsprogramme en dat 'n aansienlike potensiaal vir sulke aksies in Suid-Afrika bestaan wat evolusionêr ontgin sal moet word.

## NASIONALE PROGRAM VIR ENERGIE-NAVORSING (NPEN)

Die NPEN is in 1978 deur die WNNR gestig. Dit is in 1981 gereorganiseer toe dit amptelik as die nie-kernenergie navorsingsarm van die Departement van Minerale- en Energiesake (DMES) gestruktureer is. Die NPEN is soos die naam aandui 'n nasionale aksie wat deur die Stigting vir Navorsingsontwikkeling van die WNNR bestuur word. Die belangrikste eienskappe van die NPEN is:

- 'n matriksbestuurstruktuur word gebruik ten einde met alle tersaaklike instansies in die publieke en privaat sektor saam te werk;
- op hierdie manier kan interinstusionele, multi-dissiplinêre en tussensektorale navorsingsprojekte onderneem word;
- kundige komitees word as ondersteunende infrastruktuur gebruik ten einde aanbevelings te maak oor die ontwikkeling van die navorsingstrategie, nuwe en voltooiende navorsingsprojekte te beoordeel, resultate te implementeer en 'n stuuraksie te verskaf;
- navorsingsdoelwitte word in samewerking met die gemeenskap opgestel om aan die nasionale energie-strategie te voldoen, alhoewel ruimte gelaat word vir innoverende projekte;
- die NPEN se spesifieke taak is dus die ontwikkeling van 'n navorsingstrategie, die evaluering van nuwe en voltooiende projekte, die finansiering, geheel of gedeeltelik, van projekte, die bestuur en koördinasie van projekte, die opvolg en vrystelling van resultate en internasionale skakeling;
- die program word tans uitgebou ten einde nywerheidsbetrokkenheid ten opsigte van beide finansiering en deelname te verhoog.

Die NPEN rapporteer aan die Nasionale Komitee vir Energie navorsing wat op sy beurt weer aan die DMES se Energiebeleidskomitee (EBK) rapporteer. 'n Doelwit van die ontwikkeling van die NPEN is 'n effektiewe kommunikasie- en beleidsinfrastruktuur.

## NAVORSING OOR DIE GEBRUIK VAN ENERGIE IN SUID-AFRIKA

In die laat sewentigerjare het die WNNR 'n mate van navorsing oor die gebruik van sonenergie, die gebruik van energie in geboue, lugreëling en verkoeling gedoen. Vroeg hierdie dekade is gidentifiseer dat navorsing oor die gebruik van energie (en elektrisiteit in die besonder) 'n prioriteitstaak is, gesien, in die lig van die toename in energie- en veral elektrisiteitsgebruik en -koste. Soos in ander lande het energienavorsing voor hierdie stadium

byna uitsluitlik op die voorsiening van energie gekonsentreer. Tans weet ons in Suid-Afrika nog nie veel van hoe, waar, wanneer en hoe doeltreffend ons energie gebruik word nie. 'n Hele aantal aksies wat dié onderwerp moet ontgin, word tans onderneem met 'n beperkte begroting en relatief min navorsers wat die nodige ondervinding het.

Twee projekte oor elektrisiteitsverbruik is vroeër vanjaar voltooi:

- i) 'n Oorsig van elektrisiteitsbesparingsaksies in ander lande.
- ii) 'n Studie oor die gebruik van elektrisiteit en die potensiaal vir besparing in Suid-Afrika.

Alle projekverslae is publieke dokumente wat in die NPEN se biblioteek ter insae is of aangekoop kan word teen 'n geringe koste om vir die afgedrukte te vergoed. Gegewens uit hierdie studies is ingespan deur die werkgroep wat die Minister van Minerale- en Energiesake in die lewe geroep het om optimalisering van elektriese spitsvrag te ondersoek. Hierdie werkgroep is saamgestel nadat die Kabinet die verslag van die de Villiers-kommissie oor die elektrisiteitsbedryf aanvaar het. Die werkgroep se taak is in September 1985 voltooi en die verslag is gedurende Oktober aan die Elektrisiteitsraad besorg.

## OORSIG VAN ELEKTRISITEITSBESPARINGS-AKSIES IN ANDER LANDE

Elektrisiteitsbesparingsaksies word in talle ander lande onderneem, veral die VSA, ten einde die toename in spitsvrag en sodoende ook die kapitale uitgawes te verminder. Elektrisiteitsbesparing word as 'n alternatief vir 'n nuwe kragstasies gesien en bring in talle gevalle 'n aansienlike laer koste teweeg. Indien dit byvoorbeeld R1 000 per kW kos om 'n nuwe kragstasie te bou, is die vermindering van die spitsvrag teen enige koste laer as R1 000 per kW kostedoeltreffend, 'n saak wat voorheen in Suid-Afrika geen aandag geniet het nie.

Hierdie aksies konsentreer op die huishoudelike en kommersiële sektore — hoofsaaklike lugreëling, waterverwarming en in 'n mindere mate ruimteverwarming. Elektrisiteitsmaatskappye maak gebruik van omvangryke navorsing bemaking en aansporingsmaatreëls vir die verskillende fasette van hulle programme. Hieruit blyk die verskeidenheid van aksies, innoverende denke en multidissiplinêre benadering, waar ekonomiese en sosiale elemente ook aangespreek word, baie duidelik. Van die maatskappye wat die voorlopers op dié gebied is, wend aansienlike hulpbronne vir hierdie aksies aan (tot 75 mense en \$75 miljoen per jaar vir maatskappye so groot soos Evkom).

Dit is duidelik dat beide vragvermindering- en elektrisiteitsbesparingsaksies onderneem word en wel d.m.v. die volgende:

## VRAGVERMINDERING ELEKTRISITEITSBESPARING

Radio- en rimpelvragbeheer	Energie-ouditte
Onderbreekbare tariewe	Termiese isolasie
Tyd-van-dag-tariewe	Energiedoeltreffende toerusting
	Hittepompe
	Opleiding
	Regulasies en standaarde

Talle van die aksies wat onder elektrisiteitsbesparing gelys is, dien ook om die spitsvrag te verminder. 'n Onlangse publikasie van Gellings' meld 'n beraamde spitsvragvermindering van 25 maatskappye in die VSA wat aansienlike besparings-

programme het van 26 284 MW, of 4,5% van die totaal. Indien in aanmerking geneem word dat hierdie aksies eers laat die vorige dekade 'n aanvang geneem het, is aansienlike resultate alreeds behaal.

## ELEKTRISITEITSGEBRUIK EN POTENSIAAL VIR BESPARING IN SUID-AFRIKA

Hierdie studie is deur 'n tegno-ekonomiese onderneming en die grootste probleem was om geskikte data te verkry<sup>1</sup>. Eventueel is die studie uitgevoer met Evkom-data, voltooië vraelyste wat deur mrn Barnard, die Stads-Elektriese Ingenieur van Johannesburg, gesirkuleer is en persoonlike en telefoniese onderhoude. 'n Multi-organisatoriese projékcommittee is in die lewe geroep om die projek te koördineer en die navorsing te evalueer. Die studie het gekontreer op die groter gebruikers van elektrisiteit. Aannames moes gemaak word oor klein industrieë, huishoudings en die kommersiële sektor, aangesien daar min gegewens oor die elektrisiteitsverbruik van hierdie sub-sektore beskikbaar is. Elektrisiteitsverbruiks-data kon in die meeste gevalle verkry word, maar data oor spitsvrag is baie skaars en is 'n onderwerp wat heelwat aandag verdien. Dit is algemeen bekend dat Evkom basies drie hoofgebruikers het: nywerhede wat direk van elektrisiteit voorsien word, myne en grootmaatverbruikers (hoofsaaklik munisipaliteite). Munisipaliteite voorsien weer hoofsaaklik elektrisiteit aan kleiner nywerhede (8% van die Evkom spitsvrag), handel (10%) en huishoudings (10%). Hiervolgens is die munisipaliteite die belangrikste bydraer tot die Evkom-spitsvrag met 38% van die totaal wat die VME0 se betrokkenheid onderstreep. Die persentasie elektrisiteitsverbruik van munisipaliteite is laer as die persentasie spitsvrag, a.g.v. 'n lae lasfaktor. In die geval van groot nywerhede en myne daarenteen is die lasfaktor hoër sodat die persentasie spitsvrag hoër as die persentasie elektrisiteitsverbruik is.

Die meeste munisipaliteite ondervind hul spitsvrag om 09h00 in die winter, alhoewel 'n middagspits in sowel die winter as die somer deur sekere munisipaliteite ondervind word. 'n Grafiek vir 'n tipiese (en hipotetiese) munisipaliteit is opgestel vanaf (karige) bestaande data en opinies van betrokkenes en toon 'n redelike konstante spitsvrag vanaf 09h00 tot 18h00, wat veroorsaak word deur die kommersiële sektor se spits om 09h00, die industriële sektor wat vanaf 09h00 tot 16h00 ongeveer konstant is, en die huishoudelike sektor se spits om 07h00 en 18h00, dit is duidelik dat die verskillende komponente mekaar ondersteun, aangesien die huishoudelike spits voorkom wanneer die ander twee se bydrae relatief laag is. Wanneer spitsvragbestuursaksies oorweeg word, moet dus nie net na die betrokke vrag gekyk word nie, maar ook na die effek op die geheel. Hierdie saak word dikwels deur bemarkers en voorstanders van spesifieke tipes toerusting uit die oog verloor.

Gebaseer op bogenoemde data en opinies is vasgestel dat elektriese motors (42%) van spitsvrag en elektrisiteitsverbruik van monster, wat ook in sekere kategorieë hierna ingesluit word), druklugkompressors (10%) water- en ruimteverwarming (8%), bogoende (6%) en die aandrywing van maganiese toerusting (6%) die hoofgebruikers van elektriese krag en energie in die algemeen is. Belliging, huishoudelike elektriese toerusting (uitgesluit verwarming) en verkoeling (almal 4%) is nie baie belangrik nie. Hierdie syfers is nie heeltemal verteenwoordigend van die volle elektrisiteitsverbruiksektor nie daar dit nie Evkom-kleinywerheidsgebruikers uitsluit en daar ook drastiese aannames vir die munisipale gebruikers gemaak moes word.

<sup>1</sup> 'n Positiewe houding jeens vragbestuur is vasgestel daar dit in 'n mate reeds deur 52% van die plaaslike owerhede, 81% van die Evkom-grootnywerheidsgebruikers en byna alle myne toegepas word. Daar is beraam dat plaaslike owerhede tans hule spitsvrag d.m.v. 'n verskeidenheid

maatreëls met 375 MW verminder en dat daar met die bestaande toerusting 'n totale potensiaal van 515 MW bestaan. Daar is ook bepaal dat plaaslike owerhede tans 1 000 MW gedurende die nasionale spitsvrag d.m.v. eie opwekking bydra en dat die totale bestaande potensiaal 2 500 MW is. Dit is dus duidelik dat optimale gebruik van bestaande toerusting 'n aansienlike bydrae tot die nasionale spitsvrag kan maak, maar dan sal 'n eenvormige beleid, 'n toepaslike tariefstruktuur en diepgaande tegno-ekonomiese analise nodig wees.

Met betrekking tot elektrisiteitsbesparing geld totaal 'n ander situasie. Daar is vasgestel dat munisipaliteite nie 'n hoë prioriteit hieraan verleen nie en gevolglik is geen aksieplan in die vooruitsig gestel nie. Die goumyne is meer positief en skenk reeds ernstige oorweging aan elektrisiteitsbesparing aangesien elektrisiteitskoste hoog is. Kontrasterende houdings word bespeur by die energie-intensiewe nywerhede waar sommige talle dinamiese aksies onderneem terwyl ander 'n totale gebrek aan kennis en belangstelling toon. 'n Moontlike rede is dat daar met die huidige hoër rentekoerse 'n baie kort terugbetalingstydperk van 1 tot 2 jaar as kriterium gestel word.

Gebaseer op die data wat verkry is, het die projekteur beraam dat die nasionale spitsvrag met 3220 MW verlaag kan word, hoofsaaklik d.m.v. opleiding, die gebruik van tyd-vandag-tariewe en 'n energiebesparingsprogram. Indien hierdie teoretiese potensiaal gerealiseer word, sal Evkom se lasfaktor verhoog na 85%, wat moontlik 'n hoër reserwemaagte sal noodsaak ten einde kortsluitingonderhoud te kan onderneem. My gevoel is dat hierdie raming optimisties is en dat so 'n aksie evolusie van aard moet wees. Om hierdie rede is dit nie moontlik om besparings en kostes te beraam nie, alhoewel die projekteur aangedui het dat 'n kapitale koste-besparing van R2 500 miljoen (1983 prys) verkry sal word maar dat ten minste R20 miljoen per jaar vir die aksie nodig sal wees.

Die projekteur se raming vir elektrisiteitsbesparing is moontlik te pessimisties. Hy beraam 'n besparing van 4 000 GWh per jaar vir die nywerheid, 2 400 GWh per jaar vir die mynswes en 1900 GWh per jaar vir huishoudings met 'n totaal van 8500 GWh per jaar of 8% van Evkom se verkope. Die implikasie hiervan is 'n kapitaalbesparing op nuwe kragstasies van R1 030 miljoen en 'n vermindering van veranderlike kostes van R115 miljoen per jaar.

Daar kan natuurlik nie van 'n eenmalige besparing gepraat word nie, want so 'n besparing kan nie eensklaps of eenmalig bereik word nie. Ons moet eerder praat van wat in die toekoms bereikbaar is t.o.v. die afname in die groeikoers van die spitsvrag ten einde 'n afname in kapitale belegging en elektrisiteitskoste teweeg te bring. Om hierdie rede is beide vragvermindering en elektrisiteitsbesparing van belang. Vragvermindering word gebruik om die vorm van die vragkurwe te verander, maar die totale potensiaal is uitgeput wanneer die optimum vragkurwe verkry word. Daarna is elektrisiteitsbesparing nodig om die orde-grootte van die vragkurwe te verklein (die vermindering van die area onder die vragkurwe). Vragbesparing is dus 'n kort- en middeltermynmaatregel en terwyl elektrisiteitsbesparing 'n middel- en langtermynmaatregel is. Die vrees word dikwels uitgespreek dat elektrisiteitsbesparing sal lei tot 'n vermindering in inkomste en verhoging van die eenheidskoste van elektrisiteit. Daar is egter al bewys dat in gevalle waar dit spitsvrag en elektrisiteitsverbruik in die kortke tydperk vermindert oor 'n gepaste tydperk vermindert word, die eenheidskoste van elektrisiteit in werklikheid verlaag.

Because of specific constraints, no dynamic activities in the field of electricity conservation are presently taking place in South Africa. These constraints are:

- i) A negative attitude and perception at operational level due

to a lack of knowledge and funds. Because of Treasury limitations at present, municipalities especially indicate that they cannot invest in such activities.

- ii) A lack of structure at higher level so as to develop, introduce, manage and coordinate electricity conservation programmes. Other countries have made effective use of research/demonstration projects but in South Africa such programmes do not exist.
- iii) Until recently a total lack of policy existed regarding electricity conservation at top level, i.e. in both the Government and Escom. In the past the policy was to expand the supply system to meet the demand and no steps were taken to reduce the rate of growth or to optimize the demand.

The conclusions of the study were that considerable gaps exist in data on electricity use, that knowledge on electricity conservation is limited, that demand and electricity conservation must develop hand in hand, that a considerable potential exists for these activities but that the true potential or cost cannot at present be established. It was therefore heartening to hear the announcement by the President of the AMEU that a policy decision was taken that demand side management activities will in future be supported.

The conclusions of the study were that considerable gaps exist regarding the lack and inaccuracy of data, further research into high electricity use equipment, the introduction of research/demonstration projects and of a demand side management implementation programme. An overriding recommendation is the development or purchase of expertise for diverse tasks related to this topic.

#### FUTURE RESEARCH

A question that is often asked is where the NPER is going. We are doing a relatively small amount of research on solar and biomass energy. Slightly more is done in the field of energy supply in the rural areas of our country where serious energy problems exist and ecological damage is occurring in specific areas. More details on these activities can be obtained from a document entitled "Announcement to submit research proposals" which was circulated earlier this year. More funds have been allocated for research into energy consumption and conservation, and electricity is an important component of this action. The more prominent electricity research topics are-

- i) Specific electricity and demand conservation topics such as energy efficient electric motors and air compressors;
- ii) The potential for the cogeneration of heat and electricity in South Africa;
- iii) Optimization of the performance of domestic hot water systems in South Africa;
- iv) Sensitivity of the electricity policy to variations in the demand, including cost versus quality trade-offs;
- v) Design norms for low income electrification for peri-urban and urban application, related to future electricity consumption and cost;
- vi) Technical, social and economic parameters of the electrification of Soweto as an input into similar actions in the future;
- vii) The efficiency of domestic electrical equipment;
- viii) Essential rural electricity supply (lighting, radio) with solar cells.

#### CONCLUSION

Electricity forms a very large component of our lives.

International developments are indicating that many changes are occurring in terms of the use and supply of electricity. We in South Africa, because of our first world component lying so close to our third world component, will have to ensure that we utilize the most appropriate technology for the local conditions. Increasing the efficiency of use of electricity will lead to reduced costs and capital investment. We are all painfully aware that loan capital will in future be difficult to obtain in the international market. An electricity conservation programme will therefore be to the strategic benefit of the country as it will also release scarce capital for other essential development activities. For this purpose a national scientific research programme is necessary to ensure objective results that can be disseminated to all concerned. The NPER was specifically developed for this purpose and will gladly cooperate with the AMEU and individual members.

#### REFERENCES:

1. Ernst and Whinney: Review of electric load and energy conservation by the final consumer in other countries — final project report to the NPER, March 1985.
2. Gellings, C.W.: The importance of load management in reducing electric peak demand, a national perspective. "Meeting Energy Challenges" Conference, May 1985.
3. LHA Management Consultants: The potential for electric load and energy conservation in South Africa — final project report to the NPER, March 1985.

#### CLR J CIVIN : BEDFORDVIEW

Mr President, in Bedfordview we have tried to be so progressive as possible with demand control. We have computer systems to cut our geysers at peak periods, in fact with our 13 000, roughly kVA load we feel we can control it by about 5 000 kVA, which enables a certain improvement in the load factor but only up to that point. Now, I was very interested to hear that Escom is now going to improve their load factor. A very practical factor. Will they give us other means to improve our load factor. Will we, for argument's sake, if it is economic, be allowed say a 5 000 kVA generator in our area to lob off the load at peak time? We cannot cut our consumers off any further. We cannot for argument's sake switch off Eastgate's air conditioning on a summers day. So it has to come some other way, and we are interested to hear from Escom what these other schemes are that they have got for load control.

#### MR REILLY : ESCOM

Mr President, Escom, as I showed on the screen, are still crawling. We will be looking at all possible alternatives to improve the load factor and by that we mean the national load factor. We feel that there is something that can be done in a situation where certain municipalities are cutting load when we are in fact bringing sets down. Now we will have to look at the possibility later of some kind of power pool, but at this stage I cannot give any promises on how it will operate, we will certainly look at it. One possible alternative which may be of use to the municipalities, could be interruptible tariffs, if they have consumers that do not require 24 hours a day supply and they can perhaps sell to us interruptible load, then they would of course share the advantage with Escom.

#### CLR EBEN COMBRINK : VEREENIGING

From the reports of Mr Palser, who attended the World Energy Conference, it appears that the USA erected a solar energy station. I believe it is a 5MVA unit and Russia has done the same. Has Escom given consideration to wind and solar generation of electricity?



In the present economic situation where the inflation rate is very high, it seems to me such a waste of money to break down power stations that were erected near coalfields. Even in cases where the coal is not yet worked out.

**MR STOFFBERG : ESCOM**

Mr President, Mr Combrink raised the question of solar energy or wind energy as alternative energy sources for the generation of electricity. I would like to assure you Mr President, that Escom remains alert to the possible use of solar-, wind-, or other energy sources, for the economic generation of electricity.

I believe that Mr Basson of the CSIR will later during this Convention also refer to the continued research into the economic application of solar energy for electricity generation.

Mr Combrink also referred to the plans for decommissioning of certain older coal-fired power station in Escom's system. The decision to decommission a power station is only taken after careful consideration of the economic factors and is only taken if this step will curtail overall costs and thus help in moderating the unavoidable future increases in the price of electricity.

**CLR VAN DER VELDE : CAPE TOWN**

Mr President, we have on many platforms heard this word of conservation and saving of energy, but could you tell me how you motivate a council to save energy when it means it is going to loose income and will correspondingly put up its tariffs to get the same profit into the rates account?

**RAADSLID POTGIETER : VERWOERDBURG**

Mnr die President, om aan te sluit by Rdl van der Velde se aanmerking oor energiebesparing, ek dink daarmee kan ons almal saamstem, 'n stadsraad wil nie 'n kleiner inkomste vin sy elektrisiteitsdepartement kry nie, maar eerder 'n groter inkomste, so dit is eintlik onwys vir 'n stadsraad om energiebesparing aan te moedig, maar mnr Reilly het ons daarop gewys dat ons in Suid-Afrika anders as in Amerika en Engeland nie op energiebesparing, maar eintlik op kapitaalbesparing ingestel is. Ons kan dit bereik deur aanvraagbespar-

ing. Het dit nie tyd geword vir ons mense wat meters verskaaf dat ons op 'n goedkoop manier wel verbruikers se aanvraag, veral gedurende spitsstye, kan lees hetsy die aanvraag direk te meet of die eenhede vinniger te meet gedurende spitsstye. Is dit nie waarna ons moet kyk nie?

**9 DIE BEVEILIGING VAN OORHOOFSE LAAGSPANNINGSLYNE**

Die Ad Hoc Subkomitee het sy werk afgehandel, die riglyne is deur die VME0 Uitvoerende Bestuur goedgekeur en aan die Hoof Inspekteur van Masjinerie deurgestuur. Die Sekretaris van die VME0 is versoek om die riglyne in boekvorm te druk en die konsep afgerolde vorm is vir my nie aanvaarbaar nie, aangesien die Komitee voel dat dit in 'n meer substansiële vorm beskikbaar gestel behoort te word. Ons innige dank aan Evkom vir die samewerking wat ons ervaar het. Lede word gemaam om 'n kople van hierdie riglyne te bekom en daarvolgens te werk.

Mnr Clarke het met dr Erickson van die WNNR geskakel in verband met 'n ondersoek wat die WNNR moontlik namens die VME0 kan uitvoer en ek vertrou dat hy u verder sal kan inlig.

**MNR MAX CLARKE : RANDBURG**

Gentlemen, just to put you in the picture, I have been in touch with Dr Erickson and he has expressed interest in some kind of a joint research project on this problem of low voltage lines. What most of us begun to realize and those of us I am referring to, have already started some implementation of recommendations, is that they do not always work, and it looks very much as if we need a far greater indepth study of the problem. We could all be chasing our tails with a lot of fruitless expenditure where some sort of co-ordinated effort is required in order to channel our very meagre national resources in the right direction.

**MR P J BOTES : ROODEPOORT**

In conclusion, Mr President, I enjoyed the honour to be convenor of this very important committee of the Executive Council, no doubt was this due to the support I received from experts such as Mr Clarke, our Secretary, Mr Palsler, Dr Botha and Messers Robson and Davies.



**SABS CO-ORDINATING  
COMMITTEE  
REPORT  
1985 CONVENTION**

**KOÖRDINERENDE  
SABS-KOMITEE  
VERSLAG  
1985 KONVENSIË**

- 1 Pursuant to a resolution of the Executive Council (permitting rapporteurs to submit their reports in the official language of their choice) the language used in this report will be partly English and partly Afrikaans.

Ingevolge 'n besluit van die Uitvoerende Raad (wat verslaggewers toelaat om hulle verslae in die amptelike taal van hulle keuse aan te bied) is hierdie verslag gedeeltelik in Afrikaans en gedeeltelik in Engels.

- 2 Tensy anders gestel, dek hierdie verslag die tydperk 1 Julie 1984 tot 30 April 1985. (Vorige verslae het die tydperk voor 1 Julie 1984 reeds gedek).

- 3 The members of the Committee are Messrs J A Loubser, J K von Ahlften and E de C Pretorius (Convenor).

**4 Vergaderings/Meetings**

- 4.1 Die Komitee het tot 1985-06-30 drie vergaderings gehou. Heelwat sake is onderling ook telefonies afgehandel.

- 4.2 Salient points from the deliberations and activities of the Committee are as follows:

- 4.2.1 Representatives of the AMEU have been nominated to serve on the following new SABS technical committees:

- 4.2.1.1 Revision of SABS 158-1965 (Electric kettles and similar portable electrical appliances for heating liquids.)

- 4.2.1.2 Aerial bundled conductor systems.

- 4.2.1.3 Non-metallic wireways and accessories - (re-established committee).

- 4.2.1.4 Stove connectors for electric cooking appliances. (The formation of this committee was instigated by the AMEU.)

- 4.2.1.5 Uninterruptible power systems.

- 4.2.1.6 Dry-type transformers.

- 4.2.1.7 Safety requirements for mains operated electronic and related apparatus for household and similar general use.

- 4.2.1.8 Revision of the code of practice for the wiring of premises. (Although the AMEU is entitled to only one representative, the SABS very kindly agree, after strong pleas from the Co-ordinating Committee, to accept a second representative.)

- 4.2.2 AMEU representation has been withdrawn from the committee dealing with the revision of the specification for energy regulators for heating units because it was felt that this subject was outside the cadre of the AMEU.

- 5 Nadat die Hoëveldtak, deur die Koördinerende Komitee, so ver terug as 1979 vertoë tot die SABS gerig het vir 'n standaardspesifikasie vir kwikdamplampe het die Buro in 'n brief gedateer 1985-04-16 uiteindelik laat blyk dat die bal nou aan die rol gesit is vir so 'n spesifikasie. Dit sal gebaseer word op die ekwivalente spesifikasie van die Internasionale Elektrotegniese Kommissie wat ongelukkig geen vereistes vir die lewensduur van lampe stel nie.

- 6.1 Op 24 Oktober 1984 is die SABS se voormalige Direkteur van Elektrotegniese Ingenieurswese en Fisika en 'n groot vriend van die VMEO, mnr J W Smit, na 'n lang lyding oorlede.

- 6.2 Die SABS het besluit dat die betrokke departement, omdat dit te groot en die funksies daarvan te uiteenlopend van aard geword het, in twee nuwe departemente geskei moes word, te wete "Elektriese Ingenieurswese" en "Elektroniese Ingenieurswese en Fisika". Aan die hoof van laasgenoemde staan dr C J Johnston a an die ander, 'n ou bekende van die VMEO, mnr J V (Ian) Grant, beide met die rang Direkteur. Dit is seker gepas dat die VMEO se gelukwense aan mnr Grant en dr Johnston op rekord gestel word.

- 6.3 Mnr Grant se departement bestaan uit 5 afdelings, naamlik (met die naam van die hoof van die afdeling in hakies) -

Verligtingstegnologie (mnr H J Steyn);  
Ontploffingsvoorkomingstegnologie (mnr H A Meijer);  
Hoëspanningsingenieurswese (mnr J C van Alphen);  
Elektriese Tegnologie (mnr I P Kruger);  
Kabel en Installasies (mnr J E Toms - waarnemend).

- 6.4 As gevolg van die herorganisasie is sekere projeknommers gewysig. Om verwarring te voorkom, word die ou projeknommers in hierdie verslag vermeld.

**7 Vorderingsverslae/Progress Reports**

During the period under review the following SABS technical committees, on which the "AMEU is represented, have been active. (The headings start with the project number followed by a description of the project. The name of the representative who submitted the report is shown in brackets at the end of the report.)

- 7.1 **361/50280: Isoleerolie vir transformators en skakeltoeg: Voorgestelde hersiening van SABS 555**

Die finale vergadering is gedurende November 1984 gehou, en die wysigings is gedurende Mei 1985 deur die Raad van die SABS goedgekeur. (G Nortjé)

- 7.2 **381/50170: Nie-metaalleipype en -toebehore (vir elektriese bedrading)**

Die komitee het op 28 Januarie 1982 en 4 November 1982 vergader waarna 'n konsepspesifikasie van deel

1. "Onbuigsame leipype en toebehore van ongeplaatseerde polivinylchloried", opgestel en vir kommentaar vrygestel is.

Die kommentaar wat ontvang is, is op 6 Junie 1984 deur die komitee bespreek en enkele kleiner aspekte wat nog aandag verg sou met korrespondensie afgehandel word waarna die spesifikasie aan die SABS-raad vir goedkeuring voorgelê sou word.

Hierdie deel 1 van die spesifikasie dek slegs PVC-geleibuis en toebehore, terwyl buigsame en ovaal buise en toebehore asook buise en toebehore van materiaal ander as PVC, wat kragtens die ou SABS 950 toelaatbaar sou wees, in latere dele van die spesifikasie, gedek sal moet word. Daar sou dus by die SABS-raad aansoek gedoen word om die veristes van die ou SABS 950 vir 'n verlengde tyd van krag te hou ten einde vir produkte waarvoor nie in deel 1 van die spesifikasie voorsiening gemaak word nie, te dek. (J J Boshoff)

**7.3 711/50220: Mobile kommunikasietoetusting vir landgebruik**

Die stigtingsvergadering van die komitee is gehou op **Woensdag, 14 September 1977**. Die finale vergadering het plaasgevind op **2 Augustus 1984** waar die spesifikasie goedgekeur is met geringe wysigings. Die finale spesifikasie sal bekend staan as SABS 1069 gedateer 22 Mei 1985, en sal eersdaag verskyn.

Die spesifikasie is gebaseer op die EIA- en CEPT-spesifikasie wat aangepas is vir Suid-Afrikaanse toestande. Herhalerstasies, basisstasies, sowel as mobiele stalle word gedek behalwe instelsels soos byvoorbeeld ZVEI-toonstelsel.

Dit dien gemeld te word dat die Poskantoor nie radiostelle volgens die totale spesifikasie gaan toets nie maar slegs enkele onderafdelings van die spesifikasie gaan uitgevoer word op stalle wat vermoedelik ongewenste uitstralings veroorsaak. Daar sal byvoorbeeld slegs na die uitgangsdring en modulisie gekyk word om maar twee te noem. Die rede hiervoor is dat dit eerstens baie omslagtig sal wees en dit vereis gesofistikeerde toerusting om stalle aan die volledige spesifikasie toetse te onderwerp. Die spesifikasie dien dus meer as riglyne vir die vervaardiger en stel die eindverbruiker in staat om meer realistiese toerusting te eis. (M W Odendaal)

**7.4 721/50050: Ballasts for low pressure sodium vapour and HID lamps**

No meetings were held since 1979 apart from minor editorial amendments handled by correspondence. (J K von Ahlften)

**7.5 721/50240: Fixed luminaires for fluorescent lamps**

The existing compulsory specification - Government Notice 466 - covers a wide range of appliances. Because of the general nature of the requirements of the specification it was decided to replace certain requirements in the compulsory specification to make the specification more applicable to fixed luminaires for fluorescent lamps.

The revised document was approved and went through the normal channels at the SABS whereafter it could be finally published in the Government Gazette. (J K von Ahlften)

**7.6 751/50010: Bedradingskode: Werkgroep 4**

Die werkgroep het op 14 en 27 November en 6 Desember 1984 vergader om 'n groot aantal voorgestelde wysigings op die gebruikskode SABS 0142 te oorweeg.

Ek kon ongelukkig weens ander verpligtinge slegs die laaste vergadering bywoon maar mnr G Brown het handel om drie vergaderings bygewoon.

Die werkgroep se aanbevelings sal nou aan die hoofkomitee voorgelê word vir verdere oorweging. (J J Boshoff)

(Nagenoeg 200 kommentare en voorgestelde wysigings, ook dié van die VMEO wat in vorige verslae van die Koördinerende Komitee vermeld is, is oorweeg - 'n formidabele taak!)

**7.7 751/50030: Plugs, socket-outlets and adaptors, non-domestic**

The SABS Council has given approval to start with revision. Busy with Revision 1 (SABS).

**7.8 751/50110: Manually operated air-break switches**

The proposed revision of Schedule 1 - Compulsory Standard Specification for manually operated air-break switches was considered by the Committee at a meeting held on 8 June 1984 and the SABS was authorised to proceed with the draft for comment. (J K von Ahlften)

**7.9 751/50130: Internasionale kontakprop en sokkeltel (International plug and socket-outlet system)**

By 'n vergadering gehou op 26 Oktober 1984 was die SA Nasionale Komitee met 'n meerderheidstem ten gunste van die voorstelle soos vervat in IEK-dokument 23C (Secretariat) 16.

Die gedagte was dat, indien die meerderheid van IEK-lidlande ten gunste van die dokument besluit, 'n ampelike kennisgewing volgens die 6-maande-reël uitgereik sou word met die nodige stembriewe. Die uitslag is egter nog nie beskikbaar nie maar alle aanduidings is daar dat sekere wysigings aangebring sal moet word waarna daar weer volgens die 2-maande-reël gestem sal word.

Nadere besonderhede sal mondelings verstrekk word. (J A Loubser: telefonies)

**7.10 751/50170: Bedradingskanale vir elektriese kables**

Deel 2: Metaalbedradingskanale vir installering in vloere. Geen vergaderings is gehou nie maar in 'n brief gedateer 28 Maart 1985 het die SABS kennis gegee dat die spesifikasie nou goedgekeur is. (J J Boshoff)

**7.11 761/50010: PVA-insulated electric cables (SABS 150)**

A proposal (from a manufacturer) to amend SABS 150 in order to permit the use of tubed bedding was opposed.

In a letter dated 1985-05-28 the SABS advised that "since the majority of organizations are not in favour of the proposed amendment, it will not be implemented". (E de C Pretorius)

**7.12 761/50060: XLPE cable (SABS 1339-1981)**

A proposed amendment was received to specify volume resistivity instead of linear resistance of the

screen to bring the associated test methods in line with NEMA specification. To be discussed at a committee meeting. (P J Botes)

I quote from a letter dated 1984-10-23 from Mr A H L Fortmann, who also represents the AMEU on the particular technical committee, to the SABS.

"At the Executive Council Meeting of the AMEU held on 12 September 1984 in Bloemfontein, concern was expressed about the three core type C cable manufactured under SABS 1339.

Information has been received which indicates that partial discharges on the surface of the semi-conducting screen over each core, where the three cores make contact and due to the fact that the three cores do not have a metallic shield, causes the cable cores to erode. The Executive Council of the AMEU resolved that this matter be investigated.

As a member who served on the SABS Committee and representing the AMEU, I herewith request that the SABS consider re-opening this particular aspect of SABS 1339 covering three core type C cables.

Your kind consideration in this matter will be appreciated."

This matter apparently has not received any further attention.

**7.13 761/50120: The selection, handling and installation of electric power cables up to and including 33 kV rating**

Parts IV, V and VI of the Code of Practice concern current (ratings of PVC, paper and XLPE) insulated cables respectively and as it is difficult to specify standardized current ratings, since the current ratings of the various manufacturers are at variance and because the factors are compounded by soil thermal resistivity, soil moisture content and the variation of these factors along the route of the cable as well as seasonal variation in the soil moisture content and temperature, it was decided not to provide tabulated figures and to leave it open for consultation with the manufacturer.

Part III has undergone minor alterations to bring it in line with the newly approved Code of Practice SABS 0119 "Design and installation of an earth electrode" and Code of Practice SABS 0200 "Neutral earthing in medium voltage industrial power systems" and together with part VII and VIII is now again being circulated for comments. (P J Botes)

**7.14 761/50560: Electric cables and conductors**

Two meetings were held, one during March 1985 and the second during April 1985, when the proposed standard for materials of insulated electric cables and flexible cords: Part I: Polyvinyl Chloride (PVC), Part III: Cross-linked Polyethylene (XLPE) as well as the proposed standard for Conductors of Insulated Electric Cables and Flexible Cords, were processed and final drafts are expected in due course.

The principle of using the IEC Specification as a basis for the SABS Specification for cable conductors, was accepted by the Committee. (A H L Fortmann)

**7.15 761/50570: Aerial bundled conductor systems**

A working group of the main committee has drafted a specification which the SABS is now editing and which is expected to be considered by the committee

in the second half of 1985. (M P P Clarke)

**7.16 781/50150: Safety of electrical appliances**

A special meeting was held on 7 February 1984 to resolve the long impasse that had existed in view of the technical deviation of the compulsory SABS specification from the IEC specification due to editing of the SABS specification to a form acceptable for publication in the Government Gazette causing considerable interpretational difficulties.

The Committee decided to adopt the text of the IEC Publication 335-1 as is, without any change except for references in the IEC Publication to other specifications to be changed to SABS specifications in terms of the Standards Act. It was also agreed to include power tools and lighting appliances with retention of the full IEC text. This would ensure that all appliances now covered in the scope of the existing specification would remain covered. (J K von Ahlfen)

**7.17 783/50100: Ballasts for fluorescent lamps**

Ballast manufacturers requested amendments to SABS 890 to allow for temperature rise under normal operating conditions of 60°C on a ballast winding and one requesting under 'abnormal' conditions, temperature rise of at least 105°C.

Die laasgenoemde versoek word nie gesteun nie. (P J Botes)

**7.18 791/50160: Standard voltages and currents from electrical power supply: Revision of SABS 1019-1975**

In November 1984 the draft revision was sent to members of the technical committee for comment. Comments received were collated in a document dated 1985-02-26 with SABS proposals in consideration of the comments. Committee members were requested to comment on the collated comments and SABS proposals before the end of March 1985. Up till 1985-07-15 there has been no further communication from the SABS.

An interesting aspect of the revision is that the standard voltages for LV supplies in the range 200 to 250 volts are laid down as 220/380 V and 230/400 V, with this footnote: "In accordance with IEC standard voltage. IEC Publication 38 further recommends that the voltage variations of existing 220/380 V and 24/415 V systems be brought within the range of 230/400 V ± 10%". (E de C Pretorius)

**7.19 791/50170: Verspreidingstransformators**

**7.19.1 Uithaantapskakeelaars ("off-circuit tapping switches")**

Die SABS het in 'n brief gedateer 1984-05-14 aan lede van die tegniese komitee 'n gewysigde Toetsmetode SABS T2 voorgestel vir kommentaar wat beskou word as meer bevredigend om te gebruik as 'n toetsmetode vir uithaantapskakeelaars vir SABS 780-transformators. Aangesien hierdie saak by wyse van korrespondensie gehanteer word, neem dit baie tyd in beslag en is daar nog nie finaliteit bereik nie.

**7.19.2 Voorgestelde wysiging nr 4 van SABS 780**

Hierdie voorgestelde wysiging raak onderafdeling 3.24: "Beskerming teen korrosie". Die SABS het dit in 'n brief gedateer 1984-08-30 aan die lede van die tegniese komitee voorgelê vir kommentaar. Na aanleiding van kommentaar is 'n tweede voorstel op

1984-11-23 voorgelê. Ook 'n derde voorstel is aan die komiteelede gesirkuleer waarop hulle vóór 1985-04-07 moes reageer. (Hierdie jongste voorstelle is tot 'n mate beïnvloed deur bevindinge van mnr de Alphen en Hatch van die SABS oor die ondervinding van Evkom se Natalstreek met transformator-korrosie.)

Daar is sedertdien nog nie weer van die Buro vernem nie. (E de C Pretorius)

7.20 **851/51830: Metaalleipe en -toebehore (met skroef-ent en gladde ent) vir elektriese bedrading**

Hierdie projek vervang gedeeltelik die ou projek-nommers 851/50070: Skroefleipe en -toebehore vir elektriese bedrading, SABS 162; en 851/50850: Gladde ent-metaalleipe en toebehore vir elektriese bedrading, SABS 1007.

Nadat besluit is om begenoeemde twee spesifikasies te kombineer, is 'n konsepspesifikasie wat beide gladde ent en geskroefde metaalleipe dek, opgestel en vir kommentaar aan komiteelede gestuur.

Kommentaar is telefonies en met korrespondensie gelewer en deur die SABS werkwinkel, en 'n konsepspesifikasie vir Metaalleipe en -toebehore (met skroefent en met gladde ent) vir elektriese bedrading, Deel I: Metaalleipe, is op 31 Julie 1984 vir kommentaar vrygestel.

Kommentaar is ontvang en die spesifikasie word nou gefinaliseer vir voorlegging aan die SABS-raad. (J J Boshoff)

7.21 **851/51840: Metaalleipe en -toebehore vir elektriese bedrading – Deel II: Metaaltoebehore**

Hierdie projek is die tweede gedeelte van die gekombineerde spesifikasie wat die ou SABS 162 en SABS 1007 sal vervang en dek toebehore vir metaalleipe met skroefdraad en met gladde ente.

Hierdie projek is ook met korrespondensie afgehandel.

Die konsepspesifikasie is gedurende Desember 1984 vir kommentaar vrygestel en die kommentaar is pas van die SABS ontvang. Die spesifikasie word nou gefinaliseer om aan die SABS-raad vir goedkeuring voorgelê te word. (J J Boshoff)

- 8 On behalf of my committee and myself, I wish to thank all those AMEU representatives on SABS technical committees and working groups who, quite often under difficult circumstances and pressure of work, devotedly and diligently study the SABS documents they receive, submit their comments and/or attend committee meetings. Thank you also to those who have submitted progress reports without which it would have been nigh impossible to compile this report.

I also wish to thank those local authorities who employ these representatives for the opportunities afforded to them to carry out this work which is of national interest.

- 9 Weens die ligging van die SABS se setel en die gevolglike afstandsprobleem word VMEQ-verteenwoordigers in SABS-komitees hoofsaaklik uit die Hoëveldtak benoem wat natuurlik 'n geweldige werklast op hulle plaas.

- 10 Ek wil weereens VMEQ-lede aanraai om in te teken op die SABS-Bulletin wat u op die hoogte hou van die doen en late van die SABS, nuwe spesifikasies,

spesifikasiewysigings en dies meer, en wat ook interessante artikels oor standarde en verwante sake bevat.

- 11 In conclusion I wish to reiterate what I have said in previous reports: We, the AMEU, must regard the SABS as one of our most loyal and powerful allies in our aspirations to offer our electricity consumers only the best service. But the SABS is virtually powerless if we do not cooperate by ourselves in turn being loyal to and promoting the image of the Bureau: being mark-conscious is one very simple way to accomplish this.

E de C PRETORIUS  
Sameroeper/Convener

## DISCUSSIONS – BESPREKINGS

### MR A H L FORTMANN : PRESIDENT ELECT

With regard to the report, I would like to make a correction and say that I erred with my reference to type C cable which I wrote in my letter to the SABS and which Mr Pretorius quoted in his report. The correct reference is collectively screened cable which is not only confined to type C cable.

The progress so far is that the SABS recognises that there appear to be shortcomings in SABS 1339 as far as three-core collectively screened cable is concerned.

The SABS therefore proposed that the specification be amended by :

- (a) the deletion of all references to collective metallic screens.
- (b) making the application of a semi-conductive bedding tape over the extruded semi-conductive core screen mandatory.

NOTE: This means in effect that all cores of all cables will be individually screened with a semi-conductive tape under a copper tape or tapes.

- (c) increasing the minimum average thickness of the extruded semi-conductive screen to 1 mm.
- (d) by deleting the requirement for linear resistance and by introducing a requirement for a maximum volume resistivity of 500 ohm-meters at 90° Celsius for extruded conductor and core screens.
- (e) and introducing a new SABS test method for volume resistivity based on the IEC test method.

Members of the SABS Committee concerned with this project were asked to comment on these proposals.

I telephoned the SABS on Wednesday last week and was advised that the closing date of 25 September 1985 for comments is extended to a later date.

However, the comments received so far are generally in favour of the proposals put forward by the SABS.

### MR I GRANT : SABS

I did want to say something because there has been a further development. Referring to item 7.9 on page 4 of the report

under discussion.

The two months rule procedure which is to be applied round about November/December this year to this IEC plug and socket system, if that fails to get approval, then we revert to the original document which is being updated. Twenty three C 16 is mentioned here. So what I can tell you is the IEC plug and socket system will be published as far as I can see, next year. It will be the one that you have seen if you are on the committee or something very, very similar. I don't think there is anymore to say, but I would like to thank Mr Pretorius, very much for his good wishes.

MR K MURPHY : SOMERSET WEST

Mr President, besides congratulating Mr Pretorius on his report, I note that we now have a standard specification that will be coming out shortly on radio communication. I would just like to say that is going to be worth a lot to us. We are

very pleased that this has seen the light at last.

MR VAN ALPHEN : SABS

Mr Pretorius made reference on one item on the agenda and that is on distribution transformers. I am very delighted to see all the efforts being made as reported by Mr Piet Botes on standard tariffs. I think there is a move afoot to really give serious consideration to a standard capitalisation formula. In the past it has always been regarded as impossible, the rationalisation of transformers. The other thing is that I would like to mention that we have been approached to now prepare a standard for large standard transformers, up to 132 kV and up to 40 to 45 MVA. This is a big step for the SABS but seeing the success they had with the distribution transformers we are confident that this is also just something that we can do to the cost benefit of the users of transformers.

## REPORT OF THE TECHNICAL TRAINING COMMITTEE FOR THE PERIOD 1983/85

## VERSLAG VAN DIE TEGNIESE OPLEIDINGS KOMITEE VIR DIE TYDPERK 1983/85

### 1 COMPOSITION OF COMMITTEE

The following members of the AMEU were appointed to this committee by the Executive Council at its meeting held on the 14th October, 1983:

NS Botha	-	Bloemfontein
E G Davies	-	Pietermaritzburg
J D Dawson	-	Uitenhage
A H L Fortmann	-	Boksburg
G J Nortjé	-	Germiston
D C Pelsler	-	Cape Town

At a later date the Executive Council, at the request of the Training Committee, added Mr J A Loubser of Benoni.

At the time of writing this report in June 1985 three meetings of the committee have been held and a fourth meeting is scheduled to be held on the 2nd August, 1985.

### 2 PROFESSIONAL ENGINEERS ACT NO. 82 OF 1968

The committee met on the 15th June, 1984 to discuss the implication of the introduction of Section 21(1)(a) of the Professional Engineers Act on the 29th May, 1986. The committee supported the introduction of Section 21(1)(a), but depending on the interpretation of Government Gazette Notice No. R3063 dated 8th August, 1969, foresaw possible problems for electricity supply undertakings.

Later on the same day the committee and President, W Barnard, met with Professor de Vos, the President of the South African Council of Professional Engineers.

Professor de Vos reassured the committee that in his opinion, municipal electrical engineers who were not registered as professional engineers, need have no fears over the introduction of Section 21(1)(a), as an engineer does not need to be a professional engineer to do any specific work, provided he has adequate knowledge and experience of such work.

Professor de Vos then offered to address the next meeting of the AMEU, and full details of his address are contained in the proceedings of the 10th Technical Meeting which was held in Bloemfontein, on the 10th and 11th September, 1984.

The President also wrote to all engineer members of the AMEU informing them of the position.

It is hoped that this problem is now resolved to the satisfaction of all concerned.

### 3 AMEU BURSARY SCHEME AND MERIT AWARDS

#### 3.1 Bursary Scheme

3.1.1 The committee considered that the existing bursary scheme did not relate adequately to the objectives of the AMEU and decided to recommend as follows to the Executive Council.

3.1.2 That there should be four bursaries each for the full period spent at the university.

3.1.3 That the first bursary should be awarded for 1986, the second for 1987, and so on until there are four bursaries operating concurrently but commencing in successive years.

3.1.4 That the bursaries be awarded with the objective of providing electrical engineers for electricity supply industry.

3.1.5 That the awardee should be required to work for the number of years corresponding to his bursary for a municipal electricity supply undertaking.

The award of the above bursaries would commit the AMEU to providing financial assistance of  $\pm$  R5 000 in 1986,  $\pm$  R10 000 in 1987,  $\pm$  R15 000 in 1988, and  $\pm$  R20 000 in 1989 and subsequent years.

The above estimates are based on current university



fees of say R2 000 for tuition, R2 000 for residence and R1 000 for expenses and these will obviously escalate in future.

Arising out of recommendations 3.1.2 and 3.1.5 the committee made the following additional proposals.

- 1.6 That the AMEU should encourage, and possibly help, municipal electricity undertakings to establish approved training schemes for graduate engineers.
- 1.7 That if the Executive Council approves this committee's proposals that the Technical Training Committee should draw up detailed conditions for the bursaries, and that the control of the bursaries should be vested in the Technical Training Committee.
- 1.8 That the members of the AMEU should be kept aware of the functioning of the bursary scheme and the progress of the recipients of the bursaries.  
  
For example it was suggested that the recipients of bursaries who had done well at university should be introduced to the AMEU at conferences and/or technical meetings.
- 1.9 That the Finance Committee should consider the implications of financing the bursaries.
- 1.10 That, as a number of committee members felt that the university courses for electrical engineers tended to be directed more to the light current field, the AMEU should draw the attention of universities to the need for their co-operating in producing more electrical engineers for the electricity supply industry. In support of this opinion attention is drawn to the report to FSPE entitled "The supply and demand for engineers 1984", by Dr Philip Lloyd and Professor Bob Plewman, which points out, amongst many other items, that in the late 1980's each graduate in heavy current electrical engineering will have over four jobs on offer to him.

The Executive Council at its meeting held on the 26th April, 1985, approved the committee's proposals and as a result of this approval, the Training Committee will hold a meeting on the 2nd August, 1985 to draw up detailed conditions for the bursaries and these will be submitted to the Executive Council meeting on the 3rd October, 1985.

The Finance Committee will report to the same meeting as to whether or not the AMEU can support the proposed bursary scheme in whole or in part and depending on the outcome of these discussions the bursary scheme could come into operation in either 1986 or 1987.

### 3.2 Merit Awards: Technical Training Centres

The committee noted that the Secretary of the AMEU had eight registered technical training centres, viz

Benoni (East Rand Training Centre)  
Bloemfontein  
Cape Town  
Durban  
East London  
Johannesburg  
Port Elizabeth  
Roodepoort

The opinion was expressed that there were more centres operated by members of the AMEU and it was decided to send a questionnaire to all engineer members, requesting details of any training centre or

scheme operated by their undertakings.

It was considered that the existing scheme should be continued except that it should be a condition that merit awards should only be made to electrical apprentices/trainees who are employed by municipalities.

It was also decided that a final recommendation as to whether the amount of the award, viz R250, should be increased or decreased should only be made after the results of questionnaires are known.

The questionnaire has been issued and a response received from 93 undertakings out of the 100 approached.

The replies indicate there are 14 centres/schemes for the practical training of apprentices, 11 of which are full time and 3 are parttime.

The training committee after its meeting to be held on the 2nd August, 1985 will submit further recommendations to the Executive Council on the 3rd October, 1985.

I would like to place on record the committee's thanks to all the undertakings who completed and returned the questionnaires.

### 3.3 Merit Awards: Technicians and Technical Colleges

According to the information provided to the committee there are 8 technicians and 12 technical colleges presently receiving awards of R50 and R100 respectively from the AMEU.

It was considered that the number of technicians and technical colleges was incorrect, and Mr Davies was requested to produce an up-to-date list.

Doubts were also expressed about the financial level of the awards and Mr Davies, was requested to obtain comparisons to similar awards made by other organisations.

As in the case of technical training centres it was decided that the present scheme should continue to operate except that the award should only be made to electrical apprentices/students/trainees who are employed by municipalities.

It was decided to make a final recommendation, only after the information to be collected by Mr Davies, has been considered at the meeting to be held on the 2nd August, 1985.

In addition, the committee also recommended the following.

### 3.4 Post Graduate Grants

In order to encourage research into problems experienced in the electricity supply industry, it was suggested that the AMEU should consider making grants to post graduates on an ad hoc basis, where, it was felt that such assistance would benefit municipal electricity supply undertakings and would result in recognition of the AMEU.

The Executive Council approved this proposal in principle and the committee will now investigate the concept in more detail and submit detailed recommendations to the Executive Council in due course.

### 3.5 Publicity

It is considered essential that maximum publicity and media coverage should be obtained for these proposals and with the Executive Council's approval, the Publicity Committee under the convenship of Mr Max Clark, of Randburg, has agreed to assist this project.

#### 4 SUBSIDY FOR THE TRAINING OF MUNICIPAL APPRENTICES

Despite numerous efforts the AMEU has not yet managed to obtain any subsidy for electricity undertakings which would encourage them to train more apprentices.

The replies to the questionnaire referred to in 3.2 which was issued to ascertain the number of training centres/schemes, also provided the following statistics.

Total number of apprentices	636
Total number of artisans	1964
Total number of centres/schemes for the practical training of apprentices	14 (11 full time, 3 part time)
Undertakings who indenture apprentices	50
Number of undertakings employing between 41 and 164 apprentices	4
Number of undertakings employing between 11 and 40 apprentices	8
Number of undertakings employing between 1 and 10 apprentices	38
Number of undertakings employing no apprentices	43

From the above it appears to me that many electricity undertakings, particularly in the smaller towns, make little or no effort to train apprentices probably because of the financial implications of doing so.

Such cost in 1982 was established at roughly R20 00 per apprenticeship, and I am sure that if financial assistance was provided all municipal electricity undertakings would be prepared to train apprentices.

This in turn would contribute to a reduction in the present and anticipated shortage of artisans and technicians.

It is the intention of the President to make a further approach to the Department of Manpower on the basis that the granting of such subsidies could make a significant contribution to solving the shortage of skilled manpower problem.

#### 5 APPRECIATION

Finally, may I place on record my sincere thanks to all members of the committee for the hard work they have done and their wholehearted participation in the workings of this committee.

By J D DAWSON  
Convener



Mr J D Dawson

#### MR J D DAWSON : UITENHAGE

Further to the written report to the Convention it is only necessary to add that the Technical Training Committee met in Cape Town on the 19th July, 1985 and formulated the detailed conditions for the bursary scheme.

These will be submitted to the Executive Council when it meets on the 3rd October, 1985 and if approved the scheme will be put into operation as soon as possible.

#### MR A B J TINDERHOLM : ICMEE

Mr President, please permit me to convey to you, your Council and all delegates at this convention, the greetings from the Institute of Certificated Mechanical and Electrical Engineers. Thank you for inviting me to attend the AMEU Convention as the President of ICMEE. Mr Loubser, may I also congratulate you on your election as President of the AMEU for the ensuing term of office. We trust that you will enjoy a most satisfying and rewarding two years.

On page 1 par 2, Mr Dawson makes reference to the Professional Engineers' Act No. 82 of 1968 which incidentally should read No. 81 of 1968. His Committee supported the introduction of Section 21(1)(a) but found difficulty with the correct interpretation of Government Gazette Notice R3063 dated 8 August 1968.

Since many certificated engineers employed by local authorities have been affected by the said legislation and some are in fact present here today, I will endeavour to provide clarity on this matter. I have also learnt that some certificated engineers are even prohibited by their seniors from approving design drawings prepared by themselves or under their direct control. This state of affairs leaves a lot to be desired and will only lead to reduced productivity and utter frustration for our members.

For many years, i.e. since 1911, the Engineers' Certificate of Competency was the only engineering qualification to enjoy statutory recognition in the Republic of South Africa prior to the advent of the Professional Engineers' Act of 1969. This act has made provision for the reservation of certain types of work for professional engineers only and was the cause of great concern amongst many certificated engineers although the Professional Engineers' Act does not specifically infringe upon the preserves of certificated engineers under the relevant Acts.

Subject to a certificated engineers' personal education, training and experience having rendered him fully competent to carry out engineering work involving investigating, advising, reporting, evaluating, measuring, planning, designing, specifying, laying out, directing, constructing, commissioning, inspecting or testing of a degree or standard requiring the skilled application of the principles of mathematics, the basic physical sciences (such as physics and mechanics) and the basic engineering sciences (such as applied mechanics, thermodynamics, electro-technology and material sciences) for their development and attainment, he is at liberty to carry out such work for which he is qualified. The following excerpts from Notice R3063 will hopefully provide further clarity:

Subject to the provisions of Section 21(1)(b) of the Act, nothing herein contained shall be so construed as to prevent an

architect registered in terms of the Architect's Act, or a quantity surveyor registered in terms of the Quantity Surveyor's Act, or a land surveyor registered in terms of the Land Surveyor's Registration Act, or a natural scientist or a member of any other profession from performing one or more of the elements of the kind of work reserved in terms of this notice for which his education and experience have rendered him competent. Nothing herein contained shall be construed as derogating from the force and effect of the regulations made in terms of the Factories, Machinery and Building Work Act, 1941 (Act 22 of 1941), or the Mines and Works Act, 1956 (Act 27 of 1956).

Therefore, the effects on certificated engineers may be summarised as follows :

They may do any engineering work required by the MOS Act for the premises on which they are appointed as responsible engineer/person.

In terms of these provisions they are also not precluded from performing any engineering function for which his educa-

tion and his experience render him competent. There is no restriction on the area where this work may be carried out, i.e. he does not necessarily have to hold an appointment as responsible engineer/person for the premises where the work will be executed.

It is further recommended that the approval of drawings for submission to any authority be signed by the certificated engineer and that the following wording be indicated below his signature "Certificated Engineer" and below this the type and number of the certificate, i.e.

Mines Mechanical Certificate No. ....

or Factories Electrical Certificate No. ....

Example: John Hones  
Certificated Engineer  
Factories Electrical Certificate No. ....

Note: Where an engineer holds both certificates, he should state the number and type of the one most appropriate to the work concerned.

## AMEU BURSARIES AND AWARDS



*His Worship the Mayor, Councillor J A Yazbeck presenting the AMEU Award for 1984 to Mr Ivar Belling, the outstanding Apprentice Electrician in the Apprentice Training Centre of the East London Municipality Undertaking.*



*Mnr H J S Zeeman het sy beurs van R1 000 ontvang van prof N Wessels, Hoof van die Departement Elektriese Ingenieurswese aan die Universiteit van Pretoria. Prof Wessels skryf "Hiermee wil ek graag namens die Universiteit van Pretoria en myself u en u Vereniging van harte bedank vir die skenking aan mnr Zeeman. Dit is veral welkom in die lig van die skaarste van elektriese ingenieurs vir elektriese kragstelsels en swaar nywerhede. Hierdie beurs sal help om belangstelling in hierdie rigting aan te moedig.*



*The City Electrical Engineer, Mr K G Robson presenting the AMEU Award for 1984 at the Annual Prizegiving of the East London Technical College to Mr Gavin Smit, the Most Deserving Electrical Engineering Student at the College. Mr Smit is an Apprentice Electrician in the East London Municipal Electricity Undertaking.*



*His worship the Mayor of Durban, Cnr H N C MacLennan, presenting the award to the recipient, Mr Brian Harry Kloppenberg. Mr Kloppenberg commenced duty on 3 March 1980 as an apprentice electrician and reported for 2 years national service on 3 July 1980. He qualified as an artisan (electrician) on 21 September 1984, having obtained his NTC V. During his apprenticeship he received training in the district works and major works divisions. The method of selection was based on the percentages earned by the apprentices on the progress reports which are completed by the heads of the various sections. In this regard, Mr Kloppenberg obtained 86%.*



**A**  
*Mr J W J Koekemoer (senior assistent-registrateur (Akademies)), Universiteit van Pretoria oorhandig die VMEQ beurstjek van R1 000 aan mr A F Strydom.*



*His worship the Mayor of East London, Cnr A E Spring, representing the AMEU award for 1983 to the electricity undertaking's outstanding student, Mr Michael Backlund.*

# VMEQ BEURSE EN TOEKENNINGS

## AWARD TO THE MOST DESERVING T4 ELECTRICAL ENGINEERING STUDENT (1984)



The award of R500 was made to Mr A A Waja of 102 Shaanti Crescent, Gateville. The presentation was made at a Cape Technikon liaison committee meeting on 29 May 1985.



Mr Mso Mahomed receives the AMEU bursary of R1 000 from Mr D H Fraser, city electrical engineer, Durban.



Mr D C Pater, is handing over the R250 prize donated by the association to the most deserving apprentice at the apprentice training centre during 1984, to Mr D C Wood, a final year apprentice electrician who attained a first class N3 certificate and passed his trade test with a B+ during 1984.



## NEW REGULATIONS FOR ELECTRICAL INSTALLATIONS

## NUWE REGULASIES VIR ELEKTRIESE INSTALLASIES

Amended draft electrical installation regulations were issued for comment in the Government Gazette of 10 August 1984, Number 9366, under the new Machinery and Occupational Safety Act 1983 (Act 6 of 1983) to replace Part VIII of the existing electrical installation regulations in the Factories, Machinery and Building Work Act, 1941. Upon the coming into operation of these regulations, regulations C175 to C190 made under the Factories Act, will therefore be repealed.

The proposed basic changes to the following existing regulations may be worth noting:

- C175 – The "Code of Practice" has been replaced by a "safety standard" as defined in the new Act.
- C176 –
- 1 This regulation has been split – defining persons who are permitted to perform installation work *and* commencement of and permission to connect installation work which is now spelt out more clearly.
  - 2 A subclause has been added permitting the supplier to allow certain installation work to be connected subject to the certificate of compliance being lodged with the supplier within 14 days of permission having been granted.
- C177 –
- 1 A clause has been added to subregulation (4) that the supplier may permit the electrical contractor or permit holder to rectify any defects at the time of the inspection.
  - 2 Subregulation (5) has been amended to the effect that the supplier may require the electrical contractor or permit holder to be present at initial inspection and the electrical contractor or permit holder may be present at each initial inspection even if not required by the supplier.
  - 3 It has been made clear that "if in the opinion of the supplier" a fault or defect constitutes immediate danger the supplier shall disconnect the fault or defect circuit.
- C179 –
- 1 This regulation has been split concerning electrical contractors and permit holders.
  - 2 It is no longer necessary for the electrical contractor to produce satisfactory proof that he conducts a business for the purpose of performing installation work. He shall only have a fixed address and telephone listed in his name and must employ an installation electrician on a full time basis or that he himself is an installation electrician available on a full time basis to do or supervise installation work.
  - 3 Subregulation (4) has been deleted and the registration certificate shall now be valid for a period not exceeding 12 months and shall be renewed on application.

- 4 Regarding permit holders a permit may now be issued to any person who employs an installation electrician on a full time basis or he himself is an installation electrician to perform installation work on his own behalf.

Although it would appear that a private house holder or owner of small premises cannot obtain the services of an installation electrician to perform occasional installation work on his behalf unless he employs him on a full time basis it would appear that this is not necessary as the interpretation seems to be that the installation electrician in such cases will still perform the work on his own behalf and not on behalf of a full time employer as in the case of larger users.

It may therefore be appropriate to obtain the opinion of the Chief Inspector on this aspect at this Convention.

- General – New standardised suppliers forms referred to in the regulations have been drawn up in consultation with all the Branches.

*J K VON AHLFTEN  
Representative and Convenor*

## AANVULLENDE VERSLAG : KONSEP ALGEMENE MASJINERIE REGULASIES

Konsep algemene masjinerie regulasies is vir kommentaar uitgereik in die Staatskoerant No. 9366 van 10 Augustus 1984 wat met inwerkingtreding regulasies C1, C4, C9, C21 tot C28, C50, C51(1) en (2), C53, C54 en D2 wat uitgevaardig is onder die Wet op Fabriek, Masjinerie en Bouwerk 1941 sal vervang.

Daar dien egter gelet te word op die volgende voorgestelde wysiging wat vir elektrisiteitsondernemings van belang is.

Die definisie van "bevoegde persoon" in artikel 1(ii)(a) (b) en (c) word sodanig gewysig dat 'n gegradueerde ingenieur met minstens twee jaar nagraadse praktiese ondervinding in die instandhouding en bedryf in die toepaslike klas masjinerie waarvan hy beheer moet uitoefen ingevolge regulasie 2(3) as bevoegde persoon aangestel kan word, sonder dat hy ook 'n gediplomeerde ingenieur hoef te word, waar sodanige masjinerie wat uitsluitlik gebruik word vir die distribusie van elektrisiteit 5 000 kW te bowe sal gaan. Die vorige beperking was 800 kW tot 1 200 kW en bo 1 200 kW 'n vereiste.

Die Uitvoerende Raad van die VMEO ondersteun in beginsel hierdie wysiging aangesien dit eerstens baie van

die kleiner ondernemings met 'n hoogaanvraag van minder as 5 000 kW, wie nie die dienste van 'n gediplomeerde ingenieur kan bekom, instaat stel om nou 'n bevoegde persoon soos definieer in 1(ii)(a) met toepaslike ondervinding aan te stel, en tweedens dit meer aantreklik maak vir 'n gegradueerde elektriese ingenieur om in diens van plaaslike owerhede te tree, wat in die lig van die nuwe staatkundige bedeling vir plaaslike owerhede verwelkom behoort te word.

Hierdie wysiging weerhou natuurlik nie 'n gegradueerde ingenieur om nogtans die diploma te bekom nie, indien dit deur 'n werkgever as minimum vereiste gestel word, vir bevordering ongeag enige statutêre bepaling.

Die orige wysigings aan hierdie regulasies wyk egter nie basies af van die vereistes van die bestaande regulasies nie en geen spesifieke kommentaar is dus hier ter sprake nie.

J K VON AHLFTEN  
Sameroeper: Regulasie Komitee

## DISCUSSIONS - BESPREKINGS

### MR J K VON AHLFTEN: SPRINGS

Mr President, please note a literary gremlin which has crept into my report that the changes to the regulations may be worth "nothing" instead of "noting". I therefore trust that the new regulations will still be worth "something".

Regulations written in any manner will never satisfy everybody as was the case with these new regulations, but, I am confident that the changes have resolved many grey areas in the existing regulations especially concerning the standardisation of the "forms" which after much effort and long consultation with the branches, has now been resolved and finalised. I trust that these will now be applied within the spirit of the regulations to ease the task of both "contractor" and "supplier".

There is only one point which may still not be quite clear regarding the issuing of permits referred in paragraph 4 of my report. I think my interpretation is correct and as we have Mr Weich with us, he can tell us whether he agrees.

Apart from this I have no specific comments but to thank those branches and engineers who have given valuable advice and assistance in the preparation of the forms. I am sure that Mr Weich could clarify any further points you may wish to raise in connection with these regulations.

Wat die konsep algemene masjinerie regulasies betref is dit van belang om te let op die nuwe definisie van "bevoegde persoon" waar dit vir 'n gegradueerde ingenieur met die toepaslike ondervinding nie meer nodig is om die Staatsbevoegdheidsertifikaat te verwerf vir die klas masjinerie waaroor hy beheer moet uitoefen nie. Toepaslike ondervinding wat ons bedryf betref het betrekking op die "klas masjinerie" vir elektriese distribusie en moet die gegradueerde ingenieur 'n elektriese ingenieur wees.

Dit staan egter 'n werkgever vry om nogtans die sertifikaat vir sy besondere bedryf te vereis indien hy dit nodig ag, alhoewel dit nie meer 'n statutêre verpligting sal wees nie.

Ek wil egter graag hier melding maak van mnr Weich se bydrae met die voorgestelde wysiging wat vir baie kleiner en

middelslag ondernemings probleme uit die weg sal ruim.

### MNR A B J TINDERHOLM: IGWEI

Meneer die President, ek wil graag die Department van Mannekrag gelukwens met die opstel van die nuwe wet wat handel oor *Masjinerie en Beroepsveiligheid*, Wet Nr 6 van 1983. Hierdie stel artikels het dit ten doel om sterker klem te laat val op gesondheid en die algemene veiligheid van werknemers asook van die publiek in die algemeen.

Ongeukkig kan my Instituut egter nie met die gepubliseerde *Konsep Algemene Masjinerie Regulasies* akkoord gaan nie, soos vervat in die Staatskoerant Nr 9366 van 10 Augustus 1984.

Ons het veral beswaar teen die drastiese verhoging van die kilowatt perke vir die verskillende klasse van *Bevoegde Persone*, asook teen die nuwe definisie van *Bevoegde Persoon*. Alhoewel die nuwe verhoogde kW vlakke ongetwyfeld voordeel inhou vir die kleinere plaaslike owerhede kan dit onmoontlik groter veiligheid in die hand werk soos wat immers deur die Wet op Masjinerie en Beroepsveiligheid in die vooruitsig gestel word.

At present an artisan is permitted to take charge of machinery where the installed or equivalent power rating of machinery does not exceed 800 kW or, if permission is granted by the chief inspector, this level may be increased to 1200 kW. Where it exceeds 1200 kW the responsible person shall be a certificated engineer.

In the proposed draft regulations it is now contemplated to raise the level of the artisan to 2500 kW and where such machinery is used solely for the distribution of electricity to 5000 kW. This, Mr President, cannot be agreed to. The person contemplated here as the competent person is usually neither academically qualified nor technically trained to assume such responsibility, with the emphasis still on safety. His legal knowledge of the act and regulations is usually also meagre.

In factories or local authorities where the diversity factor may vary between 0,6 and 0,7 the actual installed power may be well above the 5000 kW if this figure is to be calculated on the maximum demand as referred to in the report by the regulations committee.

I submit that qualifications as well as experience together play a very important part in rendering a person competent. The mechanical or electrical technician (heavy current) can perform this function with great distinction in order to fill the gap between the certificated engineer and the artisan. I would recommend that the following classification be considered:

#### MACHINERY USED FOR DISTRIBUTION OF ELECTRICITY

Up to 1000 kW	- experienced artisan
1000 to 3000 kW	- electrical technician (heavy current) or a graduate engineer with 2 years post graduate experience
Exceeds 3000 kW	- shall be a certificated engineer

#### MECHANICAL / ELECTRICAL MACHINERY

Up to 1000 kW	- experienced artisan
1000 to 2000 kW	- mechanical/electrical technician or a graduate engineer with 2 years post graduate experience
Exceed 2000 kW	- shall be a certificated engineer.

N.B. If the employer so desires the certificated engineer may, of course, be appointed for all levels of responsibility.

Mr President, to conclude, I submit that a graduate engineer must complete two years post graduate experience and must also write and pass the prescribed subject - Legal

Knowledge. There is no valid reason why he should not prepare for this one subject whilst gaining his two years practical experience.

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## SATEPSA MAIN POWER SUB-COMMITTEE

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Sedert die vorige verslag in Oktober 1983 is heelwat vordering gemaak en ook wysigings aangebly aan die vorige lysie. Dokument SATEKG 1/84 "Beplanning van Elektriesiteitsverspreiding om voorsorg te tref vir gebeurlikhede" het die lig gesien en in Augustus 1984 gedruk deur die Verdedigingshoofkwartier, Pretoria. Die doel van die dokument is om as riglyn te dien vir die stappe wat gedoen kan word by die beplanning van nuwe netwerke of uitbreiding van bestaande netwerke om waar praktiese moontlik, kragvoorsiening te verseker aan hoëprioriteitstoelvoere.

SATEKG het die konsep van Primêre Voorkeurverbruikers ontwikkel. Die Primêre Voorkeurverbruikers sal sover prakties moontlik van krag voorsien word gedurende en na 'n noodsituasie waar daar 'n tekort aan elektrisiteit voorkom. Indien daar nog krag beskikbaar is, sal dit aan Sekondêre Voorkeurverbruikers verskaf word.

Onder Primêre Voorkeurverbruikers moet 'n staking van hulle werksaamhede die bedryf tydens 'n elektrisiteitstoelvoer-noodsituasie, die volgende moontlike gevolge kan hê:

- 1 Lewensgevaar of openbare veiligheidsgevaar.
- 2 Vernietiging of beskadiging van installasie of toerusting wat 'n opskorting van produksie van 'n nasionale kritieke produk vir 40 dae of langer sal veroorsaak.
- 3 Besliste brand of ontploffingsgevaar wat kan omsit in een van die bostaande gevolge.
- 4 Vernietiging of beskadiging van installasie of toerusting wat 'n opskorting van produksie van 'n nasionale kritieke produk vir 20 of 40 dae tot gevolg sal hê.
- 5 Potensiële gesondheidsgevaar.
- 6 Verlies van die vermoë om vir 10 tot 20 dae nie 'n

nasionale kritieke produk te kan vervaardig nie.

Die bywerk van die inligting vir die bepaling van die Derde Verbruikersvoorkeurlus het die volgende aksie genoodsaak wat voor 30 Mei 1985 voltooi moes gewees het, maar waaraan tydens die skrywe van hierdie verslag nog geen gewerk is, naamlik:

- 1 Die oorweging van die stad/dorp se eie noodkrag-behoefies en voltooiing van vraelus (Vorm B).
- 2 Versoek aan verbruikers om ook Vorm B te voltooi (nie verbruikers met 'n aanvraag van 500kVA of meer moet genader word).
- 3 Opsomming van die vraelyste ontvang asook eie noodkrag-behoefies moet gedoen word (Vorm SATEKG 84/11/11-A).

Dit word beoog dat die verbruikers wat op die Primêre Voorkeurlus ingeval is, teen Maart 1986, in kennis te stel of hulle wel op die voorkeurlus is.

Inmiddels het die Elektriesiteitsvoorsieningskomitee besluit:

- (1) om data aangaande groot transformatore wat by lidondernemings in gebruik is by te verk;
- (2) dat 'n ontmoeting gereël word tussen die Elektriesiteitsvoorsieningskomitee en die voorsitter van SATEKG se krag-subkomitee (mnr D F Conradie) tesame met die voorsitter van SATEKG oor die kwessie van "kwotas" v.s. "Primêre voorkeurlus-toekenning". Hierdie vergadering sal so gou moontlik na die Konvensie gereël word.

*P J BOTES, G J NORTJÉ EN G R MARLOTH  
Verteenwoordigers Hoofkomitee*

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## AMEU/ECA LIAISON SUB-COMMITTEE

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At the first meeting of the above Committee, held on 1 March 1984, after the 1983 Convention, the AMEU representatives advanced reasons for and proposed that the ECA should in future chair the meetings of the Liaison Committee. Mr R L Jung, President of the ECA (SA), was

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## VMEQ/EKV- SKAKELKOMITEE

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thereafter unanimously elected as Chairman of the Committee. In view of the valuable contributions made at these meetings by the ESCOM representatives, it was agreed that the Committee be renamed as the ECA/AMEU/ESCOM Liaison Committee.

It was also agreed that a working group be formed which will meet at regular intervals to discuss problems encountered with the interpretation of the Wiring Code. Regarding comments by this Committee, on the draft electrical installation regulations, the AMEU members were of the opinion that this fell outside the terms of reference of this Committee as each organisation should put forward its own comments, as the AMEU is only authorised to submit comments on behalf of its own members and not on behalf of any other organisation on any statutory regulations.

It was further agreed that regional Liaison Committees be established to discuss matters of common interest and the various branches of the AMEU will therefore be represented on these Committees.

As this Committee is now being chaired and administered by the ECA and not the AMEU, individual reports will have to be submitted to the Convention in future by the AMEU branch representatives on matters of common interest.

*J K VON AHLFTEN  
Convener*

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## DISCUSSIONS – BESPREEKINGS

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### MR D KNEALE : AFFILIATE

Mr von Ahlften very kindly sent me the copies of the proposed new forms that are to be incorporated as part of the revised regulations under the Machinery Occupational Safety Act. I was just wondering whether Escom have been

consulted and agreed to the format of these forms, because as a supply authority dealing directly with the power supply to the consumer I think it is necessary that they have some say in the way this form has been laid out.

### MR J K VON AHLFTEN : SPRINGS

The forms that we drew up have been submitted to the Chief Inspector for his perusal and further comment. I believe that he has considered Escom in this regard. These forms have not yet been published as an official form as approved by the Chief Inspector, but, I gather that they will be sent out as the approved form to all supply authorities, including Escom.

### MR D KNEALE : AFFILIATE

Mr President, one other question that is of great concern to us, and I think to Escom as well, the numerous electrical contractors that are springing up, which it seems there to be very little control over. It is extremely difficult to keep track of these persons. We are not at all happy with the proposed change to the existing regulations that requires a contractor not to produce proof of registration with an industrial council.

### MR J K VON AHLFTEN : SPRINGS

Mr President, can I ask Mr Kneale whether he made that suggestion to the Chief Inspector.

### MR D KNEALE : AFFILIATE

I believe our Association have done so but we would like the opinion of the AMEU if it is at all possible.

### MR J K VON AHLFTEN : SPRINGS

Well the AMEU did not see any problem in this regard at all.

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## REPORT ON THE HIGH VOLTAGE CO-ORDINATING COMMITTEE FOR THE PERIOD 1983/84

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This Committee was established by the CSIR in 1966, the primary objective being the development and co-ordination of research and testing facilities in the high voltage field. Over the years the Committee's areas of concern and activity have broadened gradually to include several diverse aspects of power and high voltage electrical engineering and it has developed a unique role as a medium for the voluntary co-ordination of various national and multi-organisational research projects in the electric power field. The AMEU and all branches of the industry, the State and the universities are represented on the Committee, which meets twice a year.

Certain aspects receive special attention through the activities of appointed Working Groups who report regularly to the Committee through conveners in five specialised technical fields. An informal sub-committee, under the chairmanship of Mr J C von Alphen of the SABS, was ap-

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## VERSLAG OOR DIE KOÖRDINERENDE HOOGSPANNINGSKOMITEE VIR DIE TYDPERK 1983/84

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pointed to co-ordinate the acquisition of equipment for the operation of research and test facilities in the EHV and UHV fields, which presently include the national EHV test facility at Apollo, the National Electrical Engineering Research Institute (NEERI), EHV research facility at the CSIR and the Escom corona test facility at Megawatt Park.

The activities of the Working Groups are summarized below:

### 1 EARTHING

Work and investigations into earthing methods and materials and problems arising therefrom, are proceeding throughout the Republic, and the Working Groups has been involved in various aspects of the work, which are of particular significance to the local authority, particularly in areas of high soil resistivity, because of its re-



sponsibility in terms of the Machinery and Occupational Safety Act. A code of practice for "design and installation of an earth electrode" (SABS 0199) was accepted by the group and it is hoped to publish this Code in 1985. The AMEU code of practice on "the application of protective multiple earthing to low voltage distribution systems" was submitted to the SABS for the preparation of a code of practice by a national committee. Other matters considered by the group were a standard for copper-coated earth rods, the use of corrosion resistant steel as earth rods and a code of practice on "neutral earthing in medium voltage industrial power systems", prepared by the SAIEE and to be issued shortly as a draft for comment.

The convener of this Working Group is Mr J C von Alphen of the SABS.

## 2 SYSTEM DISTURBANCES

The terms of reference of this Working Group include the study of the characteristics and implications, as well as the related originating and control mechanisms, of the system disturbances that are encountered in practical electric power systems, including harmonic distortion, unbalanced voltage, frequency and voltage variations and switching transients and temporary overvoltages, all of which are of particular concern to members of the AMEU because of the use of system polluting loads such as static inverters, the possible introduction of battery vehicles and their associated charging equipment and the local authority's responsibility to maintain an acceptable electricity supply system.

A newly formed task force on harmonic pollution is to draw up a code of practice dealing with the restriction of harmonics at the point of common coupling in transmission, distribution and industrial networks. Because South African power systems have longer lines, more capacitance, single-phase loads and few line transpositions, it is important that industrial supplies should receive particular consideration.

The need for rotating machines to be suitable for a voltage variation in excess of  $\pm 5\%$  was investigated and certain recommendations made by the Working Group following an analysis of measurements recorded to Escom and consumer substations. The "application guide for switching surge suppression devices in medium voltage motors for various switching media", is also being revised and should be ready for approval by the Committee in 1985.

Mr E F Raynham, Chief Electrical Engineer of Escom, is convener of this Working Group.

## 3 INSULATION

This Working Group covers a wide field which is subdivided into:

### 3.1 External Insulation and

### 3.2 Internal Insulation

#### External Insulation

A field programme by Escom and the University of Stellenbosch to assess pollution severity and the performance of outdoor insulation under AC conditions is in progress at four sites and it is hoped that this work will also lead to the development of an effective early warning system which will allow the implementation of timely maintenance procedures.

Other items receiving attention are the performance

of metal oxide arrestors in polluted environments, quality control tests on porcelain cap and pin insulators, service failures of the glass cores of composite insulators and the assessment of live deluge spraywashing systems.

An investigation into the high shatter rate of insulators on high voltage DC lines is continuing in collaboration with a Cigré working group and is of particular interest in relation to Escom supplies from Cabora Bassa.

#### Internal Insulation

This group continues to be involved in problems relating to the use of solid and gaseous insulation under local environmental conditions, including transformer insulation, extruded cable insulation, cast and moulded resin insulation and air and compressed gas insulation.

Local manufacturers are producing power and instrument transformers for use at voltages up to 400 kV, using paper and oil as insulation materials, as well as instrument transformers of 132 kV systems and power transformers for up to 22 kV, using cast epoxy resin as the major insulation material. Instrument transformer failures have been experienced by local authorities and the work of the group in investigating the role of partial discharge, its long-term effects and acceptable levels is of major importance.

High voltage extruded cables and cross-linked polyethylenes are manufactured in South Africa for voltages up to 132 kV. Problems relating to the ingress of moisture, jointing techniques and the compatibility of jointing materials have been largely eliminated. Experience at Sasol has provided valuable information relating to thermal ageing of cable joints. Work in this field was presented in a paper at the 1984 Biennial Session of Cigré.

A sub-committee within the SAIEE is continuing to assess the extent of the use of polychlorinated biphenyls (PCBS) in South Africa. Escom is involved in an examination of the breakdown properties of conductor and tower window geometries and it is hoped that this work will lead to a better understanding of the processes involved in the breakdown of long air gaps and make it possible to refine the design of future tower structures.

Convener: Professor J P Reynders, University of the Witwatersrand.

## 4 LIGHTNING

This Working Group continued its work on the survey of lightning flash density in the Republic, and 1984 saw the commercial installation, on a trial basis, of the LPAT-lightning location system in South Africa. Studies of the lightning protection of 11 kV overhead lines continued and a report on design and insulation co-ordination principles for distribution lines is being prepared. Based on the Group's work in this field, some seven papers were presented at the IEE conference on lightning and power systems held in London, at which Dr R B Anderson of NEERI, past convener of the Group, presented the Keynote Address. The group also participated in the revision of the South African Bureau of Standards code of practice for the "protection of structures against lightning", which is due for publication in 1985.

The importance of work in this field to municipalities, particularly on the highveld, was highlighted by the fire which destroyed a major transformer at Johannesburg's



prospect bulk supply substation in 1984, attributed to lightning striking the 88 kV overhead catenary system.

The convenor of this Working Group is Dr A J Eriksson of NEERI, who has taken over from Dr R B Anderson.

## 5 ROTATING MACHINES

This Working Group is involved in a number of projects relating to rotating machines, which particular emphasis on high voltage motors, which are extensively used in the mining industry in the Republic. A fault recording scheme is in progress to capture data for future analysis, but interest in this project on the part of the contributors has declined, which although disappointing, does serve as further confirmation that the occurrence of machine failure is not as great as it has been in the past. The group is also considering research into the impulse testing of high voltage motors, the possibility of introducing a standard specification for rewinding high voltage motors and a standard for special purpose, heavy duty, low voltage motors. A sub-committee is to assist in preparation for a proposed SAIEE workshop on high voltage motors in 1986.

Convenor, Mr A S Meyer of GEC Machines.

## 6 PUBLICATIONS OF THE CO-ORDINATING COMMITTEES ACTIVITIES

Considerable interest has been shown in publications of the Committee's activities, including progress reports for 1982, 1983 and 1984, (reference HVCC1, HVCC3 and HVCC4). The Systems Disturbances Working Group's report on recommendations on unbalanced voltage limits (reference HVCC2), was published as a technical note by the SAIEE in September 1983.

These publications are available from NEERI, P O Box 395, Pretoria.

*W BARNARD  
Representative*

## RESEARCH METHODS

Only during the last few years has concerted research attention been given to lighting protection of distribution instead of transmission lines. Many of you will remember the paper presented to the AMEU three years ago by Dr Andy Eriksson. He described lighting research carried out by the CSIR and on the CSIR/ESCOM test line. This, and other research carried out by members of the task force, formed the basis of the seven papers presented to the conference in London, as reported by Mr Barnard.

The results of the research so far has greatly increased our knowledge of the behaviour of unscreened lines (i.e. those without earthwires), but there is much more still to be learnt. We are not studying two new Escom distribution systems on which the lessons learned already have been taken into account in the design.

However, it takes too long to build a line, analyse its performance, modify the design and study the effects of the changes. Therefore, we need data on a wide variety of designs.

## LINE OUTAGE SURVEY

To get this data we set up a survey of the distribution lines being operated by municipalities and other similar organisation. To start with we had an enthusiastic response. Obviously some authorities were, and still are, unable to contribute data because they do not operate overhead distribution lines, but it appeared that we would be getting outage reports on over 100 lines operated by supply authorities other than Escom.

What are the results so far? We have collected reports for a full lighting season. I regret to have to tell you that we received reports from Escom, the SA Transport Services and only four municipalities.

## WE ARE GOING TO CONTINUE WITH THE SURVEY

To those municipalities who have contributed so far, thank you. To all the others with overhead lines, we would appreciate your assistance with the collection of reliable data. We know that many of you are short of staff and have other pressing tasks, but we hope that with your assistance we will be able to prepare a better code of practice to be applied to the thousands of kilometers of distribution lines built each year. In future this will mean more reliable supplies and fewer problems for system operators, that is yourselves.

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## DISCUSSIONS - BESPREEKINGS

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### MR TREVOR GAUNT: AFFILIATE

I would like to expand on one aspect of Mr Barnard's report which I am doing at the request of Mr Len Penman, chairman of the HEER Task Force on the Lighting Protection of Distribution Lines.

### TASK FORCE OBJECTIVE

The objective of the task force is to gain a better understanding of the effects of lighting on distribution lines so that such distribution lines can be designed to give the best possible performance within economic constraints. As Mr Barnard has reported, "a report on design and insulation, co-ordination principles is being prepared". I hope that this report will eventually take the form of a code of practice for application by all engineers.

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# SOUTH AFRICAN NATIONAL COMMITTEE OF THE WORLD ENERGY CONFERENCE (SANCWEC)

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## 1 Introduction

Since the last AMEU Convention in Johannesburg in October 1983, there have been four meetings of the South African National Committee of the World Energy Conference (SANCWEC). As in the past, all meetings were held at Escom head office, Megawatt Park, Johannesburg, under the chairmanship of Mr Jan Smith, chairman of Escom at the time.

Matters of interest to the AMEU are reviewed below under their respective headings.

## 2 12th WEC Congress : New Delhi, India, September 1983

As mentioned in my last report, it was considered that for political reasons attendance by South African delegates would not be possible. In the event this proved to be the case. Prof R K Dutkiewicz, of the Energy Research Institute of the University of Cape Town, however managed to attend, in his personal capacity.

Prof Dutkiewicz, reported that about 3 000 people from 62 countries attended the Congress. The main points raised are briefly summarised below.

### • Nuclear energy

It was generally felt that opposition to nuclear power has peaked and that the erection of nuclear power stations would now commence accelerating again.

### • Solar energy

The Russians announced that they had a 5 MV solar power station under construction. Considerable development was also taking place in California.

### • Wind energy

The economics of wind energy appear to be marginal in certain countries although considerable development was taking place in Denmark and Holland.

### • Hydro-power

Increasing interest was being shown in so-called mini-hydro and small-hydro schemes.

### • High-voltage transmission

Two interesting Russian schemes under construction were reported on, one a 1 150 kV AC line and the other kV DC line.

## 3 Growing role of electricity in the energy spectrum

An invitation was received from the Secretary-General of the World Energy Conference (WEC) to nominate a person to serve on an ad hoc committee, to consider the growing role of electricity in the energy spectrum. The Secretary-General in his letter stated that he was anxious that South Africa should serve on this committee, in

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# SUID-AFRIKAANSE NASIONALE KOMITEE VAN DIE WERLDENERGIEKONFERENSIE (SANKWEK)

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## 1 Inleiding

Sedert die laaste VMEO-konvensie in Oktober 1983 in Johannesburg, was daar vier vergaderings van die Suid-Afrikaanse Nasionale Komitee vir die Wêreldenergiekonferensie (SANKWEK). Soos in die verlede is al die vergaderings by die Evkom-hoofkantoor, Megawatt Park, Johannesburg onder die voorsitterskap van mnr Jan Smith, destydse voorsitter van Evkom, gehou.

Sake van belang vir die VMEO word hieronder, onder hulle eie hoofies bespreek.

## 2 12de WEK-kongres : Nieu-Deli, Indië, September 1983

Soos in my laaste verslag gemeld, is daar vermoed dat bywoning deur Suid-Afrikaanse afgevaardigdes om politieke redes onmoontlik sou wees. Daarna het dit geblyk die geval te wees. Prof R K Dutkiewicz, van die Eenergieavorsingsinstituut van die Universiteit van Kaapstad het egter daarin geslaag om dit in sy persoonlike hoedanigheid by te woon.

Prof Dutkiewicz het berig dat ongeveer 3 000 mense van 62 lande die Kongres bygewoon het. Die belangrikste punte wat geopper is, word kortliks hieronder opgesom.

### • Kernenergie

Daar was 'n algemene gevoel dat die teenkanting teen kernkrag sy hoogtepunt bereik het en dat die oprigting van kernkragentrales nou weer sal begin versnel.

### • Sonenergie

Die Russe het aangekondig dat by hulle 'n 5 MW-sonkragentrale in aanbou is. Aansienlike ontwikkeling vind ook in Kalifornië plaas.

### • Windenergie

Die skyn asof die ekonomie van windenergie in sekere lande marginaal is alhoewel aansienlike ontwikkeling in Denemarke en Holland plaasvind.

### • Waterkrag

Verhoogde belangstelling is getoon in sogenaamde Russiese skemas in aanbou, een 'n WS-lyn van 1 150 kV en die ander een 'n GS-lyn van 1 500 kV

## 3 Groeiende rol van elektrisiteit in die energienspektrum

'n Uitnodiging is van die Sekretaris-generaal van die Wêreldenergiekonferensie (WEK) ontvang om 'n persoon te benoem wat kan dien in 'n ad hoc-komitee om die groeiende rol van elektrisiteit in die energienspektrum te oorweeg. Die Sekretaris-generaal het in sy brief gemeld dat hy gretig was dat Suid-Afrika in hierdie komitee moet dien in die lig van die reuse-ontwikkeling

view of the vast expansion that had taken place in the country's generating capacity over the past decade.

It was intended that the greater use of electricity and its effects on labour productivity and the application of new technologies would be studied. The increasing cost competitiveness of electricity would probably accelerate this process.

It was resolved that as South Africa was a leader in the application of electricity in relatively under-developed countries, SANCWEC, should nominate a representative on this committee, either from the Department of Mineral and Energy Affairs or from Escom.

#### 4 Symposium on the management of plant availability

SANCWEC was invited to nominate a chairman for one of the sessions to be held at a symposium in Rome, in October later this year. The committee will act under the direction of the ad hoc study committee on the Availability of Thermal Generating Plant whose activities, I, reported on at the last Convention in Johannesburg, two years ago.

This session will consider the subject from the utility view-point, covering areas such as the need for high plant availability, information flow between operator and designer, life-style costs, specifications and contract management.

Mr I C McRae, then Escom general manager (engineering), was nominated to chair this session.

#### 5 Environmental effects and the resulting costs arising from the production and use of electricity.

Member committees were invited to nominate persons to serve on a number of study committees. One of these was a committee to consider the environmental effects and resulting costs arising from the production and use of electricity. The study would be concerned with investigating the balance between costs and benefits and ameliorating environmental effects on energy processes.

It was resolved that the Department of Mineral and Energy Affairs would consider nominating a representative to serve on this committee.

#### 6 Future SANCWEC Conference

The last SANCWEC Conference was held at the CSIR Conference Centre, Pretoria in January 1983, the theme being "South African Energy in Perspective. The AMEU was represented at this conference by the President at the time, Mr D H Fraser, and myself and our report on the proceedings was submitted to the last AMEU Convention in Johannesburg in October 1983.

Because of the success of this last conference consideration was given to holding a further one in 1986, the suggested theme being "Energy Supply and Demand in Southern Africa - quo vadis". This proposal received general support and will be investigated further.

#### 7 Acid deposition

A working group has been set up by WEC to consider acid deposition or acid rain, particularly from power stations. This is a subject that is receiving increasing atten-

tion and is a subject that is receiving increasing attention. It was resolved that the Department of Mineral and Energy Affairs should consider nominating a representative to serve on this committee.

Die gedagte was dat die groter gebruik van elektrisiteit en sy uitwerking op arbeidsproduktiwiteit en die aanwending van nuwe tegnologieë bestuor sou word. Die verhoogde koste-mededingendheid van elektrisiteit sal waarskynlik hierdie proses versnel.

Daar is besluit dat omdat Suid-Afrika 'n leier is in die aanwending van elektrisiteit in betreklik onder-ontwikkelde lande, SANKWEC, 'n verteenwoordiger in hierdie komitee moet benoem, of van die Departement van Minerale- en Energiesake of van Evkom.

#### 4 Simposium oor die bestuor van installasiebeskikbaarheid

SANKWEC is versoek om 'n voorsitter vir een van die sessies wat later vanjaar in Oktober by 'n simposium in Rome gehou gaan word, te benoem. Die komitee sal handel oor die leiding van die ad hoc-komitee oor die Beskikbaarheid van Tegnieke Ontwikkelingsinstallasie waarvan ek twee jaar gelede by die laaste Konvensie in Johannesburg, verslag gedoen het.

Hierdie sessie sal die onderwerp uit die utiliteitssoopgoot oorweeg en sodanige gebiede as die behoefte om 'n hoë installasiebeskikbaarheid, inligtingsvloei tussen operateur en ontwerper, lewensloopkoste, spesifikasie en kontrakbestuor dek.

Mnr I C McRae, toe Evkom se algemene bestuor (ingenieurswese), is benoem om as voorsitter by hierdie sessie op te tree.

#### 5 Omgewingsinvloede en die voortspruitende koste wat volg op die produksie en verbruik van elektrisiteit.

Lidkomitees is versoek om persone te benoem om in 'n aantal studiekomitees te dien. Een hiervan was 'n komitee wat die omgewingsinvloede en die voortspruitende koste wat volg op die produksie en verbruik van elektrisiteit moet oorweeg. Die studie sal gemoed wees met die ondersoek van die balans tussen koste en voordele asook verbeterde omgewingsinvloede op energieproues.

Daar is besluit dat die Departement van Minerale- en Energiesake sal oorweeg om 'n verteenwoordiger te benoem om in hierdie komitee te dien.

#### 6 Toekomstige SANKWEC-konferensie

Die laaste SANKWEC-konferensie is in Januarie 1983 in die WNNR se konferensiesentrum, Pretoria gehou, en die tema was "Suid-Afrikaanse Energie in Perspektief". Die VMEIO is by hierdie konferensie verteenwoordig deur my en die destydse president, mnr D H Fraser, en ons verslag oor die verrigtinge is in Oktober 1983 in Johannesburg, aan die laaste VMEIO-konvenie voorgelê.

As gevolg van die sukses van hierdie laaste konferensie is oorweging daaraan geskenk om in 1986 'n verdere een te hou, met "Energievoorsiening en -aanvraag in Suidelike Afrika - quo vadis" as voorgestelde tema. Hierdie voorstel het algemene steun geniet en sal verder ondersoek word.

#### 7 Suurafsetting

'n Werkgroep is deur die WEK aangewys om suurafsetting of -reën, in die besonder van kragentrales, te oorweeg. Hierdie is 'n onderwerp wat vandag toenemende

tion today, both internationally and in South Africa. Certain member committees, including SANCWEC, were invited to nominate representatives to serve on this committee.

#### 8 13th WEC Congress : Cannes, France, October 1986

The 13th Congress of the WEC is to be held in Cannes, France during October 1986, the theme being "Energy : Needs/Expectations". The technical programme, which is divided into four divisions is intended "to establish a link between yesterday's experience and tomorrow's hopes". The four divisions are the following:

- World energy trends since 1970;
- Relations between economy, environment and energy;
- International co-operation : technical and commercial;
- What can we aim for?

From a study of the more detailed programme it is clear that the technical papers will be of a high standard and of considerable interest to the AMEU, particularly in the light of present governmental emphasis on electrical load management and energy conservation.

Members of SANCWEC were asked at short notice whether they wished to attend the Congress. In view of the very limited time allowed in which to respond, I submitted this matter to the last meeting of the Steering Committee of the AMEU for its consideration. The Steering Committee supported representation at the Congress and authorised me to complete and submit a preliminary registration form. The matter will be submitted to the next meeting of the Executive Council for a final decision.

#### 9 Conclusion

As your representative on SANCWEC over the past four years, I, have found the proceedings stimulating and of considerable interest to the AMEU. The informal discussions held with other members of SANCWEC and Escom senior personnel have proved to be of great value in keeping abreast of energy developments on both the local and international scene.

The AMEU's representation on this local committee of the prestigious international parent body has accorded the AMEU the recognition and status it rightly deserves.

*D C PALSER  
Representative / Verteenwoordiger*

aandag geniet, internasionaal sowel as in Suid-Afrika. Sekere lidkomitees, met inbegrip van SANKWEK, is gevra om verteenwoordigers om in hierdie komitee te dien, te benoem.

#### 8 13de WEK-kongres : Cannes, Frankryk, Oktober 1986

Die 13de Kongres van die WEK gaan gedurende Oktober 1986 in Cannes, Frankryk gehou word, met "Energie : Behoeftes/Verwagtings" as tema. Die tegniese program wat in vier afdelings verdeel is, is bedoel "om 'n skakel tussen gister se ondervindings en môre se verwagtings te bewerkstellig". Die vier afdelings is die volgende:

- Neigings in wêreldenergie sedert 1970;
- Verhoudings tussen ekonomiese, omgewing en energie;
- Internasionale samewerking : tegniek en kommersiële;
- Waarna kan ons mik?

Uit 'n studie van 'n meer gedetailleerde program is dit duidelik dat die tegniese referate van 'n hoë standaard en van aansienlike belang vir die VME0 gaan wees, veral in die lig van huidige regeringseklem op die bestuur van elektriese belasting en energiebewaring.

Lede van SANKWEK is op kort kennisgewing gevra of hulle hierdie Kongres sal wil bywoon. In die lig van die beperkte tyd toegelaat waarin gereageer kan word, het ek hierdie saak aan die laaste vergadering van die Loodskomitee van die VME0 vir oorweging voorgelê. Die Loodskomitee het verteenwoordiging by hierdie kongres ondersteun en het my gemagtig om 'n voorlopige registrasievorm in te vul en voor te lê. Die saak sal aan die volgende vergadering van die Uitvoerende Raad vir 'n finale besluit voorgelê word.

#### 9 Slot

As u verteenwoordiger in SANKWEK die afgelope vier jaar het ek die verrigtinge stimulerend en van aansienlike belang vir die VME0 gevind. Die informele besprekings wat met ander lande van SANKWEK en senior personeel van Evkom gevoer is, het getoon dat dit van groot waarde kan wees om op hoogte te bly met energieontwikkelings op die plaaslike sowel as die internasionale toneel.

Die VME0 se verteenwoordiging in hierdie plaaslike komitee van die toonaangewende internasionale oerliggaam het aan die VME0 die erkenning en status wat dit tereg verdien, verleen.

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## SA ELECTROLYTIC CORROSION COMMITTEE

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### MAIN COMMITTEE

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Two meetings of the SA Electrolytic Corrosion Committee were held during the period under review.

#### REGIONAL FIELD COMMITTEES

The chairman of the 4 regional field committees report annually on the activities of their committees. In general, although electrolytic corrosion problems do arise, the mitigative measures employed are effective and the position is under control.

#### AC CORROSION

Approximately 3 000 kilometers of AC electrified track is now in service. To date no confirmed case of AC electrolytic corrosion has been reported.

#### INTRODUCTION OF CHROME MANGANESE RAILS

SA Transport Service is making increasing use of chrome manganese rails on tracks used by heavy trains. Although the resistivity is substantially higher than normal rails, this is offset by the use of rails with a larger cross-section, resulting in an increase in resistance of approximately 30%. Due to changes in the design of signalling circuits on certain sections all rails became available for traction currents, resulting in an overall reduction in resistance.

Rail insulation to earth is also being increased by the use of concrete sleepers.

#### ELECTROLYTIC CORROSION GUIDE

A draft guide to electrolysis has been compiled by the SA Transport Services. The guide covers the complete spectrum of electrolysis, with emphasis on DC electrolytic corrosion and cathodic protection. It is intended to issue the guide initially as a Technical Bulletin and possibly at a later stage as an SAECC Code of Practice

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## SA KOMITEE VIR ELEKTROLITIESE VERWERING

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### HOOFKOMITEE

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Twee vergaderings van die SA Elektrolitiese Korrosie Komitee is gedurende die onderhawige tydperk gehou.

#### STREEKVELDKOMITEES

Die voorsitters van die 4 streekveldkomitees doen jaarliks verslag oor die aktiwiteite van hulle onderskeie komitees. In die algemeen, alhoewel probleme te wyte aan elektrolitiese korrosie ontstaan, is die teenmaatreëls wat getref word effektief en is die situasie onder beheer.

#### AC KORROSIE

Ongeveer 3 300 kilometers AC elektrifiseerde spoor is nou in diens. Tot datum is geen gevalle van AC elektrolitiese korrosie nog aangemeld nie.

#### GEBRUIK VAN KROOM-MANGAAN SPORE

Die SA Vervoerdienste maak toenemend gebruik van kroom-mangaan spore op spoorlyne wat swaar treine dra. Terwyl die spesifieke weerstand aansienlik hoër is as dié van gewone spore, word spore met 'n groter deursnit-oppervlakte gebruik, en gevolglik is verhoging in weerstand ongeveer 30%. As gevolg van veranderinge in die ontwerp van sinjaaluitrusting op sommige trajakte is al die spore eger beskikbaar vir die dra van traskrag-strome, wat 'n algehele vermindering in weerstand teweegbring.

Die weerstand van die spoorbaan na aarde word ook verhoog deur die gebruik van beton dwarslêers.

#### ELEKTROLITIESE KORROSIE HANDLEIDING

'n Konsep handleiding ten opsigte van elektrolitiese korrosie is deur die SA Vervoerdienste saamgestel. Hierdie handleiding bevat breedvoerige inligting in verband met elektrolitiese korrosie, met die klem op gelykstrom elektrolitiese korrosie en katodiese beskerming. Dit is die voorname om die handleiding aanvanklik as 'n Tegnieke Bulletin uit te reik, en moontlik later as 'n SAEKK Gebruiks-kode.

*G J NORTJE*  
*Representative / Verteenwoordiger*



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## WITWATERSRAND REGION

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Six meetings were held during the period October 1983 to June 1985. The meetings are generally well attended by the various members.

During this period applications for 12 drainage bonds were processed by the Committee, of which 8 were from the Rand Water Board.

One case of electrolytic corrosion damage affecting two cables at the same location was reported to the Committee by Mr van der Merwe of Carletonville. The damage occurred at a point approximately 100 metres from a rail crossing. The cables had been in service for approximately 30 years, and were not provided with anti-electrolysis protection.

The Committee has revised the procedure to be adopted when applying for drainage bonds, mainly for the purpose of reducing delays in the installation of bonds. The action to be taken by applicants as well as the Secretary of the Committee will be clearly set out. This procedure will be circulated to all members of the AMEU within the Witwatersrand and OFS region when finalised.

The Committee has repeatedly expressed concern regarding the use of multiple earthing systems in areas where stray current electrolytic corrosion may be severe, as such systems distribute the stray currents over a much wider area, thereby aggravating the problem. The Committee disputes the validity of the argument that multiple earthed systems are essential for safety reasons, maintaining that in the more severe corrosion areas, earths and earth wires in the multiple earthed system will probably be destroyed by corrosion in a relatively short time. Supply authorities should bear this aspect in mind, especially when designing low voltage distribution systems for areas seriously affected by stray current corrosion.

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## WITWATERSRANDSTREEK

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Ses vergaderings is gehou gedurende die tydperk Oktober 1983 tot Junie 1985. In die algemeen was die bywoning goet.

Gedurende hierdie tydperk is aansoeke ten opsigte van 12 dreineringsaansluitings deur die Komitee afgehandel. Hiervan was 8 aansoeke deur die Randse Waterraad ingedien.

Een geval van elektrolitiese korrosie as gevolg waarvan 2 kables op dieselfde plek beskadig is, is onder die Komitee se aandag gebring deur mnr van der Merwe van Carletonville. Die skade het voorgekom by 'n punt van ongeveer 100 meters vanaf 'n spoorlynkruising. Die betrokke kables was vir ongeveer 30 jaar in diens, en het nie 'n anti-elektrolitiese bekleeësel gehad nie.

Die Komitee het die prosedure hersien wat gevolg moet word wanneer aansoek gedoen word om 'n dreineringsaansluiting, hoofsaaklik met die doel om vertraging in die aanbring van aansluitings te verminder. Die stappe wat deur die applikant asook die Sekretaris van die Komitee gedoen moet word sal duidelik uiteengesit word. Hierdie prosedure sal aan die lede van die VME0 binne die gebied van die Witwatersrand en OVS-streek gesirkuleer word nadat dit finaal goedgekeur is.

Die Komitee het by herhaling sy besorgdheid uitgespreek in verband met die gebruik van menigvuldige aardingstelsels in gebiede waar dwaalstroom elektrolitiese korrosie ernstige afmetings aanneem, aangesien sulke stelsels die dwaalstrome oor 'n groter gebied versprei, en sodoende die probleme vererger. Die Komitee betwyfel die geldigheid van die argument dat menigvuldige aardingstelsels noodsaaklik is om veiligheidsredes, en beweer dat in die gebiede waar ernstige korrosie voorkom, aardverbindinge en aardeleiers in 'n veelvuldige aardingstelsel waarskynlik binne 'n betreklike kort tydperk as gevolg van korrosie vernietig sal word. Voor-sieningsowerhede behoort hierdie aspek in gedagte te hou, veral wanneer laagspanning verspreidingsnetwerke ontwerp word vir gebiede waar ernstige elektrolitiese korrosie voorkom.

*G J NORTJE*

*Representative / Verteenwoordiger*

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## NATAL REGION

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This report covers the involvement of AMEU representation on the abovementioned committee.

Meetings are held regularly six monthly and are attended by organisations including :

SATS (Electrical, Pipeline & Laboratory divisions)  
Sasol & SFF  
Oil Industry Control Group  
Escom  
Department of Water Affairs

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## NATALSTREEK

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Pinetown Regional Water Services  
Electricity Department of Durban and Pietermaritzburg  
AE & CI  
GPO  
Umgenti Water Board.

Applications for encroachments over SATS property by cables, overhead lines and pipelines are approved through the laid down channels and contentious items discussed and resolved by the committee.

Information relating to installations and potential corrosion problems and/or prevention is passed on to AMEU bodies e.g. Buffalo River Water Supply Scheme for Newcastle, information and plans forwarded to parties concerned. In the immediate vicinity of Pietermaritzburg, a temporary test bond was installed in the Midmar-Hilton area, the Umgeni Water Board liaising with the local authorities concerned and this bond made permanent at a later stage, there being no apparent interference to local services.

Guidance was sought and guidelines received from the main committee regarding matters of cost, it being noted that the regional committee (all committees for that matter) is not empowered to rule on costs and responsibility for costs, but should operate on the basis of fostering co-operation amongst organisations.

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## NORTHERN CAPE REGION

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The Committee attended to six problems.

### 1 DRAINAGE BOND DIODE FAILURES : RIVERTON-NEWTON PIPELINE

In the annual report dated September 21, 1983, the Committee mentioned that two forced and one natural drainage bonds were installed in the abovementioned pipeline. The two forced drainage bonds have both failed. One forced drainage bond has been destroyed by lightning.

Waterpump metal corrosion also occurred on this pipeline. The Kimberley City Council has since established, from samples, that the metal was badly casted and not damaged due to electrolytic corrosion.

### 2 CONVERSION OF TRACTION SUBSTATIONS FROM MERCURY ARC TO SILICON DIODE RECTIFIERS

Since mid year 1983, the Committee attended to the changes in direct earth current pattern throughout the Northern Cape. Tap-changing was necessary on the main transformers of traction substations in order to re-establish load sharing. A diagram has been prepared to keep record of all tap changes.

By December 1983, the programme was completed after the conversion of 22 substations, no adverse effects have been noted or reported. Tap-changing of the traction main transformers will be kept under strict control.

### 3 APPLICATION AND APPROVAL OF DRAINAGE BONDS - LOHATLHA

On April 19, 1983, the Committee approved a temporary natural drainage bond for the Department of Environmental Affairs. The location of this bond is north of Lohatla station (between Postmasburg and Sishen), where the Glouster - Roscoe water pipeline crosses the railway line. This drainage bond was continuously kept under observation, and no adverse effects have been reported.

The Committee knew that this temporary drainage bond will become permanent in due course. The Committee

The SATS (Electrical Laboratory) representative has been requested to investigate and report back on measures employed elsewhere to combat the general problem of diode failure. The report back is scheduled for November 1985.

The newly developed cathodic protection survey recorded (development initiated and assisted by SATS (pipeline division)) has attained a large degree of success and is still being perfected.

In general, problems covered by this committee are minor and mostly resolved with a number of installations being monitored regularly but presently satisfactory.

E G DAVIES  
Pietermaritzburg

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## NOORD-KAAPSTREEK

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Die Komitee het aan ses probleme aandag geskenk.

### 1 DREININGSVERBINDINGSDIODEFOUTE : RIVERTON-NEWTON PYPPLYN

Die Komitee het in sy jaarverslag gedateer 21 September 1983 gemeld dat twee verpligte en een normale dreineringsverbinding op bogemelde pyplyn geïnstalleer is. Die twee verpligte dreineringsverbindinge het albei foute. Een verpligte dreineringsverbinding is deur weerlig vernietig.

Op hierdie pyplyn het ook waterpomp metaalkorrosie voorgekom. Die Stadsraad van Kimberley het sedertdien vanaf monsters vasgestel dat die metaal swak gegiet was en die beskadiging nie was veroorsaak deur elektrolitiese korrosie nie.

### 2 OMSKEPPING VAN TRAKSIESUBSTASIES VANAF KWIKBOOG NA SILIKONDIODE GELYKRIJTERS

Sedert die helfte van 1983 het die Komitee aandag geskenk aan veranderinge in die aard gelykstrom patroon in Noord-Kaapland. Tap-wisselaar veranderinge was nodig op die hooftransformators van traksiesubstasies ten einde vrugdeling te bewerkstellig. 'n Diagram is opgestel ten einde inligting te versamel van alle tap-wisselaar veranderinge.

Nadat 22 substasies verander is, was die program teen Desember 1983 afgehandel, geen nadelige invloed is gerapporteer of waargeneem nie. Die hooftraksie-transformators se tap-wisseling sal streng beheer word.

### 3 AANSOEK OM GOEDKEURING VAN DREININGSVERBINDINGS - LOHATLHA

'n Tydelike natuurlike dreineringsverbinding is op 19 April 1983 vir die Departement van Omgewingsake goedgekeur. Hierdie verbinding is geleë noord van Lohatla stasie (tussen Postmasburg en Sishen) waar die Glouster - Roscoe waterpyplyn die spoorlyn kruis. Hierdie dreineringsverbinding was onder voortdurende observasie en geen nadelige gevolge is gerapporteer nie.

Die Komitee het besef dat hierdie tydelike dreineringsverbinding mettertyd permanent sou word. Die Komitee het ook gevoel dat dit nodig mag wees om

also felt that it will be necessary to convert it into a forced drainage bond, in which case the availability of an electric supply point will have to be investigated.

#### 4 CITY COUNCIL KLERKSDORP

Messrs Cortec, cathodic protection consultants, has performed tests for the City Council of Klerksdorp on the forced drainage bond for the water pipeline from Ellaton pumpstation to Alabama reservoirs rising main. Messrs Cortec did not inform the SA Transport Services or the Northern Cape regional committee of these tests. After pointing out the correct procedures to Messrs Cortec, and after consultations with the pipeline manager, the connection was approved.

#### 5 COMMITTEE BOUNDARIES

It was accepted that the boundaries of the Committee should not necessarily run along with the boundaries of the SA Transport Services. The area should therefore also be known as the "Northern Cape Regional Committee" and not "Cape Northern", as referred to by the transport services boundary indications.

#### 6 TEST WORK ON STRAY CURRENT VAAL-GAMAGARA PIPELINE

These pipelines of the Director of Water Affairs runs from Barkly West to Hotazel, and crosses the Sishen/Hotazel railway line, approximately 4 kilometer outside Sishen.

The Department of Environmental Affairs appointed Messrs A Brett and Partners International (consulting corrosion engineers), with the consent of the SA Transport Services, to undertake a cathodic protection survey and design work on the pipelines until the first quarter of 1985.

The consulting engineers have reported that a drainage bond will probably be considered in the region where one of the pipelines crossed the Sishen/Saldanha railway line.

dit te omskep tot 'n verpligte dreineringsverbinding, in welke geval die beskikbaarheid van 'n kragpunt ondersoek moet word.

#### 4 STADSRAAD KLERKSDORP

Mnr Cortec, katodiese beskermingskonsultante, het toetse vir die Stadsraad van Klerksdorp uitgevoer op die verpligte dreineringsverbinding van die waterpyplyn vanaf Ellaton-pompstasie na die Alabama-reservoir styglyding. Mnr Cortec het nie die SA Vervoerdienste of die Noord-Kaaplandse streekseksie ingelig insake hierdie toetse nie. Nadat mnr Cortec op die korrekte prosedures gewys is en na samesprekings met die pyplyn bestuurder is die verbinding goedgekeur.

#### 5 KOMITEEGRENS

Dit was aanvaar dat die grense van die komitee nie noodwendig sal saamval met die grense van die SA Vervoerdienste nie. Die gebied sal daarom ook bekend wees as die "Noord-Kaaplandse Streekdienste" en nie "Kaap-Noord", soos verwys deur die SA Vervoerdienste grens aanduidings nie.

#### 6 TOETSWERK OP SWERFSTROME VAAL-GAMAGARA PYPPLYNE

Hierdie pyplyne van die Direkteur Waterwerke strek vanaf Barkly-Wes tot by Hotazel, en kruis die Sishen/Hotazel spoorlyn, ongeveer 4 kilometer buite Sishen.

Die Departement van Omgewingsake het mnr A Brett en Vennote Internasionaal (raadgewende korrosie ingenieurs), met die toestemming van die SA Vervoerdienste, aangewys om 'n katodiesebeskermingsonderzoek en ontwerpprojek te doen op die pyplyne tot die eerste kwartaal van 1985.

Die raadgewende ingenieurs het rapporteer dat 'n dreineringsverbinding moontlik oorweeg sal moet word in die omgewing waar een van die pyplyne die Sishen/Saldanha spoorlyn kruis.

*N S BOTHA  
Representative / Verteenwoordiger*

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## WESTERN CAPE REGION

Report of the AMEU representative on the Cape Western Electrolytic Corrosion Regional Field Committee for the past two years.

Six meetings of the committee were held during this period under the chairmanship of Mr R R Gilmour. The venue, teas and secretarial services being generously provided by the South African Transport Services Cape Town.

Meetings are always well attended with regular visitors being representatives of Department of Water Affairs and Mr van Rooy of SATS electrical laboratory.

No serious electrolytic corrosion problems were reported by members of the committee or of the AMEU. A close

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## WES-KAAPSTREEK

watch is kept on the monitored cathodic protection systems of buried assets in the Western Cape which include underground cables, water and petroleum pipelines and tanks, sewage disposal pipelines in the sea, gas mains, SATS, Provincial Administration, Municipal and Escom equipment.

The chairman, Mr R R Gilmour, presented a paper on The Engineers Role in Corrosion Control with Special Reference to Electrolysis to the 10th Technical Meeting of the AMEU - which provides the engineer faced with corrosion problems with a valuable reference work.

*K J MURPHY  
Representative*

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## THE NBRI STEERING COMMITTEE ON SOLAR ENERGY AND ENERGY CONSERVATION IN BUILDINGS AND BUILD ENVIRONMENT

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### 1 INTRODUCTION

There have been two meetings of the SEEC Steering Committee since my last report to the 48th Convention of the AMEU in Johannesburg, in October 1983.

During this period relatively few matters of concern to the AMEU were discussed. Certain items of general interest, however, are reviewed below under their respective heading.

### 2 INTERNAL SOLAR HEATER DEMONSTRATION PROJECT

With a view to overcoming some of the objections to the more general use of integral solar water heaters in low-income homes, a large research/demonstration project was undertaken by the NBRI in April 1982. A manufacturer of solar water heaters initiated this project by offering 100 integral solar water heaters free of charge for installation in low-income homes on condition that their operation be monitored and the results reported on. The monthly use of hot water, the consumption of electricity for water heating, the total electricity consumption and the reaction of occupants was to be recorded over a twelve month period.

The project has now been completed and the report of the NBRI forwarded to the Foundation for Research Development (FRD). The hot water and electricity consumption patterns have been analysed and the effectiveness of the integral solar water heaters in practice considered, together with user reaction and the economics of the system.

The final report is now being completed by FRD and it is hoped that it will be published before the end of this year. However, preliminary indications are that the results are rather disappointing.

### 3 CAPE LOW ENERGY EXPERIMENTAL HOUSE PROJECT (CLEEP)

This is a NBRI research project to investigate the use of passive solar heating techniques in housing for Coloureds in the Western Cape, as a means of improving thermal comfort and reducing the heating capacity required for such housing.

The aim of the project is to investigate, inter alia, the hot water and electricity usage patterns of families and to report on the performance of the solar water heaters in the houses.

The three year research period in which experimentation took place with the buildings unoccupied was completed last year. The results obtained are now being classified and the resulting data obtained will be merged into a data management system. From an analysis of the data and the experience gained it is hoped to develop a new

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## DIE NBNI-LOODSKOMITEE OOR SONENERGIE EN ENERGIEBEHOUD IN GEBOUE EN BEBOUDE GEBIEDE

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### 1 INLEIDING

sedert my laaste verslag aan die 48e Konvensie van die VME0 in Johannesburg in Oktober 1983, is twee vergaderings van die SEEB-loodskomitee gehou.

Gerurende dié tyd is betreklik min sake van belang vir die VME0 bespreek. Sekere items van algemene belang word egter hierna onder hulle onderskeie hoofde in oënskyn geneem.

### 2 DEMONSTRASIEPROJEK : INTEGRALE SON-VERHITTERS

Ten einde sommige van die besware teen die meer algemene gebruik van integrale sonwaterverhitters in lae-inkomstehuise te oorkom, het die NBNI in April 1982 'n omvattende navorsings/demonstrasie-projek onderneem. 'n Vervaardiger van sonwaterverhitters het die projek aan die gang gesit deur 100 integrale sonwaterverhitters gratis vir installering in lae-inkomstehuise aan te bied, op die voorwaarde dat die werking daarvan gekontroleer word en daar verslag oor die resultate gedoen word. Die maandelikse warmwatergebruik, elektrisiteitsverbruik vir waterverhitting, die totale elektrisiteitsverbruik en die reaksie van inwoners moes oor 'n tydperk van twaalf maande aangeteken word.

Die projek is nou afgehandel en die NBNI se verslag is na die Stigting vir Navorsingsontwikkeling (SNO) gestuur. Die verbruikerspatrone van warm water en elektrisiteit is ontleed en die effektiwiteit van die integrale sonverhitters in die praktyk, asook verbruikersreaksie en die ekonomiese doeltreffendheid van die stelsel, is oorweeg.

Die SNO is tans besig om die finale verslag te voltooi, wat hopelik voor die einde van vanjaar sal verskyn. Volgens die aanduidings, intussen, was die resultate egter taamlik teleurstellend.

### 3 LAE-ENERGIE-HUISPROJEK IN DIE KAAP (KLEHP)

Hierdie NBNI-projek het die gebruik van passiewe sonverhittingstegnieke in Kleurlingbehuising in die Wes-Kaap ondersoek as middel om termiese gerief te verbeter en die verhitingsvermoë wat vir sodanige behuising nodig is te verlaag.

Die oogmerk van die projek is om onder andere die verbruikerspatrone van warm water en elektrisiteit deur gesinne te ondersoek en om verslag te doen oor die werkverrigting van sonwaterverhitters in die huise.

Die navorsingstydperk van drie jaar waartydens eksperimente met die onbewoonde geboue gedoen is, is verlede jaar voltooi. Die uitslag van die navorsing word tans geklassifiseer en die data wat hieruit verkry word, sal in 'n databestuurstelsel opgeneem word. Die NBNI hoop om, uit 'n ontleiding van die inligting en die onderverrigting wat opgedoen is, 'n nuwe passiewe sonverhit-

passive solar heating design.

#### 4 ACTIVE SOLAR ENERGY PROJECT

The NBRI is presently engaged on an active solar energy project with a view to quantifying a comparison between different solar water heating and electrical water heating systems in the domestic application. A system to compare different domestic hot water systems is now fully operational.

#### 5 FURTHER ACTIVITIES OF COMMITTEE

Presumably with a view to economising on expenditure the CSIR asked all steering committees to review the effectiveness of their respective committees and to consider whether or not they should continue to operate as before.

After careful consideration of all the facts, it was resolved at the last meeting held in October last year, not to hold any further regular annual meetings, but instead to hold ad hoc meetings as and when activities and general interest warranted such further meetings.

#### 6 CONCLUSION

Although the activities of this steering committee appear to be tapering off it is nevertheless considered that the AMEU should maintain contact and continue to attend any future meetings that may be held.

*D C PALSER*

*Representative / Verteenwoordiger*

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## REPORT ON THE ACTIVITIES OF THE NBRI ADVISORY COMMITTEE DEALING WITH THE DRAWING UP OF STANDARD CONDITIONS OF CONTRACT FOR ELECTRICAL AND MECHANICAL ENGINEERING WORKS

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Emanating from the committee charged with drawing up guidelines and standards for electrical services, it was felt that it would be desirable to also have standard conditions of contract for electrical and mechanical engineering works.

The AMEU executive council supported this suggestion and Messrs J A Loubser and A H L Fortmann were delegated to serve on the committee to investigate this matter.

The bodies represented on this committee are the following:

ECA; AMEU; SAACA; SEIFSA, SECC (Specialist Engineering Contractors' Committee); ESCOM; NBRI; and

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tingsontwerp te ontwikkel.

#### 4 PROJEK : AKTIEWE SONENERGIE

Die NBRI is tans besig met 'n projek oor aktiewe sonenergie met die oog daarop om 'n hoeveelheidsvergeliking tussen verskillende son- en elektriese waterverhittingsstelsels in 'n huishoudelike aanwending, te doen. 'n Stelsel wat verskillende huishoudelike warmwaterstelsels vergelyk, is nou in volle werking.

#### 5 ANDER BEDRYGWIGHEDE VAN DIE KOMITEE

Vermoedelik met die oog om kostes te bespaar, het die WNNR al die loodskomitees gevra om die doeltreffendheid van hulle onderskeie komitees te hersien en te oorweeg of hulle steeds soos in die verlede te werk moet gaan of nie.

Na deeglike oorweging van al die feite is daar by die laaste vergadering, wat in Oktober verlede jaar gehou is, besluit om nie meer gereelde jaarvergaderings te hou nie, maar in plaas daarvan ad hoc-vergaderings soos en wanneer bedrywighede en algemene belangstelling sodanige verdere vergaderings regverdig, te hou.

#### 6 AFSLUITING

Hoewel die bedrywighede van hierdie loodskomitee aan die afneem blyk te wees, word daar nogtans gevoel dat die VMECO kontak moet behou, en moet voortgaan om enige toekomstige vergaderings wat moontlik gehou word, by te woon.

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## VERSLAG OOR DIE BEDRYGWIGHEDE VAN DIE NBRI ADVISERENDE KOMITEE BEMOED MET DIE OPSTEL VAN STANDAARD VOORWAARDES VAN KONTRAK VIR DIE ELEKTROTEGNIËSE EN MEGANIESE INGENIEURSWESE

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Voortvloeiend uit die komitee wat belas is met die opstel van riglyne en maatstawe vir elektriese-dienste, is gevoel dat dit wenslik sal wees om ook standaard voorwaardes van kontrak vir die elektrotegniese en meganiese ingenieurswese te bekom.

Die VMECO uitvoerende raad het hierdie voorstel ondersteun en mnr J A Loubser en A H L Fortmann was afgevaardig om op die komitee te dien om die saak te ondersoek.

Die volgende verenigings word op die komitee verteenwoordig:

EKV; VMECO; SAVRI; SEIFSA, SECC (Specialist Engineering Contractors' Committee); EVKOM; NBNI; en



the Department of Community Development.

The first meeting was held on 3 June 1981, at the offices of The South African Association of Consulting Engineers in Rosebank, Johannesburg, under the chairmanship of Mr G F Geyer, and attended by eleven persons.

A progress report was submitted to the 1983 AMEU Convention.

A further meeting of the abovementioned committee was held on 28 February 1984 where Messrs J A Loubser and A H L Fortmann were also present.

At this meeting the final draft prepared by the working sub-committee was considered.

A number of relatively minor amendments were put forward and discussed.

It was agreed by the committee that the working sub-committee would process these amendments and be taken up in the final draft without the need for the committee to meet again.

The English copy was ready for issuing at the end of April 1985 and the Afrikaans copy will, as at the time this report was drawn up, be ready by the end of June 1985.

The cost per copy for the member organisations involved in drawing up the document - this includes the AMEU, is R8.00. The price per copy to the public is R10.00.

It is considered that the document containing the standard conditions of contract for electrical and mechanical engineering works, will without doubt be an extremely valuable and useful one and members are strongly urged to purchase and use the document.

Although the committee agreed that this document should be issued by the SABS, the working sub-committee established that the SABS can only issue codes of practice and specifications.

The South African Association of Consulting Engineers will therefore take charge of issuing this document.

Copies may therefore be purchased from:

The SA Association of Consulting Engineers  
P O Box 1644  
Randburg  
2125

☎(011) 787-5949

The person to speak to is Mrs L Steyn.

Payment is required with an order.

However, as the buying procedure with local authorities may cause problems in this regard, the SAACA will first post a proforma invoice on receipt of an order or, in order to save time, on the strength of a telephone call. Payment can then be made and the document will be posted.

A H L FORTMANN  
Representative / Verteenwoordiger

die Departement van Gemeenskapontwikkeling.

Die eerste vergadering was op 3 Junie 1981, in die kantore van die Suid-Afrikaanse Vereniging vir Raadgewende Ingenieurs te Rosebank, Johannesburg, onder voorsitterskap van mnr G F Geyer, gehou. Elf persone het die verrigtinge bygewoon.

'n Vorderingsverslag was by die 1983 VME0 Kongres ingedien.

'n Verdere vergadering van bogenoemde komitee is op 28 Februarie 1984 gehou, en mnr J A Loubser en A H L Fortmann was ook teenwoordig.

By hierdie vergadering is die konsepriglyne en maatstawwe deur die werkende subkomitee oorweeg.

'n Paar, relatief onbelangrike, veranderings is voorgestel en bespreek.

Die komitee het besluit dat die werkende subkomitee hierdie veranderings verder verwerk en by die finale konsepdokument insluit, sonder dat die komitee weer byeengeroep word.

Die Engelse weergawe was gereed vir uitreiking teen die einde April 1985 en die Afrikaanse weergawe sal gereed wees teen die end van Junie 1985.

Die koste van die dokument, vir die organisasies wat betrokke was by die opstel daarvan - dit sluit die VME0 in, is R8.00. Die prys per afskrif vir die publiek is R10.00.

Die gevoel is dat die dokument wat die standaard voorwaardes van kontrakte vir elektriese en meganiese ingenieurswerke bevat, 'n besondere waardevol en handige dokument sal wees. Die dokument word sterk by lede aanbeveel.

Alhoewel die komitee besluit het dat hierdie dokument deur die SABS uitgegee sal word, het die werkende subkomitee vasgestel dat die SABS nie by magte is om dit te doen nie. Volgens die SABS se mandaat mag hulle slegs gebruikskodes en spesifikasies uitreik.

Die Suid-Afrikaanse Vereniging van Raadgewende Ingenieurs het derhalwe onderneem om die uitreiking van die dokument te behartig.

Afskrifte kan van die volgende adres bestel word:

Die SA Vereniging van Raadgewende Ingenieurs  
Posbus 1644  
Randburg  
2125

☎(011) 787-5949

Die persoon om mee te skakel is mev L Steyn.

Betaling word saam met die bestelling verlang.

Die aankoopprosedure by die plaaslike owerhede kan moontlik probleme in dié geval veroorsaak. Derhalwe sal die SAVRI 'n proforma faktuur by ontvangs van 'n bestelling, of om tyd te bespaar, op sterkte van 'n telefoontoeroep, uitreik. Betaling kan dan gedoen word en die dokument sal gepos word.

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## REPORT OF THE NBRI STEERING COMMITTEE AND WORKING SUB-COMMITTEE – RATIONAL NORMS FOR TOWNSHIP SERVICES

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After the official publication of the document "Guidelines for the Provision of Engineering Services in Residential Townships" during 1983, the Steering Committee and working subcommittees of the NBRI, entrusted with this task ceased to exist as it is the intention to set up a standing committee for updating the guidelines after a 3 year trial period.

As a result of the new constitutional dispensation, however, no progress has been made towards the setting up of the proposed standing committee as recommended by the former housing matters advisory committee of the department of community development. Until responsibilities under the new constitution are made clear, this exercise

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## REPORT ON THE CSIR/NEERI ADVISORY COMMITTEE 1983/84

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The National Electrical Engineering Research Institute undertakes research and development over a wide spectrum of electrical engineering.

Its research objectives are to facilitate economic growth and strategic self-sufficiency in the Republic by helping to solve problems in industry and in the infrastructure of the country.

Its advisory committee, which meets annually, and three technical sub-committees which include representatives from the AMEU, industry, statutory bodies, universities and other CSIR institutes, advise the institute on the long-term planning of its research activities. The committee assists in planning the longer term objectives and priorities to which the available manpower should be devoted.

Although regular dialogue takes place between NEERI and the AMEU, the committee considered that this contact should be expanded, and it was therefore agreed that a representative of the AMEU be invited to serve on the sub-committee for power electrical engineering. Mr H J Human, the town electrical engineer of Brakpan, has been appointed to serve on this sub-committee for a period of two years. Although the lack of qualified staff to undertake active research remains a problem, the staffing situation improved somewhat during the period under review. Dr A J Eriksson was appointed director, responsible for NEERI's activities in the field of power electrical engineering.

will therefore have to remain in abeyance.

A series of seminars on the published document was, however, held in Pretoria, Cape Town, Port Elizabeth and Durban, between 27 February 1984 and 15 March 1984. The seminars proved very popular with an overall attendance of nearly 600 from all the professions involved in township development, both public and private sector.

The response and feedback have been largely positive with a far greater appreciation of the philosophy behind the formulation of the rational norms, and a one-day mini seminar was subsequently conducted in East London during October 1984.

It is my sincere hope that the setting up of an updating committee will not have to be withheld for a too long a period. Unfortunately this appears to be the case with most government sponsored exercises of this nature as a large amount of effort and hard work has been put into the formation of the guidelines by all concerned, and especially the AMEU members of the working sub-committee for electricity distribution of which I was the chairman, and for which the AMEU wishes to thank them.

J K VON AHLFTEN  
*Representative and Convenor*

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## VERSLAG OOR DIE WNNR/NEEI ADVIESKOMITEE 1983/84

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In this field, which is of particular interest to the AMEU, research is continuing on lightning location systems, lightning disturbances in systems and the effects on arrestors and transformers, insulation evaluation of high voltage motors and solar power generating equipment.

The energy crisis has led to a research programme into battery driven electric vehicle drive systems. A battery powered passenger vehicle has been equipped with an automatic drive system developed by NEERI and its performance is being compared with that of an identical vehicle powered by a commercially available drive system.

A five-year research plan for the period 1985–1989 was prepared by the institute and considered by the committee. In the electric power department the plan strongly emphasises the procedures for optimised design of transmission systems as the ultimate goal. Research projects of particular interest to local authorities include:

- 1 the study of tower footing impedance which plays an important role in the flashover rate of transmission lines;
- 2 the study of organic insulators in a polluted environment, including tracking resistance measurements and field tests, which it is hoped will result in guidelines for insulator designs for local applications;
- 3 the study of static power factor correction equipment, where advances in power semiconductors could reduce the cost of compensators and increase the potential for

greater savings on maximum demand through the fast regulation of reactive power flow.

W BARNARD  
Representative

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## DISCUSSIONS – BESPREEKINGS

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MNR J D N VAN WYK : WNNR

Mnr die President, veroorloof my 'n paar algemene opmerkings in verband met die rol van die WNNR.

In u referaat en weereens in die van mnr Ken Maud, het u albei beklemtoon hoe belangrik die toepassing van geskikte tegnologie is om ons meer mededingend te maak en dat dit selfs in sekere areas nodig gaan wees vir ons om te oorleef, waar ons tradisionele bronne van tegnologie miskien tydelik vir ons gesluit gaan wees, word die ontwikkeling van eie tegnologie mees belangrik.

Die van u wat die onlangse Witskrif oor nywerheidsontwikkeling gelees het, sou gesien het dat die regering die belangrikheid van tegnologie beklemtoon. In hierdie Witskrif is dit aan die WNNR opgedra om in samewerking met die Departement van Handel en Nywerheid, geskikte meganismes daar te stel vir die oordrag van tegnologie in hierdie land. Hierdie taak is tans aan die gang.

U beweeg op 'n terrein waar tegnologie 'n belangrike rol speel en vinnig groei. Daar die identifisering van u geskikte tegnologie, toegang tot bronne van inligting benodig, en ook omdat 'n tegnologie selde sonder aanpassing direk benut kan word, en skakeling deur die VMEQ met die WNNR omdat NEO-organisasies en universiteite baie belangriker word.

U het reeds vir etlike jare u verteenwoordigers op die NNEI

se advieskomitee en dit is verblydend dat u ook so pas mnr Human benoem het om op ons subkomitee vir elektriese krag te dien. U sal ook in mnr Barnard se verslag sien dat ons ook aktief is op die gebied van kubernetika wat, byvoorbeeld, industriële tegnologie en selfs rekenaar geïntegreerde vervaardiging (RIV) insluit, asook op die gebied mikro-elektronika. U mag vra waarom hierdie uiteenlopende dinge onder dieselfde dak, maar ek kan u verseker dat dit doelbewus is. Die gebied van elektriese ingenieurswese benut al hierdie dinge almeer integraal.

Wat ek dus vir u wil aanmoedig om te doen, is dat u ook moet welkom voel om met ons op hierdie gebiede te skakel. Ons het twee spesialis komitees oor kubernetika en die ander oor mikro-elektronika. U kan dit wel oorweeg of daar van u lede is wat u graag 'n nouer kontak wil laat maak hiermee of miskien iemand benoem om op die komitees te dien.

Mnr die President, daar is een item wat ek dink nie in mnr Barnard se verslag aangespreek is nie en wat ek as belangrik beskou. Ek wil graag vir dr Anderson vra om met u vergunning net in 'n paar woorde kortliks daarna te verwys.

DR R B ANDERSON : CSIR

What has not been mentioned is that NEERI participated on the Steering Committee for the Johannesburg Trolley Bus Demonstration Project. An official report on the project has been issued by the Department of Transport together with a companion report by NEERI. The main report included that under present circumstances the reintroduction of trolley buses in Johannesburg was not economically viable, compared with the existing diesel bus system.

The NEERI report on the other hand concluded that given developments in the longer term and under certain assumption, trolley bus systems could in fact prove to be viable.

The transport commission recommended that Johannesburg should consider keeping its trolley bus system operative.

The NEERI report will be published in the October issue of the SAIEE Journal, Electron and it is suggested that the so introduction of electric trolley bus systems might be a subject for discussion at a future AMEU meeting.

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## REPORT ON THE SOUTH AFRICAN NATIONAL COMMITTEE ON ILLUMINATION

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This report covers the activities of SANCI for the two years 1983 and 1984.

Thirtieth Annual General Meeting and Congress – 1983:

The 30th annual general meeting and congress was held at the Riverside Holiday Inn, Vanderbijlpark, from 3 to 4 November 1983.

The theme for the congress was "Progress in lighting".

On Thursday 3 November 1983, her worship the mayor of Vanderbijlpark, councillor Boegoe Swart, delivered the

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## VERSLAG OOR DIE SUID-AFRIKAANSE NASIONALE KOMITEE VIR VERLICHTING

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Hierdie verslag dek die bedrywighede van SANKV vir die twee jaar 1983 en 1984.

Dertigste Algemene Jaarvergadering en Kongres – 1983:

Die 30ste algemene jaarvergadering en kongres was by die Riverside Holiday Inn, Vanderbijlpark, vanaf 3 tot 4 November 1983, gehou.

Die tema van die kongres was "Vooruitgang in verligting".

Op Donderdag 3 November 1983, het haar edele die burgemeester van Vanderbijlpark, raadslid Boegoe

welcoming address and the presidential address was given by Mr C J Kok, president of SANCI.

Technical committee reports on the CIE (Commission Internationale De l'Éclairage of International Commission on Illumination) session held in Amsterdam were presented and discussed.

The following papers and paperettes were presented.

"Local television requirements for sports" by Mr B Lester, Durban Corporation.

"Security lighting" by Mr P Davies, Barrow Litecraft.

"SABS or CIE"? Why must we change our present road lighting design methods" by Mr M A Martins of Lidec Phillips SA and Mr R F del Mistro, NITRR/CSIR.

"Draft CIE proposals for residential roads" by Mr A H L Fortmann, Boksburg Town Council.

"A re-think on use of clear mercury lamps for residential roads" by Mr C Marran, Germiston City Council.

"Harmonic current in three phase neutrals in large fluorescent lighting installations" by Mr K H Goodenough and Mr V R Krause, G H Marais and Partners, Inc.

"Low temperature operation of fluorescent tubes" by Mr W K Lumsden, Thorn Lighting Industries.

"The mechanism of failure of incandescent lamps" by Mr J J Sullivan, ELMOSA.

"An inexpensive digital lightmeter" by Dr H D Einhorn and Dr M Case.

"Fading of materials under UV radiation" by Mr M Dempster.

"Emergency lighting code" by Mr N Lee, Lascon Lighting.

"Glare design for emergency lighting" by Dr H Einhorn.

"Lighting for CAD's and VDU's" by Mr M Staines, Barrow Litecraft and Mr M Dempster.

"Design of squash court lighting" by Mr A A Pawinski, Evkom.

"Report on lighting conditions in a coal mine" by Mr P Engelbrecht, Amcoal, Arnot.

#### Thirty-first Annual General Meeting and Congress – 1984:

The 31st annual general meeting and congress was held in Randburg from 5 to 7 September 1984.

The theme of the congress was "Lighting, energy and conservation".

On Wednesday 5 September 1984, his worship the mayor of Randburg, councillor S van Metzinger, delivered the welcoming address and the presidential address was read by Mr N A L Allen on behalf of Mr J W Smit, who was unfortunately ill.

The first paper was delivered by Dr S H A Begemann of the lighting division of Philips International in Eindhoven, Netherlands. His paper, "Trends in modern lighting" was followed with great interest by all present.

His paper covered the following headings:

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Swart, die verwelkomingsrede gelewer en mnr C J Kok, president van SANKV, het die presidentsrede gelewer.

Tegniese komiteeverslae oor die CIE (Commission Internationale De l'Éclairage of International Commission on Illumination) byeenkoms, gehou in Amsterdam, was voorgelê en bespreek.

Die onderstaande referate en skripsies was voorgelê.

"Local television requirements for sports" deur mnr Lester, Stadsraad van Durban.

"Security lighting" deur mnr P Davies, Barrow Litecraft.

"SABS or CIE"? Why must we change our present road lighting design methods" deur mnr M A Martins van Lidec Phillips SA en mnr R F del Mistro, NIVPR/WNNR.

"Draft CIE proposals for residential roads" deur mnr A H L Fortmann, Stadsraad van Boksburg.

"A re-think on use of clear mercury lamps for residential roads" deur mnr C Marran, Stadsraad van Germiston.

"Harmonic current in three phase neutrals in large fluorescent lighting installations" deur mnr K H Goodenough en mnr V R Krause, G H Marais en Vennote.

"Low temperature operation of fluorescent tubes" deur mnr W K Lumsden, Thorn Lighting Industries.

"The mechanism of failure of incandescent lamps" deur mnr J J Sullivan, ELMOSA.

"An inexpensive digital lightmeter" deur dr H D Einhorn en dr M Case.

"Fading of materials under UV radiation" deur mnr M Dempster.

"Emergency lighting code" deur mnr N Lee, Lascon Lighting.

"Glare design for emergency lighting" deur dr H Einhorn.

"Lighting for CAD's and VDU's" deur mnr M Staines, Barrow Litecraft en mnr M Dempster.

"Design of squash court lighting" deur mnr A A Pawinski, Evkom.

"Report on lighting conditions in a coal mine" deur mnr P Engelbrecht, Amcoal, Arnot.

#### Een-en-dertigste Algemene Jaarvergadering en Kongres – 1984:

Die 31ste algemene jaarvergadering was in Randburg, vanaf 5 tot 7 September 1984, gehou.

Die tema van die kongres was "Verligting, energie en besparing".

Op Woensdag 5 September 1984, het sy edele die burgemeester van Randburg, raadslid S van Metzinger, sy verwelkomingsrede gelewer en die presidentsrede was deur mnr N A L Allen namens mnr J W Smit, wat ongelukkig siek was, voorgelees.

Die eerste referaat is deur dr S H A Begemann van die beligtingafdeling van Philips Internasionaal in Eindhoven, Nederland gelewer. Sy referaat "Trends in modern lighting" was deur almal met groot belangstelling gevolg.

Sy referaat het die volgende temas gedek:

- 1 Why good lighting?;
- 2 Visual requirements;
- 3 Lighting requirements;
- 4 Efficiency.

With regard to efficiency, a new family of fluorescent lamps is coming to the fore, with the control gear operating on high frequencies and producing extremely efficient type of lamp sources.

Following on the guest speaker's address, the following papers were presented:

"Street lighting in Randburg" by Mr M P P Clarke, town electrical engineer of Randburg.

"Township lighting in South Africa" by Mr H S Schleritzko of Beka (Pty) Ltd.

"Sports events lighting for TV coverage" by Mr M Ben-Ari of the SABC

"Glare in sports field lighting" by Mr M Martins.

On Thursday morning, after the AGM and election of office bearers where Mr J W Smit was re-elected as president, the CIE report by Messrs Grundy and R S Yates was presented after which the following papers were delivered:

"Uplighter calculations" by Mr R J Henderson.

"Development of luminaires for use with CRT tubes" by Mr Einhorn and Mr E H Cutler.

"Daylight design by sector flux calculation" by Dr Einhorn.

"Implications of the proposed code of practice for emergency lightings in buildings" by Mr D N Lee of Lascon Lighting Industries (Pty) Ltd.

On Friday the following papers were presented:

"Mini lamps" by Mr B Rowell of Wotan Lampe.

"Hoëfrekwensiewerking van hoëdruk natriumlampe" by Dr F Leuchner of the University of Pretoria.

"Artificial Illumination of hops in the George area" by Mr A Swansen and Mr D Simpson.

"Area lighting of transmitting stations" by Mr I Webb of the SABC.

"High mast lighting" by Mr B Bakker of Lascon Lighting.

"Motorway lighting in relation to a complex interchange" - namely that of Uncle Charlies interchange, south of Johannesburg, by Mr T Strydom of, Van Niekerk, Klein en Edwards.

Both congresses were very well organised and were also enriching.

Of concern to SANCI is that relatively few AMEU members are members of SAMCI.

Not only would more AMEU members be of benefit to SANCI, but more importantly, the AMEU members would without doubt receive tremendous benefit.

As far as street lighting on roads and highways in our cities and towns is concerned, it has been proved beyond all doubt that road accidents are reduced and lives are saved with good and efficient lighting. Good lighting also im-

- 1 Why good lighting?;
- 2 Visual requirements;
- 3 Lighting requirements;
- 4 Efficiency.

Wat doeltreffendheid betref, het 'n nuwe tipe flouesceerlamp sy verskyning op die mark gemaak. Die lamp het beheeruitrusting wat op hoëfrekwensie werk wat 'n buitengewone doeltreffende lamp tot gevolg het.

Na die gasspreker se toespraak is die volgende referate voorgelê:

"Street lighting in Randburg" deur mnr M P P Clarke, elektrotegniese stadsingenieur van Randburg.

"Township lighting in South Africa" deur mnr H S Schleritzko van Beka (Edms) Bpk.

"Sports events lighting for TV coverage" deur mnr M Ben-Ari van die SAUK.

"Glare in sports field lighting" deur mnr M Martins.

Op Donderdagoggend, na die AJV en die verkiesing van ampsdraers, waar mnr J W Smit herverkieë is as president, is die CIE verslag deur mnr Grundy en R S Yates aangebied. Die volgende referate is toe voorgelê:

"Uplighter calculations" deur mnr R J Henderson.

"Development of luminaires for use with CRT tubes" deur dr Einhorn en mnr E H Cutler.

"Daylight design by sector flux calculation" deur dr Einhorn.

"Implications of the proposed code of practice for emergency lightings in buildings" deur mnr D N Lee van Lascon Lighting Industries (Edms) Bpk.

Die volgende referate was op Vrydag voorgelê:

"Mini lamps" deur mnr B Rowell van Wotan Lampe.

"Hoëfrekwensiewerking van hoëdruk natriumlampe" deur dr F Leuchner van die Universiteit van Pretoria.

"Artificial Illumination of hops in the George area" deur mnr A Swansen en mnr D Simpson.

"Area lighting of transmitting stations" deur mnr I Webb van die SAUK.

"High mast lighting" deur mnr B Bakker van Lascon Lighting.

"Motorway lighting in relation to a complex interchange" - naamlik die van die Unle Charlies wisselkruising suid van Johannesburg, deur mnr T Strydom van, Van Niekerk, Klein en Edwards.

Albei kongresse was baie goed georganiseer en was ook verrykend.

Wat vir SANKV kommerwekkend is, is dat relatief min VME0 lede ook lede van SANKV is.

Nie alleen kan VME0 lede vir SANKV tot voordeel wees nie, maar meer belangrik, kan hulle self baie baat vind as lede van SANKV.

Wat straatverligting op paaië en snelweë in ons stede en dorpe betref is dit onteenseglik bewys dat die getal padongelukke en lewens verlies deur goeie en doeltreffende verligting verminder kan word. Goeie verligting ver-



proves the aesthetics of a city or town.

Practically all the research that is being conducted in South Africa in the field of lighting and illumination is being carried out by members of SANCI.

Therefore to become conscious of good lighting practices, it is of tremendous benefit to be in close contact with an organization like SANCI and its members.

The following extract is quoted from the 'Aims, objects and activities of the South African National Committee on illumination', prepared some years ago by Dr W M H Rennhackkamp, at that time of CSIR, regarding membership.

"It should be realized that the scope of SANCI is so great that it could not possibly be managed by a single organization and the stronger the national team, the more extensive and intensive the field that could be covered. It is important to emphasize that the committee represents not only the field of illumination, but all the allied fields. It is important that a strong membership be maintained so that illumination practice can benefit by the experience of members.

With the existence of a South African national committee on illumination the interest in illumination problems can be stimulated and be better appreciated. The work of SANCI is a vital step in improving illumination and thus providing a substantial contribution to the improvement of the living standard of all inhabitants in this country."

AMEU members who wish to become members of SANCI should write to the secretary of SANCI at the following address:

The Secretary  
SANCI  
c/o CSIR  
P O Box 395  
Pretoria  
0001

beter ook die estetiese aansien van 'n stad of dorp.

Bykans alle navorsing wat in Suid-Afrika in die verligtingsveld gedoen word, word deur SANKV lede uitgevoer.

Om bewus te word van goeie verligtingspraktyke is dit uiters voordelig om in nou kontak met 'n organisasie soos SANKV en sy lede te wees.

Die onderstaande is 'n uittreksel uit "Aims, objects and activities of the South African National Committee on illumination", wat 'n aantal jare gelede deur dr W M H Rennhackkamp, destyds van die WNNR, met die oog op lidmaatskap, opgestel is.

"It should be realized that the scope of SANCI is so great that it could not possibly be managed by a single organization and the stronger the national team, the more extensive and intensive the field that could be covered. It is important to emphasize that the committee represents not only the field of illumination, but all the allied fields. It is important that a strong membership be maintained so that illumination practice can benefit by the experience of members.

With the existence of a South African national committee on illumination the interest in illumination problems can be stimulated and be better appreciated. The work of SANCI is a vital step in improving illumination and thus providing a substantial contribution to the improvement of the living standard of all inhabitants in this country."

VME0 lede wat lid van SANKV wil word kan aan die sekretaris van SANKV by die onderstaande adres skryf -

Die Sekretaris  
SANKV  
p/a WNNR  
Posbus 395  
Pretoria  
0001

A H L FORTMANN  
*Representative / Verteenwoordiger*

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## DISCUSSIONS - BESPREEKINGS

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### MR A H L FORTMANN : PRESIDENT ELECT

With regard to the SANCI report, all I have to add is that there is now available a guide for extedious security lighting. You know in these times of problems with terrorists, terrorist attacks on substations, and other installation we have a guide available to tell you how to put up lighting at these installations, and this is now available.

# A man died on the fifth discovered the

No one saw the flames. No one saw the poisonous fumes and gas. Why? Because the fire burned along conventional power cables. Spreading death and destruction no one could see. And no one could contain.

## Fire-retardant.

That's why African Cables created Zerotox, a unique new fire-retardant cable. If a fire should start, you have the security of knowing that Zerotox is not only fire-retardant, but free of deadly toxic and corrosive hydrochloric acid gas as well.

## Halogen gas free.

Zerotox is the safe choice. There is no hydrochloric acid gas, which kills people and destroys equipment. Because it is fire-retardant, it curtails both the chance and spread of fire. And it's virtually smoke free. All of these benefits eliminate the danger of choking fumes. Increase visibility. And help with evacuation and rescue in a fire situation.

Zerotox Power and Control Cables. These two cables are available armoured or unarmoured, and power cables come with coloured cores for easy identification. The

insulation bedding and sheath are fire-retardant and free of poisonous halogens, so no dangerous hydrochloric acid gas is produced.

Zerotox RF (Rockfall) Cables. This cable is designed for use in mines, where rock falls can occur. The earthed metallic tape ensures that any fault quickly becomes a fault

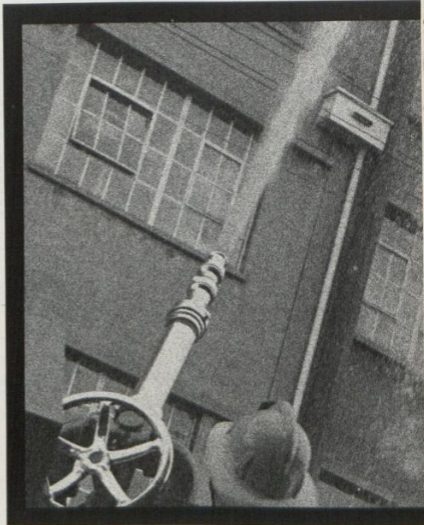


Photo courtesy of The Star.

# floor before a caretaker fire on the first.

possible. And personnel can be evacuated safely, because you'll never lose power to lights, ventilation and other essential services.

## Cable of the future.

Zerotox is the cable of the future. And you can use it today. It's perfect for all "in-air" installations open to fire danger. The perfect power cable that saves lives. Property. And money.

And all from South Africa's leading power cable company. African Cables. A company whose innovation and expertise are setting standards for the world. And the future.

So don't leave life and property to chance. Look into Zerotox fire-retardant cables today.

For more information about Zerotox cables, just call us at (016) 4-5821.

**ZEROTOX**®

to earth, which can be cleared before a serious fire can start.

## Zerotox FS (Fire Survival)

Cables. This special cable is designed to withstand even the hottest fires. Even if the insulation and outer protection is destroyed, the circuit integrity is still maintained. This means that a controlled shut-down is



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## REPORT ON THE ACTIVITIES OF THE AMEU/ILESA/SANCI STREET LIGHTING ADVISORY COMMITTEE

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This report covers the activities of the AMEO/ILESA/SANCI street lighting advisory committee.

On 29 February 1978, a symposium entitled "Practical and economic road lighting" was held in Johannesburg. This symposium was a joint project of the AMEU, ILESA and SANCI. During the discussion period it became evident that the participants felt that a lot of common problems could be alleviated if a special committee could be formed to investigate these problems. As a result two members of each of the three organisations were appointed to form the new "Street lighting advisory committee". The appointed members are as follows:

AMEU	Messrs J K von Ahlften and A H L Fortmann
ILESA	Messrs J Grundy and R Yates
SANCI	Messrs H Steyn and A Claasen

Subsequently the SANCI members were replaced by Messrs Mike Gifford and Connie Jonker while Mr M Martins was co-opted into the committee.

At its first meeting, the committee agreed to draw up guidelines on all aspects of street lighting, for the benefit of its members. The guidelines would be compiled with the assistance of outside experts in the various fields and published as and when they were completed.

The guidelines are split up into ten projects, as follows :

Project 1	: Poles
Project 2	: Luminaires
Project 3	: Lamps and control gear
Project 4	: Maintenance
Project 5	: Incentive and economics
Project 6	: Reticulation
Project 7	: Personnel and safety requirements
Project 8	: Training
Project 9	: Design parameters
Project 10	: Vehicles and plant in use on street lighting

All projects, except project 9 have been completed.

With regard to "project 9 : design parameters", the committee held a meeting on 27 March 1985 where it was resolved to firstly revise the SABS code on street lighting before compiling project 9.

The first draft of the revised SABS code is expected at the end of July 1985, which incidently, is being revised by the AMEU/ILESA/SANCI street lighting advisory committee, on behalf of the SABS.

At this stage it appears that project 9 will constitute a short description on how to use the SABS code.

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## VERSLAG OOR DIE BEDRYGWIGHEDE VAN DIE VMEO/IVISA/SANKV STRAATVERLIGTING ADVISERENDE KOMITEE

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Hierdie verslag dek die bedrywighede van die VMEO/IVISA/SANKV straatverligting adviserende komitee.

'n Simposium, getitel "Practical and economical road lighting" was op 28 Februarie 1978 in Johannesburg gehou. Dit was 'n gesamentlike projek van die VMEO, IVISA en SANKV. Tydens die besprekings het dit duidelik geword dat die deelnemers die mening toegedaan is dat 'n spesiale komitee, wat vir die doel saamgestel behoort te word, baie van die probleme kan ondersoek en op die manier die taak vergemaklik. Gevolglik was twee lede van elk van die drie organisasies aangestel om die nuwe "Straatverligting adviserende komitee" te vorm. Die aangestelde lede is soos volg:

VMEO	Mnre J K von Ahlften en A H L Fortmann
IVISA	Mnre J Grundy en R Yates
SANKV	Mnre H Steyn en A Claasen

Daarna is die SANKV lede vervang deur mnre Mike Gifford en Connie Jonker, terwyl mnr M Martins tot medelid of die komitee verkies is.

By die eerste vergadering het die komitee ooreengekom om riglyne oor alle benaderings in verband met straatverligting, tot die voordeel van sy lede op te stel. Die riglyne sou met behulp van buitestaande deskundiges in die verskillende rigtings saamgestel word en wanneer dit gereed is, gepubliseer word.

Die riglyne is in tien projekte soos volg opgedeel :

Projek 1	: Pale
Projek 2	: Lanterne
Projek 3	: Lampe en beheertoerusting
Projek 4	: Instandhouding
Projek 5	: Aansporing en besparing
Projek 6	: Benetting
Projek 7	: Personeel en veiligheidsvereistes
Projek 8	: Opleiding
Projek 9	: Ontwerpparameter
Projek 10	: Voertuie en toerusting in gebruik by straatverligting

Al die projekte, behalwe projek 9, is voltooi.

"Projek 9 : Ontwerpparameters". Die komitee het met sy vergadering van 27 Maart 1985, besluit dat die SABS gebruikskode oor straatverligting eers gewysig word voordat projek 9, opgestel word.

Die eerste konsepdokument van die gewysigde SABS gebruikskode word teen die einde Julie 1985 verag. Die wysigings word deur die VMEO/IVISA/SANKV straatverligtings adviserende komitee, namens die SABS gedoen.

Op hierdie stadium lyk dit of projek 9 slegs 'n kort beskrywing oor hoe om die SABS gebruikskode te gebruik, sal wees.

The guidelines for the installation and maintenance of street lighting are published under the auspices of the journal "Vector" and copies are available, complete with suitable binder at R6.00 plus GST, per copy.

An appeal is made to members of the AMEU and other interested parties to order copies of the guidelines as they are considered to be invaluable, to engineers, middle management, electricians and street light attendants in local authorities.

For the benefit of AMEU members who do not receive "Vector", the following address is provided:

"Vector"  
P O Box 311  
Kloof  
3640.

Die riglyne vir die installasie en onderhoud van straatverligting word deur die tydskrif "Vector" gepubliseer. Afskrifte is beskikbaar teen R6.00 plus AVB, per afskrif wat 'n binder insluit.

'n Versoek word aan VMEO lede en ander belangstellers gerig om afskrifte van die riglyne te bestel. Die riglyne bevat waardevolle inligting soos wat deur ingenieurs, middelbestuur, elektrisiëns en straatligbedieners van plaaslike owerhede gebruik kan word.

Vir dié VMEO lede wat nie "Vector" ontvang nie, word die volgende adres verskaf:

"Vector"  
Posbus 311  
Kloof  
3640.

A H L FORTMAN  
*Representative / Verteenwoordiger*

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## DISCUSSIONS – BESPREEKINGS

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### MR JOHN T GRUNDY : AFFILIATE

My remarks are really on behalf of ILESA and SANCI. SANCI represents the Republic in the CIE (International Lighting Commission) of 35 countries. Within CIE and 7 divisions and under the directorship of Dr K Narisada of Japan, I am secretary of division 7. During 1985 the division received from ISO an enquiry involving a very complex questionnaire relating to World Energy. On behalf of CIE, I have to thank Mr D C Palser and the AMEU for his great help in completing this questionnaire.

Turning now to the joint AMEU/ILESA/SANCI Street Lighting Advisory Committee Guides, mentioned by Mr

Fortmann, the work on the proposed revisions to the SABS Code has been held up, pending a vast amount of CIE work relating to public lighting. In regard to the SANCI Security Lighting Guide, this is obtainable from SANCI, c/o SABS, Private Bag X191 Pretoria, or ILESA, P O Box 61552, Marshalltown or from myself at Duncansby (Pty) Limited, P O Box 10508, Strubenvale, Springs. It is worth mentioning that a SANCI Guide for emergency lighting should be available in January 1986.

The technical input into all CIE work by South Africa is extensive and as such has the respect and high regard of the other 34 countries, examples being the work of Dr F Hengstberger of CSIR/NPRL on the radiometric standard of light and the development of a Report on Urban Lighting by Mr R S Yates of the City of Johannesburg. All my experience on behalf of South Africa in CIE, even at meetings during September 1985, indicates no withholding of international technology in our lighting world nor whatever happens in the future, would I expect such a situation to arise. Lamp and lighting technical people confine their arguments strictly to their own discipline.

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## STANDARDISATION OF ELECTRICITY TARIFFS

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### 1 Introduction

At the Technical Meeting in Bloemfontein last year, I submitted an interim report outlining the progress made to date in the AMEU investigation into the standardisation of electricity tariffs.

In accordance with a resolution of the Executive Council taken at its meeting on 26 April 1985, the final draft report will be considered by the Executive Council at its next meeting, namely just after the Benoni Convention on 3 October 1985.

Certain salient points in the report, however, may be of general interest at this stage and these are considered

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## STANDAARDISASIE VAN ELEKTRISITEITSTARIEWE

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### 1 Inleiding

By die Tegnieëse Vergadering verlede jaar in Bloemfontein het ek 'n tussentydse verslag voorgelê waarin die vordering wat tot op hede in die VMEO-onderzoek met betrekking tot die standaardisasie van elektrisiteits-tariewe gemaak is, geskets word.

Ooreenkomstig 'n besluit van die Uitvoerende Raad wat op 26 April 1985 op sy vergadering geneem is, sal die finale konsepverslag deur die Uitvoerende Raad op sy volgende vergadering, naamlik kort na die Benoni-konvensie op 3 Oktober 1985, oorweeg word.

Sekere hoofpunte in die verslag mag egter op hierdie stadium van algemene belang wees en word hieronder



below.

## 2 Tariff Survey

In last year's interim report I mentioned that in response to a circular distributed to all AMEU member undertakings requesting comments and copies of their electricity tariffs, replies has been received from only 92 authorities. This was a rather disappointing response in the light of the AMEU membership of around 200 undertakings. Two further appeals were accordingly made and replies have now been received from 177 undertakings, a very satisfactory response indeed.

On the basis of these latest and more complete returns the table given in my previous report has been updated. The latest figures, expressed as percentages of the total number of authorities that responded, are detailed below:

Factor	Domestic (%)	Commercial or General (%)	Industrial or Large User (%)
Minimum and/or Service Charge	78	79	73
Circuit Breaker Capacity Charge	23	25	-
Maximum Demand Charge:			
Single	5	16	92
Multiple	1	1	8
Energy Charge:			
Single	75	72	72
Multiple (or Blok)	25	27	16

These latest figures do not differ significantly from the earlier figures based on the smaller sample, and the general conclusions drawn from this more comprehensive sample remain sensibly as before, the more popular rate structures being clearly indicated by the relevant figures.

## 3 Consumer Classes

In the above table consumers have been grouped into the customary three classes of Domestic, Commercial and Industrial.

Certain views have been expressed, however, that it might perhaps be better to follow the terminology adopted by Eskom, namely Domestic, Small Power User and Large Power User respectively. There is no real objection to such a proposal other than that this terminology is evidently not in accordance with international practice which generally appears to favour the more conventional and traditional classification.

Incidentally, in the White Paper on the report of the de Villiers Commission of Inquiry into the Supply of Electricity, when considering Eskom's present tariff structure, it is stated that "a further possibility which merits consideration is the introduction in South Africa of a three-tier tariff structure for industrial, domestic and commercial consumers". This would appear to indicate a degree of support for the more traditional classification.

## 4 Load Management and Energy Conservation

In the aforementioned White Paper it was also announced that the new Electricity Council of Eskom is to submit proposals to the Government on certain of the recommendations of the Commission of Inquiry, with priority being given to tariff structures and an emphasis on savings. This is evidently in line with the Commission's recommendation that future tariff structures should "satisfy load management requirements as well as economic demands".

besprek.

## 2 Tariefopname

In verlede jaar se tussentydse verslag het ek gemeld dat daar in reaksie op 'n omsendbrief wat aan al die VMEO-lidondernemings versprei is en waarin kommentaar en afskrifte van hulle elektrisiteitsariewe gevra is, van slegs 92 plaaslike owerhede antwoorde ontvang is. Dit was 'n taamlike teleurstellende reaksie in die lig van die VMEO-lidmaatskap van ongeveer 200 ondernemings. Twee verdere beroepe is gevolglik gemaak en antwoorde is nou van 177 ondernemings ontvang wat wesklik 'n baie bevredigende reaksie is.

Op die grondslag van hierdie jongste en meer volledige opgawe is die tabel in 'n vorige verslag bygewerk. Besonderhede oor die jongste syfers, uitgedruk in persentasies van die totale getal owerhede wat gereageer het, verskyn hieronder:

Faktor	Huishoudelik (%)	Kommerseel of Algemeen (%)	Industriël of Groot Gebruiker (%)
Minimum- en/of Diensheffing	78	79	73
Heffing op stroombrekerkapasiteit	23	25	-
Maksimumaanvraagheffing:			
Enkel	5	16	92
Meervoudig	1	1	8
Energieheffing:			
Enkel	75	72	72
Meervoudig (of Blok)	25	27	16

Die jongste syfers verskil nie aanmerklik van die aanvanklike syfers gebaseer op die kleiner monster nie, en die algemene gevolgtrekkings waartoe met behulp van hierdie meer volledige monster gekom word, bly soos tevore waarneembaar en meer gewilde tariefstrukture word duidelik deur die toepaslike syfers aangetoon.

## 3 Verbruikersklasse

In die bogenoemde tabel is verbruikers in die gebruiklike drie klasse van Huishoudelike, Kommerseel en Industriële gegroepeer.

Sekeere persone is egter van mening dat dit miskien beter sal wees om die terminologie wat Evkom gebruik, Huishoudelik, Kleinkraggebruiker en Grootkraggebruiker onderskeidelik, te volg. Daar is geen werklike beswaar teen sodanige voorstel nie, behalwe, die feit dat hierdie terminologie klaarblyklik nie in ooreenstemming met internasionale praktyk is wat blykbaar die meer konvensionele en tradisionele klassifikasie verkies nie.

Terloops, in die Witskrif oor die verslag van die de Villiers-Kommissie van Ondersoek oor die Voorsiening van Elektrisiteit, toe Evkom se huidige tariefstruktuur oorweeg is, is daar vermeld dat "n verdere moontlikheid wat oorweeg verdien, die instelling van 'n drievlaktariefstruktuur vir industriële, huishoudelike en kommersiële verbruikers in Suid-Afrika is". Dit kom voor asof dit op 'n mate van ondersteuning vir die meer tradisionele klassifikasie dui.

## 4 Belastingbestuur en Energiebewaring

In die bogenoemde Witskrif is ook aangekondig dat die nuwe Elektrisiteitsraad van Evkom voorstelle aan die Regering oor seker van die aanbeveling van die Kommissie van Ondersoek sal voorleë, waarin voorkeur verleen sal word aan die tariefstrukture en die klem op besparing sal val. Dit kom klaarblyklik ooreen met die Kommissie se aanbeveling dat toekomstige tariefstrukture moet voldoen aan die vereistes van belastingbestuur sowel as aan ekonomiese eise.

It is quite clear, therefore, that future tariff structures will have to take into account load management and energy conservation considerations. In this regard it is interesting to note that Eskom hopes to introduce an off-peak rate for large power users next year. In such an event municipal electricity undertakings would then be in a position to reflect this change in their own tariffs by also offering an off-peak rate.

Another related aspect referred to in the White Paper is the need to improve system load factors, not only through the medium of special off-peak and interruptible rates, but also by means of load control techniques, such as the use of ripple control for the switching off of domestic hot water heaters.

## 5 Electricity Tariff Stabilisation Fund

Again referring to the White Paper it is to be noted that "in order to bring about savings in electricity as soon as possible and to the largest extent possible" it is advocated inter alia that "increases in the price of electricity should occur once a year only (in January)", and that such increases should "include the coal price adjustment for the following year, and should be valid for the whole year".

There is no doubt that the periodic financial adjustments to tariffs required to compensate for Eskom's "quarterly energy change adjustment for the price of coal" (the so-called, coal clause adjustment) are bothersome to apply, cause confusion amongst consumers and make it difficult for firms to budget ahead adequately. If, as is now evidently intended, Eskom should drop the clause next year, then this difficulty will automatically be resolved.

Should the clause not be dropped, however, then the best solution would be to establish an Electricity Tariff Stabilisation Fund to which relatively modest annual contributions from income could be made, say to the extent of about 3% each year. This fund, which incidentally would also earn interest on behalf of the consumers, could then be drawn upon as required to meet the quarterly coal clause adjustments. The Cape Town electricity undertaking has employed such a stabilisation fund for close on ten years now with great success, and, I believe that other municipalities have also adopted, or are considering adopting, a similar procedure.

Even if the coal clause is dropped a tariff stabilisation fund is still recommended as a means of accommodating or smoothing out other unforeseen costs or inflationary increases generally. Any annual contribution to such a fund would then, however, clearly be proportionately smaller.

## 6 Eskom's Proposed New Electricity Tariff

Eskom's proposed new electricity tariff, which it hopes to introduce next year subject to Electricity Control Board approval, could well exert an influence on the structure of any standardised municipal tariff rates. Of particular interest is the intended introduction of an off-peak rate and a transmission surcharge, and the dropping of the coal clause adjustment, as well as the extension change in certain areas.

## 7 Sundry Matters

Other matters considered in the report include the ques-

Dit is derhalve baie duidelik dat toekomstige tariefstrukture met oorwegings rakende belastingbestuur en energiebewaring sal moet rekening hou. In hierdie verband is dit interessant om daarop te let dat Evkom hoop om volgende jaar 'n buitenspitsurartarief vir groot kragverbruikers in te stel. In sodanige geval sal munisipale elektrisiteitsondernemings dan in die posisie wees om hierdie heffing in hulle eie tariewe weer te gee deur ook 'n buitenspitsurartarief aan te bied.

'n Ander verwante aspek waarna in die Witskrif verwys word, is die behoefte om stelselbelastingfaktore te verbeter, nie alleen deur middel van buitenspitsuur- en onderbrekbare tariewe nie, maar ook deur middel van belastingbeheertegniese, soos die gebruik van rimpelbeheer vir die afskakeling van huishoudlike waterverwarmers.

## 5 Stabiliseringsfonds vir Elektrisiteitstariewe

Deur weer na die Witskrif te verwys, moet daarop gelet word dat "ten einde so spoedig moontlik en tot die grootste mate moontlik besparings in elektrisiteit te bewerkstellig" daar onder andere aanbeveel word dat "verhogings in die prys van elektrisiteit slegs een keer per jaar (in Januarie) moet voorkom" en dat sodanige verhogings "die steenkoolprysaanpassing vir die volgende jaar moet insluit, en vir die hele jaar geldig moet wees".

Daar bestaan geen twyfel dat dié periodieke finansiële aanpassings in tariewe wat vereis word vir Evkom se "kwartaalike energieheffingsaanpassing vir die prys van steenkool" (die sogenaamde steenkoolklousule-aanpassing) lastig is om toe te pas, verwarrend vir verbruikers veroorsaak en dit vir firmas moeilik maak om doeltreffend vooruit te begroot. Indien, soos nou blykbaar die voorneme is, Evkom volgende jaar van hierdie klousule gaan afsien, sal hierdie probleem outomaties opgelos wees.

Indien daar egter nie van die klousule afgesien gaan word nie, sal die beste oplossing wees om "n Stabiliseringsfonds vir Elektrisiteitstariewe daar te stel waartoe betreklik klein jaarlikse bydraes van inkomste van sê tot ongeveer 3% elke jaar, gemaak kan word. Van hierdie fonds, wat toevallig ook rente ten bate van die verbruikers gaan verdien, kan dan getrek word om die kwartaalike steenkoolklousule-aanpassings te betaal. Die Kaapstadse elektrisiteitsonderneming gebruik nou reeds amper tien jaar lank 'n sodanige stabiliseringsfonds met groot sukses en ek glo dat ander munisipaliteite het ook, of oorweeg dit om 'n soortgelyke prosedure aan te neem.

Selfs al word daar afgesien van die steenkoolklousule word 'n tariefstabiliseringsfonds nog steeds aanbeveel as 'n middel om ander onvoorsiene koste of inflasionistiese verhogings in die algemeen te absorbeer of uit te stryk. Enige jaarlikse bydraes tot sodanige fonds sal dan egter na verhouding ongetwyfeld kleiner wees.

## 6 Evkom se Voorgestelde Nuwe Elektrisiteitstarief

Evkom se voorgestelde nuwe elektrisiteitstarief wat hy hoop om volgende jaar in te stel onderworpe aan die goedkeuring van die Elektrisiteitsbeheerraad, kan wel 'n invloed uitoefen op die struktuur van enige gestandaardiseerde munisipale tariewe. Van besondere belang is die voorgenome instelling van 'n buitenspitsurartarief en 'n transmissietoelag, en die opgee van die steenkoolklousule-aanpassing, sowel as die uitbreidingsheffing in sekere gebiede.

## 7 Diverse Sake

Ander sake wat in die verslag oorweeg is, sluit die kwes-

tion of the electricity undertaking's trading surplus or profit, cross-subsidisation between tariff rates, marginal cost pricing and kVA or kW demand metering.

## 8 Conclusion

The main aim of the report is to establish a set of guidelines that hopefully will assist member undertakings in formulating equitable tariff rates that are not only economically sound but also socially acceptable. At the same time, consideration must be given to the recommendations of the de Villiers Commission as endorsed by the Government, with particular emphasis on load management and energy conservation aspects.

sie van die elektrisiteitsondermeening se handelsoorskot of wins, kruissubsidiëring tussen tariewe, marginale kostberekening en kVA- of kW-aanvraagmeting in.

## 8 Slotopmerking

Die hoofdoel van die verslag is om 'n stel riglyne daar te stel wat hooplik lidondernemings sal help om billike tariewe te formuleer wat nie alleen ekonomies gesond, maar ook sosiaal aanvaarbaar is nie. Terselfdertyd moet oorweeging geskenk word aan die aanbevelings van die de Villiers-Kommissie soos deur die Regering geëndoseer, met besondere klem op die aspekte van belastingbestuur en energiebewaring.

D C PALSER

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## DISCUSSIONS – BESPREEKINGS

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### MR D C PALSER: CAPE TOWN

Mr President, you have my report which is a very brief summary of the main and more detailed report that I will be submitting to the Executive Council later this week.

The main report deals firstly with certain statutory investigations and reports, consider the Board of Trade and Industries' report some years ago, the De Villiers Commission of Inquiry report and the impact that the proposed new Escom National Licence will have on us. The report then looks briefly at electricity tariff principles, but not in any great depth. Then various practical tariff considerations are reviewed, including marginal cost pricing which was mentioned some years ago. This is a possibility that the economists are very keen on, but I have noticed that in the De Villiers Commission report it is mentioned that the economy is not in the right state at present to adopt marginal cost pricing and that we should rather continue to base tariffs on average or historical costs. The report also considers the different consumer classes, namely industrial, commercial, and domestic, and various other categories. Also the pros and cons of cross-subsidisation between tariff rates, and the coal price adjustment clause which we were told this morning is going to be discontinued and which, if it should be discontinued and which will certainly make life easier. In Cape Town we have for some years now employed a tariff stabilisation fund to avoid having to make quarterly adjustments to our tariffs and this has worked very well. Another matter considered is the magnitude of trading surpluses.

The report then deals with a subject of some importance today, namely load management and energy conservation. In this context I would like to read to you something from the main report.

“Although the De Villiers Commission report centres almost exclusively on Escom it did make reference to certain matters falling outside the scope of its study of Escom's strategy. One of these was the question of the supply and distribution of electricity by local authorities. In this regard the Commission reported that 'in view of the present uncertainty about constitutional developments the Commission does not feel qualified to make specific recommendations on the supply and distribution of electricity by local authorities'. The Commission, while not making any specific recommendations, nevertheless, did make certain general observations, one of them being that

'it is satisfied that Escom's role should be predominantly that of a bulk supplier and therefore feels that the role of local authorities in the industry should in general be left unchanged. It is however necessary that local authorities supply electricity in accordance with the principle of efficient load management, and uniformity of tariff structures of local authorities throughout the country is furthermore desirable'.

So it is quite clear that it is definitely the view of the De Villiers Commission that we should consider a uniform national tariff structure. I think this is exactly what we are doing, as well as proposing that we also embody in our tariffs the principle of efficient load management and energy conservation.

Other matters considered in the main report are off-peak rates and maximum demand metering, as well as the tariff survey where almost 200 municipalities were circularised with 177 replies being received. I think this is a very good and representative sample. From this survey certain clear results emerged which are summarised in the report which you have before you today.

Then finally — and this will be considered by the Executive Council at its meeting on Thursday — there are certain guidelines that are recommended. I do not know whether I should go through these in full now. I would mention, though, that they cover certain recommendations on practical tariff formulation and standardisation.

For instance, one recommendation is to continue basing the calculation of the cost of supply and the formulation of tariffs on historical costs and not marginal costs. Then there are certain recommendations concerning the structuring of tariffs for domestic, commercial and large user consumers, and that the large user demand tariff be based on kVA and not kW and that a 30 minute demand metering period be standardised on. Another recommendation is that the monthly service charge may be either a fixed amount or a variable amount based on circuit breaker rating, the latter alternative incidentally being favoured by a large number of municipalities. About 25% of domestic consumers prefer the circuit breaker tariff. Also mentioned in the report is the fact that block tariff rates need not comprise more than two blocks despite the tariff survey revealing that some municipal tariff rates extend to five or six blocks. There is no practical advantage in going beyond two blocks.

Another guideline recommends limiting cross-subsidisation between tariff rates which, as mentioned earlier, is a practice the economists say we should avoid. It is also something the De Villiers Commission and others have said we should avoid. On occasions, however, one can justify a degree of cross-subsidisation depending on local requirements or social constraints. As a general principle, though, try to avoid or at least minimise cross-subsidisation as far as possible.

Regarding trading surpluses, there is a recommendation that this be limited to around 10% of total income. This is a figure that has been mentioned before in the Board of Trade and Industries report and by the Electricity Control Board, both of whom considered a figure of around 10% to be reasonable. There was a paper presented some years ago at the Durban Convention in 1975 by Dr Cowden on program budgeting in which he looked at the trading surpluses of municipalities and found that they ranged from about 5% up to 100% or more. A figure of 10% is therefore not unreasonable.

There are various other points considered in the report including support for the policy of load management and energy conservation. I am pleased to note, Mr President, that you have publicly announced today that the AMEU officially supports this policy.

Regarding the introduction of suitable off-peak rates, particularly in view of the reference this morning to Eskom's new off-peak rate, I doubt whether many municipalities will really benefit from this rate. But as Mr Reilly has said — although I do not think he mentioned it this morning — this is merely a first step. I trust that Eskom's tariff structure will in future reflect a greater degree of sophistication, particularly in the adoption of off-peak rates.

And then finally, there is a recommendation to adjust tariff rates preferably only once annually, as proposed by the De Villiers Commission.

These then are the main points from my report which will be discussed at the Executive Council meeting on Thursday.

That is all I have Mr President, thank you.

#### MNR E DE C PRETORIUS : POTCHEFSTROOM

Ek is van mening dat daar geen tegniese regverdiging is vir die klassifikasie van verbruikers in die drie kategorieë Huishoudelik, Komersieel en Industrieel op wie verskillende tariewe van toepassing is nie. Daar behoort 'n enkele tarief, met variasies vir verskillende lasgroottes te wees wat op alle verbruikers van toepassing is.

Dit is soms veral baie moeilik om te bepaal of 'n verbruiker as kommersieel of industrieel geklassifiseer moet word. Hou ook in gedagte dat 'n kommersieel verbruiker se aanvraag etlike megawatt kan beloop en dié van 'n industriële verbruiker so min as 20 kW en selfs minder.

Wat maak 'n mens met 'n sogenaamde huishoudelike verbruiker met 'n las van 50 kW of selfs meer? Waaronder klassifiseer 'n mens 'n buitestedelike verbruiker wat 'n klein boerdery bedryf, of 'n universiteit, of 'n militêre basis om 'n paar te noem?

Indien daar dan moet geklassifiseer word, is Evkom se benadering vir my baie meer aanvaarbaar, naamlik, Huishoudelik, Kleinkragverbruiker en Grootkragverbruiker, op voorwaarde dat enige verbruiker wie se las meer is as 20 kVA geklassifiseer word as 'n kragverbruiker (klein of groot, na gelang van die geval).

'n Interessante aspek van Evkom se voorgestelde nuwe tarief vir grootkragverbruikers insoverre dit hoogaansvraag betref, is dat dit gekoppel is aan die toevoerspanning wat 'n gesonde beginsel is wat al baie jare in Potchefstroom toegepas word.

Uit mnr Palsers se verslag, — 'n formidabele taak waaraan hy baie tyd en energie moes gespandeer het te oordeel aan die veelomvattende verslag wat hy aan die uitvoerende raad gaan voorleë en wat ek ter insae het — dit is feitlik 'n verhandeling — blyk dit dat stroombrekertariewe nog nie dieselfde populariteit geniet as die minimum-en/of diensheffingstariewe nie; maar ek kry die indruk dat dit vinnig veld wen. Ek wonder of daar meer as 5 ondernemings is wat 10 jaar gelede so 'n tarief gehad het.

'n Stroombrekertarief het natuurlik baie "PT" waarvoor sommige ingenieurs en/of tesoieurs gerieflikheidshalwe wegstroom. Dit is mynsinsiens egter die enigste tegniese-verdedigbare tarief vir kleiner verbruikers, sê tot 65 kVA. Maar om enigsin doeltreffend te wees, dit wil sê om verbruikers lasbewus te maak, moet daar 'n baie sterk aansporing vir die verbruiker wees om so 'n klein maontlik stroombrekeraanslag te kies. Daarom behoort die stroombrekerheffing alle aanvraag- en verbruikersverbonde koste te verhaal en sal daarom redelik hoog wees. Op hierdie manier word die verbruiker met 'n swak lastfaktor bygekomp (Onder huishoudelike verbruikers is daar baie meer desulkes as wat algemeen aanvaar of vermoed word.) Die kwh-heffing behoort dan net die Evkom-kwh-heffing (plus stelselverlies) te verhaal en die "profy" van die onderneming op te lewer.

**Buitespitstariewe :** Interessant is dit dat Evkom se voorgestelde kwh-heffing in die buitespitstarief dieselfde is as vir grootkragverbruikers, 'n beginsel wat Potchefstroom ook al baie jare toeepas. Daar moet net lig geloop word dat die buitespitlas nie naderhand 'n verleenheid word nie, soos alreeds in Groot Brittanje ondervind is nie!



Mr D C Palsers



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## SOUTH AFRICAN NATIONAL COMMITTEE OF THE IEC

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- 1 IEC is die afkorting vir Internasionale Elektrotegniese Kommissie. IEC stands for International Electrotechnical Commission.
- 2 This report covers the period 1983-07-01 to 1985-04-30, unless otherwise stated.
- 3 The SABS, as the national standards committee of the RSA, is a (well respected) member of the IEC whose task it is to draw up international electrical standard specifications which could be either adopted or used as a guideline by national committees.
- 4 Plenary sessions of the IEC take place annually, the previous one (the 49th) from 20 May to 1 June 1985, in Montreal, Canada, which was attended on behalf of the AMEU by Messrs W Barnard, president and J K von Ahlften, as part of the South African contingent headed by the SABS.
- 5 Interim meetings of technical committees are held as and when necessary. One such meeting of Technical Committee 64 (Electrical Installations in Buildings) was held from 14 to 18 May 1984 in Berne, Switzerland and was attended on behalf of the AMEU by Mr N S Botha. The main theme of this meeting was safeguarding against electric shock.
- 6 Documents on 21 technical committees are sent, by the SABS, to 8 members of the AMEU (nominated by the AMEU's SABS Co-ordinating Committee) for their perusal and comment which, in some instances, is a formidable task. I have approached these members for a progress report covering the activities of the committees concerned; 5 of them responded, as follows:

### 7.1 TC 8 : Standard voltages

During 1983 the work done by the technical committee culminated in the issue of the sixth edition of IEC Publication 38 : IEC Standard Voltages. No further progress. (W Barnard).

### 7.2 TC 14 : Transformers and reactors

#### 7.2.1 Determination of transformer and reactor sound levels:

Collated comments were circulated in August 1983 and voting papers in January 1985.

#### 7.2.2 Small power transformers and special transformers:

The scope of sub-committee 14D was amended in August 1983 to avoid duplication of work undertaken by TC 14, and a report was circulated for information in September 1983.

#### 7.2.3 Reactors:

Collated comments on a draft specification were circulated for information in September 1983.

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## SUID-AFRIKAANSE NASIONALE KOMITEE VANDIE IEC

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### 7.2.4 On-load tap-changers:

A suggestion to revise IEC Publication 214 (1976) (On-load tap changers) was made by Germany in October 1983. Working group 2 was accordingly set up in June 1984 and proposed amendments were circulated in February 1985 for comment.

### 7.2.5 Dry-type power transformers:

A proposed amendment to IEC Publication 726 (Dry-type power transformers) was circulated for comment in April 1984.

A proposed loading guide for these transformers was circulated for information in May 1984 and voting papers in January 1985.

### 7.2.6 External clearances in air for power transformers:

Voting papers for a draft first supplement to IEC Publication 76-3 (Power transformers. Part 3: Insulation levels and dielectric tests) were circulated in January 1985.

### 7.2.7 Preparation of IEC chapter on transformer terminology:

Working group 9 was re-constituted in January 1985 to prepare a supplement to chapter 421 dealing with additional terms.

In addition, correspondence was received concerning minor changes in working groups and committees as well as minutes of the IEC meeting held in Tokyo in 1983. (D C Palser).

### 7.3 TC 23E: Circuit breakers and similar equipment for household use

#### 7.3.1 It was decided to include an Appendix D "Co-ordination between circuit breakers and separate fuses associated in the same circuit" to the document, which is now being circulated for comments. (P J Botes)

#### 7.3.2 The draft - Circuit breakers for equipment - intended for protection within electrical equipment in case of electrical overcurrent conditions covering conventional overload but excluding short-circuits at the terminals of the equipment submitted for approval under the 6 months rule was approved without comment by the national committee. (J K von Ahlften)

### 7.4 TC 34A-D : Lamps and related equipment

All proposals put forward by the main IEC committee were accepted without comment by the national committee and as I will be attending the IEC conference in Montreal, Canada, during June 1985, a more comprehensive report can only be submitted at a later stage. (J K von Ahlften)



#### 7.5 TC 59A: Electric dishwashers

This committee is also now occupied in the preparation of a test code for the determination of airborne acoustical noise emitted by household and similar electrical appliances and part 2 thereof, deals with particular requirements for dishwashers. (P J Botes)

#### 7.6 TC 59H : Microwave appliances

The committee is now occupied with a test code for determination of acoustical noise emitted by microwave appliances. (P J Botes)

#### 7.7 TC 61 : Safety of household and similar electrical appliances

7.7.1 A considerable amount of documentation was received for comment monthly confined to testing procedures involving SABS specifications. As the AMEU is mainly concerned with the practical implications of the proposals put forward on specific comment was involved as the basic safety requirements are being met in the interest of consumers. (J K von Ahlften)

7.7.2 The technical committee has been dealing with the proposed amendments to the specifications for refrigerators and food freezers. Difficulties have been encountered in obtaining consensus among the various countries for the various proposals put forward. The document 61C-15 was circulated to national committees for a vote on the draft amendments and 15 countries approved whilst 3 countries were against. In view of this the document would be printed as the second edition of IEC publication 335-2-24.

The sub-committee 61C considered the safety requirement for motor compressors for refrigeration. Proposals from all participant countries were received and considered at length and the draft docu-

ment 16C-7 was circulated to national committees with a request that central office be informed whether or not they were in favour of the document being published. The result was that 18 countries were in favour with nil against. The document 61C-17 was therefore considered approved. No further progress can be reported. (L. Fletcher)

8 On behalf of the AMEU, I wish to express my thanks to the above rapporteurs who have spared themselves no pains to carry out their task.

*E DE C PRETORIUS*

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## DISCUSSIONS – BESPREKINGS

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#### MR KEES VAN ALPHEN : SABS

May 1 add a short report in TC 28 Insulation Co-ordination which met in Montreal in May 1985.

A heated debate evolved on the subject of corrosion for altitude above 1 000m. Based on our experience in South Africa with regard to electricity supply at high altitude, I was asked to prepare an IEC document. This was done within two months and submitted to the chairman in Italy.

His reaction by telex was: "Very good work – prepare this as a Cigre colloquium document for the Budapest colloquium in September 1985".

The document was indeed rewritten and was taken by Dr Andy Eriksson who was to attend the Budapest colloquium and very happy to make the presentation.

## OPENING CEREMONY

The 49th General Meeting of the International Electrotechnical Commission, Tuesday, 21st May 1985, by Her Excellency the Right Honourable Jeanne Sauv , P.C., C.C., C.M.M., C.D., Governor General of Canada.



**SOUTH AFRICAN DELEGATION FROM LEFT TO RIGHT**

*Roger Fillipi (SABS), Albert Middlecote (SABS), Wessel Barnard (AMEU), Iona Barnard, Jules von Ahlften (AMEU), Bessie von Ahlften, Dr Clifton J Johnston (SABS) (Partly cut off), Henrie Steyn (SABS).*

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## INTERIM COMMITTEE FOR REGISTRATION OF TECHNOLOGISTS AND ENGINEERS

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### DISCUSSIONS – BESPREKINGS

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MR A B J TINDERHOLM : ICMEE

#### BOARD OF CONTROL

Mr President, I have pleasure in reporting for general information that the Regulations in both English and Afrikaans for the Board for Control for Certificated Engineers, have been finally amended, edited and forwarded to the State Legal Advisors. It is therefore expected that the Bill for the establishment of the Board of Control will be published in the near future.

#### THE TITLE ENGINEER

Mr President, great concern has been expressed by several certificated engineers who were not registered as professional engineers. It was rumoured that only registered professional engineers would in future be permitted to use the title of *Engineer* whilst in the employ of a local authority. I have pleasure in allaying the fears of these engineers. It now appears that some 'Committee' came to the wrong conclu-

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## INTERIM-KOMITEE VIR REGISTRASIE VAN TEGNOLOË EN INGENIEURS

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sion and the incorrect information was propagated.

It was in fact resolved by the South African Council for professional engineers during February 1985 that the titles *Electrical Engineer* and *Mechanical Engineer* would be reserved for professional engineers, however, with the proviso specifically written into the Act that *Certificated Engineers* would be exempt from the provisions of the prohibition clauses.

It was further agreed that a *Certificated Engineer* registered with the proposed *Board of Control* would be referred to as a *Registered Certificated Engineer*.

#### DISCUSSIONS REPORT 21

MR J DAWSON : UITENHAGE

Mr President, this committee was set up at the request of SARET. Who came to the AMEU for their advise in their initial stages. The AMEU indicated that they would be prepared to assist them at any time that they so asked. But at the same time we did not wish to give the impression that we were trying to tell them how they should organise it. And we therefor waited for advise from them. Untill that happened we did not decide to take any action. For that reason we have done nothing for the last year.

Thank you Mr President.

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### REPORT REGARDING ATTENDANCE OF THE INTERNATIONAL TECHNICAL COMMITTEE MEETING (TK64) HELD AT BERNE, SWITZERLAND

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I wish to express my thanks and appreciation to the AMEU for the decision to send me to Switzerland to attend the abovementioned meeting.

The meeting was held at Berne on May 14-18, 1984, where various areas and aspects were dealt with.

The fact that French, among others, was regarded as conversation language caused me some problems.

Only the proposals of other countries could be supported or opposed, due to the fact that no positive contributions were made by South Africa during the past year or two, on re-

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### VERSLAG INSAKE BYWONING VAN DIE INTERNASIONALE TEGNIESE KOMITEE VERGADERING (TK64) GEHOU TE BERNE, SWITZERLAND

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Ek wens my dank en waardering teenoor die VMEO uit te spreek vir die besluit om my na Switserland te stuur vir die bywoning van bogemelde vergadering.

Die vergadering was vanaf 14-18 Mei 1984, te Berne gehou waar verskeie terreine en aspekte bespreek is.

Die feit dat Frans onder andere as aanvaarde spreektaal gebesig was, het sake vir my bemoeilik.

Aangesien Suid-Afrika die afgelope jaar of twee nie positiewe bydraes gemaak het nie en ook nie kommentaar op voorstelle van werkgroepe gelewer het nie, het dit verorsaak dat slegs ander lande se voorstelle ondersteun of

ports of working groups.

I am of the opinion that the Executive Council of the AMEU should attend to the following:

- 1 To a greater extent the SABS must be coerced and assisted to ensure that South Africa at least react on working group reports.
- 2 If the association decide to depute a member to attend future meetings, decisions in this regard must be taken well in advance in order to allow such a member to make comments in collaboration with the SABS on working group proposals. The deputed member will then be in a position to present the view of South Africa in a convincing way.

Delegates from twenty two countries with Mr B Krediet from the Netherland's as chairman, attended the meeting.

I wish to elucidate only briefly as it is impossible to present a detail report on the meeting.

The effect of current conducted through the human body were dealt with, alternating current with frequencies from 15 Hz to 100 Hz and emphasis was placed on a direct current with an effect of two to four times the intensity of alternating current. The impedance of the human body which is mainly resistive, is an important criterion for the danger arising from the flow of and current on touching a live potential.

Electric installations at sauna-baths and garden equipment were pointed out as specific danger points.

Classification of electrical and electronic protection equipment are in the process of preparation, owing to the importance of electrical protective apparatus to prevent fatal electrical shocks. Fire requirements, choice of switching and control gear, the choice and use of wiring diagrams etcetera, were some of the aspects which were attended to. Overvolten low voltage systems as well as isolation level coordination have been closely looked at.

The meeting also attended to automatic disconnection of power supply as protection against electric shock, which is set to disconnect the power supply fast enough to minimise the risk of disadvantageous physiological effects. Inevitably this can only function effectively when the necessary inspections and tests are performed according to the necessary requirements and codes laid down by control authorities, on the installation of the consumer.

The classification of electrical apparatus against shock are divided into direct and indirect contact. In order to reduce the risk of contact in practice, special attention was given to insulation and different levels of insulation. The role played by insulation to prevent the risk of contact with live conductors is especially of importance if electrical installation of parks and caravan parks are considered. These installations are temporary and should always be assessed against laid down rules for similar cases.

Finally the meeting considered new items which needs attention. Hoisting equipment, the marking of conductors and the protection of low voltage generators were in particular mentioned for investigation by the working groups.

teengestaan kan word.

Ek is van mening dat die Uitvoerende Raad van die VMEO aan die volgende aandaag moet skenk:

- 1 Daar moet tot 'n groter mate druk uitgeoefen word op die SABS en meegehelp word om te verseker dat Suid-Afrika ten minste kommentaar lewer op werkgroep-verslae.
- 2 Besluite moet vroegetydig geneem word indien die vereniging 'n lid gaan afvaardig om toekomstige vergaderings by te woon. Sodanige lid moet die geleentheid gebied word om tesame met die SABS kommentaar te lewer op werkgroepvoorstelle. Die afgevaardigde lid sal dan in staat wees om tydens die vergadering Suid-Afrika se standpunte oortuigend te stel.

Afgevaardigdes van twee en twintig lande het onder voorsitterskap van mnr B Krediet van Nederland, die vergadering bygewoon.

Dit is onmoontlik om volledig verslag te doen ten opsigte van die vergadering, en ek wil u gevolglik slegs kortliks toelig.

Die effek van stroom wat deur die menslike liggaam vloei is behandel en is klem gelê op wisselstroom van 15 Hz tot 100 Hz frekwensie en gelykstrom met 'n effek twee tot vier keer die intensiteit van wisselstroom. Die impedansie van die liggaam, wat hoofsaaklik resistief is, is 'n belangrike kriterium vir die gevaar verbonde aan die vloei van 'n stroom by aanraking van 'n lewendige geleier deur die mens.

Elektriese installasies by saunabaddens en tuinboukundige apparatuur is spesifiek uitgewys as gevaaropunte.

Aangesien beskerming deur middel van elektriese apparatuur die hoofrol speel om noodlottige elektriese skokke te beperk, word gewerk aan die opstel van 'n klassifikasie van elektriese en elektroniese beskermingsapparatuur. Onder andere word gekyk na brandverreistes, keuse van skakel- en beheertuig, die keuse en gebruik van bedringsisteme, ensovoorts. Oorspanning op laagspanningsisteme asook isolasievlakkoördinerings het onder die soeklig gekom.

Verder was met betrekking tot beskerming teen elektriese skok gelet op outomatiese ont koppeling van kragtoevoer, wat daarop ingestel is om die spanning by aanraking gou genoeg te onderbreek en sodoende die risiko van nadelige fisiologiese effekte te minimeer. Dit kan uiteraard slegs effektief funksioneer as die nodige inspeksie en toetse gedoen word op die installasie van die verbruiker in ooreenstemming met die nodige vereistes en kodes neergelê deur die beheerowerheid.

Die klassifikasie van elektriese apparaat teen skok word opgedeel in direkte en indirekte kontak. Aandaag word veral gegee en isolasie en verskillende vlakke van isolasie in die praktyk om die risiko van aanraking te verminder. Die rol wat isolasie speel om lewendige geleiers te isoleer van aanraking is veral van belang as installasies in parke, karavaanparke ensomeer, in oenskou geneem word. Hierdie is 'n tydelike tipe installasie en behoort altyd gemeet te word aan die neergelegde reëls vir sodanige gevalle.

Laastens is nuwe items waaraan aandaag geskenk behoort te word oorweeg. Hystoestelle, die merk van geleiers en beskerming van laagspanning generators word onder andere uitgesonder vir ondersoek deur die werkgroep.

N S BOTHA

# INTERNATIONAL ELECTROTECHNICAL COMMISSION 1983

# INTERNASIONALE ELEKTROTEGNIJESKE KOMISSIE 1983

## INTRODUCTION

South Africa was well represented at the 48th General Meeting of the IEC held in Tokyo, by a delegation of nine officials from organisations in both the private and public sectors, including the manufacturing and contracting industries, Escom, SABS and AMEU. In total there were approximately 800 delegates from 33 different countries.

The programme included meetings of the committee of action, the full council and 56 separate technical committees, sub-committees and working groups. The matters being dealt with by a number of these committees such as

- TC 14 Power transformers
- SC 23 B Plugs, socket-outlets and switches
- SC 23 C World-wide plug and socket-outlet systems
- TC 37 Surge arresters
- TC 61 Safety of household and similar electrical appliances

are relevant to the activities of municipal electricity supply undertakings.

Due to overlapping of times of meetings of these committees, the number which it was possible to attend was restricted. In any event the formulation of international standards are generally very protracted and an ongoing involvement in the deliberations of a particular committee is necessary in order to make a meaningful contribution. In consequence attendance at IEC meetings by a delegate on a "one off" basis limits his contribution to one of a supportive nature to other national representative who attend more regularly.

Apart from participation in several technical visits which provided an interesting but limited insight into the Japanese manufacturing industry, I was able to attend meetings of the council and committee of action of the IEC and of SC 23 B and SC 23 C. The following brief details of these meetings are submitted for information of members of the AMEU.

## COUNCIL OF THE IEC

The president of the IEC, Mr W A McAdams of USA, chaired the meeting of the council which extended over two days and were attended by over 90 delegates including the president of the International Standards Organisation (ISO), Dr Kothari.

Matters discussed included:

### 1 Liaison between IEC and ISO to

- (a) avoid or eliminate possible or actual overlapping in the technical work and to organise the co-operation; this relates to the creation of new technical committees as well as to the work of already established technical committees;

- (b) ensure that the rules for the presentation of international standards be harmonized;
- (c) develop common proposals for assimilating with each other the rules for the development of international standards (including those for target dates and voting);
- (d) present IEC and ISO as "a system for international standardisation as a whole" as required by the IEC/ISO Agreement of 1976.

- 2 Finance.
- 3 Amendments to statutes and rules of procedure.
- 4 Reports on the activities of the special working group of the council set up in 1982 to examine various policy matters.
- 5 Reports from the committee of action and officers of the IEC.
- 6 IEC quality assessment system for electronic components.
- 7 Product certification and quality assurance.
- 8 Consumer matters.
- 9 Management of the IEC.

## ELECTION OF PRESIDENT OF IEC

Mr A Dejou (France) was elected as incoming president.

## COMMITTEE OF ACTION

The Committee of Action met on 21 October 1983, under the chairmanship of the president of the IEC, Mr W A McAdams. Three members of the South African delegation namely Messrs A A Middlecote and J W Smith of the SABS, and myself attended as observers.

The countries represented as members of this committee were:

Canada	India	Sweden
China	Italy	United Kingdom
France	Japan	USSR
Germany	Netherlands	

Reports of various technical and advisory committees and working groups were considered including:

- 1 Advisory committee on safety (SCOS);
- 2 Advisory committee on electronics and telecommunications (ACET);
- 3 Information technology working group;
- 4 Electromagnetic compatibility co-ordinating working group.

In addition several other matters relating to administration and policy were dealt with at this meeting.

### **SUB-COMMITTEE 23 B : PLUGS, SOCKET-OUTLETS AND SWITCHES**

This sub-committee is involved in details relating to design, construction testing, choice of materials, etc. in relation to plugs, socket-outlets and switches.

Meetings extended over three days and progress was made on numerous items discussed but there is nothing to report of particular significance or interest to members of the AMEU.

### **SC 23 B : WORLD WIDE PLUG AND SOCKET-OUTLET SYSTEM**

As is well known, South Africa has a particular interest in the outcome of this sub-committee's efforts to evolve an international standard plug and socket arising from a perceived need to replace the large and cumbersome system being used in the Republic by a neater more modern system. Mr J V Grant of the SABS acts as secretary to the sub-committee.

The sub-committee met in Tokyo on 22 and 24 October 1983, and this country was represented by Messrs T K Laverley, V A M McDonald, A A Middlecote, J W Smit and myself.

Prolonged debate took place on document 23 C (Secretariat) 32 relating to various policy options now available to the IEC following failure to date to obtain the required degree of acceptance of earlier proposals for a standard 16A 250V socket-outlet.

Some time was spent on considering whether insulated sleeves on the live pins were necessary or not and the majority of countries saw no need for these provided the design of the system made the live pins inaccessible to the standard test finger during insertion of a plug.

The final decision of the committee was to circulate under the "Six Months Rule" a document based on the round pin system only.

As a matter of interest, it has been ascertained from the SABS that the system was duly circulated under the six month rule as decided in Tokyo. Insufficient negative votes had been lodged by the closing date to defeat the proposed system. However, additional negative votes were subsequently received and the IEC committee of action at its last meeting in Montreal in 1985, decided to revise the document in the light of comments received and re-issued it for approval under the two months rule. The secretary of SC 23 C anticipates that the re-issue will take place in November or December 1985.

### **CONCLUSION**

Notwithstanding my earlier observation that a somewhat limited direct contribution only to the formal proceedings of the conference was possible due to lack of continuity of attendance, I am convinced that the policy of the AMEU in sponsoring annually, one of its members to attend IEC meetings is justified provided the programme includes matters relevant to the activities of electricity supply undertakings.

The presence of a strong South African delegation at an international technical conference such as a meeting of the IEC, where political differences are ignored in favour of

the pursuit of dialogue to reach agreement on important issues aimed at reduction of production costs and promotion of international trade through standardisation, has great value. Furthermore opportunities arise from the establishment of contacts and information discussion which can do much to clear misconceptions and promote better understanding.

Finally, I wish to record my appreciation of the opportunity afforded to be by the AMEU, to attend the 48th IEC general meeting in Japan which I found most informative and stimulating and to the SABS, and Mr A A Middlecote in particular, for their invaluable assistance.

*D H FRASER (Pr. Eng.)*

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## **DISCUSSIONS – BESPREEKINGS**

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### **DR N BOTHA : BLOEMFONTEIN**

Mnr die President, ek sou net graag 'n beroep wil doen op die Buro van Standaarde en hulle span indien moontlik, as 'n persoon na hierdie vergaderings moet gaan, of hulle nie vir ons net vroeër die verslae en dokumentasie kan beskikbaar stel nie. 'n Mens vind jousef daar in 'n moeilike posisie om sinvolle hydrae te lewer want dit is 'n menigte werk wat jy moet deurgaen. Indien moontlik dankie.



### **MR J TOMS : SABS**

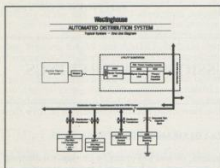
On behalf of the Bureau of Standards, I would like to express my intention of accepting Dr Botha's recommendations regarding the SABS participation in the affairs of TC64. Working group 3 still exists, still receives the documentation from TC64 but unfortunately over the last two years there has not been a meeting convened to deliberate on the TC64 documents or to give it any feedback to the IEC. But it is our intention that this will happen in the near future.

Thank you.



# ENERGY MANAGEMENT IS THE REQUIREMENT OF THE FUTURE

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## Automated Distribution

### System Benefits

The EMETCON system offers utilities the opportunity to:

- Shave peaks,
- Conserve energy,
- Reduce system operating costs,
- Decrease outage time,
- Increase distribution line efficiency (VAR control),
- Increase utilization of existing facilities,
- Improve load factor.

Because the EMETCON system provides exceptional flexibility to the utility, the economic results of any combination of benefits listed above would be sufficient to cover the expenses to install and operate the system.



## The Hard-to-Access Metering Problem

All utilities have some problems with inaccessible meters. These problems include situations like:

- Indoor meter with the owner away
- Fenced in yards
- Vicious animals near meters
- Dangerous neighbourhoods
- Row houses with inaccessible back yards
- High-rise apartment buildings
- Condominiums with inaccessible meters

This can be solved by two-way transponders at the metering sites and a modified field configuration terminal (FCT), used as a portable reader, that can be carried to any point on the secondary where the two-way terminal is located.



## EWR-84 Bubble Memory Demand Recorder

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P.O. Box 1034 Boksburg 1460  
Telex: 4-28842 SA. Telephone: (011) 827-5912

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# TOPICS FOR DISCUSSION ONDERWERPE VIR BESPREKING

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## HEAT SHRINKABLE TERMINATIONS FOR THE POWER INDUSTRY OR HYBRID AND POLYMERIC INSOLATORS

## HITTE KRIMPBARE ENTTOERUSTING EN POLIMERIESE ISOLATORS VIR NYWERHEID OF NETWERK GEBRUIK

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MR R E MACEY : AFFILIATE

High voltage, outdoor insulators are subjected to extremely severe service conditions. They are exposed to extreme climatic conditions and can be highly stressed both electrically and mechanically. Moreover, they are expected to work for long periods with little maintenance and to have a long life, limited generally by the obsolescence of the plant as a whole.

Conventional porcelain and glass insulators have proved to be extremely reliable over many years. In some situations, however, problems have been experienced with one or more of the following:

(i) Lightning:

Steepfronted impulse voltages induced on the line by lightning activity can cause insulator flashover or, worse, insulator puncture. Such difficulties can, though, be eliminated by careful design of the basic impulse level (BIL) of the insulator and structure and by the use of class A, unpuncturable insulators.

(ii) Pollution:

Pollution flashover is the second largest cause of power outages in South Africa. A better understanding of the failure mechanism has resulted in improved insulator designs with aerodynamic shed profiles. The removal of grooves in the shed undersides and the provision of optimal shed spacing to projection ratios reduces the contamination build-up on the insulator surface and promotes efficient rain washing. In certain applications, however, a reliable, maintenance free system is still difficult to attain.

(iii) Mass:

The high mass of porcelain and glass units is a disadvantage. Particularly at the higher transmission voltages this can significantly affect the transport and erection costs.

(iv) Vandalism:

Insulator damage by vandalism is occurring more and more frequently. Glass is particularly susceptible to breakage under impact and being toughened, i.e. mechanically pre-stressed, completely shatters when

the outer layer of the materials is penetrated. Porcelain is stronger than glass and does not shatter but sheds can be knocked off resulting in a serious loss of creepage distance. This, in turn, can lead to premature flashover.

The introduction of composite, inorganic insulators was thus welcomed enthusiastically by distribution engineers. Most are of a class A design, the materials allow a versatility of shed design so that long creepage distances can be provided with an aerodynamic, open shed profile, they offer a small target for vandals and when hit, the damage is minimal and the effect not psychologically satisfying to the shooter. Further, the strength-to-weight ratio is extremely high.

Unfortunately, the types of composites available today differ widely in material, construction and price. In South Africa, experience with some units in certain applications has been good, but most failed within three years.

In polluted areas, those with a silicon rubber shed material, for example, fared extremely well. They are at present operating satisfactorily in the onerous coastal environments of Cape Town, Alexander Bay and Richards Bay where regular insulator washing and greasing used to be necessary to ensure reliability of supply. Other types, though, performed little better than glass or porcelain and in a relatively short period suffered from leakage current erosion and shed puncture.

New problems, unknown for conventional insulators, soon manifested themselves. Poor shed materials and also joints in the shed materials allowed the ingress of moisture to the core. Electrical discharge activity thus occurred on the core surface in the critical interface zone between core and shed. On some units, tracking of the epoxy resin in the core progressed rapidly until total internal electrical breakdown and destruction of the insulator was experienced. On other types, the internal discharges in the presence of water vapour produced an acidic attack of the "E" glass fibres commonly used for insulator cores. The sequential breakage of the individual fibres produced a fine crack which propagated through the core, perpendicular to its axis, until sudden mechanical failure of the unit occurred. This phenomenon, known as "brittle fracture", is the most worrying characteristic of glass fibre when electrically and mechanically stressed.

Based on this field experience, composites with more

sophisticated, high quality shed materials, no joints in the shed materials, hydrolysis resistant epoxy resins and acid immune glass fibres are becoming more widely accepted although they are considerably more expensive.

Another approach which is being carefully examined locally, is the production of a "hybrid" insulator. It is aimed at achieving most of the advantages of composite units without their disadvantages. It consists of a conventional porcelain core and end fittings covered by a silicon based, shedded polymeric sleeve. A special sealant material layer provides adhesion between the porcelain and the sleeve and prevents the ingress of moisture into the critical interface region.

Thorough testing of the concept has been undertaken by, amongst others, the FGH of West Germany and British Rail with most successful results. In view of this, and the fact that the polymeric material has been used for many years in cable terminations in a variety of climatic conditions, it was felt that the idea had potential and a number of units were produced locally. The integrity of the interface was assessed by boiling the units for 40 hours continuously and then subjecting them to power frequency flashover tests, 25 positive and 25 negative impulse waves of 1 MV amplitude and 1 000kV per microsecond rise time and long duration AC stresses of amplitude equal to 80% of the insulator flashover value. No sign of shed or sleeve puncture, tracking of the interface, temperature rise or any other form of degradation was found.

The hybrid concept is an exciting one because of the following benefits:

- (i) The core, being porcelain, is unaffected by exposure and not susceptible to the numerous failure mechanisms possible with fibre glass components.
- (ii) The probability of pollution flashover is significantly reduced owing to the high quality shed profiles which can be provided on the sleeve and the exceptional, water repellent properties common to silicon materials.
- (iii) The insulator is resistant to malicious and accidental damage.
- (iv) It has a lower mass than conventional insulator types.
- (v) It offers additional safety when used on equipment which could explode. Not only does the sleeve tend to hold the porcelain fragments together but the fact that there is less porcelain involved reduces the risk of injury.
- (vi) Whereas composites are limited to applications where the mechanical loads are predominantly tensile or support positions where the forces are small and a large insulator deflection can be tolerated, the hybrid concept can be applied to virtually all insulator types such as transformer bushings, switchgear bushings, station posts and surge arrester shells.

There is no "ideal" insulator and there probably never will be. Insulator selection must be based on a careful study of the environment in which the unit is expected to perform and the detailed characteristics of the insulators themselves. Costs must be properly considered as the insulator chosen can significantly affect the structure cost and the future maintenance costs. Insulator manufacturers are undertaking considerable product development to be able to provide improved insulator types to facilitate more optimum insulation designs.

## MR D C PALSER : CAPE TOWN

As far as I am aware Cape Town was one of the first, if not the first, municipality in South Africa to adopt heat shrink terminations. It was an idea brought back from overseas by one of our engineers some 15 years ago after a study tour.

Initially, these terminations were applied to low voltage jointing where two types of material were used, namely the straight heat shrinkable and the coated heat shrinkable material. The coating of the heat shrink material was introduced to obtain a better water seal between the heat shrink material and the conductor insulation or sheathing materials. This type of jointing, however, suffered from a serious drawback in that repeated crutch failures were experienced due to cracking of the material in the crutch area which allowed the ingress of moisture and ultimate joint failure. However, subsequent improvement in the quality of the material by the manufacturers overcame this problem.

The earthing of the low voltage cable termination also caused problems with the earlier type of joint marketed but has, subsequently been improved by the modification of the joint design which allows the earth conductor to come through the heat shrink glove and the earth conductor being treated in a similar manner to an insulated conductor, that is the joint now has five fingers.

The modified low voltage cable termination has proved to be satisfactory in its present form and any failures are now due primarily to faulty workmanship.

Currently all low voltage terminations indoor and outdoor are of the coated heat shrink type.

As regards high voltage, 11 kV outdoor terminations were introduced in about 1973. The first units put into service gave relatively trouble free service but with the more general adoption of the heat shrink terminations, failures began to manifest themselves, as follows.

- Crutch failures. These occurred due to insufficient support of the cable tails in the area close to the crutch. This type of failure was overcome by reinforcing the crutch area with a shed arrangement, bonding the three cores together.
- Tracking over the conductor insulation. Severe tracking and erosion of the heat shrink material was experienced on terminations exposed to a high degree of pollution. The introduction of heat shrink material with good anti-tracking qualities has largely overcome this problem.
- Tracking and erosion of rain sheds. This problem was most evident in areas subject to high pollution. Heat shrink termination failures were experienced in as little as six months after commissioning in areas subject to high pollution.

Erosion and tracking was attributed to the method of making off the shed. The manufacturers attributed the failures to the excessive build up of self amalgamating tape at the top of the rain sheds which caused a higher stress area and therefore breakdown could be expected if the rain shed attachment to the core insulation material was not properly sealed against moisture ingress or did not provide a very smooth transitional surface at the contact face.

This problem has since been overcome by the use of pre moulded rain sheds which are a tight fit over the

conductor insulation. A certain amount of elasticity is built into the rain sheds to ensure good contact with the core insulation. The shed is slid onto the insulated core after the core has been lightly coated with a silicone grease.

Coming next to 11 kV indoor terminations, the use of indoor type heat shrink has been tried on metalclad switchgear. Failures of this type of termination also occurred and were attributed to surface tracking taking place on the heat shrink material. To overcome this problem the use of anti-tracking material was introduced and cable boxes have been modified to make them free breathing. Terminations of this modified design have given trouble-free service to date.

Regarding straight-through 11 kV joints, heat shrink terminations have been utilised for the purpose of temporary joints only, namely where the installation is not expected to remain in service for more than a few years.

None of these joints has failed in service.

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## DRY-TYPE TRANSFORMERS – A BREAKTHROUGH IN FIRE PROTECTION

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MR R STEINBERG : AFFILIATE

Mr President, ladies and gentlemen,

What is a GEAFOL dry type cast resin transformer?

● This picture shows two examples. A big one of 10MVA and a small unit of 50kVA. Last week we completed the successful testing of a similar unit of 12MVA in our factory in Isando.

● The Advantages of GEAFOL transformers are:

- reliable
- safe in the event of fire
- no extra safety protection necessary
- low noise
- maintenance free and
- economic

A few words to the reliability:

“Safe against voltage surges” is a very important aspect in South Africa in view of the high rate of lightning.

“Free of partial discharges up to 2 x rated voltage” effects the life of the transformer.

“By forced cooling suitable to take 40% overload” can be achieved by either cross flow fans mounted at the bottom structure or when installed in a cubicle by top mounted fans.

A relatively new development is the introduction of a cold shrink material. This was introduced to the market some two years ago to simplify the technique of heat shrink jointing.

The insulating material is retained in an expanded state by the use of a spiral type spring inside the portion to be shrunk. The insulating material is suitably positioned over the area to be insulated, the spiral spring is withdrawn from the insulating material which then shrinks to its predetermined size.

The introduction of this form of jointing has not only simplified the type of equipment required to perform the jointing task but has also removed the human factor associated with the heat shrink process.

Cold shrink materials used on the low voltage system have so far given satisfactory service.

I trust that the foregoing outline of our experience with heat shrink terminations will be of some use to members.

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## DROË TIPE TRANSFORMATORS – DEURBRAAK IN BRAND VOORKOMING

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● This slide shows the implications:

3 only 1000kVA transformers installed in a cubicle and, therefore, reduced by 10% are giving a total continuous load of 2700kVA. In case one transformer or one feeder fails, 2 transformers with forced cooling can supply the complete load of 2700kVA. Also, it would be possible to supply a total load of 4200kVA with all 3 transformers.

“Moisture resistant and tropicalised”. This aspect is more important for the coastal regions.

A couple of days ago I received a phone call from Richards Bay where one of the GEAFOL transformers is installed on a barge. The barge, complete with transformer, sank. I was asked what to do and replied: “Take the GEAFOL transformer out of the water, clean it, let it dry and then switch it on”.

● Now we come to our main theme: The fire. “Not ignitable by transformer faults”.

● This flammability diagram shows the flamepoints of the transformer insulants.

160° C for mineral oil  
320° C for synthetic ester  
360° C for silicon oil and  
660° C for PCB

At normal operation all transformers are safe with a safety margin of 45K for mineral oil and 245K for silicon oil.

But in case of a failure, either by internal faults of the transformer or by external faults in conjunction with a failure of the protection devices we reach the temperatures in the malfunction area. Then we can reach temperatures which lead to explosions.



- This has been proved by short circuit tests as seen on this picture.

Test conditions: Rupturing capacity 150MVA  
 Duration of short circuit: 0,5 sec  
 Media: Mineral oil and silicon oil  
 Temperature of transformers before tests  
 Cold and operation temperatures

In all cases the transformers exploded. The liquid started burning and the transformer was destroyed.

The differences in the tests were : Mineral oil at operational temperature burned for longer than cold silicon oil which extinguished quickly.

The same tests have been performed on GEAFOL transformers, with short circuits on the terminals and at short circuit durations of 0,5 and 3 seconds. The flash can be clearly seen. The transformer is marred. But after cleaning, fully operational.

RESULT: GEAFOL transformers cannot become a source of fire.

And what happens if the transformer is subjected to fire? Several tests give the answer.

- Wood was ignited under one outer leg. The duration of the fire was approximately 40 minutes. A strong fire developed due to the chimney effect. Then the other outer leg was ignited by gas burners, at a flame temperature of more than 1200° C. A very intensive fire. The two outer legs of the transformer were badly burnt. The middle leg was virtually undamaged. On the low voltage coil burned by gas burners, the resin burned off completely. On the other outer leg, only a little damage was done. The low voltage coil of the middle was virtually undamaged as well.

RESULT: No "flame propagation horizontally" and "flame retardant". As soon as the external fire was extinguished, the transformer fire self-extinguished.

- The next statement, "no additional fire hazard" can be confirmed as we look at this calorific value of insulants in comparison to oil transformers. If the whole heat content which can be freed by the burning of an oil transformer is 100%, even silicon oil has a certain heat content of 88% which can be freed if the temperature is high enough. For the resin transformer only 24% can add to any fire hazard if the outside temperature exceeds 460° C.
- "No threat to persons by toxic gases". The fumes have been analysed. With the exception of those gases which occur in every household or industrial fire no other specific toxic gases were released. This is quite different with PCB transformers.
- I just want to show you this picture. The 18 storey state

office building in Binghampton has been completely taken out of operation, although — according to this article — more than 14 million pounds were spent to clean it without any results. And this happened because the fire started in the switchgear, came in contact with the PCB transformer next to it and a little bit of PCB was burnt and polluted the whole building because the air conditioning units took the fumes into the whole building.

- "No extra safety protection". Oil transformers need oil pits. In Europe all oil transformers with more than 1000 litres of oil must have a pit which prevents that the burning oil can continue to burn. The oil goes through a screen and is collected in an oil catchment trough. If this is not considered (and in the paper this morning of Mr van Niekerk he had not the time to mention it), it can be dangerous. If such an oil pit is provided with no oil catchment, the danger arises that this oil pit afterwards, if something starts burning, becomes a pan.

- "No fireproof walls" are required. We have no fire propagation in the horizontal direction. "No fire protection equipment" is necessary and "no sophisticated transformer protection" like the Buchholz relays or the Differential protection.

"Low noise". The noise is equal or lower than in oil transformers.

"Maintenance free" will be of increasing importance.

- The economics: The relative cost of the GEAFOL transformer is approximately 2x the cost of an oil transformer. This statement is, however, only half the truth, because designing a whole scheme properly by exploiting all advantages of GEAFOL transformers can even save costs. The green pages in the GEAFOL transformer folders shows schemes where the overall costs of the scheme are cheaper than the original scheme using oil transformers.

- A last word with regard to buildings. Especially high rise buildings. We state that GEAFOL transformers have "no restriction in positioning". They are "compact and have less mass". In South Africa particularly no regulation exists which prevents oil transformers from being positioned in high rise buildings. There are restrictions which say that no flammable material should be placed into a building without special safety measurements. But by definition "flammable material" is material with a flamepoint above 90° C. Mineral oil has a flame- point of 160° C. It, therefore, does not fall into this category. In Europe all transformers are not allowed to be put into a high rise building.

Ladies and gentlemen, I thank you for this opportunity to put this forward to you and I want to close with the word which is very familiar in the medical profession: "Prevention is better than cure".



## THE DEVELOPMENT AND APPLICATION OF MINATURE SUBSTATIONS AND ASSOCIATED EQUIPMENT IN THE ENVIRONMENT

MR R WALLIS: AFFILIATE

The challenge facing this Association and the Electrical Supply Industry as a whole is to provide 'safe low cost electricity for mass urbanisation.'

Then, in the provision of this electricity is it a question of cost, or security?. Not only security of the system but security of personnel who must operate and maintain that system.

Is the miniature substation as we know it today appropriate for use in mass urbanisation? I believe that a previous speaker at this Congress has warned us of the dangers of over engineering.

If today's miniature substation is not appropriate what, are the alternatives.

The CEBG in England has just completed a very comprehensive study of reticulation systems and it appears that their recommendation will be in favour of a non-switched T-off. Based on the fact that transformers have proved to be most reliable, isolation and connection is achieved by plug-in connectors. This obviously makes the minisub cheaper therefore reducing capital expenditure.

Another system favoured in parts of the United States is the 220V centred tapped supply. This arrangement does not necessarily make the minisub cheaper but the cost of the reticulation from there to the dwellings and the wiring installation within the house are greatly reduced, earth leakage for instance would not be necessary.

On the security of supply aspect many supply authorities are considering automatic control by utilising a distribution control system implementing current sensors and fault analysis. This obviously would be required in the case of non-switched T-offs.

Automatic control by remote switching using sophisticated switching arrangements is another alternative which offers great security of supply and safety to operations personnel but it is extremely costly.

Again on the security aspect and also for aesthetic reasons the Americans have either fully or half buried the minisub, a system referred to as the pad mounted system. This system is more costly to install as the equipment needs to be designed with additional cooling capabilities and also the cost of the initial installation is higher.

Returning to the low cost aspects some authorities in South

## DIE ONTWIKKELING EN GEBRUIK VAN MINIATUUR-SUBSTANSIES EN AANVERWANTE TOERUSTING VIR KRAG VERSPREIDINGS-DOELEINDES

Africa and elsewhere in the world are considering urban reticulation at 22kV. This obviously achieves savings through using fewer larger units. This system would make the USA pad mounted system more economic.

In conclusion Mr President the solution may not be one of these alternatives but a mixture of a number of them. It may well be that our present system utilising the ring main unit, remains the best solution.

MR GORDON DAVIES: PIETERMARITZBURG

Miniature substations have been in operation for some 20 years and the time is now opportune to access their performance.

South Africa seems to be the only country to proportionally use such large quantities of minisubs. Which shows a large degree of enterprise by the manufacturers to produce a product which has been necessary and suited to local conditions. In most local authority undertakings the number of miniature substations purchased are more in value than distribution transformers.

As far as the design is concerned the size of the mini substation is determined in the main by the transformer compartment i.e. the basic height, depth and width are already determined. But depending on the switching required these dimensions may be increased. There are as far as I am aware not more than three designs of epoxy type switchgear all of which would benefit by being at least 50% longer without imposing any additional dimensional disadvantage on the substation. On the other hand if oil switches are used the substation size is increased dramatically and the unit is no longer a minisub.

Manufacturers of epoxy insulated switches of this type endorse live, on-load operation, but some users, including this municipality (Pietermaritzburg), prefer to treat the switches as off-load isolators or links.

The philosophy of 'fit and forget' which is often applied to the oil-filled metal-clad ring-main unit must not be used with the epoxy unit. A fair amount of preventive maintenance is required chiefly centred around washing down to remove dust and dirt build up on the outer epoxy shell due to electrostatic charge, and, as a result of compound migration, or other causes, it is necessary to refill or top-up the cable end boxes from time to time. This latter problem has been obviated by the use of sealing tapes on the cable-end make-off.

Optimisation of the climatic conditions within the 11kV switch compartment to minimise temperature changes and limit or prevent condensation of moisture on the outer surface of the switch units will go a long way towards extending the time between successive wash down operations.

Papers read at the 1981 CIRED Conference provide some interesting conclusions. In one paper, the authors, by

means of a computer-aided study, have shown that it is possible to transfer heat from the transformer compartment into the 11kV switch compartment when the transformer is lightly loaded without the risk of excessively high temperatures when the transformer is heavily loaded. Coupled with more effective gasket sealing to prevent ingress of pollutants the life of epoxy switches could be extended considerably and maintenance reduced. The author of another paper indicates that competition between manufacturers of epoxy insulated switches in Europe is so fierce that factors of safety have been reduced to such an extent that the dielectric strength of most of the ex-factory is not sufficient whereas others have practically no safety margin.

Particular care must be taken when testing cable circuits terminated into epoxy resin switch units. It is essential to isolate all circuits to the unit before testing because otherwise the impressed test voltage (usually 19kV dc for an 11kV system) can raise the instantaneous peak voltage across adjacent switch circuits to around 27kV which may cause flashover within the switch and thus raise the test set to the 11kV system voltage with consequent extreme risk to the test set operator. This condition is unlikely to arise with metal-clad equipment where each circuit is normally screened by earthed metal.

#### MR J G BRÜMMER : STELLENBOSCH

##### A. Urban distribution (purely domestic areas)

The 315kVA minibus popularly used suffers from the following disadvantages:-

- 1 It presents a large obstruction if installed on sidewalks and is aesthetically unacceptable to many people.
- 2 The 11kV ring main unit which forms an essential part of many minibus contributes considerably to the size and cost of such units.
- 3 The LV switchgear and street lighting control equipment associated with minibus likewise make an appreciable contribution to the size and cost of such units.

##### B. City/Town centre distribution (mixed loading areas)

The 160kVA to 400kVA minibus typically used suffer from the same disadvantages mentioned under (A) except that space requirements are in many cases more stringent.

#### Suggested improvements

- 1 Development of a compact and inexpensive unit which will allow off-load isolation of one or both 11kV supply cables and incorporating HRC fuse protection of the transformer.
- 2 Provision of a compact LV panel with isolators and HRC fuse protection for say 4 feeders. Ammeters with thermal delay to indicate maximum loading should be provided. (Street lighting control and metering can be installed at distribution cabinets).
- 3 Minisubstations should be suitable for subterranean installation (partial or complete) where circumstances warrant such action.

#### MR KEES VAN ALPHEN : SABS

The SABS has published a number of years ago Section 1029 on miniature substations. In that time the accent was mostly placed on safety. Can you untie bolts and thereby lift up the roof or so from outside as not to endanger people. Since then manufacturers have been asking could we go further in standardisation. We were never able to achieve this because there is an increasing proliferation of designs and people want more and more things inside a minibus. I think Mr President, that perhaps we come to a time that it would be a good idea to take up this work again and try to come to a reasonable standard that is economical and can be made thus at a cost advantage and larger runs.

#### MR T GAUNT : AFFILIATE

Supply engineers are conservative and very rightly so because the systems that we put in are likely to last for a good 30 to 40 years. Many of the suggestions that have been made for changes require some innovation and I particularly comment on the proposed underground substations or transformers.

The concept is not new, both on the Continent and the USA they have had direct buried transformers for years, but the problem that arises in South Africa, is that people are very worried about the source of supply both in the future for extensions to that system or for spares and therefore none of these innovations can take place in South Africa without leadership of the major manufacturers and that means that the major municipalities must create a demand which is big enough for the manufacturers to tool up. Without that we cannot think of taking any of these innovating steps for many years to come.

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## THE USE OF MICROCOMPUTERS IN ROBOT CONTROL

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#### MR G MATTHEWS : BENONI

The Electricity Department of the Benoni town Council has been involved with the development and production of Robot Traffic Controllers for the past 8 years now. We initially started off with the modifying of electro-mechanical controllers for semi- and full V.A. operation, soon to realise that not only was this type of controller

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## MIKRO REKENAARS VIR ROBOTKONTROLEERDERS

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limited in its flexibility, but that it became a complex nightmare for an artisan to fault-find and repair in the field.

At this stage two concepts were born:

The controller had to be flexible — that one must be able to take it off the shelf, program it and install it to satisfy a particular requirement of an intersection.

- 2 The controller must be easy to maintain. We all know that for traffic flow and safety reasons the down time of a controller must be kept to an absolute minimum.

Therefore, in order to put these two concepts into practice we redesigned an existing electronic controller. Looking at flexibility, it covered the range of requirements from pedestrian crossing control, to fixed time isolated or linked intersections, to semi or full V.A. operated intersections, all of which could accommodate 2, 3, or 4 phase operation.

This requirement of flexibility led to a degree of standardisation of which the benefits are self explanatory. Looking at "ease of maintenance" and because we had to use artisans for this purpose, the controller had to be kept as simple as possible. This called for modular design. The controller consisted of 3 large modules:

- 1 The sequencer and output relay section.
- 2 The relay board which accommodated the vehicle detection and timer relays for V.A. operation.
- 3 The emergency flasher unit.

We had hardly completed this new design when, at the beginning of 1984 an Urban Design Committee was formed to plan for the redevelopment of the CBD in Benoni. One of its major tasks was to upgrade, alter and enlarge the CBC traffic control system. The functional requirements of this system were laid down by appointed Traffic Consultants. These requirements lead to a need for greater power and flexibility from the controller, which could not easily be accommodated using this particular design.

Something far more flexible and intelligent was required.

Keeping our concepts in mind, we turned to the market place for help, only to discover that what was available would not suit all our requirements. So we sat down and thought about redesign. The age of the microcomputer was here, and many producers of robot traffic controllers were using the microchip.

The microcomputer as a unit has become a highly reliable tool and extremely user-friendly when looking at units like the Programmable Logic Controllers.

So we studied all the PLC's on the market, selected the most suitable, designed an interface unit between it and the outside world and produced a robot controller. A sample of the controller can be seen on display, but if any of you do look at it, take note of the concepts rather than the product.

The advantages in using the microcomputer in the context of our concepts are:-

#### A Under flexibility we get:

- 1 Standardization — all the hardware of our controllers are standard, be they in operation in the CBD or in operation as isolated V.A. intersections on the outskirts of town.
- 2 Ease in changing intersecting parameter requirements — the programs reside in what is called EEPROM, (Electrically Erasable Programmable Read Only Memory) which is a 24 pin dual inline chip. This is programmed at the workshop or in the field using a plug in key board or alternatively the programme

can be loaded from a magnetic cassette or data cartridge.

- 3 Minimum stock of spares is required, for only one or two spare modules of each kind are required for back-up.

#### B Under ease of maintenance we get:

- 1 Modularization — the controller consists of two main modules, the programmable controller on the top and the relay board below it.
- 2 Minimum downtime — every controller in Benoni has a back-up preprogrammed memory chip with the idea that if a controller fails, the back-up programmable chip is inserted into a spare PLC unit, and if required an artisan can change both modules in a matter of 5-10 minutes and then take the faulty modules back to the workshops for repair.
- 3 Low rate of repetitive faults — those of you who have ever been involved with the repair of electronic apparatus will know that it is far easier to repair a unit under workshop conditions than in the field where artisans and technicians often convince themselves that an intermittent fault has now cleared itself merely because of their presence.
- 4 High reliability — because of the hi-technology and the large demand for microcomputers today, the level of quality is at a high, and this is where the reliability of the product stems from.
- 5 Confidence in operation — this is a culmination of high reliability and ease of use.

Another point which is worth mentioning here is how cost effective it has been by using the microcomputer as a standard unit as compared to the cost of customizing a controller for a particular intersection.

In conclusion, I would like to say that I am not here to knock private enterprise or take work away from them, but rather to ask you to learn from our experience, to take cognizance of the few points mentioned, and to write comprehensive specifications for robot controllers in order that we may school private enterprise into supplying products that suit our requirements.

#### MR D C PALSER : CAPE TOWN

Just as electro-mechanical controllers were phased-out and replaced with electronic controllers some twenty years ago, hardware electronic controllers today are in turn being replaced and superseded by "softwire" microprocessor-based traffic controllers.

One of the advantages of microprocessor-based controllers are that they allow many more flexible user configurations to be established and offer enhanced processing facilities for traffic algorithms, for example demand logic, extensions signal plan changes and area traffic control mode of operation.

In Cape Town we first purchased microprocessor-based controllers some two years ago and to date have installed some 50 odd units. Most of these controllers incorporate common microprocessor families backed up by about 4k of ROM, containing the executive programmes, and 2k of RAM containing the user data.

The use of microprocessor controllers has opened up the possibility of dialogue between the traffic engineer and the street hardware and special traffic orientated computer

languages like PASMO AND MASMO have been developed to assist.

There are a number of other advantages associated with microprocessor controllers, such as the following.

- Changes in configuration can be achieved by simple reprogramming without the need for extensive hardware modifications, provided of course that the basic capability in terms of signal groups and detectors exist.

- They are more capable of being interfaced with area traffic controllers.

- They are more reliable and offer higher traffic security.

There is no doubt, therefore, that with the price of microprocessors coming down and memory becoming cheaper, microprocessor-based controllers will progressively take over the future market.

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## THE USE OF RADIO AS A DATA SIGNALLING CHANNEL FOR CIVIL DEFENCE PURPOSES

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MR G MATTHEWS : BENONI

Civil defence is the co-ordinated utilization of all available resources to cope with the consequences of an emergency or a disaster.

This co-ordination can not be done without an effective and an efficient communications system.

The people involved with civil defence are municipal employees and the public in general. Therefore our approach in Benoni to communications (and I hope that this will stimulate discussion here today) was:-

- A To give the municipal employee, who is accustomed to radio procedures (for it forms part of his day to day activities) a voice channel for the co-ordination and control of the resources at hand.
- B To give the public, who at this stage consist of schools and national key points, a push button radio alarm system.

It is this radio alarm system and the choice of its parameters that I would like to elaborate on:-

- 1 The operating and the installation of such an alarm system has to be practical.

We in Benoni fit all the alarm transmitters in a secure position.

Alarm push buttons which are supplied in a set of three catering for 3 discrete alarm types, and mounted in one or two strategic positions are then wired to these transmitters.

These push buttons are free from false alarms, which are caused by "people unknown", because to activate the contacts one has to break the glass covering, the push button, thereby proving that an alarm has actually been initiated.

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## DIE RADIO VIR GEBRUIK AS DATA EN SEIN KANAAL VIR BURGERLIKE BERSKERMINGS- DOELEINDES

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- 2 The functioning of the alarm radio is automatically checked and monitored by the following:-

- A test message which is recorded on a printer, is automatically sent by the alarm transmitter once every 24 hours.
- A power fail indication is received from the alarm transmitter if a power fail has occurred, thereby alerting the civil defence officer that the alarm sending unit is operating on batteries.
- A battery low indication is received warning the civil defence officer that alarms can no longer be guaranteed.
- An alarm is received if either the radio, the cabling or the switches are being tampered with.

- 3 Technically we must be sure that the system has the highest possible integrity. For this requirement we have insured that:-

- An alarm message, which contains information pertaining to the origin of the alarm, has to pass certain checks before it can be accepted by the common alarm receiving station.

These include:

- A synchronization check at the start and end of each message
- A bit count
- A bose chaudhuri check
- A parity check
- A bit width check

From this it can be seen that neither speech nor unquenched noise can possibly stimulate a message.

- This message is then repeated 20 times in a 2 second transmission period.
- To further ensure that the message gets through each transmission of 20 repetitive messages is repeated a further 3 times every 20 seconds.



It is possible to operate this system in conjunction with speech on a single channel, but we decided to enhance the integrity of the system still further and only allowed data to be transmitted.

This allows us almost unlimited expansion of the civil defence system or optionally allows us to operate three other systems concurrently, each the size of 512 outstations.

These optional systems could include:-

- The monitoring and control of electrical substations.
- The monitoring and control of water systems.
- The monitoring of fire alarms.
- The monitoring of security systems.
- The monitoring and control of robot traffic control systems.

In conclusion, I would like to say that we as engineers must help our civil defence officers in choosing and implementing a civil defence communication system that is as practical and secure in operation as possible.

#### MR D C PALSER : CAPE TOWN

Although Cape Town has not employed radio channels for civil defence data transmission purposes, it has nevertheless used its radio channels for general data transmission for over a decade now. Accordingly our experience in this field may be of interest.

Some of the advantages of data transmission over voice transmission are the following:

- Even with relatively poor signal-to-noise radio information is accurately transmitted, with the

incorporation of error detection and parity checks.

- The high speed of transmission (up to 1200 baud) reduces radio air time and hence congestion on radio channels.
- It provides a degree of security when transmitting confidential messages.

One of the latest applications for data transmission has been to radio paging systems. Whereas the conventional paging system using tone identification and voice transmission takes an average of 20 seconds to transmit a message, the latest data transmission paging systems take on average only 3 seconds from the start of transmission to the display of the message on the alphanumeric liquid crystal display of the pager. In our system the data is transmitted at 600 baud, with error and parity checks.

Other radio data transmission applications currently being considered by Cape Town include the following:

- Vehicle registration and driver's licence verification for the traffic branch.
- Ambulance despatch and location system incorporating patient statistics and monitoring facilities for the ambulance branch.

Because of the mountainous terrain of the Cape Peninsula data transmission over radio channels has also been employed to provide supervisory control between remote substations and the System Control Centre.

Overall, our experience with data transmission over radio circuits has been excellent and there is no doubt that more extensive use will be made of this mode of transmission in the future.

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## PROGRESS WITH BUNDLED CONDUCTORS

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#### MR M P P CLARKE : RANDBURG

#### PROGRESS WITH AERIAL BUNDLED CONDUCTORS

Arising from the general interest of supply undertakings in the use of L V aerial bundled conductor systems and the paper which was read at last year's Bloemfontein Technical Meeting, as well as the discussion ensuing therefrom, the SABS convened a Technical Committee to consider the preparation of a specification for these systems.

The first meeting of the Committee took place on 5/12/84 and was attended by some 34 delegates representing cable manufacturers, commercial interests, large supply authorities including Escom and the larger cities, the AMEU, SATS, consulting engineers and other interested bodies.

A working group of some 14 representatives from the main

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## VORDERING TEN OPSIGTE VAN LUGBONDELGELEIERS

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Committee was appointed to consider details of the proposed specification and this group has met three times, the last being on 10/9/85.

A second meeting of the full committee considered the draft document and made various recommendations. It is expected that the amended version of the draft will be available for comment towards the end of this year (1985) after the SABS has re-edited the document and altered its content to incorporate the various proposals.

In its present form the document consists of two parts and three appendices.

Part I covers matters relating to the individual cores including conductor materials, construction, joints, compaction, for both normal and "supporting" cores. It also includes details of insulating material type (which incidentally has been agreed to be only XLPE), thickness, etc as well as core identification and markings.



Part II covers matters relating to the bundle and includes such items as laying-up, configuration (with or without a supporting core), electrical and physical requirements of the finished cable, sampling, inspection and test methods, etc.

Appendix A gives reference to applicable IEC and SABS standards.

Appendix B gives notes to purchasers and Appendix C abbreviated installation notes.

A further appendix will be added to cover all fittings for these systems but the details have not yet been worked out although it is tentatively agreed that reference will be made to existing overseas standards.

From this you will appreciate that the user will be free to choose whatever configuration of cores, with or without a supporting wire, is necessary to suite the system which has been adopted for a particular use or area.

I believe that real progress has been made in this matter and that a full specification is not very far off from being available to both users and manufacturers.

Some delegates here today may be disappointed that the Committee has not come out with a straight recommendation in favour of either the "catenary" type bundle incorporating what is specified as a "supporting core", or the alternative configuration in which all four phase and neutral cores are terminated under tension.

While I do not wish or intend to provoke controversy or discussion on the merits of either system, I believe that the fact that both systems are well designed and engineered, and are in fairly general use in various overseas countries, will mean that they will both be used extensively in the Republic. Perhaps the respective commercial organisations will sponsor a research project with NEERI to quantify the advantages and disadvantages of the two systems particularly relating to the reduced neutral concept to practical South African system operating conditions.

#### MR ROGER MARTIN : AFFILIATE

The first commercially available bundle conductor systems marketed in South Africa were based on a high tensile aluminium alloy neutral conductor which acts as a carrier conductor and supports the phase conductors. The French type system uses one size of neutral carrier of 54,6mm<sup>2</sup> for all phase conductor sizes from 35 to 95 mm<sup>2</sup>. This means that one size of deadend and suspension clamp can be used for all phase conductors from 35 to 95 mm<sup>2</sup>. The advantage of this is that installation is greatly simplified and the inventory requirements of fittings is small. The cost of these fittings is also reduced due to the higher production volumes. The authorization certificates for bundle cable systems issued by the AMEU to date are all for systems based on a neutral messenger system carrying the phase

conductors. These systems are very similar and the fittings are interchangeable between the systems which means the user is not tied to one supplier.

In terms of the proposed SABS specification for bundle cables two fundamentally different systems are proposed.

- 1 The neutral carrier or commonly known French System.
- 2 The self supporting or German System.

The main difference between these two systems is that the self supporting or German System has the neutral and phase conductors of the same cross sectional area and all are made of hard drawn aluminium. The conductor bundle is supported on all phase and neutral conductors. In the neutral carrier system the neutral is made from a high tensile aluminium alloy which has sufficient strength to support the phase conductors and any available conductors which may be used.

Both the systems previously mentioned have been used widely with phase conductors up to 95mm<sup>2</sup>. Hardware and electrical connections are covered by rational standards and are readily available.

The proposed SABS specification allows phase and neutral conductors up to 150mm<sup>2</sup> for both systems. With the neutral carrier system the choice of size of neutral conductor is left up to the user. For neutral conductors up to 70mm<sup>2</sup> there is no problem with obtaining fittings. In fact the same deadend and suspension clamp can be used for the 54,6 and 70mm<sup>2</sup> neutral. Should larger sizes of neutral carriers be used difficulty will be found in obtaining fittings manufactured in accordance with national standards. In the case of the self supporting or German system deadend and suspension clamps are also readily available for conductors up to 95mm<sup>2</sup>. As the fittings form an integral part of the system and play an important part with regard to ease of installation it is recommended that the user use only hardware and electrical connectors manufactured in accordance with national specifications as at this time there is no proposed SABS specification for connectors and hardware.

The user must bear in mind that the hardware between the two systems is not interchangeable. Before the users choose what system to use and what sizes of cable to use he should check what hardware is available and the cost of hardware.

#### MR J TOMS : SABS

I just wanted to make one small point, in answer to Mr Clarke's disappointment, and that is that the Bureau of Standards we cannot opt for a system which offers commercial advantages to one particular firm. You can rest assured that we would very much like to follow this practice, because it will make our task much easier if we could opt for one rather than three systems in writing the specifications.

MR C M GROVES : AFFILIATE

My short talk is going to cover some of the principles of optical fibre transmission and then some of the applications that I feel may be applicable to your type of environment. The use of fibre optics for communications dates back to a number of Patents which were taken out in the United Kingdom in the late 60's but it required a number of technologies to evolve before we could say that this form of communication is a practical reality. Today, As I hope to demonstrate to you in a few moments, I think that we can show that it is very much a reality Worldwide and in South Africa as well.

Initially, fibre optic communications was aimed at the long distance telecommunications fields where the requirement is to handle large numbers of circuits over long distances and provide a number of services. As the costs have reduced, it has become far more practical to consider this type of medium for shorter distances to satisfy a number of services in the local community.

Perhaps the most advantageous use of fibre optic cables is in their use in those situations where they are exposed to large degrees of interference, either from the proximity of power cables or exposure to lightning interference and possibly where there are problems with ground loops. The cable can be entirely non-conductive made out of dielectric materials and therefore all those problems associated with communication systems where the requirement is to carry the information over metallic conductors is to a large extent overcome. Fibre optics also offer the capability of lower attenuation, very large bandwidths which means one can carry communications not simply just one channel at a time but many channels for voice, data, video or security systems, just to name a few possibilities. The cable is very low weight and if you look around in the exhibition area outside, there are examples of fibre optic cable where the actual conducting material, the silica, is only a few microns in diameter. As it can be made in long lengths, it does not have to be jointed very often. If it has to be jointed, it can be relatively easily handled.

Perhaps something which is becoming even more important today with communications is the requirement to carry data communication. The use of computers in everyday life has become common place but unlike voice signals, where perhaps one can tolerate the odd interruption to the speech or the odd syllable being lost, in data communications, one does not want to tolerate any errors at all and fibre optics offers the possibility of a genuine error free transmission medium.

The principle is quite simple. The thread of silica is capable of propagating a lightwave and the equipment that terminates the cables consists of a transmitter which is a semi-conductor light source and a detector which is a semi-conductor photo diode. Any piece of electronic equipment designed to communicate can have these terminations

added to enable it to communicate over an optical fibre medium. The principle of propagation along the fibre relies on the fact that if you launch light into a core of silica which is surrounded by silica with a greater refractive index, then the light that travels will be contained within the core. This is quite simply explained by the fact that any light that wants to leave the core is literally reflected back into the core again and this leads to the ability to communicate over long distances.

The principle is quite simple. The thread of silica is capable of propagating a lightwave and the equipment that terminates the cables consists of a transmitter which is a semi-conductor light source and a detector which is a semi-conductor photo diode. Any piece of electronic equipment designed to communicate can have these terminations added to enable it to communicate over an optical fibre medium. The principle of propagation along the fibre relies on the fact that if you launch light into a core of silica which is surrounded by silica with a greater refractive index, then the light that travels will be contained within the core. This is quite simply explained by the fact that any light that wants to leave the core is literally reflected back into the core again and this leads to the ability to communicate over long distances.

The methods of manufacture have evolved over the years and there are now a number of processes in common use. Typically, the process starts with raw silica, which could have come from the Northern Transvaal where much of the silica that is used for fibre manufacture throughout the world originates. It requires to be very pure and perhaps to give an analogy, one can think of the amount of light that is let through your house window and compare that to the loss of light or the attenuation of light in a fibre. If the window in your house is made out of the same material as an optical fibre, you could make that window something like 1 to 2 kilometres thick and it would still let the same amount of light into your room.

I won't go into greater detail now, because this is a very condensed talk, on how the fibre is built up to a cable, except to say that basically, silica is made into a pre-form which is processed and eventually drawn into a thin thread and as I said, the thread can be up to a few kilometres long. The threads are covered with a protective plastic coating and then made up into cables. Depending on the application, one may be looking at one fibre in the jacket, or one may be looking at a number of fibres contained within the jacket. Cables are very flexible, light and in fact it can be handled with virtually the same amount of freedom as you would handle a normal telephone cable. One has to bear in mind one or two restrictions, particularly on the minimum bending radius and here I am talking typically about a minimum of ten centimetres. Fibre cables are therefore very suitable to put into existing cable ducts.

Internally, the fibre cables are made up in much the same way as a normal communication cable in layers and in order to keep the cable strong, the strength members are either contained in the centre of the core of the cable as is shown here or they may be wrapped around the outside again, using dielectric materials with high strengths like Kevlar.

I mentioned that the use of fibre optics in the local area is probably the application which is most applicable to you

people here today and I will describe a few examples here. Firstly, the situation is a computer centre where there is a requirement to pick up a computer data from a number of sites in the local area. One can look at networks in the local area made up in a star formation from a central point, a dropping type of circuit using an optical splitter as a means of separating the channels off and also as a ring circuit so that one can afford to have a failure or a breakage in any part of the ring and still maintain communication to each of the locations.

An optical splitter is a very simple passive device and which splits the beam of light into two fibres from the one fibre and combines the two beams in the opposite direction.

The optical components are fairly small. They can be added on the printed circuit boards of normal communications equipment and a typical card can be fitted with both a transmitter and a receiver module forming a very small assembly.

Another example of a network is the use of fibre to reduce the amount of cable where ducts have become full and it has become very difficult to utilise conventional means of communications. This is possible by combining a number of terminals onto the one fibre, thus avoiding the need for additional cables in existing ducts.

In many situations, Particularly with computers, there is a limit to the distance that terminals can be placed from the computer but with the aid of fibre, this distance can be increased.

Finally, in conclusion, I believe that the use of optical fibres for communications in local reticulation schemes and alike offers a tremendous opportunity in the future. It is a technology which has evolved over the last twenty years and is very much something which can be handled by the average person today. The economics of the use of fibre are continually becoming more attractive and allowing this technology to be used in more and more cost sensitive areas.

I would also like to say that this technology is well supported locally in South Africa and we can all look forward to it becoming common place in communications in the future. There is a synopsis of what I have just said which is available at the foyer.

#### MR D C PALSER : CAPE TOWN

In Cape Town we have a fairly extensive internal PABX telephone system between power stations, district offices and substations for control purposes.

Some two years ago a study was undertaken to determine whether it would be economic to replace certain faulty 50 pair conventional telephone cable with an optical fibre system. A detailed study revealed that the economic breakdown point between conventional cable and an optical fibre installation was around a route length of 5 km. As all the various circuits were in excess of 10 km it was decided that it was clearly economic to purchase and install optical fibre cable with the necessary terminal equipment.

The planned total length of conventional cable to be replaced is around 25 km, of which 10 km has already been replaced with optical fibre cable.

Since optical fibre cable has the capability for high speed data transmission, for which the Post Office has the monopoly right for public transmission, the permission of the Post Office had to be obtained and the assurance given

that these circuits would only be used for conventional telephone purposes and not at any time for high speed data transmission.

To minimise the number of joints required, which introduce losses, the cable was supplied in drum lengths of 2 000m. Although easy to handle it posed problems in built-up areas because of the necessity to leave open long lengths of trenches. Both 4-fibre and 8-fibre cables have been installed.

Joining is a precision operation and our staff were specially trained to undertake the fusion operation. Alignment of the fibres is most important. The fusion arc produces a high surface tension on the molten glass which provides precise self-alignment of the fibres to be joined. Although the acceptable splice attenuation is 0.3dB, in practice figures of around 0.1dB have been obtained.

Overall our experience with this type of cable has been quite satisfactory and it is proposed to install further circuits in the future as the need arises.

#### MR G DAWES : AFFILIATE

Longest distance 16 km.  
Number of channels — 30 (possible 120).  
Bit rate — 2,048 Mb/Sec. (possible 8,192 Mb/Sec).  
Voice frequency band — 0.3-3.4 kHz.  
Modulation System — PCM.  
Channel sampling rate — 8 kHz.  
Encoding system — 8 bits/sample.

This system is installed as an alternative route additional to conventional pilot and control cable to link one of our major substations to the central control centre. It carries 3 telephone channels for control purposes, 2 channels for telemetering and control purposes, and 14 channels for interrupting relays.

The cost of the installation was comparable with convention cables in this instance. The performance of the link over the time in operation ( $\pm 6$  months) has been entirely satisfactory and exceeds that of the conventional cables in respect of signal strength fidelity.

The fibres are carried within the central core of the overhead ground wire carried on an 88 kV transmission line.

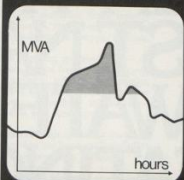
#### MR R PHILLIPS : AFFILIATE

Mr president, ladies and gentlemen, I would like to congratulate Mr Groves and Mr Dawes on their very clear summary of both the complexities and advantages of optical communications technology.

In distribution systems, it is becoming increasingly important to monitor and control accurately and without interference, even under fault conditions, the operations of all the elements of the network. With fibre-based solutions and suitable electrical to optical interfaces, not only can one use fibre in place of pilot and telephone cable, but also there is the possibility of broad-band transmission which will include closed circuit TV over long distances without electronic repeaters. Where security of substations and switchyards is becoming increasingly important, the use of a closed circuit TV system merits close attention.

With the local manufacture of optical fibre cable now a reality, optical communications has emerged from the cupboard of the laboratory into the clear light of a practical commercially available technology.

# The Problem



# The Solution



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## MR E F RAYHAM : ESCOM

The word CIGRÉ is an abbreviation of the French words meaning The International Conference on Large High Voltage Electric Systems, and this is the name given to a permanent, non-profit making, non-governmental organisation founded in 1921, with its head office in Paris.

Its aim is the development of technical knowledge and the interchange of information between all countries on the generation and transmissions of high voltage electric energy. The status of Cigré is such that it is being increasingly quoted as a reference source by international standards organisations, notably the IEC (International Electrotechnical Commission).

Cigré has nearly four thousand members from seventy countries, and membership covers the whole electrical spectrum: research institutes, industry and supply utilities.

In South Africa, we have a growing membership — at present we have forty members, drawn from CSIR, Escom, SABS, SAIEE, SATS, various private companies, municipalities and universities; and individuals. We have recently welcomed three new municipal members — Pietermaritzburg, East London and Roodepoort.

Regarding the organisation itself, Cigré is not a research organisation. Its mode of operation has been perfected after many years of experience and is probably unique.

The highlights of activities are the biennial conferences known as Sessions held in Paris on even numbered years. Papers from around the world on the whole range of Cigré topics are discussed at these Sessions. The discussions are under the control of Session Chairmen and Special Reporters, who by prearranging topics and questions, ensure that all the time available is devoted to discussion in an orderly manner. Engineers from industry, research institutes and supply utilities; from developed and underdeveloped countries are able to compare their experience, and gain reliable information on new techniques at the Sessions.

Symposia, colloquia and open conferences on particular topics, are held in member countries in the odd numbered years. Co-ordinating bodies ensure technical continuity from one meeting to the next, thus allowing the organisation to play a far more significant role than that of just a forum for discussion.

Cigré's organisational structure comprises of an executive and administrative council, with the technical contribution being provided by the various Study Committees. Temporary Working Groups are formed from time to time within the Study Committees to pursue in-

depth studies of particular topics. The work of the Study Committees is co-ordinated by a Technical Committee. Each member country has a National Committee to administer the Cigré activities in that country.

Regarding documentation, Cigré produces a high level technical journal, *Electra*, issued bi-monthly free to members. *Electra* contains papers on current issues and articles on general Cigré topics, as well as summaries of Study Committee and Working Group activities.

Cigré also publishes proceedings from Sessions, symposia and colloquia, as well as technical brochures reporting on Study Committee findings on specific topics. A recent example of a technical brochure is the publication called "Biological effects of electric and magnetic fields at power frequencies".

I would like to highlight the benefits of Cigré membership. South Africa is faced with certain difficulties in gathering information on new techniques and on performance of equipment and systems. Due to Cigré's non-political character, South African engineers are able to participate in the valuable exchanges of information, made possible by Cigré membership. One important benefit here, apart from the obvious advantage of not having to duplicate costly research, is the shortening of the time between the development and the application of new techniques.

Furthermore, South Africans no longer play a passive listening role. We are now active participants; authoritative in certain fields such as static compensation, variable speed drives, high voltage DC transmission and lightning.

Presently there are eight South African experts serving on Study Committees and a further five on Working Groups.

At the last Paris Sessions (1984) four papers written by South African engineers were presented, and I am pleased to say that three South African papers have already been accepted for the 1986 Sessions.

In conclusion, I would like to say that there are many examples of direct benefits to South Africa arising from Cigré membership. The South African National Committee of Cigré continues to grow — we were mentioned in the despatches recently for having increased our membership during 1984 by 15%, which is regarded as something of an achievement in these recessionary times.

There are two categories of membership — Individual and Collective. As the name suggests, Individual Membership provides membership for a private person in his own right, and Collective membership provides membership for organisations such as government bodies, universities and municipalities.

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## PRE-MOUNTED TERMINATIONS, SPLICES SEPARABLE CONNECTING SYSTEM

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MR BRIAN MADELEY : AFFILIATE

In the beginning, 1955 the first pre-moulded stress cone was developed. In 1963 the first fully screened elbow was installed and has had over 20 years of service.

### SLIDE 1

Pre-moulded products were designed for economy, reliability, flexibility and ease of installation, and are completely safe.

### SLIDE 2

Terminating.

### SLIDE 3

Stress cone design — reduction in stress at cable shield and at air insulation surface.

### SLIDE 4

A comparison between 2 methods. These stress cones will operate up to 42 kV. Moulded out of EPDM rubber. Semi-conducting and insulating.

### SLIDE 5

Indoor application: Stress cone only. If contamination present 1 or 2 modules to be fitted.

Outdoor application: Stress cone and modules 12 off for 42KV or single piece termination for up to 25kV. One piece moulding.

### SLIDE 6

Cut-away of a stress cone and modules. Simple to apply, 4 modules for 11kV.

### SLIDE 7

Cut-away of single piece termination, once in position completely waterproof, as are all products.

### SLIDE 8

Some applications of pre-moulded terminations.

### SLIDE 9

Suitable for single and 3 core cables at present compatible with XLPE or EPR insulations.

### SLIDE 10

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## VOORAF GEVORMDE ENTTOERUSTINGS, DEURLASTE EN DEELBARE AANSLUITING- STELSEL

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All components are factory tested prior to leaving.

### SLIDE 11

Splices.

### SLIDE 12

Cut-away of a pre-moulded splice. The design is such that it is simply a re-construction of the cable. An inner semi-conductive screen in contact with the conductor eliminating the necessity to pencil the insulation or concern oneself with rough edges.

### SLIDE 13

Pre-moulded splices are available for up to 138kV. All factory tested.

### SLIDE 14

A 33kV splice cut-away with a clear view of the conductor screen — in this case metal. These splices are completely submersible and are working up to 60 meters underwater.

### SLIDE 15

Conditions under which they operate.

### SLIDE 16

Pre-moulded splices lend themselves to single core cable, but can be used with 3 core.

### SLIDE 17

Can be buried under very rough terrain.

### SLIDE 18

3 Way splice capable of joining 3 different size conductors.

### SLIDE 19

T splice used extensively in HV bundle cable systems.

### SLIDE 20

600/1250 AMP splice network that can be added to very simply, without opening the cable. Part of the connecting system shown later.

### SLIDE 21

The father of pre-moulded splices 138kV.

### SLIDE 22

Methods of splicing.

### SLIDE 23

Every 138kV splice is factory tested.

Partial discharge  
AC Hipot  
Basis impulse factor  
Insulation power factor

SLIDE 24 . . . and is fitted to cable in the laboratory, to do these tests. Not possible with other types of splicing methods.

SLIDE 25

The 138kV splice has excellent stress management and superior temperature profile. It is a proven fact that the splice runs cooler than the cable.

SLIDE 26

A typical installation site.

SLIDE 27

Preparing the cable.

SLIDE 28

No special technicians required. No pencilling. Any competent person able to prepare this cable can make off the splice.

SLIDE 29

Fitting the cable adaptors. These cable adaptors can accommodate up to 64 mm shrink back on each side.

SLIDE 30

Ready to complete the weld.

SLIDE 31

Completed. Any method of joining the conductors is acceptable.

SLIDE 32

Heat transfer shield in place. This shield is at the same potential as the conductor.

SLIDE 33

Simple tools.

SLIDE 34

. . . required to close.

SLIDE 35

Crank away.

SLIDE 36

and "WALLA" a completed pre-moulded 138kV splice. Made off in 4-5 hours.

SLIDE 37

The 138kV splice was tested for 7 years under very arduous conditions. It was tested to destruction at 1.7MV.

SLIDE 38

Pre-moulded connecting devices, complete dead front system.

SLIDE 39

Connecting to transformers or apparatus with oil reservoir a bushing well with interface for dead break or load break 200A upto 35kV was developed.

SLIDE 40

For In-air application a different bushing well is available to accommodate the same interfaces.

SLIDE 41

A typical transformer showing 3 different bushing wells. 200A Universal — left, 400/630A — centre, 600/1250 — right. The two interfaces shown on the left, merely screw into the universal bushing well.

SLIDE 42

A load break connector (left) and a dead break connector fully shielded. Completely safe to touch on load, capable of handling 200A upto 35kV. 300A for 8 hours.

SLIDE 43

A typical 200A dead break connector to a transformer. Dead break application as the term refers must be connected and disconnected off load.

SLIDE 44

Load break connector, however, can be connected or disconnected on load up to 35kV 200A. A cut-away of a load break connector showing the contact with arc follower. The black area in centre is semi-conductive and energised at the potential. The grey area is insulating material, and semi-conductive on the outside. This is the formula for a completely safe and reliable HV connection.

SLIDE 45

Load break interface.

SLIDE 46

A clear picture showing the method of connecting. A hot stick must be used.

SLIDE 47

The arc follower emits a gas when heated and extinguishes the arc during connecting and disconnecting.

SLIDE 48

A closed load break connection. These connectors are completely submersible.

SLIDE 49

The load break system is so designed that should the connector be closed on a fault the gas is emitted with such magnitude that the contact in the inner-face is shot forward and makes before the operator completes his close. The protection circuit takes over. The connectors can accommodate at 10 000 amp fault close.

SLIDE 50

400/630A dead break connection designed for the European market. Extensively used on ring main units. Extensive development being undertaken for fitting these connectors to PILC. A system is available for single M.L.N.D. cables.

SLIDE 51

A typical 3 core XLPE connection using the 400A load

break connector. I would point out that over 400 amps the connector is bolted.

#### SLIDE 52

Component parts for the very versatile 600/1250A pre-moulded system. The meccano of HV connecting devices.

#### SLIDE 53

Here one can see 2 connectors per phase connected to the transformers, in fact you can connect as many as you like providing they are supported and supply not exceeded.

There is also a lighting arrester fitted to a 200A connector and simply plug into the 600A.

May I remind you that this system is completely safe. No special covering required.

#### SLIDE 54

Another similar application where the connectors are used as splices with a 200A tap off. Additional connectors can be added without interfering with the cable.

#### SLIDE 55

Various accessories available.

A dead break 3 way junction.

#### SLIDE 56

And load break. This system is being used in township reticulation in Lebowa and Gazankulu.

#### SLIDE 57

A lighting arrester.

#### SLIDE 58

A neon indicator fitted to the test point on the connector. This neon can be fitted to all 200A and 400A connectors. A unit for 600/1250 amp system is under development. These indicators can be fitted retrospectively.

#### SLIDE 59

Some applications.

A pad mounted transformer used in the USA. No switch only load break connectors on the HV side. With the use of a hot stick, place 2 way feed through junction into bracket between 1 and 2. Then remove each connector and place on junction. Power is only interrupted for a few minutes.

#### SLIDE 60

Straight 200A connectors on an underground transformer.

#### SLIDE 61

Switchgear. 400A connectors.

#### SLIDE 62

Motor connection : imagine how easy it will be to disconnect and reconnect this motor.

#### SLIDE 63

Notice the close proximity of these connectors. All connectors are shielded and therefore the mounting criteria is purely mechanical.

#### SLIDE 64

A multitude of connections, on a submersible transformer. Not easily possible with any other method.

#### SLIDE 65

An oil switch.

#### SLIDE 66

Another HV switch showing the various connections. See the piggy-back below the switch.

#### SLIDE 67

25kV AC termination on the pantograph of a SATS locomotive exposed to the environment of S.A.

#### SLIDE 68

The top connector is connected through the bulk head to the termination, the lower one onto the transformer. The picture was taken inside the locomotive. Very little space and completely safe.

#### TEN SLOTTE

Mnr Loubser, baie dankie vir die geleentheid dat ek hierdie aanbieding kon gee. Ek wil ook vir u en mr Fortman alle sukses vir die volgende tweede jaar toe wens.

#### MR E M MARTIN : AFFILIATE

I would like to point out, that when it comes to terminations and joints on medium voltage XLPE cables i.e. from 6.6 to 33Kv, there is not merely one performance standard.

The type of terminator to be used should be chosen with a view to the conditions under which it will operate and the reliability of service required.

There are a number of American ANSI or IEEE specifications dealing with terminations and joints and these take into account whether the cable is "distribution voltage class" or "sub-transmission voltage class" — a very important distinction — and in addition, there are three classes as follows based on the severity of the operating environment.

#### CLASS 1:

These terminators provide some form of electric stress control at the termination of the cable insulation shield, complete external leakage insulation between the hi-voltage conductors and ground, and a seal to prevent the entrance of the external environment into the cable.

#### CLASS 2:

These provide only the first two items above (some form of electric stress control for the cable insulation shield and the complete external leakage insulation) but no seal against external elements. Terminations falling into this classification would be, for example, stress cones with rain shields.

#### CLASS 3:

These terminations provide only the first item (some form of electric stress control for the termination of the cable insulation). This class of termination would be for use primarily indoors and would include hand wrapped stress cones, tapes and the slip on type stress cones.

For the outdoor use, the IEEE specification only covers the

conventional and tried terminations with porcelain bushings.

The following is a brief summary of the relevant U.S.A. specifications which I hope will be of assistance to members in deciding what type of equipment to specify.

**ANSI/IEEE number 386-1977** — This national standard defines ratings, design, and production tests for separable insulated connector systems, divided into 200A and 600A maximum current groups. It covers loadbreak and deadbreak (suitable for deenergized separating only) connectors. The following voltage ratings are specified.

Voltage Class	Max kV to Grd.	Corona (CEV)	Impulse (BIL)	A.C. 1 Min. Dry	D.C.15 Min. Dry
15	83.	11	95	34	53
25	15.2	19	125	40	78
35	21.1	26	150	50	103

These are "reduced" withstand ratings suitable for "effectively grounded" or multi-grounded neutral systems such as are commonly used for distribution. Products conforming to these specifications are, therefore, required to be marked with the maximum permissible phase-to-neutral voltage.

**ANSI C119.4-1976** — This national standard defines current cycling and pullout tests for aluminium connectors.

**IEEE 592-1977** — "Standard for Exposed Semi-Conductive Shields on Premolded High Voltage Cable Joints and Separable Insulated Connectors", specifies design tests for these shields to keep them at a low electrical potential and to conduct fault currents adequately should they occur. This standard applies to all products which have thick, molded conductive shields.

**IEEE 48-1975** — This defines ratings and tests for Class 1, 2 and 3 cable terminators (potheads and stress cones). The following "full" voltage withstand ratings are specified.

## Subtransmission Voltage Ratings (kV)

Voltage Class	Max. kV to Grd.	Corona (CEV)	Impulse (BIL)	A.C. 1 Min. Dry	D.C. 15 Min. Dry	A.C. 10 Sec. Wet*	A.C. 6 Hour Dry
5kV	3.2	4.5LV	75	25	50	25	15
15kV	9.5	13kV	110	50	75	45	35
25kV	16.0	21.5	150	65	105	60	55
35kV	22.0	30.0	200	90	140	80	75

These full ratings are often used for subtransmission circuits or systems which are not "effectively grounded".

Outdoor terminations are rated for these higher withstand levels even though they are not normally required for distribution systems. To quickly define which set of withstand voltage levels apply, stress cones or other products to which the IEEE 386 voltage levels apply are referred to as "Distribution Voltage Class", and those to which IEEE 48 apply are referred to as "Sub-transmission Voltage Class".

**ASTM D-2302-68** — "Tests for Resistance to Electrical Tracking and Erosion". These tests apply to the track and weather resistant material used on terminators to insulate the conductor terminal from the grounded shielding.

**IEEE 502-1977** — Standard for Power Cable Joints. This standard specifies current and voltage withstand tests for cable splices. The current tests are those of ANSI C119.4, but the voltage tests are for the higher withstand levels normally used for subtransmission.

From the above, it will be seen that the American specifications define very clearly the types of terminators to be used under various conditions. Unfortunately, these can be somewhat confusing to users in another country who are not familiar with the U.S.A. specifications. I trust that the above notes will be of assistance to members in ensuring that they use the correct type of terminator to meet the duty requirements of the particular cable installation.

## CLOSING SESSION AFSLUITINGSITTING

### MR S GROLMAN : MAYER OF BENONI

Mr President, I wish to thank you for inviting me to open this Convention on Monday and for the Civic Function which we attended on Monday evening. My wife and I have the privilege of being invited to your dinner/dance tonight to which we look forward tremendously.

I hope that the visitors to Benoni have enjoyed their stay with us and as I said at the opening session, Benoni is and will always be proud of itself being a happy town. We like people who visit us to enjoy their stay and to go away with fond memories of the time that they spent here with us in the jewel of the East Rand. We call Benoni the jewel of the East Rand as we have the right to do so. We have our suburbs going out to the West and East, Johannesburg and Germiston, but as far as we are concerned, those of us who have grown up and live here,

Benoni is and I quote our Mr Nestadt, who is also called "Mr Benoni": "That is the best place in the world". Mr Nestadt cannot understand why everybody in the world does not want to come and live in Benoni.

Seriously, Mr President, I really hope, and on behalf of the Town Council, I also speak for my fellow Councillors that your deliberations here have been a great success and that those who have attended have learned a lot towards the progress of your Organisation, towards the progress and development in their particular field and specialities which will benefit not only them, the municipalities, but obviously the organisations in the long run enhance the knowledge of the people of South Africa. That is what we all work for, to endeavour to improve and make this a better developed country for all it's people.

To you, Mr President, on behalf of the Town Council, once



again congratulations to your election to this very high office. We know that you have two years of very hard work ahead of you, long hours, devoted not only to your occupation and your involvement in the Town Council, but also to this Organisation. We wish you lots of luck, and I must repeat, do not forget that we are right behind you.

Baie dankie menseer en aan alle betrokkenes nogmaals veels geluk. Wanneer u later vandag of more huiswaarts keer, reis asseblief veilig. Dankie.

#### MR D A SMITH — ON BEHALF OF THE AFFILIATES

Mr President, Mr Mayor, ladies and gentlemen, on behalf of the affiliates we would like to congratulate you on being appointed to the office of president of the AMEU and we wish you a successful 2 years. Likewise our wishes go to your executive council.

Mr Fortmann congratulations on being elected as President Elect.

Mr President during this Convention reference was made to many committees such as electrolytic corrosion committee, high voltage co-ordinating committee etc. So I would like to define the word "committee".

Now a committee is defined as:-

A group of knowledgeable people entrusted with the responsibility for putting off an issue or identifying the problem to a given solution."

Another school of thought has defined a camel as being a horse designed by a committee. The fact is however, that the camel serves its purpose with remarkable efficiency. It is our hope that your Committee will be designing many camels.

Mr President, we would like to congratulate you on the professional manner in which the conference was organized, and to thank you for allowing affiliate companies to display some of their products in the wings of the town hall.

Mr President, the outside world has a mistaken idea that municipal engineers are unapproachable as they are seen to be part of the bureaucracy. The social events during this conference have taught us — some of us to our cost — that this is not so and if anything that your members are all too good at letting their hair down.

Finally, Mr President, thank you for giving me the opportunity of speaking on behalf of the affiliates. Thank you for the conference and best wishes to you and the AMEU for the future.

#### MNR PETER MULLER : NAMENS DIE DAMES

Mnr die President, toe u my uitgenooi het om hierdie sluitings toespraak te maak, namens die dames, het ek dit met plesier aanvaar, maar daar was ook 'n mate van ongemak, vanweë my bedenkings aangaande my bekwaamheid, om namens die skoner geslag te praat.

Mnr die President, tydens die opening van hierdie Konvensie het u kleur gegee deur u moeder op so 'n treffende wyse te eer. U het u vereenselwig met 'n president wat die eerbare tradisie van die VMEQ nastreef, deur u besorgdheid aan te dui, teenoor alle persone hier teenwoordig, en in besonder die dames.

Die dames is 'n diepe dank verskuldig aan Martie en haar reëlingskomitee vir die oordeelkundige beplanning, wat daar moes gewees het in die daarstelling van die damesprogramme, asook die ander sosiale geleenthede. Ons is ook 'n besondere dank verskuldig aan die Burgemeesteres mev. Grolman.

Mr President, a garden would be but a desert were it not for the

flowers therein and even so our Convention would have been most desolate were it not graced by the ladies. This more so, sir, being set in your charming City Benoni.

During the special programme set for them, the ladies have enjoyed two most meaningful and informative tours and equally with their menfolk celebrated with enthusiastic oomphs. No doubt we will all be having our hair done for the final festivity tonight.

I would be most arrogant in the discharge of my duty today if I were to attempt to explain the fairer sex. This has been ably handled by both grey-haired philosophers and blonde Apollos, throughout the ages. However, to indicate the depth of the subject I am reminded of the truth that,

"The strength of the weaker sex is the weakness of the stronger sex for the weaker sex."

This may not be universal, as one is reminded of Mr Chamberlain, who when asked why he never married said that while he supported the battle of the sexes, he did not believe in taking prisoners.

In keeping with the long tradition of the AMEU, this the 49th Convention, has been a resounding success.

On behalf of the ladies may I express our heartiest congratulations to you Mr President, your Executive and the fair city of Benoni. And indeed all the ladies wish both you, Jan and Martie, a most successful and enjoyable two years of office.

And finally, Mr President,

If roses are red,  
and violets are blue,  
all the ladies  
thank the AMEU.

#### MNR JAN LOUBSER : PRESIDENT

Mnr die Burgemeester, dames en here, ek wil 'n paar firmas noem wat werklik groot moeite gedoen het en bygedra het tot die koste en andersins van hierdie Konvensie.

Heel eerstens, en ek dink in hierdie geval ook die grootste is Trust Bank van Johannesburg. Al hierdie mooi sakke wat u ontvang het, het hulle vir ons gratis geskenk, en ek dink hulle verdien 'n applous daarvoor.

Tweedens, Edward Lumley en Seuns, wat die sakke vir die dames geskenk het. Ek dink dit is ook iets wat ons nog nie voorheen by die VMEQ gehad het nie. Ek dink ons kan vir hulle ook applous gee.

Dan die volgende firmas, nl. ICL wat vir ons rekenaar fasiliteite beskikbaar gestel het en ook die uitstalling hier gehad het. Ons het dit saam met hulle geniet. Coca Cola wat vir ons gratis koeldrank verskaf het. Reeva wat skoonheidsmiddels aan die dames verskaf het. Shulton S.A., Bayer Miles, Twin Produkte, Carlton Papers, Rembrandt van Rijn, Solly Kramers — Benoni, L.K. Electrical, Benoni, Jacobs Nissan, Caichis Electrical, Pat Hinde and Sons, Thomsons Motor Metal Works, Morgans Electrical, Chloride S.A., Cranbourne Panel Beaters, Argus Motors, East Rand Electrical, en Siemens wat die spesiale penne wat in u sakke geplaas was, geskenk het.

As u dink ek het al hierdie reëlings getref, dan sal u nou agterkom dat dit nie die geval is nie. Ek het hier 'n span dames en mans wat my help het en u sal agterkom dat ek gedelegeer het.

Let us start with Carol Bennett and Gretchen Stolz of Asea,

Jane McGregor of Bowthorpe-Hellermann-Deutsch. The following people may not be present namely, Messrs. Crompton, Hutcheson and Reid from Johannesburg City Council. I have to thank them for all their experience which they passed on to us for this Convention.

Now, the employees of the Benoni Town Council, namely, Mrs Murray, Mrs Morgan, Mrs du Plessis, Mrs van der Merwe, Mrs Udvaros, Mrs Bisschoff, Mrs Maritz, Miss Goosen, Miss Botha, Johan Momborg, Pierre Fourie, Martin Earle and Leonard Kardolus. Mr Fourie from the Bus Department who arranged the buses in conjunction with Mr Kock, also from the Bus Department. They did a marvellous job. Mr Esterhuizen and workers of the Town Treasurer's Department and Mr Botha and Mr Dercksen, the caretakers of this building. Mrs Coetzee and her staff who arranged for the meals at the Convention as well as for the civic function on Monday night. Mr Kruger who did the photography and Mrs Borchers and Mrs Lemmer of the Publicity Association. I have not as yet mentioned the staff from the Trust Bank who were very efficient indeed. They did the registration of delegates and everything that was necessary was done so expeditiously and efficiently that it took the worries off my shoulders. These people are Marie Dempsey, Ricks MacDonald, Marieta van Biljon, Marianne Houston, Valerie Verster, Engela Wilken, Esme van Heerden, Isabel Faquar and Eugenele de Roux from the Benoni Branch.

Dit was a groot plesier om saam met Trust Bank te werk en alles wat hulle gedoen het, is so professioneel uitgevoer dat dit die taak baie vergemaklik het.

Before I proceed, I think it is fitting to thank my wife and Mrs Grolman for all the trouble they went to for this Convention, and I would like Mrs van Vuuren to please present them each with a bouquet.

You see Mr Mayor, here is again an example of us doing all the work and they getting the reward.

Die volgende personeel naamlik mnr Conradie, Carmel en Hough, het ook meer as hulle deel bygedra. Mnr Conradie is die staturesourier van Benoni en ek wil nog sien of enige ander ingenieur hier kan spog soos wat ek kan spog wat die samewerking van 'n stadstaturesourier aanbetref. Mnr Conradie, baie, baie dankie.

Mnr. Hough, Matthews, Lamprecht, Bosch, Balejko en Brown, baie dankie. Richard Balejko is another person who never spared any effort. He really did a lot of work for the Convention, thank you very much Richard.

Ek sal nou aan my wederhelf vra om oorhandigings te maak

aan die twee dames wat die hartslag van hierdie Konvensie was, naamlik mev van Vuuren en mev Krog.

Laat ek vir u een ding omtrent mev van Vuuren sê en dit is dat ek daarvan oortuig is dat al die kongresgangers ken haar beter as wat hulle my ken. Sy het al die navrae telefonies en andersins beantwoord en al die reëlings getref. Baie dankie aan die twee dames.

Mnr Bennie van der Walt ons sekretaris, ek het nog nie vir u dankie gesê vir al die harde werk wat u hierin gesit het nie. Dit was heerlik om saam met u te werk en ek kan nou begryp waarom al die presidente so lekker terugsit, wat Van der Walt en Kie doen al die werk vir ons. Baie dankie Bennie.

#### **MNR A FORTMAN : AANGEWESSE PRESIDENT**

Mr Mayor, honoured guests, ladies and gentlemen, u het nou die bedankings gedoen en daar was so baie en so 'n menigte. Maar daar is een persoon was oorbly wat nog nie bedank is nie, naamlik u mnr die President. Namens al die lede hier teenwoordig, sê ek baie dankie vir u bekwame en waardige wyse waarop u hierdie Konvensie gelei het. Daar Boksburgs en Benoni bure is was ek verskeie kere met u in aanraking oor een of ander sakkie en het ek net met die bietjie wat ek verneem het, tot die besef gekom dat u 'n reuse taak met die Konvensie op u skouers gedra het.

Vir u en Martie sê ons baie dankie vir die groot poging wat u aangewend het om ons verblyf en bywoning hier in Benoni se aangenaam te maak.

Ons is ook aan u raad vir hulle bydrae en ondersteunign wat u van u raad met hierdie verrigtinge ontvang het, groot dank verskuldig.

Mr President, may your and Martie's two year of office be happy and memorable one and from all of us again a big thank you for an enjoyable Convention.

#### **MNR JAN LOUBSER : PRESIDENT**

U weet tradisioneel baklei buurdorpe met mekaar, maar in ons geval, tussen Boksburg en Benoni, is dit nie so nie. Baie dankie ek waardeer dit mnr Fortmann.

Last but not least, Mr Mayor, I know we took up a lot of your time, but I think you have enjoyed it as much as we did. Thank you very much for being here to do this of us.

Dames en here, voordat ek die Konvensie sluit, hoop ek om al die mense wat vanmiddag hier is, asook die wat nie hier is nie, vanaand by die dince/dans te sien. Baie, baie dankie, ek verklaar nou hierdie Konvensie geslote.

# MEMBERSHIP ROLL

## LEDELYS

### ENGINEER MEMBERS - INGENIEURSLEDE

**A**  
ADAMS, CE: City Electrical Engineer, P.O. Box 369, Port Elizabeth 6000.  
ALGERA, JD: Elektrotegniese Stadsingenieur, Posbus 16, Rustenburg 0300.  
ANDERSON, CA: Stads Elektriese Ingenieur, Posbus 423, Pretoria 0001.  
ANDREWS, KI: Elektrotegniese Stadsingenieur, Posbus 86, Walvisbaai 9190.

**B**  
BAKER, AB: Electrical Engineer, P.O. Box 20, Swellendam 6740.  
BARNARD, W: City Electrical Engineer, P.O. Box 699, Johannesburg 2000.  
BARTHOLOMEW, WG: P.O. Box 47, Koffiefontein 9986.  
BARRATT, MEO: Electrical Engineer. P.O. Box 13, Port Alfred 6170.  
BEKKER, MJ: Elektrotegniese Ingenieur, Posbus 96, Louis Trichardt 0920.  
BOOYSENS, L: Elektrotegniese Ingenieur, Posbus 155, Vrede 2455.  
BOSHOFF, JJ: Elektrotegniese Stadsingenieur, Posbus 3, Vanderbijlpark 1900.  
BOTES, PJJ: Elektrotegniese Ingenieur, Posbus 15, Grootbrakrivier 6525.  
BOTES, PJ: Elektrotegniese Ingenieur, Posbus 217, Rodepoort 1725.  
BOTH, A: Hoof, Elektriese Afdeling, Posbus 6, Delmas 2210.  
BOTH, JJ: P.O. Box 708, Welkom 9460.  
BOTH, NS: Elektrotegniese Ingenieur, Posbus 3704, Bloemfontein 9300.  
BOTH, PJ: Posbus 37, Viljoenskroon 9520.  
BOTH, A: Posbus 6, Delmas 2210.  
BOTHMA, O: Elektrotegniese Ingenieur, Posbus 25, Mosselbaai 6500.  
BOZYCZKO, W: P.O. Box 56, Ladysmith 3370.  
BRIERS, DB: Elektrotegniese Ingenieur, Posbus 302, Kroonstad 9500.  
BRINK, PSJ: Town Electrical Engineer, P.O. Box 20, Hermanus 7200.  
BRINK, HJ: Groeppingenieur, Posbus 288, Bloemfontein 9300.  
BRUMMER, JG: Elektrotegniese Ingenieur, Posbus 17, Stellenbosch 7600.

**C**  
CLARE, CA: Borough Electrical Engineer, P.O. Box 5, Howick 3290.  
CLARKE, MMP: City Electrical Engineer, Private Bag 1, Randburg 2125.  
CLOETE, DJ: Privaatskap X7, Virginia 9430.  
CLOETE, J: Chief Electrical Engineer, P.O. Box 44, Ceres 6835.  
CLOETE, RH: Dorpsingenieur, Posbus 20, Senekal 9600.

**D**  
DAVIES, EG: City Electrical Engineer, P.O. Box 399, Pietermaritzburg 3200.  
DAUTH, WJ: Chief Electrical Engineer, P.O. Box 48, Volksrust 2470.  
DAWSON, JD: Municipal Electrical Engineer, P.O. Box 45, Uitenhage 6230.  
DE BRUIN, HJ: Elektrotegniese Stadsingenieur, Posbus 218, Randfontein 1760.  
DE BRUYN, CD: Elektrotegniese Ingenieur, Posbus 10, Carnarvon 7060.  
DE KOCK, FP: Posbus 156, Virginia 9430.  
DEKENAH, KC: Town and Electrical Engineer, P.O. Box 33, Barberton 1300.  
DREYER, HJ: Elektrotegniese Ingenieur, Posbus 21, Jeffriesbaai 6330.  
DU PIESANIE, SJ: Posbus 2879, Brits 0250.  
DU TOIT, E: Elektrotegniese Stadsingenieur, Posbus 16, Brits 0250.  
DU TOIT, GB: Hoof, Elektriese Departement, Privaatsak X3, Hopetown 8750.  
DU TOIT, PL: Posbus 34, Orkney 2620.  
DE VRIES, GS: Posbus 52, Robertson 6705.  
DE VRIES, JM: Hoof Tegniese Beampte, Privaatsak X12, Vredenburg 7300.

**E**  
EHRICH, JA: Town Electrical Engineer, P.O. Box 66 Standerton 2430.  
ERASMUS, PR: Elektrotegniese Ingenieur, Posbus 2, Secunda 2302.  
ESTERHUYSEN, AC: Posbus X02, Viljoenskroon 9520.

**F**  
FORTMANN, AHL: Town Electrical Engineer, P.O. Box 215, Boksburg 1460.  
FRASER, DH: City Electrical Engineer, P.O. Box 147, Durban 4000.  
FRENCH, EM: Borough Engineer, P.O. Box 712, Greytown 3500.

**G**  
GELDENHUYSEN, PJA: Posbus 17, Wolmaransstad 2630.  
GOUSSARD, PJ: Hoofelektrisiën, Posbus 14, Koppies 9540.  
GREYLING, JPJ: Posbus 23, Piet Retief 2380.  
GROBLER, J: Elektrotegniese Stadsingenieur, Posbus 551, Bethlehem 9700.  
GROVE, CR: Hoof-Elektrotegniese Ingenieur, Posbus 43, Harrismith 9880.  
GROTIUS, RJ: Posbus 13, Dewetsdorp 9940.

**H**  
HALLIDAY, KWJ: Municipal Electrical Engineer, P.O. Box 5, Port Shepstone 4240.  
HAMMERSCHLAG, SN: Town Electrical Engineer, P.O. Box 3, Bedfordview 2008.  
HARVEY, PH: P.O. Box 15, Estcourt 3310.  
HEYDENRYCH, JE: Elektrotegniese Ingenieur, Posbus 14, Middelburg 1050.  
HUGO, AHW: Town Electrical Engineer, P.O. Box 78001, Sandton 2146.  
HUGO, JG: Electrical Engineer, P.O. Box 51, Bredasdorp 7280.  
HUMAN, MJ: Elektrotegniese Stadsingenieur, Posbus 15,

Brakpan 1540.  
HUNT, LE: Town Electrical Engineer, P.O. Box 2, White River 1240.

**J**  
JANTZEN, GH: Elektrotegniese Stadsingenieur, Posbus 29, Henneman 9445.  
JANSE V RENSBURG, WW: Posbus 14064, Benoni 1500.  
JELLIMAN, CE: P.O. Box 36, Fort Beaufort 5720.  
JORDAAN, DJP: Posbus 35, Vereeniging 1930.  
JORDAAN, PW: Hoof-Elektrotegniese Afdeling, Posbus 34, Potgietersrus 0600.

**K**  
KLOPPERS, TJ: Posbus 201, Heidelberg 2400.  
KOK, JA: Elektrotegniese Ingenieur, Posbus 55, Middelburg 5900.  
KRÉBS, WF: Privaatsak 2209, Otjiwarongo 9210.  
KRIGE, WA: Elektrotegniese Ingenieur, Posbus 14103, Verwoerdburg 0140.

**L**  
LAAS, CP: Elektrotegniese Ingenieur, Posbus 15, Kenhardt 8900.  
LE ROUX, DE: P.O. Box 2, Stutterheim 4930.  
LEWIS, L: Town Electrical Engineer, P.O. Box 59, Windhoek 9100.  
LINDE, AP: Hoof Elektriesien, Posbus 2, Frankfort 9830.  
LOCHNER, J VAN S: Elektrotegniese Ingenieur, Posbus 111, Pietersburg 0700.  
LOTTER, GA: Elektrotegniese Ingenieur, Posbus 34, Potgietersrus 0600.  
LOÛBSER, D PVP: Posbus 27, Douglas 8730.  
LOÛBSER, JA: Elektrotegniese Ingenieur, Posbus 1014, Benoni 1500.  
LOUW, HAL: Elektrotegniese Stadsingenieur, Posbus 12, Paarl 7620.  
LOUW, L: Posbus 16, Prieska 5940.  
LUUS, AJ: Posbus 520, Witbank 1035.

**M**  
MALLINSON, RJ: Elektrotegniese Ingenieur, Posbus 21, Somerset-Oos 5850.  
MARAIS, CHA: Stads Elektriesiteits/Meganiese Ingenieur, Buitenstraat 30, Parys 9585.  
McMILLAN, KHD: Electrical Engineer, P.O. Box 47, Umtata 5100.  
McNAMARA, AB: Electrical Engineer, P.O. Box 21, Komga 4950.  
MEYER, A: Elektrotegniese Ingenieur, Posbus 52, Malmesbury 7300.  
MILLEN, TJ: Electrical Engineer, P.O. Box 24, Tzaneen 0850.  
MOSTERT, SA: Elektrotegniese Ingenieur, Posbus 19, George 6530.  
MOSTERT, AH: Posbus 53, Swakopmund 9180.  
MURPHY, KJ: Municipal Electrical Engineer, P.O. Box 19, Somerset West 7130.  
MYBURGH, G: Elektrotegniese Ingenieur, Posbus 4, Kuruman 8460.

**N**  
NAUDÉ, E: Adjunk Elektrotegniese Ingenieur, Posbus 725, Carletonville 2500.  
NEL, JTF: Elektrotegniese Stadsingenieur, Posbus 33, King Williamstown 5600.  
NORTJE, GJ: Elektrotegniese Stadsingenieur, Posbus 145, Germiston 1400.  
NORTJE, JJ: Elektrotegniese Stadsingenieur, Posbus 10, Warrenton 8530.

**O**  
ODENDAAL, MW: Elektrotegniese Stadsingenieur, Posbus 4, Alberton 1450.

**P**  
PAGEL, PVE: Elektrotegniese Ingenieur, Munisipaliteit Plettenbergbaai 6600.  
PALSER, DC: City Electrical Engineer, P.O. Box 82, Cape Town 8000.  
PETERS, AG: Town Electrical Engineer, P.O. Box 278, Gwelo, Harare.  
PIENAAR, JF: Elektrotegniese Ingenieur, Posbus 10, Glencoe 2930.  
PIKE, E: P.O. Box 57, Vryheid 3100.  
POLLOCK, T: Electrical Engineer, P.O. Box 3, Gordons Bay 7150.  
PRETORIUS, E DE C: Elektrotegniese Stadsingenieur, Posbus 113, Potchefstroom 2520.  
PRETORIUS, PJR: Elektrotegniese Stadsingenieur, Posbus 35, Vryheid 8600.  
PRITCHARD, MR: Elektrotegniese Stadsingenieur, Privaatsak X7, Virginia 9430.

**R**  
RATTEY, WP: Electrical Engineer, P.O. Box 3, Strand 7140.  
RAUTENBACH, GF: Elektrotegniese Ingenieur, Posbus 99, Klerksdorp 2570.  
ROBSON, KG: City Electrical Engineer, P.O. Box 529, East London 5200.  
ROHRBECK, WD: Posbus 39, Hoopstad 2670.  
ROODT, JSG: Posbus 26, Reitz 9810.  
ROSSOUW, GT: Posbus 241, Kempdorp 8550.  
ROSSOUW, SPJ: WNDÉ Elektrotegniese Ingenieur, Munisipaliteit van Wellington, Posbus 12, Wellington 7655.

**S**  
SIMPSON, AC: Town Electrical Engineer, P.O. Box 42, Despatch 6220.  
SMALL, CTR: Town Electrical Engineer, P.O. Box 9, Beaufort West 6970.  
STAPLETON, R: Borough & Electrical Engineer, P.O. Box 37, Eshowe 3815.  
STRAUSS, JC: Elektrotegniese Ingenieur, Posbus 60, Sasolburg 9570.  
SWART, JCP: Posbus 29, Velddrif 7365.  
SWART, TL: Elektrotegniese Ingenieur, Posbus 10, Glencoe 2930.  
SWARTS, JTE: Elektrotegniese Ingenieur, Posbus 201, Heidelberg 2400.

**T**  
TENCATE, JJ: Elektrotegniese Stadsingenieur, Posbus 67, Phalaborwa 1390.  
THERON, TA: Stadslektrotegniese Ingenieur, Posbus 48, Ermelo 2350.

**V**  
VANDEN BERG, J: Stads- en Elektrotegniese Ingenieur, Posbus 20, Stilfontein 2550.  
VANDEN BERG, AJ: Elektrotegniese Ingenieur, Posbus 94, Krugersdorp 1740.  
VAN DER LINDE, JL: Elektrotegniese en Werktuigkundige Ingenieur, Posbus 21, Odendaalsrus 9400.  
VAN DER MERWE, DS: Elektrotegniese Ingenieur, Posbus 3, Witbank 1035.  
VAN DER MERWE, G: Posbus 96, Louis Trichardt 0920.  
VAN DER MERWE, PJ: Stads & Elektrotegniese Ingenieur, Posbus 20, Stilfontein 2550.  
VAN DER SCHYFF, GW: Stadsingenieur, Posbus 3, Bethal 2031.  
VAN DER WALT, FSP: Privaatsak 5005, Kimberley 8300.  
VAN DER WALT, PS: Posbus 3, Bultfontein 9670.  
VAN NIEKERK, PJS: Borough Electrical Engineer, P.O. Box 21, Newcastle 2940.  
VAN ROOYEN, HE: Dorps-Waterwerke en Elektrotegniese Ingenieur, Munisipaliteit, Kirkwood 6120.

VAN SCHALKWYK, AP: Assistent-Elektrotegniese Stadsingenieur, Posbus 288, Bloemfontein 9300.  
VAN WYK, AA: Elektrotegniese Ingenieur, Posbus 45, Nelspruit 1200.  
VENTER, GA: Elektrotegniese Ingenieur, Posbus 9, Meyerton 1960.  
VENTER, JA: Posbus 90, Thabazimbi 0380.  
VELDSMAN, DE: Elektrotegniese Ingenieur, Privaatsak X7, Goodwood 7460.  
VON AHLFTEN, JK: Elektrotegniese Ingenieur, Posbus 45, Springs 1560.  
VOSLOO, C: Posbus 628, Kimberley 8300.

**W**  
WHEELER, DJ: Posbus 13, Burgersdorp 5520.

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#### ASSOCIATE MEMBERS - ASSOSIAATLEDE

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**B**  
BAILEY, RV: Acting Electrical Engineer, P.O. Box 72, Stanger 4450.  
BECK, HD: Deputy City Electrical Engineer, P.O. Box 529, East London 5200.  
BOSCH, LA: Elektrotegniese Superintendent, Posbus 13, Burgersdorp 5520.  
BOSHOFF, MHL: Deputy Director Electrical/Macanical, 20 Bradley Road, Summerstrand, Port Elizabeth 6001.  
BOTH, JN: Posbus 1, Fochville 2515.  
BRINK, HJ: Groepingenieur, Posbus 288, Bloemfontein 9300.

**C**  
CLOETE, DJ: Posbus 99, Klerksdorp 2570.  
COETZEE, CJF: Adjunk-Elektrotegniese Stadsingenieur, Privaatsak X30, Rodepoort 1725.  
COOPER-CHADWICK, L: P.O. Box 57, Germiston 1400.

**D**  
DANREL, FLU: Deputy Electrical Engineer, P.O. Box 82, Cape Town 8000.  
DE BEER, WH: Adjunk-Elektrotegniese Stadsingenieur, Posbus 48, Warmbad 0480.  
DE VILLIERS, JD: Posbus 4, Alberton 1450.  
DE WET, LDM: Adjunk-Elektrotegniese Ingenieur, Posbus 15, Boksburg 1460.  
DU PLESSIS, CJ: Posbus 868, Kempton Park 1620.  
DU PLESSIS, GC: Adjunk-Elektrotegniese Stadsingenieur, Posbus 94, Krugersdorp 1740.

**F**  
FOUBISTER, JAD: Deputy City Electrical Engineer, P.O. Box 82, Cape Town 8000.

**G**  
GOWIE, E: P.O. Box 35, Matatiel 4730.

**H**  
HILL, DR: City Electrical Department, P.O. Box 147, Durban 4000.  
HOBBS, JL: Deputy Electrical Engineer, P.O. Box 45, Uitenhage 6230.

**K**  
KLOPPER, TJ: Elektrotegniese Ingenieur, Posbus 201, Heidelberg 2400.

**L**  
LABUSCHAGNE, PHJ: Adjunk Direkteur, Tegniese

Dienste, Atherstonestraat 19, Vanderbijlpark 1900  
LAMPRECHT, BC: Privaatsak X014, Benoni 1500.  
LEIGH, RA: Deputy Electrical Engineer, P.O. Box 699, Johannesburg 2000.  
LIEBENBERG, HDG: Posbus 64, Ladybrand 9745.

**M**  
MALAN, JG: Assistent Elektrotegniese Ingenieur: Posbus 13, Kempton Park 1620.  
MONTGOMERY, JA: P.O. Box 25, Edenvale 1610.  
MULDER, JAC: Posbus 60, Piketberg 7320.

**O**  
OPPERMAN, DJ: Adjunk-Elektrotegniese Ingenieur, Posbus 45, Springs 1560.

**P**  
PEENS, JG: Posbus 6, Wesselsbron 9680.  
PRETORIUS, JW: Assistent-Elektrotegniese Ingenieur, Posbus 23, Nigel 1490.

**S**  
SMIT, AH: Posbus 3, Bethal 2310.  
SMIT, JJ: Assistent-Elektrotegniese Ingenieur, Posbus 3, Witbank 1035.  
SMITH, AM: 22 Bournemouth Street, Summerstrand, Port Elizabeth 6001.  
STEYN, SJ: Adjunk-Elektrotegniese Stadsingenieur, Posbus 113, Potchefstroom 2520.  
SURTHEES, EH: Deputy Town Engineer, P.O. Box 215, Boksburg 1460.

**V**  
VAN DER WALT, CJ: Privaatsak X014, Benoni 1500.  
VAN SCHALKWYK, AP: Assistent-Elektrotegniese Stadsingenieur, Posbus 288, Bloemfontein 9300.

**W**  
WHITEHEAD, HR: P.O. Box 147, Durban 4000.  
WILLE, J: Posbus 7, Lichtenburg 2740.

---

#### LOCAL AUTHORITIES - PLAASLIKE OWERHEDE

---

**A**  
The Town Clerk, P.O. Box 38, Adelaide 5760.  
The Town Clerk, P.O. Box 46, Aliwal North 5530.  
The Town Clerk, P.O. Box 4, Alberton 1450.  
Die Stadsklerk, Posbus 73, Alexandria 6185.  
Die Stadsklerk, Posbus 22, Ashton 6715.

**B**  
The Town Clerk, P.O. Box 33, Barberton 1300.  
The Town Clerk, P.O. Box 9, Beaufort West 6970.  
The Town Clerk, P.O. Box 3, Bedfordview 2008.  
The Town Clerk, P.O. Box 45, Benoni 1500.  
The Town Clerk, P.O. Box 3, Bethal 2310.  
The Town Clerk, P.O. Box 130, Bethlehem 9700.  
The Town Clerk, P.O. Box 3704, Bloemfontein 9300.  
The Town Clerk, P.O. Box 215, Boksburg 1460.  
The Town Clerk, P.O. Box 10, Bonnievale 6730.  
The Town Clerk, P.O. Box 12, Bothaville 9660.  
The Town Clerk, P.O. Box 15, Brakpan 1540.  
Die Stadsklerk, Posbus 13, Brandfort 9400.  
The Town Clerk, P.O. Box 51, Bredasdorp 7280.  
The Town Clerk, P.O. Box 106, Brits 0250.  
The Town Clerk, P.O. Box 13, Burgersdorp 5520.  
Die Stadsklerk, Posbus 3, Bultfontein 9670.

**C**  
The Town Clerk, P.O. Box 82, Cape Town 8000.



The Town Clerk, P.O. Box 3, Carletonville 2500.  
The Town Clerk, P.O. Box 10, Carnarvon 7060.  
The Town Clerk, P.O. Box 24, Carolina 1185.  
The Town Clerk, P.O. Box 44, Ceres 6835.  
The Town Clerk, P.O. Box 24, Cradock 5880.

#### D

The Town Clerk, P.O. Box 42, De Aar 7000.  
The Town Clerk, P.O. Box 6, Delmas 2210.  
Die Stadsklerk, Posbus 42, Despatch 6220.  
The Town Clerk, P.O. Box 13, Dewetsdorp 9940.  
Die Stadsklerk, Posbus 20, Dordrecht 5435.  
Die Stadsklerk, Posbus 27, Douglas 8730.  
The Town Clerk, P.O. Box 36, Duiwelskloof 0835.  
The Town Clerk, P.O. Box 76, Dundee 3000.  
The Town Clerk, P.O. Box 147, Durban 4000.  
The Secretary, Divisional Council of the Cape, P.O. Box 1073, Cape Town 8000.

#### E

The Town Clerk, P.O. Box 134, East London 5200.  
The Town Clerk, P.O. Box 25, Edenvale 1610.  
The Town Clerk, Private Bag, Empangeni 3880.  
The Town Clerk, P.O. Box 48, Ermelo 2350.  
The Town Clerk, P.O. Box 37, Eshowe 3815.  
The Town Clerk, P.O. Box 15, Estcourt 3310.  
The Town Clerk, P.O. Box 55, Evander 2280.

#### F

The Town Clerk, P.O. Box 1, Fochville 2515.  
The Town Clerk, P.O. Box 36, Fort Beaufort 5720.  
Die Stadsklerk, Posbus 2, Frankfort 9830.

#### G

The Town Clerk, P.O. Box 19, George (C.P.) 6530  
The Town Clerk, P.O. Box 145, Germiston 1400.  
The Town Clerk, P.O. Box 10, Glencoe 2930.  
The Town Clerk, P.O. Box 33, Gobabis 9140.  
The Town Clerk, P.O. Box 3, Gordons Bay 7150.  
The Town Clerk, P.O. Box 71, Graaf-Reinet 6280.  
The Town Clerk, P.O. Box 176, Grahamstown 6140.  
The Town Clerk, P.O. Box 71, Greytown 3500.  
Die Stadsklerk, Posbus 15, Groot-Brakrivier 6525.

#### H

Die Stadsklerk, Posbus 83, Hartswater 8570.  
The Town Clerk, P.O. Box 201, Heidelberg 2400.  
Die Stadsklerk, Munisipaliteit, Heilbron 9650.  
The Town Clerk, P.O. Box 20, Hermanus 7200.  
The Town Clerk, P.O. Box 29, Henneman 9445.  
Die Stadsklerk, Munisipaliteit, Hoopstad 2670.  
Die Stadsklerk, Privaatsak X3, Hopetown 8750.  
The Town Clerk, P.O. Box 5, Howick 3290.

#### J

Die Stadsklerk, Posbus 241, Jan Kempdorp 8550.  
The Town Clerk, P.O. Box 21, Jeffreys Bay 6330.  
City Electrical Engineer, P.O. Box 699, Johannesburg 2000.

#### K

The Town Clerk, P.O. Box 174, Kakamas 8870.  
The Town Clerk, P.O. Box 25, Keetmanshoop 9020.  
The Town Clerk, P.O. Box 13, Kempton Park 1620.  
The Town Clerk, P.O. Box 15, Kenhardt (C.P.) 8900.  
The Town Clerk, P.O. Box 194, Kimberley 8300.  
The Town Clerk, P.O. Box 33, King Williamstown 5600.  
The Town Clerk, P.K. Kirkwood 6120.  
The Town Clerk, P.O. Box 99, Klerksdorp 2570.  
The Town Clerk, P.O. Box 21, Knysna 6570.  
Die Stadsklerk, Posbus 7, Koffiefontein 9986.  
The Town Clerk, P.O. Box 21, Komga 4950.  
The Town Clerk, P.O. Box 14, Koppies 9540.  
The Town Clerk, P.O. Box 302, Kroonstad 9500.  
The Town Clerk, P.O. Box 94, Krugersdorp 1740.  
The Town Clerk, P.O. Box 4, Kuruman 8460.

#### L

The Town Clerk, P.O. Box 64, Ladybrand 9745.  
The Town Clerk, P.O. Box 29, Ladysmith 3370.  
The Town Clerk, P.O. Box 7, Lichtenburg 2740.  
The Town Clerk, P.O. Box 6, Lydenburg 1120.

#### M

Die Stadsklerk, Posbus 111, Marble Hall 0450.  
The Town Clerk, P.O. Box 42, Mmabatho 8670.  
The Town Clerk, P.O. Box 35, Matatiële 4730.  
The Town Clerk, P.O. Box 11, Melmoth 3835.  
The Town Clerk, P.O. Box 9, Meyerton 1960.  
The Town Clerk, P.O. Box 55, Middelburg (C.P.) 5900.  
The Town Clerk, P.O. Box 14, Middelburg (TVL.) 1050.  
The Town Clerk, P.O. Box 47, Mooi Rivier 3200.  
The Town Clerk, P.O. Box 25, Mosiel Bag 6500.  
Die Stadsklerk, Posbus 24, Montagu 6720.

#### N

Die Stadsklerk, Privaatsak X340, Naboomspruit 0560.  
The Town Clerk, P.O. Box 45, Nelspruit 1200.  
The Town Clerk, P.O. Box 21, Newcastle 2940.  
The Town Clerk, P.O. Box 23, Nigel 1490.  
Die Stadsklerk, Privaatsak 1008, Nylstroom 0510.

#### O

Die Hoofdirekteur, Ontwikkelingsraad Hoëveldgebied, Posbus 349, Standerton 2430.  
Die Hoofdirekteur, Ontwikkelingsraad Sentraal-Transvaal, Privaatsak X449, Pretoria 0001.  
Die Hoofdirekteur, Ontwikkelingsraad Suid-Transvaal, Privaatsak X2016, Standerton 2430.  
Die Hoofdirekteur, Ontwikkelingsraad Oos-Kaap, Posbus 14025, Sidwell 6061.  
Die Hoofdirekteur, Ontwikkelingsraad Oos-Transvaal, Posbus 888, Nelspruit 1200.  
Die Hoofdirekteur, Oranje-Vaal Ontwikkelingsraad, Privaatsak X029, Vanderbijlpark 1900.  
Die Hoofdirekteur, Oos-Randse Ontwikkelingsraad, Posbus 57, Germiston 1400.  
Die Hoofdirekteur, Ontwikkelingsraad Suid-OVS, Posbus 2313, Bloemfontein 9300.  
Die Hoofdirekteur, Ontwikkelingsraad Noord-Kaap, Privaatsak X5005, Kimberley 8300.  
Die Hoofdirekteur, Ontwikkelingsraad Wes-Kaap, Privaatsak X7, Goodwood 7460.  
Die Hoofdirekteur, Wes-Randse Ontwikkelingsraad, Posbus 4414, Johannesburg 2000.  
The Town Clerk, P.O. Box 21, Odendaalsrust 9480.  
The Town Clerk, P.O. Box 34, Orkney 2620.  
The Town Clerk, Private Bag 2209, Otjiwarongo SWA 9210.  
The Town Clerk, P.O. Box 255, Oudtshoorn 6620.

#### P

The Town Clerk, P.O. Box 12, Paarl 7620.  
The Town Clerk, P.O. Box 359, Parys 9585.  
Die Stadsklerk, Posbus 12, Petrus Steyn 9640.  
The Town Clerk, P.O. Box 67, Phalaborwa 1390.  
The Town Clerk, P.O. Box 321, Pietermaritzburg 3200.  
The Town Clerk, P.O. Box 111, Pietersburg 0700.  
The Town Clerk, P.O. Box 23, Piet Retief 2380.  
The Town Clerk, Municipality, Piketberg 7320.  
The Town Clerk, P.O. Box 26, Plettenbergbaai 6600.  
The Town Clerk, P.O. Box 13, Port Alfred 6170.  
The Town Clerk, P.O. Box 116, port Elizabeth 6000.  
The Town Clerk, P.O. Box 5, Port Shepstone 4240.  
The Town Clerk, P.O. Box 5, Postmasburg 8420.  
The Town Clerk, P.O. Box 113, Potchefstroom 2520.  
The Town Clerk, P.O. Box 34, Potgietersrus 0660.  
The Town Clerk, P.O. Box 40, Pretoria 0002.  
The Head, Peri Urban Development, P.O. Box 1341, Pretoria 0001.  
Die Stadsklerk, Posbus 16, Prieska 8940.

**Q**  
The Town Clerk, P.O. Box 113, Queenstown 5320.

**R**  
The Town Clerk, Private Bag 1, Randburg 2125.  
The Town Clerk, P.O. Box 139, Randfontein 1760.  
Die Stadsklerk, Posbus 26, Reitz 9810.  
The Town Clerk, Private Bag, Richards Bay 3900.  
The Town Clerk, P.O. Box 29, Riversdale 6770.  
The Town Clerk, P.O. Box 52, Robertson 6705.  
The Town Clerk, P.O. Box 217, Roodepoort 1725.  
The Town Clerk, P.O. Box 16 Rustenburg 0300.

**S**  
The Town Clerk, P.O. Box 78001, Sandton 2146.  
The Town Clerk, P.O. Box 60, Sasolburg 9570.  
Die Stadsklerk, Munisipaliteit, Secunda 2302.  
Die Stadsklerk, Posbus 20, Senekal 9600.  
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The Town Clerk, P.O. Box 156, Virginia 9430.  
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The Town Clerk, P.O. Box 57, Vryheid 3100.

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E POOLE - Secretary/Treasurer

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**1944**

G H SWINGLER - Cape Town

**1945**

A T RODWELL - Johannesburg

**1950**

DR J H DOBSON - Johannesburg

**1951**

H A EASTMAN - Cape Town

**1955**

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1957

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1958

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W ROSSLER – Pretoria  
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R G EWING – Past Secretary

1975

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1977

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VMEQ KOVFENSIE - 1985

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1926-27	*B Sankey	Johannesburg
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1933-34	LF Bickell	Port Elizabeth
1935-36	*GG Ewer	Pietermaritzburg

1936-37	*A Rodwell	Johannesburg
1937-38	*JH Giles	Durban
1938-39	HA Eastman	Cape Town
1939-44	*IJ Nicholas	Umtata
1944-45	*A Rodwell	Johannesburg
1945-46	JS Clinton	Zimbabwe (Harare)
	*JW Phillips	Zimbabwe (Bulawayo)
1946-47	GJ Muller	Bloemfontein
1947-48	C Kinsman	Durban
1948-49	*A Foden	East London
1949-50	DA Bradley	Port Elizabeth
1950-51	CR Hallé	Pietermaritzburg
1951-52	JC Downey	Springs
1952-53	*AR Sibson	Zimbabwe (Bulawayo)
1953-54	*JC Fraser	Johannesburg
1954-55	GJ Muller	Bloemfontein
1955-56	*DJ Hugo	Pretoria
1956-57	*JE Mitchell	Zimbabwe (Harare)
1957-58	JL van der Walt	Krugersdorp
1958-59	CG Downie	Cape Town
1959-60	*RW Kane	Johannesburg
1960-61	RMO Simpson	Durban
1961-62	C Lombard	Germiston
1962-63	*PA Giles	East London
1963-64	JC Downey	Springs
1964-65	RW Barton	Welkom
1965-67	*D Murray-Nobbs	Port Elizabeth
1967-69	GC Theron	Vanderbijlpark
1969-71	HT Turner	Umtali
1971-73	JK von Ahlften	Springs
1973-75	JC Waddy	Pietermaritzburg
1975-77	E de C Pretorius	Potchefstroom
1977-79	KG Robson	East London
1979-81	PJ Botes	Rodepoort
1981-83	DH Fraser	Durban
1983-85	W Barnard	Johannesburg

\*Deceased/Oortede.

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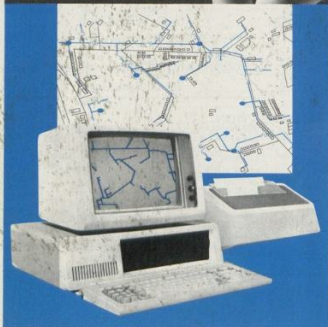
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KMP/CAPIA/11E3

# Advanced Distribution Planning and Design At Your Fingertips



## CADPAW™ Computer-Aided Distribution Planning Analysis Workstation

### CADPAW Specifications

#### Computer Requirements

CADPAW requires an IBM PC with:

- 512 kbytes memory
- Color graphics card
- DOS 2.0

Program versions are presently available for either IBM PC XT or IBM PC with two double-sided floppy disks.

CADPAW will utilize the Intel 8087 arithmetic coprocessor if installed in the IBM PC. This arrangement reduces load flow solution time by about a factor of 10 and is recommended for high-use installations.

Data communications with other computer requires appropriate modems of both machines.

#### Program Dimensions

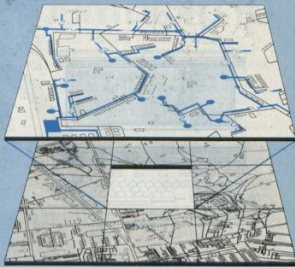
##### Load Flow

- 255 Nodes
- 510 Branches
- 100 Generation buses (can accurately model dispersed generation)
- 100 Voltage control (LTC) devices (remote site control if desired)
- 255 Constant power and/or impedance loads (either or mixture of both each node)

## Computer-Aided Distribution Planning and Design System CADPAD

### CADPAD SOFTWARE SPECIFICATIONS

Program	Function(s)	Program Dimensions/Capacity
<b>FEEDERDESIGN-1 - Primary Feeder Analysis</b>		
FDRA	Voltage Profile	System Access
	Feeder Loading	25 000 Buses
	Load Growth Impact	25 000 Feeder Segments
	Capacitor and Regulator Studies	Data Editing and Configuration Switching
	Motor Starting Studies	1 000 Buses
	Cogeneration Impacts	1 200 Feeder Segments
	Fault Studies	160 Substations
	Phase Balancing	100 Feeder Types
		1 000 Transformer/Regulator Types
		Analysis
		250 Buses, 250 Feeder Segments
VARSII	Minimum Cost Capacitor/Regulator Sizing and Sizing Studies	
	Optimal Voltage and Power Factor Correction	
PROCD	Protective Device Setting Check and Coordination	
PREEL	Reliability Analysis of Existing and Future Feeder System Configurations	
<b>FEEDERPLAN-1 - Load Forecasting, Multiple-Feeder Planning and Analysis</b>		
DUF	Small-Area Load Forecast from Manipulation and Rerating	
(Option 1)	End-Use Load Data	
SUF-1	Small-Area Load Forecast from Combination of Land-Use Patterns, Urban Growth Rules, Zoning, User Estimates	
(Option 2)		
MTF	Small-Area Load Forecast by Extrapolation of Time and Spatial	
(Option 3)	Pattern Trends (uses load data only)	
SUF-2	Small-Area Load Forecast by Prediction of Type and Density of	
(Option 4)	Small-Area Land Use, Employs Urban Model, Spatial Location Pattern, End-Use Load Analysis	
CMF	Optimized Feeder Espansion	
	Optimized Reconfiguration for - Loss of Stations or Feeders	
	- Load Curtailment - Addition of New Stations or Feeders	
	System-Wide Analysis of Voltage Drops	
<b>DATA BASE - Creation, Maintenance, Management</b>		
WIDGIT	Digitizing of Primary Feeder Maps to Develop a Facilities Data	
(DFAD)	Base - Input to FEEDERDESIGN-1	
DFOBM	Planning Data Base	
TLM	Distribution Transformer Utilization and Management	
	Feeder Load Assignment	
	Load Input to Analysis/Planning Programs	



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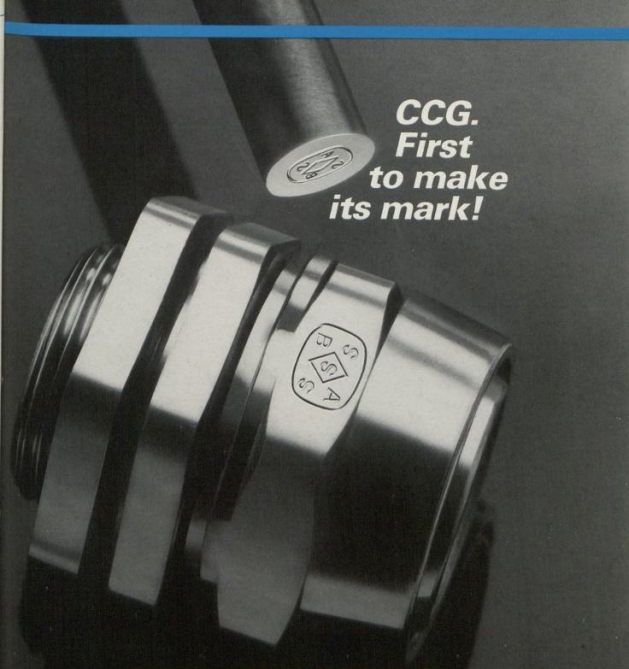
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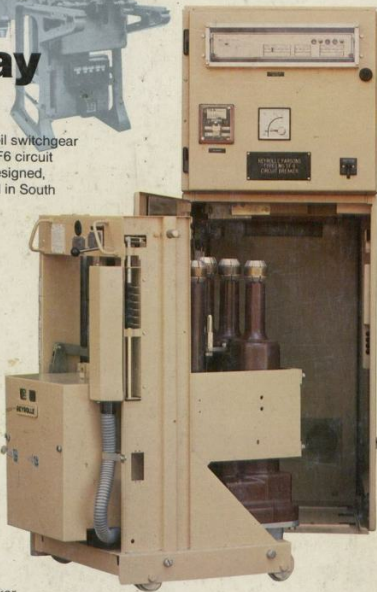
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