

PROCEEDINGS
of the
TWENTY-NINTH CONVENTION
of the
ASSOCIATION OF MUNICIPAL
ELECTRICITY UNDERTAKINGS
OF SOUTHERN AFRICA
(Founded 1915)



held at

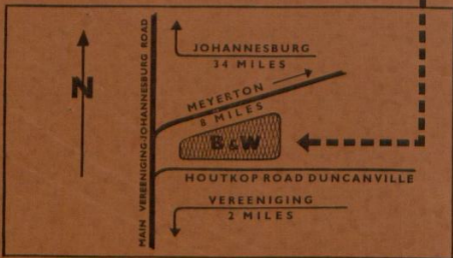
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From Tuesday, May 3rd to
Friday, May 6th

1955

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OF AFRICA



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PRICE FIFTEEN SHILLINGS

*Sixteen new Cd
with Harold Clark.*

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EXECUTIVE COUNCIL, 1955-56



Front Row (Seated L. to R.): Cr. H. Boneschans (Germiston); Cr. P. D. Santilhano (Cape Town); Cr. C. E. K. Young (Pietermaritzburg); Cr. C. E. Acton (Pretoria); D. J. Hugo (Pretoria) President; Alderman A. Morton Jaffray (Salisbury); Cr. F. J. C. Castelyn (Bloemfontein); Cr. D. J. Marais (Johannesburg); Cr. L. P. Davies (Springs).

Second Row (L. to R.): C. R. Hallé (Pietermaritzburg); A. R. Sibson (Bulawayo); G. J. Muller (Bloemfontein), E. C. Lynch (Salisbury), J. C. Downey (Springs).

Third Row (L. to R.): C. Lombard (Germiston); A. T. Taylor (Retiring Secretary); R. G. Ewing (Secretary); R. W. Kane (Johannesburg).

ASSOCIATION OF MUNICIPAL ELECTRICITY UNDERTAKINGS OF SOUTHERN AFRICA

EXECUTIVE COUNCIL 1955/56

President:

D. J. Hugo (Pretoria)

Vice-President:

J. E. Mitchell (Salisbury)

Immediate Past Presidents

G. J. Muller (Bloemfontein)
A. R. Sibson (Bulawayo)

Engineer Members:

R. W. Kane (Johannesburg)	C. R. Hallé (Pietermaritzburg)	J. L. van der Walt (Krugersdorp)
C. G. Downie (Cape Town)	C. Lombard (Germiston)	J. C. Downey (Springs)

Cities or Towns Represented:

Pretoria	Johannesburg	Pietermaritzburg	Krugersdorp
Salisbury	Cape Town	Germiston	Springs
			Bloemfontein (Co-opted)

NOTE.—The Town or City is elected and not the individual Councillors.

Secretary/Treasurer:

A. T. Taylor to 30/6/55
Arthur Tingey, Ewing & Co., from 1/7/55
P.O. Box 7462, Johannesburg

SUB-COMMITTEES:

Papers	D. J. Hugo (President), J. E. Mitchell (Vice-President), A. R. Sibson (Past President).
Tariffs Survey	J. L. van der Walt (Convenor), C. G. Downie, A. R. Sibson, J. C. Downey with co-opted members.
Amendments to Constitution and Rules	G. J. Muller (Convenor), D. J. Hugo, A. R. Sibson.
Finance	R. W. Kane, J. C. Downey.
Recommendations for New Electrical Commodities	J. L. van der Walt (Convenor), J. C. Downey.
Formation of Regional Branches	A. R. Sibson (Convenor), R. W. Kane, J. C. Downey.
Technical Staff and Man Power	J. L. van der Walt (Convenor), J. C. Downey, C. R. Hallé (with power to co-opt.).
Rights of Supply—Reef Industrial Consumers	C. Lombard (Convenor), D. J. Hugo, J. C. Downey, J. C. Fraser.

Representatives:

Electrical Wiremen's Registration Board	R. W. Kane
Coal Allocation Committee	D. J. Hugo, R. W. Kane (Alternate)
Safety Precautions Committee	J. C. Fraser, J. C. Downey (Alternate)
S.A. Bureau of Standards	J. L. van der Walt, J. C. Downey (Alternate), with power to opt.
S.A.I.E.E. Committee—Code of Practice for Sub-Stations	C. Lombard

NOTE.—The President is ex officio a member of all Sub-Committees.

ASSOCIATION OF MUNICIPAL ELECTRICITY UNDERTAKINGS OF SOUTHERN AFRICA

PAST OFFICERS AND MEMBERS OF COUNCIL:

Past Presidents:		Secretary and Treasurer:
1915-17	J. H. Dobson, Johannesburg	F. T. Stokes; E. T. Price
1917-19	J. Roberts, Durban	E. Poole
1919-20	B. Sankey, Port Elizabeth	E. Poole
1920-22	T. C. W. Dod, Pretoria	L. L. Horrell
1922-24	G. H. Swingler, Cape Town	H. A. Eastman
1924-26	J. Roberts, Durban	E. Poole
1926-27	B. Sankey, Johannesburg	R. G. Tresie
1927-29	J. M. Lambe, East London	F. Adkins
1929-31	R. Macauley, Bloemfontein	E. Poole
1931-33	L. L. Horrel, Pretoria	E. Poole
1933-34	L. F. Bickell, Port Elizabeth	F. A. P. Perrow
1934-35	A. R. Metelerkamp, Bulawayo	E. Poole
1935-36	G. G. Ewer, Pietermaritzburg	E. Poole
1936-37	A. Rodwell, Johannesburg	E. Poole
1937-38	J. H. Gyles, Durban	E. Poole
1938-39	H. A. Eastman, Cape Town	E. Poole
1939-44	I. J. Nicholas, Umtata	E. Poole until Dec., 1940
1944-45	A. Rodwell, Johannesburg	L. L. Horrell, Jan., 1941
1945-46	J. S. Clinton, Salisbury	L. L. Horrell
	J. W. Phillips, Bulawayo	L. L. Horrell to Nov., 1945
1946-47	G. J. Muller, Bloemfontein	A. T. Taylor, Dec., 1945
1947-48	C. Kinsman, Durban	A. T. Taylor
1948-49	A. Foden, East London	A. T. Taylor
1949-50	D. A. Bradley, Port Elizabeth	A. T. Taylor
1950-51	C. R. Hallé, Pietermaritzburg	A. T. Taylor
1951-52	J. C. Downey, Springs	A. T. Taylor
1952-53	A. R. Sibson, Bulawayo	A. T. Taylor
1953-54	J. C. Fraser, Johannesburg	A. T. Taylor
1954-55	G. J. Muller, Bloemfontein	A. T. Taylor

PAST ORDINARY MEMBERS OF COUNCIL

1915-17	J. Roberts, W. Bellad-Ellis, B. Sankey.
1917-19	W. Bellad-Ellis, G. Stewart, T. C. W. Dod, T. Jagger
1919-20	W. Bellad-Ellis, G. Stewart, E. T. Price, A. S. Munro
1920-22	L. F. Bickell, T. Millar, L. E. Proctor, E. Poole
1921-24	L. F. Bickell, T. Millar, R. W. Fletcher, J. Roberts
1924-26	T. Jagger, A. S. Munro, T. Millar, L. F. Bickell
1926-27	L. F. Bickell, T. C. W. Dod, T. Millar, E. Poole
1927-29	L. F. Bickell, R. A. Young, T. Millar, E. Poole
1929-30	L. F. Bickell, T. Millar, F. C. D. Mann, G. H. Swingler, A. Rodwell
1931-32	T. Millar, F. C. D. Mann, G. H. Swingler, A. Rodwell
1932-34	T. Millar, J. H. Gyles, G. H. Swingler, A. Rodwell
1934-35	T. Millar, J. H. Gyles, G. H. Swingler, A. Rodwell

NOTE.—At the Thirteenth Convention the Rules and Constitution were amended to permit of Councils becoming members of the Association and to be represented on the Executive Council by two Councillor Members, hence the new layout of members of the Executive.

Councillors:	Alternate Councillors:	Engineers:
T. P. Gray, Johannesburg	1935-36:	G. H. Swingler, Cape Town
J. McLean, Port Elizabeth	H. W. Dely, Pretoria	J. H. Gyles, Durban
		T. Millar, Harrismith
		E. A. Behrens, Port Elizabeth
	1936-37:	G. H. Swingler, Cape Town
H. Middlebrook, Durban	F. Morrell, Cape Town	T. Jagger, Ladysmith
T. P. Gray, Johannesburg	J. McLean, Port Elizabeth	E. A. Behrens, Port Elizabeth
		G. M. Pirie, Bloemfontein

ASSOCIATION OF MUNICIPAL ELECTRICITY UNDERTAKINGS OF SOUTHERN AFRICA

	1937-38:	L. L. Horrell, Pretoria
H. G. Capell, Durban	H. Middlebrook, Durban	J. S. Clinton, Salisbury
W. James, Cape Town	L. Hofmeyr, Stellenbosch	A. Q. Harvey, Springs
	1938-39:	G. M. Pirie, Bloemfontein
E. Spilkin, Umtata	G. C. Starkey, East London	D. J. Hugo, Pretoria
W. James, Cape Town	W. Fowkes, Cape Town	J. S. Clinton, Salisbury
	1939-44:	A. Q. Harvey, Springs
E. Spilkin, Umtata	G. C. Starkey, East London	G. M. Pirie, Bloemfontein
C. Olley, Salisbury	W. Fowkes, Cape Town	D. J. Hugo, Pretoria
	1944-45:	C. Kinsman, Durban
H. H. Verity, Johannesburg	H. E. Gearing, Cape Town	J. C. Fraser, Johannesburg
C. Olley, Salisbury	R. M. Thomas, Durban	G. R. E. Wright, Benoni
	1945-46:	D. J. Hugo, Pretoria
J. Ohlsen, Bulawayo	M. Jaffray, Salisbury	C. Kinsman, Durban
J. W. du Plessis, Bloemfontein	E. Boylan, M.P.C., Johannesburg	J. C. Fraser, Johannesburg
	1946-47:	G. R. E. Wright, Benoni
P. J. C. du Plessis, M.P.C. (Bloemfontein)	A. Immink, Johannesburg	D. J. Hugo, Pretoria
Major J. Raftery, J.P., M.P.C. (Durban)	A. Z. Berman, Cape Town	J. C. Fraser, Johannesburg
	1947/48:	G. R. E. Wright, Benoni
Major J. Raftery, J.P., M.P.C. (Durban)	J. M. Preller, Pretoria	D. J. Hugo, Pretoria
E. H. Tiddy, East London	C. G. Thompson, Johannesburg	D. J. Hugo, Pretoria
	1948-49:	J. C. Fraser, Johannesburg
E. H. Tiddy, East London	C. G. Thompson, Johannesburg	J. C. Downey, Springs
J. C. K. Erasmus, J.P., Port Elizabeth	J. Johnston, Durban	H. A. Eastman, Cape Town
	1949-50:	D. J. Hugo, Pretoria
J. C. K. Erasmus, J.P., Port Elizabeth	W. F. du Plessis, Bloemfontein	J. C. Fraser, Johannesburg
C. E. (Sax) Young, Pietermaritzburg	S. H. Millar, Bulawayo	J. C. Downey, Springs
		H. A. Eastman, Cape Town
		G. I. Muller, Bloemfontein
		A. R. Sibson, Bulawayo
		J. L. van der Walt, Krugersdorp

NOTE:

NOTE.—At the Twenty-Fourth Convention the Rules and Constitution were amended to permit of eight Councillor Members being elected to the Executive and that these Councillor Members shall be the Councillors of those towns whose Engineer Members (other than the two Past-Presidents) have been elected to the Executive Council.

As a result of this amendment the undermentioned constituted the Executive Council:—

Councils: 1949/50		Engineers:	
Pietermaritzburg	Councillor C. E. Young	C. R. Halle	
Springs	Councillor L. P. Davies	J. C. Downey	
Bulawayo	Councillor J. J. Wrathall	A. R. Sibson	
Bloemfontein	Councillor W. F. du Plessis	G. J. Muller	
Cape Town	Councillor J. Muller	H. A. Eastman	
Durban	Councillor G. Hayward	C. Kinsman	
Krugersdorp	Councillor E. B. Neill	J. L. van der Walt	
Johannesburg	Councillor L. M. Weiner	J. C. Fraser	
		D. A. Bradley	
		A. Foden	

Councils: 1951/52:	
Pretoria	C. W. Sinclair
East London	F. T. Fox
Springs	L. P. Davies
Cape Town	Maj. J. W. O. Billingham
Krugersdorp	Maj. H. Pannall
Bulawayo	C. M. Newman
Durban	E. E. Check
Johannesburg	L. M. Weiner

Engineers:	
J. C. Downey	
A. R. Sibson	
A. Foden	
J. C. Fraser	
D. J. Hugo	
C. G. Downey	
C. Kinsman	
J. L. van der Walt	

ASSOCIATION OF MUNICIPAL ELECTRICITY UNDERTAKINGS OF SOUTHERN AFRICA

Councils: 1952/53:

Bloemfontein	E. B. Altona
Bulawayo	T. W. Gubb
Cape Town	A. F. Keen
Durban	H. L. Richardson
Johannesburg	H. W. Harrison
Krugersdorp	M. C. Dames
Port Elizabeth	L. Dubb
Salisbury	A. Morton Jaffray

Engineers:

G. J. Muller
A. R. Sibson
C. G. Downie
C. Kinsman
J. C. Fraser
J. L. van der Walt
D. A. Bradley
J. E. Mitchell

Councils: 1953/54:

Johannesburg	H. W. Harrison
Bloemfontein	G. A. Fichardt
Port Elizabeth	A. Markman
Cape Town	A. F. Keen
Durban	H. L. Richardson
Salisbury	A. Morton Jaffray
Krugersdorp	M. C. Dames
Pretoria	C. E. Acton

Engineers:

J. C. Fraser
G. J. Muller
D. A. Bradley
C. G. Downie
C. Kinsman
J. E. Mitchell
J. L. van der Walt
D. J. Hugo

Councils: 1954/55:

Bloemfontein	F. J. C. Castelyn
Cape Town	P. D. Sauttilhaus
Krugersdorp	M. C. Dames
Port Elizabeth	A. Markman
Pretoria	C. E. Acton
Pietermaritzburg	C. E. K. Young
Salisbury	A. Morton Jaffray
Springs	L. P. Davies

Engineers:

G. J. Muller
C. G. Downie
J. L. van der Walt
D. A. Bradley
D. J. Hugo
C. R. Hallé
J. E. Mitchell
J. C. Downey

Councils - 1954/55

Lucy Post President

RULES AND CONSTITUTION

ASSOCIATION OF
MUNICIPAL ELECTRICITY UNDERTAKINGS
OF SOUTHERN AFRICA

1. TITLE

The name of the Association shall be "The Association of Municipal Electricity Undertakings of Southern Africa."

2. OBJECTS

The objects for which the Association is formed are:—

- (a) To promote the interests of Municipal Electricity Undertakings.
- (b) To bring Municipal Electrical Engineers and Chairman and Members of Municipal Electricity Committees together.
- (c) To arrange and hold periodical meetings for the reading of papers and discussions of subjects appertaining to Municipal Electricity Undertakings.
- (d) To take such action as may be lawful and expedient for the protection and defence of the rights or interests of Municipal Electricity Undertakings.

3. MEMBERSHIP

The Association shall consist of:—

- (a) Honorary Members.
- (b) Councillor Members.
- (c) Engineer Members.
- (d) Associate Members.
- (e) Associates.
- (f) Regional Branches.

4. QUALIFICATIONS

The qualifications for admission to the Association shall be as follows:—

- (a) **Honorary Members** shall be distinguished persons who are or who have been intimately connected with Municipal Electricity Undertakings and whom the Association especially desires to honour for exceptionally important services in connection therewith.
- (b) **Councillor Members.** The Member whose Chief Electrical Engineer shall have qualifications acceptable to the Council shall be the Committee appointed by the Muni-

cipality or Local Authority to have control over its Electricity Undertakings and shall be represented as regards its qualifications to vote by one member of such Committee.

- (c) **Engineer Members.** The Member shall be the Chief Electrical Engineer engaged on the permanent staff of an Electricity Undertaking owned by a Municipality or Local Authority and who has had a thorough training in electrical engineering and is otherwise acceptable to the Council of the Association. After 1st June, 1947, one only duly qualified assistant in an undertaking with sales of over 20,000,000 units per annum may also be admitted to this class on the recommendation of the Chief Electrical Engineer.
- (d) **Associate Members.** The Member shall be a Technical Assistant engaged on the permanent staff of any Electricity Undertaking represented by its Councillor Member and/or Engineer Member.
- (e) **Associates.** Any member resigning from the Class of Engineer Member or Associate Member shall be entitled to apply for transfer to the class of Associate. An Associate may also be an Engineer in the employ of an Authorised Electricity Undertaker other than a Local Authority who is engaged in the supply of electricity to consumers in the area of jurisdiction of a Local Authority.

(f) **Regional Branches:**

- (i) On application in writing being received from the Councillor and Engineer members of not less than five Municipal Electricity Undertakings, the Executive Council may approve of the setting up of a Regional Branch of the Association, and such Regional Branch may continue to operate under By-Laws laid down from time to time by the Executive Council, until such time as the Executive Council may decide that such Regional Branch should cease to exist.

- (2) The Executive Council shall from time to time delineate the geographical area falling under the jurisdiction of a Regional Branch.

5. ADMISSION OF MEMBERS

- (a) The election of Honorary Members and other classes shall be vested in the Council.
- (b) Councillor Members may be admitted on an application signed by the Town Clerk of the Municipality or Local Authority concerned.
- (c) Every candidate for election into the Association as Engineer Member shall make application on the prescribed form suitably endorsed by two supporters who shall be either Engineer Members, Councillor Members or Members of the Committee of the Municipal or Local Authority in charge of the Electricity Undertaking of which the applicant is Chief Electrical Engineer.
- (d) Every candidate for election into the Association as Associate Member or Associate shall make application on the prescribed form suitably endorsed by the Engineer Member on whose staff he is engaged.
- (e) Every candidate for transfer to the class of Associate shall make application in writing for transfer.
- (f) As laid down in 4(f) Qualifications.

6. CONTRIBUTIONS

Contributions shall become due and payable annually on the 1st day of March which shall constitute the new financial year of the Association.

- (a) **Honorary Members** shall not be required to pay any contribution.
- (b) **Councillor Members.** In the case of the Committee appointed by a Municipality or Local Authority to have control over the Electricity Undertaking, the undermentioned scale of contributions shall apply:

SCALE OF CONTRIBUTIONS

Up to	½ million units	— — —	4 guineas
½ "	1 "	" "	6 "
1 "	10 "	" "	8 "
10 "	50 "	" "	12 "
50 "	100 "	" "	14 "
100 "	200 "	" "	16 "
200 "	300 "	" "	18 "
Over 300 "	" "	" "	20 "

- (c) **Engineer Members.** The contribution of an Engineer Member in the service of a Committee making a contribution shall merge into and form part of such contribution. When a Committee is not a Member or resigns from membership the Engineer Membership contribution shall be two (2) guineas.

- (d) **Associate Members and Associates.** The contribution of Associate Members or Associates shall be one (1) guinea.

Part year contribution. All members shall pay the contribution for the year in which they are elected without reference to the period of the year at which their election takes place and they shall be entitled to receive a copy of the Proceedings or any other publication issued during such year.

Arrear Contribution. No class of member whose contribution is six months in arrear shall be entitled to attend or take part in any of the meetings of the Association or to receive any of the Association's publications.

Any class of member whose contribution is in arrear at any Convention shall deem to have forfeited claim to membership and his name may, by the Council, be removed from the register of the Association, but he shall, nevertheless, be liable for such arrears up to the date of his name being removed.

7. COUNCIL

Management. The affairs of the Association shall be managed by the Council, who shall have power to incur any expenditure necessary for the objects of the Association.

Members of the Council. The Council shall consist of a President, Vice-President, two immediate Past-Presidents, all of whom shall be Engineer Members, the Chairman of any properly constituted regional branches, six other Engineer Members and eight Councillor Members.

Officers of Council. The officers of the Council shall be President, Vice-President, Secretary/Treasurer.

Election of Council. The officers (other than the Secretary/Treasurer) and the Engineer Members shall be elected by nomination and ballot at the Convention, and shall hold office until the next Convention. In the event of a vacancy occurring during the year, the remaining members shall have power to appoint a member to fill the vacancy. The Councillor Members shall be the Councillors of those towns whose Engineer Members (other than the two Past-Presidents) have been elected to the Executive Council.

ASSOCIATION OF MUNICIPAL ELECTRICITY UNDERTAKINGS OF SOUTHERN AFRICA

Co-option. The Council shall have power to co-opt any members of the Association or other persons for any special purpose whose services in their opinion may advance the objects of the Association.

Election of Secretary/Treasurer. The Council shall appoint and from time to time determine the remuneration (if any) and prescribe the duties of the Secretary/Treasurer who shall hold office during the pleasure of the Council.

8. MEETINGS

Council. The Council shall meet as often as the business of the Association may require and at any meeting five shall constitute a quorum.

Conventions. The Association shall hold Conventions yearly (of which the local Press of the town in which the Convention is held shall be given full particulars) as far as may be conveniently arranged, and at that meeting the Secretary and Treasurer shall present the Report and Balance Sheet of the Association for the immediate past period.

Representation by Companies. Subject to the payment of the fees prescribed herein, Companies approved by the Executive Council, may be represented at Conventions of the Association. The representatives of any one Company, at any Convention, shall not exceed two in number, except with the consent of the Executive Council.

The fees payable by Companies and their representatives shall be:—

Company Convention Fee: £10.10.0 per Company.

Representatives: £3.0.0 per representative plus £1.0.0 per accompanying lady.

The President may accord the courtesy of debate to any visitor or Company representative.

Quorum. At any meeting of the Association 15 shall form a quorum.

Chairman. The President shall take the chair at all meetings of the Association, the Council and the Committees, at which he is present, and shall regulate and keep order in the proceedings.

In the absence of the President, it shall be the duty of the Vice-President to preside at the meetings of the Association, and to regulate and keep order in the proceedings. But in the case of the absence of the President, and of the Vice-President, the meeting may elect any member of the Council or, in the case of their absence, any member present to take the chair at the meeting.

Resolve into Committee. The Association shall reserve to itself the right to resolve into Committee at any time during its proceedings; moreover, it shall be competent for any member to have his paper read and discussed in committee if he so desires.

Sectional Voting. When a motion is before any Convention or meeting of the Association it shall be competent for any member of either the Councillor or Engineer sections to apply to the Chairman for a "Vote by Section." This application shall be granted by the Chairman whereupon each of these sections shall vote separately on the motion and unless a majority shall be obtained in each section, the motion shall be lost. On a sectional vote being called for, Associate Members and Associates shall not be entitled to vote.

ASSOCIATION OF MUNICIPAL ELECTRICITY UNDERTAKINGS OF SOUTHERN AFRICA

MEMBERS, DELEGATES AND VISITORS ATTENDING THE 29th CONVENTION

ALBERTON:	KEMPTON PARK
Cr. J. J. Schoeman	Cr. F. A. Els
M. W. Odendaal	L. Fitcher
BEAUFORT WEST:	KIMBERLEY
J. P. Mostert	Cr. L. Jawno
BENONI:	J. A. Mathews
Cr. Geo. Wahnsley	KOKSTAD
D. Lees	W. G. Thuckwray
BETHAL:	KLERKSDORP
M. N. Kirberger	J. M. Gericke
BETHLEHEM	KROONSTAD
Cr. B. Smuts	Cr. H. Schwim
K. M. Fisher	W. Rossler
BLOEMFONTEIN	KRUGERSDORP
Cr. F. J. C. Castelyn	Cr. E. J. Jonker and Cr. M. C. Dames
G. J. Muller	J. F. Neese
BOKSBURG	LADYBRAND
Cr. V. D. Terblans	F. J. van der Merwe
E. L. Smith	LADYSMITH
BRAKPAN	F. Stevens
P. L. Vergottini	LOUIS TRICHARDT
BULAWAYO	Cr. C. H. Roux
Cr. S. H. Millar	G. A. Lotter
A. R. Sibson	MAFEKING
BUTTERWORTH	Cr. A. Botha
D. R. Verschoor	G. E. H. Jones
CAPE TOWN	MIDDELBURG, TVL.
Cr. P. D. Santilhana	N. A. Potgieter
C. G. Downie	MOSSEL BAY
DE AAR	Cr. H. Shapira
J. A. Macquis	E. R. Stocks
DURBAN	NEWCASTLE
Cr. Spanier Marson	J. R. Stayte
R. M. O. Simpson	'NDOLA
EAST LONDON	J. McGilbon
Cr. R. L. de Lange	ODENDAALSRSUS
P. A. Giles	J. van der Spuy
EDENVALE	OUTDSHOORN
Cr. R. H. Jones	C. H. Adams
R. V. Bailey	PARYS
ESTCOURT	D. R. Pretorius
J. G. F. Erikson	✓ PIETERSBURG
FICKSBURG	J. I. Inglis
J. L. Rothman	✓ PIETERMARITZBURG
GATOOMA	Cr. C. E. K. Young
Cr. A. Stainthorpe	C. R. Hallé
P. C. Grandin	✓ PIET RETIEF
GEORGE	T. M. Mocke
Cr. J. C. Heunis	✓ PORT ELIZABETH
P. H. Newcombe	Cr. A. Markman
GERMISTON	D. M. Nobbs
Cr. H. Boneschans	PORT SHEPSTONE
C. Lombard	Cr. S. H. Lowe
GRAAFF REINET	K. W. J. Halliday
Cr. Adv. U. J. Cronje	POTCHEFSTROOM
G. A. H. Schaftenaar	Cr. H. H. Holtzhausen
GRAHAMSTOWN	T. Kramer
J. Iverach	✓ PRETORIA
GREYTOWN	Dr. H. Muller (Mayor)
J. S. Craig	Cr. C. E. Acton
HEIDELBERG	D. J. Hugo
Cr. J. D. Jordaan	John Wilson
J. F. Lategan	QUEENSTOWN
JOHANNESBURG	Cr. J. H. Chemaly
Cr. D. J. Marais and Cr. W. McPhail	V. E. O. Barratt
R. W. Kane	

ASSOCIATION OF MUNICIPAL ELECTRICITY UNDERTAKINGS OF SOUTHERN AFRICA

RANDFONTEIN ✓

Cr. P. Pretorius
J. R. Cherry

ROBERTSON

Cr. R. L. Barry
S. R. de Villiers ✓

ROODEPOORT-MARAISBURG

Cr. M. L. Rutter
D. D. Brown ✓

RUSTENBURG

Cr. Dr. J. W. Pont
P. A. Meintjes ✓

SALISBURY ✓

Cr. A. J. Thomson
Alderman M. Jaffray
E. C. Lynch

SPRINGS ✓

Cr. L. P. Davies
J. C. Downey

STANDERTON

Cr. E. I. Smith
G. B. Heunis

STANGER

Cr. R. Stone
J. L. McNeil

STELLENBOSCH

E. de C. Pretorius

THE STRAND

C. N. Sims

THEUNISSEN

J. C. van der Walt

UITENHAGE ✓

Cr. D. G. Calder
J. D. Dawson

UMTALI

H. T. Turner

UMTATA

Cr. H. R. Sissons
F. R. Waldron

VEREENIGING

Cr. H. W. Chatterton
A. F. Turnbull

VRYHEID ✓

Cr. R. Large
W. Rush

WELKOM ✓

R. W. Barton

WESTONARIA ✓

Cr. J. F. H. le Roux
L. Dreyer

WITBANK ✓

E. E. de Villiers

WORCESTER

Cr. R. Mercer
W. Theron

OTHER MEMBERS

C. Kinsman (Hon. Member)
D. A. Bradley (Engineer Member)
R. Leishman (Engineer Member)
A. K. Campbell (Associate)
H. M. S. Muller (Associate)
G. C. Theron (Associate)
R. J. S. Wylie (Associate)

W. Bellad-Ellis (Foundation Member)
J. C. Fraser (Engineer Member)
C. R. Burton (Associate)
D. J. R. Conradie (Associate)
W. N. Powell (Associate)
J. T. Williams (Associate)

DELEGATES

GOVERNMENT DEPARTMENTS

Electricity Supply Commission:

Dr. I. Theo. Hattingh (Chairman).
H. J. de Villiers, E. T. Price (Jnr.) and A. J. Levy.

Other Departments:

Dr. F. J. de Villiers, Chairman, Electricity Control Board.
Prof. J. Goudriaan, Electricity Control Board.
Dr. O. Brune, Dr. W. Rennhackkamp, Council for Scientific and Industrial Research.
J. W. Stoodley, United Kingdom Trade Commission.
R. N. F. Smit, Chief Inspector of Factories and Chairman, Electrical Wiremen's Registration Board.
J. J. de Haas, Public Works Department.
H. A. Johnson, Chief Engineer, G.P.O., Pretoria.

OTHER REPRESENTATIVES

A. H. Durr, A.A. Middlecote, S.A. Bureau of Standards.
Prof. G. R. Bozzoli, President, South African Institute of Electrical Engineers.
J. Ettershank, President, South African Institution of Mechanical Engineers.
J. Lowmie, President, South African Institute of Certificated Engineers.
A. Solomon, Pretoria Technical College.
G. Williams, S.A.R. & H.

VISITORS

A. Howell, Merz & McLellan, Newcastle-upon-Tyne, England.
 J. D. Baxter, Northern Cape Regional Electrification Board.
 T. R. J. Bishop, W. J. Hampson, Major S. G. Redman, Merz & McLellan, S.A.
 P. L. G. van den Hoogen, Pretoria.
 R. S. Dunstan, Electricity Department, Pretoria.
 F. L. Knobel, Electricity Department, Pretoria.
 E. A. McWilliam, Electricity Department, Pretoria.
 H. Preiss, Town Clerk, Pretoria.
 T. C. Stoffberg, Electricity Department, Pretoria.
 I. F. Boyack, Electricity Department, Pretoria.
 C. H. Clutterbuck, Pretoria.
 R. G. Ewing, Johannesburg.
 O. D. Gorven, Durban.
 K. M. Johnson, Johannesburg.
 A. K. Scrooby, Pretoria.

REPRESENTATIVES OF ENGINEERING COMPANIES

Aberdare Cables Africa Ltd. ————	R. J. Bates, G. McL. Yuill.
African Cables Ltd. ————	V. H. Woods, G. Yates.
Arthur Trevor Williams (Pty.) Ltd. ————	J. A. Barnett, A. T. Williams.
African Transmission and Construction Co. (Pty.) Ltd. ————	E. W. Mole.
British Thomson-Houston Co. (S.A.) (Pty.) Ltd. ————	H. G. Val-Davies.
Babcock & Wilcox of Africa Ltd. ————	J. C. Callie, J. S. Woosley, S. J. Whybrow (London).
British Insulated Cables (S.A.) Ltd. ————	A. L. Sanders, A. W. Allen.
Brush A.B.O.E. (Southern Africa) Ltd. ————	P. N. Vickerman.
British General Electric Co. Ltd. ————	R. G. Canning, W. J. Hill.
Caltex (Africa) Ltd. ————	J. Carstairs, E. F. Partridge.
Chloride Electrical Storage Co. (S.A.) (Pty.) Ltd. ————	A. C. Tilley.
Contacto (Pty.) Ltd. ————	D. R. Pigot.
Cooper & de Beer (Pty.) Ltd. ————	C. L. de Beer, M. Hewitt.
Crompton & Parkinson ————	C. J. Close, Johannesburg.
Dowson & Dobson Ltd. ————	W. Hatty, E. C. Kleep.
Davidson & Co. (Africa) Ltd. ————	F. S. Haigh, H. Doughty.
Enfield Cables (S.A.) (Pty.) Ltd. ————	A. E. Torrance.
English Electric Co. (South Africa) Ltd. ————	H. J. Nethersole, H. Prins, A. E. O. O'Dowd.
Falks Electrical Supplies (S.A.) Ltd. ————	R. C. Viviers.
First Electrical Corporation ————	A. MacArthur, M. R. Marot.
General Motors (South Africa) Ltd. ————	T. R. Park, G. Withers.
W. T. Glover & Co. Ltd. ————	W. J. G. Emery.
Henley's S.A. Telegraph Works Co. Ltd. ————	R. W. Lord.
Hubert Davies & Co. Ltd. ————	R. Cator.
James Howden & Co. Africa (Pty.) Ltd. ————	R. J. Cunningham.
Hopkinsons (S.A.) (Pty.) Ltd. ————	E. C. Enfield, Geo. Lourens.
International Combustion Africa Ltd. ————	Q. R. Nothard, K. B. Yuill.
Johnson & Phillips S.A. (Pty.) Ltd. ————	E. W. Dixon, F. H. Tyler.
John Brown & Co (Overseas) (Pty.) Ltd. ————	R. Richardson, W. H. Wilson.
G. H. Langler & Co. ————	G. H. Boyle.
Marthinussen Harold & Co. (Pty.) Ltd. ————	G. Roske.
Marthinussen L. H. Ltd. ————	A. E. Lawrence.
Mather & Platt (S.A.) (Pty.) Ltd. ————	N. J. Hatfield.
Metropolitan Vickers (S.A.) (Pty.) Ltd. ————	S. McCracken, J. Monks.
Parson, C.A. & Co. S.A. (Pty.) Ltd. ————	T. R. Strawson.
Reunert & Lenz Ltd. ————	E. J. McKechnie, I. Ofresholm, C. F. Robinson.
Reyrolle & Co. Ltd. ————	W. J. Gibbons.
Scottish Cables (S.A.) Ltd. ————	A. C. Grant, T. H. Rafferty.
S.A. Cable Makers' Association ————	A. L. Sanders.
S.A. General Electric Co. Ltd. ————	E. Crole, R. Kilfoil.
Stamcor (Pty.) Ltd. ————	J. M. Taylor.
Standard Telephones & Cables Ltd. ————	F. C. Deacon, T. R. Johnson.
Stewarts & Lloyds of S.A. Ltd. ————	J. W. Kok, T. A. Robinson.
Shell Co. of S.A. Ltd. ————	G. Phillips, D. McG. Clark.
Simplex Electric Co. (S.A.) (Pty.) Ltd. ————	J. A. Morrison.
Selby Engineers (Pty.) Ltd. ————	E. Tickton.
Wilson & Herd (Pty.) Ltd. ————	R. G. Edwards, H. N. Hancox, C. K. Burrow.
H. Wegner & Co. (Pty.) Ltd. ————	G. Tilch, M. Wegner.
Yarrow Africa (Pty.) Ltd. ————	H. D. T. Harris, C. W. Suckling.

LADIES

- Mrs. C. E. Acton, Pretoria.
 Mrs. C. H. Adams, Oudtshoorn.
 Mrs. R. V. Bailey, Edenvale.
 Mrs. J. A. Barnett, Johannesburg.
 Mrs. V. E. D. Barratt, Queenstown.
 Mrs. K. L. Barry, Robertson.
 Mrs. R. J. Bates, Port Elizabeth.
 Mrs. J. D. Baxter, Kimberley.
 Mrs. T. R. J. Bishop, Johannesburg.
 Mrs. H. Boneschans, Germiston.
 Mrs. G. H. Boyle, Johannesburg.
 Mrs. D. D. Brown, Roodepoort.
 Mrs. G. R. Bozzoli, Johannesburg.
 Mrs. C. R. Burton, Kimberley.
 Mrs. C. K. Burrow, Johannesburg.
 Mrs. J. C. Callie, Vereeniging.
 Mrs. A. R. Campbell, Johannesburg.
 Mrs. R. Cator, Johannesburg.
 Mrs. H. W. Chatterton, Vereeniging.
 Mrs. J. R. Cherry, Randfontein.
 Mrs. W. Chowles, Pretoria.
 Mrs. C. J. Close, Johannesburg.
 Mrs. C. H. Clutterbuck, Pretoria.
 Mrs. J. S. Craig, Greytown.
 Mrs. M. Crighton, Pretoria.
 Mrs. E. Crole, Johannesburg.
 Mrs. R. J. Cunningham, Johannesburg.
 Mrs. G. A. Dalton, Johannesburg.
 Mrs. L. P. Davies, Springs.
 Mrs. F. J. de Villiers, Pretoria.
 Mrs. J. J. de Haas, Pretoria.
 Mrs. R. L. de Lange, East London.
 Mrs. F. C. Deacon, Johannesburg.
 Mrs. S. de V. de Villiers, Robertson.
 Mrs. J. C. Downey, Springs.
 Mrs. L. Dreyer, Westonaria.
 Mrs. A. G. Dunn, Johannesburg.
 Mrs. R. S. Dunstan, Pretoria.
 Mrs. A. H. Durr, Pretoria.
 Mrs. R. G. Edwards, Johannesburg.
 Mrs. F. A. Els, Kempton Park.
 Mrs. E. C. Enfield, Johannesburg.
 Mrs. J. G. F. Erikson, Estcourt.
 Mrs. R. G. Ewing, Johannesburg.
 Mrs. K. M. Fisher, Bethlehem.
 Mrs. I. C. Fraser, Johannesburg.
 Mrs. L. Fitcher, Kempton Park.
 Mrs. W. J. Gibbons, Johannesburg.
 Mrs. P. A. Giles, East London.
 Mrs. O. D. Gorven, Durban.
 Mrs. A. C. Grant, Johannesburg.
 Mrs. H. N. Hancock, Johannesburg.
 Mrs. H. D. T. Harris, Johannesburg.
 Mrs. J. F. Heese, Krugersdorp.
 Mrs. G. B. Heunis, Standerton.
 Mrs. H. Haulthausen, Potchefstroom.
 Mrs. A. Howell, Newcastle-Upon-Tyne.
 Mrs. D. J. Hugo, Pretoria.
 Miss J. M. Hugo, Pretoria.
 Mrs. J. I. Inglis, Pietersburg.
 Mrs. T. R. Johnson, Johannesburg.
 Mrs. R. H. Jones, Edenvale.
 Mrs. R. W. Kane, Johannesburg.
 Mrs. R. Kilfoil, Pretoria.
 Mrs. C. Kinsman, Durban.
 Mrs. F. L. Knobel, Pretoria.
 Mrs. J. W. Kok, Johannesburg.
 Mrs. T. Kramer, Potchefstroom.
 Mrs. A. E. Lawrence, Johannesburg.
 Mrs. D. Lees, Benoni.
 Mrs. J. F. H. le Roux, Westonaria.
 Mrs. R. Leishman, Johannesburg.
 Mrs. C. Lombard, Germiston.
 Mrs. R. W. Lord, Johannesburg.
 Mrs. G. A. Lotter, Louis Trichardt.
 Mrs. G. Lourens, Johannesburg.
 Mrs. J. Lownie, Johannesburg.
 Mrs. J. A. Mathews, Kimberley.
 Mrs. S. McCrachen, Johannesburg.
 Mrs. E. A. McWilliam, Pretoria.
 Mrs. P. A. Meintjies, Rustenburg.
 Mrs. R. Mercer, Worcester.
 Mrs. A. A. Middlecote, Pretoria.
 Mrs. E. L. Mole, Johannesburg.
 Mrs. T. M. Moeke, Piet Retief.
 Mrs. J. Monks, Johannesburg.
 Mrs. J. A. Morrison, Springs.
 Mrs. H. M. S. Muller, Upington.
 Mrs. G. J. Muller, Bloemfontein.
 Mrs. H. Muller, Mayoress, Pretoria.
 Mrs. H. J. H. Nethersole, Johannesburg.
 Mrs. O. R. Nothard, Johannesburg.
 Mrs. W. M. Odendaal, Alberton.
 Mrs. N. A. Potgieter, Middelburg, Tvl.
 Mrs. E. de C. Pretorius, Stellenbosch.
 Mrs. M. J. Prins, Johannesburg.
 Mrs. T. H. Rafferty, Johannesburg.
 Mrs. G. Richardson, Johannesburg.
 Mrs. T. A. Robinson, Johannesburg.
 Mrs. J. L. Rothman, Ficksburg.
 Mrs. M. L. Rutter, Roodepoort.
 Mrs. J. J. Schoeman, Alberton.
 Miss S. Sibson, Bulawayo.
 Mrs. R. M. O. Simpson, Durban.
 Mrs. R. N. F. Smit, Pretoria.
 Mrs. E. L. Smith, Boksburg.
 Miss M. E. Smith, Boksburg.
 Mrs. F. Stevens, Ladysmith.
 Mrs. E. R. Stocks, Mossel Bay.
 Mrs. T. C. Stoffberg, Pretoria.
 Mrs. J. W. Stoodley, Pretoria.
 Mrs. T. R. Strawson, Johannesburg.
 Mrs. C. W. Suckling, Johannesburg.
 Mrs. A. J. Stroud, Pretoria.
 Mrs. A. T. Taylor, Johannesburg.
 Mrs. J. M. Taylor, Johannesburg.
 Mrs. V. D. Terblans, Boksburg.
 Mrs. G. C. T. Theron, Vanderbijlpark.
 Mrs. E. R. Tickton, Johannesburg.
 Mrs. A. C. Tilley, Johannesburg.
 Mrs. A. E. Torrance, Johannesburg.
 Mrs. H. G. Val-Davies, Johannesburg.
 Mrs. P. L. Vergottini, Brakpan.
 Mrs. D. R. Verschoor, Butterworth.
 Mrs. P. N. Vickerman, Johannesburg.
 Mrs. G. Walmsley, Benoni.
 Mrs. A. T. Williams, Johannesburg.
 Mrs. J. T. Williams, Pretoria.
 Mrs. J. Wilson, Pretoria.
 Miss H. Wilson, Pretoria.
 Mrs. W. H. Wilson, Johannesburg.
 Mrs. V. H. Woods, Vereeniging.
 Mrs. J. S. Woosley, Vereeniging.
 Mrs. K. B. Yuill, Johannesburg.
 Mrs. G. McL. Yuill, Johannesburg.

ASSOCIATION OF MUNICIPAL ELECTRICITY UNDERTAKINGS OF SOUTHERN AFRICA

LIST OF MEMBERS AS AT 31st MAY, 1955

HONORARY MEMBERS

- Bellad-Elis, W., 2, Somerset Road, East London.
 X Eastman, H. A. Torwood, Parel Vallei, Somerset West, C.P.
 Fraser, J. C., 26, Grace Road, Mountain View, Johannesburg.
 Horrell, L. L., P.O. Box 322, Pretoria.
 Kinsman, C., 7, Highgate Place, Durban North.
 Poole, E., 3, Musgrave Mansions, 690, Musgrave Road, Durban.
 Rodwell, A. T., "Miranda," Oxford Road, Parktown, Johannesburg.
 Redman, Major S. G. H. M., *Anglo-Saxon House, Ross & Co., Johannesburg*
 Young, C. H. N., *Raydon's, Johannesburg*

COUNCIL MEMBERS

- Adelaide, C.P., Municipality, P.O. Box 38.
 Aliwal North, C.P., Municipality, P.O. Box 46.
 Alberton, Tvl., Municipality, P.O. Box 4.
 Barberton, Tvl., Municipality, P.O. Box 33.
 Beaufort West, C.P., Municipality, P.O. Box 9.
 Benoni, Tvl., Municipality, P.O. Box 45.
 Bethal, Tvl., Municipality, P.O. Box 3.
 Bethlehem, O.F.S., Municipality, P.O. Box 130.
 Bloemfontein, O.F.S., City Council, P.O. Box 288.
 Boksburg, Tvl., Town Council, P.O. Box 215.
 Brandfort, O.F.S., Municipality, P.O. Box 13.
 Bulawayo, S.R., City Council, P.O. Box 501.
 Butterworth, Transkei, Municipality, P.O. Box 36.
 Brakpan, Tvl., Town Council, P.O. Box 15.
 Brits, Tvl., Town Council, P.O. Box 106.
 Bothaville, O.F.S., Municipality, P.O. Box 12.
 Cape Town, C.P., City Council, P.O. Box 298.
 Cradock, C.P., Municipality, P.O. Box 24.
 Ceres, C.P., Municipality, P.O. Box 44.
 De Aar, C.P., Municipality, P.O. Box 42.
 Delmas, Tvl., Village Council, P.O. Box 6.
 Durban, Natal, City Council, P.O. Box 147.
 Dewetsdorp, O.F.S., Municipality, P.O. Box 13.
 East London, C.P., City Council, P.O. Box 134.
 Elliot, C.P., Municipality, P.O. Box 21.
 Ermelo, Tvl., Municipality, P.O. Box 48.
 Eshowe, Zululand, Town Board, P.O. Box 37.
 Edenvale, Tvl., Town Council, P.O. Box 25.
 Estcourt, Natal, Borough, P.O. Box 15.
 Fort Beaufort, C.P., Municipality, P.O. Box 36.
 Ficksburg, O.F.S., Municipality, P.O. Box 116.
 Gatooma, S.R., Municipality, P.O. Box 114.
 George, C.P., Municipality, P.O. Box 28.
 Grahamstown, C.P., City Council, P.O. Box 176.
 Greytown, Natal, Borough, P.O. Box 71.
 Gwelo, S.R., Municipality, P.O. Box 278.
 Graaff-Reinet, C.P., Municipality, P.O. Box 71.
 Germiston, Tvl., City Council, P.O. Box 145.
 Harrismith, O.F.S., Municipality, P.O. Box 43.
 Heidelberg, Tvl., Municipality, P.O. Box 201.
 Johannesburg, City Council, P.O. Box 1049.
 Kimberley, C.P., City Council, P.O. Box 194.
 Klerksdorp, Tvl., Municipality, P.O. Box 160.
 Kokstad, E.G., Municipality, P.O. Box 8.
 Kroonstad, O.F.S., Municipality, P.O. Box 302.
 Krugersdorp, Tvl., Town Council, P.O. Box 64.
 Komgha, C.P., Municipality, P.O. Box 21.
 Kempton Park, Tvl., Municipality, P.O. Box 13.
 Ladysmith, Natal, Borough, P.O. Box 29.
 Louis Trichardt, Tvl., Municipality, P.O. Box 96.
 Livingstone, N.R., Municipality, P.O. Box 29.
 Ladybrand, O.F.S., P.O. Box 64.
 Mafeking, Bech'd., Municipality, P.O. Box 42.
 Matatiele, E.G., Municipality, P.O. Box 35.
 Middelburg, C.P., Municipality, P.O. Box 55.
 Middelburg, Tvl., Municipality, P.O. Box 14.
 Mossel Bay, Municipality, P.O. Box 25.
 Nelspruit, Tvl., Municipality, P.O. Box 45.
 X Newcastle, Natal, Borough, P.O. Box 21.
 N'Dola, N.R., Municipality, P.O. Box 197.
 Nigel, Tvl., Municipality, P.O. Box 23.
 X Ondtshoorn, C.P., Municipality, P.O. Box 132.
 X Odendaalsrus, O.F.S., Municipality, P.O. Box 21.
 Paarl, C.P., Municipality, P.O. Box 12.
 Pietersburg, Tvl., Municipality, P.O. Box 111.
 Pietermaritzburg, Natal, City Council, P.O. Box 321.
 X Piet Retief, Tvl., Municipality, P.O. Box 23.
 X Port Alfred, C.P., Municipality, P.O. Box 13.
 Port Elizabeth, C.P., City Council, P.O. Box 116.
 X Port Shepstone, Natal, Borough, P.O. Box 5.
 Potchefstroom, Tvl., Municipality, P.O. Box 113.
 X Potgietersrus, Tvl., Municipality, P.O. Box 34.
 Pretoria, Tvl., City Council, P.O. Box 449.
 Parys, O.F.S., Municipality, P.O. Box 39.
 X Postmasburg, C.P., Municipality, P.O. Box 5.
 X Queenstown, C.P., Municipality, P.O. Box 113.
 Que Que, S.R., Municipality, P.O. Box 15.
 Randfontein, Tvl., Municipality, P.O. Box 139.
 Robertson, C.P., Municipality, P.O. Box 52.
 Roodepoort-Maraisburg, Tvl., Municipality, P.O. Box 217, Roodepoort.
 Rustenburg, Tvl., Municipality, P.O. Box 16.
 Salisbury, S.R., City Council, P.O. Box 990.
 X Somers East, C.P., Municipality, P.O. Box 21.

ASSOCIATION OF MUNICIPAL ELECTRICITY UNDERTAKINGS OF SOUTHERN AFRICA

- Springs, Tvl, Town Council, P.O. Box 45.
 Springfontein, O.F.S., Municipality, P.O. Box 10.
 X Stanger, Natal, Borough, P.O. Box 72.
 Stellenbosch, C.P., Municipality, P.O. Box 17.
 Somerset West, C.P., Municipality, P.O. Box 19.
 Standerton, Tvl., Municipality, P.O. Box 66.
 The Strand, C.P., Municipality, P.O. Box 3.
 X Theunissen, O.F.S., Municipality, P.O. Box 8.
 Uitenhage, C.P., Municipality, P.O. Box 45.
 Umtata, Tembuland, Municipality, P.O. Box 5.
 Umtali, S.R., Municipality, P.O. Box 121.
 X Upington, C.P., Municipality, P.O. Box 17.
 Vereeniging, Tvl, Municipality, P.O. Box 35.
 X Vrede, O.F.S., Municipality, P.O. Box 155.
 X Vryburg, C.P., Municipality, P.O. Box 35.
 Vryheid, Natal, Borough, P.O. Box 57.
 Ventersdorp, Tvl, Municipality, P.O. Box 15.
 Walmer, C.P., Municipality, P.O. Box 5010, Walmer.
 X Winburg, O.F.S., Municipality, P.O. Box 26.
 Windhoek, S.W.A., Municipality, P.O. Box 59.
 Willowmore, C.P., Municipality, P.O. Box 15.
 Worcester, C.P., Municipality, P.O. Box 37.
 X Wepener, O.F.S., Municipality, P.O. Box 31.
 Westonaria, Tvl, Municipality, P.O. Box 19.
 Welkom, O.F.S., Village Board, P.O. Box 215.
 Witbank, Tvl, Municipality, P.O. Box 3, Witbank.
 X Warmbaths, Tvl, Municipality.
 Wellington, C.P., P.O. Box 12.

ENGINEER MEMBERS

- Aalbers, G., Municipal Electrical Engineer, P.O. Box 44, Ceres, C.P.
 Adams, C. H., Municipal Electrical Engineer, P.O. Box 255, Oudtshoorn, C.P.
 Asselbergs, P. C., Town Electrical Engineer, P.O. Box 48, Ermelo, Transvaal.
 Bahr, H., Municipal Electrical and Waterworks Engineer, P.O. Box 15, Ventersdorp, Tvl.
 Bailey, R. V., Town and Electrical Engineer, P.O. Box 25, Edenvale, Tvl.
 Barlow, K. B., Town Electrical Engineer, P.O. Box 100, Livingstone, N.R.
 Barratt, V. E. O., Municipal Electrical Engineer, P.O. Box 113, Queenstown, C.P.
 X Bechler, P., Town Electrical Engineer, P.O. Box 43, Hartswater, O.F.S. P.O. Box 21 *Verianth*
 Bradley, D. A., Target Kloof Road, Port Elizabeth.
 Brown, D. D., Municipal Electrical Engineer, P.O. Box 217, Roodepoort, Tvl.
 Barton, R. W., Electrical Engineer, P.O. Box 20, Welkom, O.F.S.
 Clarke, M. P. P., Municipal Electrical Engineer, P.O. Box 21, Somerset East, C.P.
 Cherrv, J. R., Municipal Electrical Engineer, P.O. Box 130, Randfontein, Tvl.
 Coetzee, F. J., Municipal Electrical Engineer, Municipal Offices, Wolmaransstad, Tvl. *P.O. Box 21*
 Cowley, B. W., Municipal Electrical Engineer, P.O. Box 33, Barberton, Tvl. *Enslin Tvl.*
 Craig, J. S., Borough Electrical Engineer, P.O. Box 71, Greytown, Natal.
 Delport, G. C., Municipal Electrical Engineer, P.O. Box 6, Delmas, Tvl.
 De Wet, D. P., Municipal Electrical Engineer, P.O. Box 15, Willowmore, C.P.
 De Wit, T., Engineer-in-Charge, Municipality of Brits, P.O. Box 106, Brits, Tvl.
 X Downey, J. C., Town Electrical Engineer, P.O. Box 45, Springs, Tvl.
 X Downie, C. G., City Electrical Engineer, P.O. Box 82, Cape Town, C.P.
 Dreyer, L., Municipal Electrical Engineer, P.O. Box 10, Westonaria, Tvl.
 De Villiers, E. E., Municipal Electrical Engineer, P.O. Box 3, Witbank, Tvl.
 De Villiers, S. de V., Municipal Electrical Engineer, P.O. Box 52, Robertson, C.P.
 Erikson, J. G. F., Borough Electrical Engineer, P.O. Box 15, Estcourt, Natal.
 Fainsinger, G. S., Municipal Electrical Engineer, P.O. Box 50, Windhoek, S.W.A.
 Fisher, K. M., Municipal Electrical Engineer, P.O. Box 551, Bethlehem, O.F.S.
 Fitcher, L., Municipal Electrical Engineer, P.O. Box 13, Kempton Park, Tvl.
 Gericke, J. M., Municipal Electrical Engineer, P.O. Box 90, Klerksdorp.
 Giles, P. A., City Electrical Engineer, P.O. Box 520, East London, C.P.
 Grandin, P. C., Municipal Electrical Engineer, P.O. Box 114, Gatooma, S.R.
 Gripper, H.-J., Assistant City Electrical Engineer, P.O. Box 369, Port Elizabeth, C.P.
 Hadfield, A. W. K., Town and Electrical Engineer, P.O. Box 278, Gwelo, S.R.
 Halliday, K. W. J., Municipal Electrical Engineer, P.O. Box 5, Port Shepstone, Natal.
 Hallé, C. R., City Electrical Engineer, P.O. Box 300, Pietermaritzburg, Natal.
 Hall, F. P. W., Municipal Electrical Engineer, P.O. Box 19, Somerset West, C.P.
 Hattingh, J. D., Municipal Electrical Engineer, P.O. Box 27, Bothaville, O.F.S. *Kaunville*
 Heese, J. F., Assistant Electrical Engineer, P.O. Box 04, Krugersdorp, Tvl.
 X Hugo, D. J., City Electrical Engineer, P.O. Box 423, Pretoria, Tvl.
 Haig-Smith, Municipal Electrical Engineer, P.O. Box 55, Middelburg, C.P.
 Hatwich, A. H. J., Town and Electrical Engineer, P.O. Box 13, Dewetsdorp, O.F.S.
 Hobbs, I. E., Town Electrical Engineer, P.O. Box 154, Virginia, O.F.S.
 Harvey, A. O., Town Electrical Engineer, P.O. Box 154, Virginia, O.F.S.

ASSOCIATION OF MUNICIPAL ELECTRICITY UNDERTAKINGS OF SOUTHERN AFRICA

ENGINEER MEMBERS—(Continued)

- Hennis, G. B., Town and Electrical Engineer, P.O. Box 66, Standerton.
 Hafele, C. F., Deputy City Electrical Engineer, P.O. Box 288, Bloemfontein.
- Inglis, J. I., Town Electrical and Water Engineer, P.O. Box 111, Pietersburg, Tvl.
 Iverach, J., City Electrical Engineer, P.O. Box 176, Grahamstown, C.P.
- Jones, G. E. H., Municipal Electrical Engineer, P.O. Box 42, Mafeking, Bechuanaland.
- ✗ Kane, R. W., Assistant General Manager, Electricity Department, P.O. Box 699, Johannesburg.
- Kramer, T., Municipal Electrical Engineer, P.O. Box 113, Potchefstroom, Tvl.
 Kirberger, M. N., Town Engineer, P.O. Box 3, Bethal, Tvl.
 Kruger, M. J. C., Municipal Electrical Engineer, P.O. Box 13, Port Alfred, C.P.
- Leishman, R. X., Assistant General Manager, Electricity Department, P.O. Box 699, Johannesburg.
- Lategan, J. F., Town Electrical Engineer, P.O. Box 201, Heidelberg, Tvl.
 Lees, D., Town Electrical Engineer, P.O. Box 45, Benoni, Tvl.
- ✗ Lombard, C., City Electrical Engineer, P.O. Box 145, Germiston, Tvl.
 Lotter, G. A., Town Electrical Engineer, P.O. Box 66, Louis Trichardt, Tvl.
 Lyall, R. R., Municipal Electrical Engineer, P.O. Box 45, Nelaprui, Tvl.
 Lynch, E. C., Assistant City Electrical Engineer, P.O. Box 73, Salisbury, S.R.
- Macques, J. A., Municipal Electrical Engineer, P.O. Box 42, De Aar, C.P.
 Mathews, J. A., City Electrical Engineer, P.O. Box 104, Kimberley, C.P.
 Meintjies, P. A., Municipal Electrical Engineer, P.O. Box 16, Rustenburg, Tvl.
 McGibbon, J., Municipal Electrical Engineer, P.O. Box 107, N'Dola, N.R.
 Millen, T. J., Municipal Electrical Engineer, P.O. Box 23, Nigel, Tvl.
 Miln, D. R., Town Engineer, P.O. Box 46, Fort Jameson, N.R.
- ✗ Mitchell, J. E., City Electrical Engineer, P.O. Box 73, Salisbury, S.R.
 Mocke, T. M., Town and Electrical Engineer, P.O. Box 23, Piet Retief, Tvl.
 Muller, G. J., City Electrical Engineer, P.O. Box 288, Bloemfontein, O.F.S.
 McNeil, J. L., Borough Electrical Engineer, P.O. Box 72, Stanger, Natal.
- Newcombe, P. H., Municipal Electrical Engineer, P.O. Box 28, George, C.P.
 Nobbs, D. M., Acting City Electrical Engineer, P.O. Box 399, Port Elizabeth.
- Odenaal, M. W., Town Electrical Engineer, P.O. Box 4, Alberton, Tvl.
- Potgieter, N. A., Municipal Electrical Engineer, P.O. Box 14, Middelburg, Tvl.
 Pretorius, D. R., Town Electrical Engineer, P.O. Box 39, Parys, O.F.S.
 Pretorius, E. de C., Municipal Electrical Engineer, P.O. Box 17, Stellenbosch, C.P.
- Reidman, R. H., Deputy City Electrical Engineer, P.O. Box 1803, Bulawayo.
 Relihan, H. J., Municipal Electrical Engineer, P.O. Box 12, Paarl, C.P.
 Keyneke, G. M., Town Electrical Engineer, P.O. Box 26, Winburg, O.F.S.
 Roberts, L. J., Municipal Electrical Engineer, P.O. Box 35, Matatiele, E.G.
 Rogers, J., Municipal Electrical Engineer, P.O. Box 36, Fort Beaufort, C.P.
 Rooole, L., Town and Electrical Engineer, P.O. Box 34, Potgietersrust, Tvl.
 Ross, J. W., Municipal Electrical Engineer, P.O. Box 206, Alhwal North, C.P.
 Rossler, A., Municipal Electrical Engineer, P.O. Box 24, Cradock, C.P.
 Rossler, W., Town Electrical Engineer, P.O. Box 302, Kroonstad, O.F.S.
 Rush, W., Borough Engineer, P.O. Box 57, Vryheid, Natal.
- Rozendal, D., Municipal Electrical Engineer, P.O. Box 31, Wepener, O.F.S.
 Rothman, J. L., Municipal Electrical Engineer, P.O. Box 116, Ficksburg, O.F.S.
- Sibson, A. R., City Electrical Engineer, P.O. Box 1803, Bulawayo, S.R.
 Simpson, A. G., Municipal Electrical Engineer, P.O. Box 5010, Walmer, C.P.
 Sims, C. N., Municipal Electrical Engineer, P.O. Box 3, The Strand, C.P.
 ✗ Simpson, R. M. O., City Electrical Engineer, P.O. Box 147, Durban, Natal.
 Smith, E. L., Municipal Electrical Engineer, P.O. Box 215, Boksburg, Tvl.
 Stevens, F., Borough Electrical Engineer, P.O. Box 29, Ladysmith, Natal.
 Schreuder, T. P., Municipal Electrical Engineer, P.O. Box 38, Adelaide, C.P.
 Stocks, E. R., Municipal Electrical Engineer, P.O. Box 25, Mossel Bay, C.P.
 Sulter, F. J., Assistant Electrical Engineer, P.O. Box 145, Germiston, Tvl.
- Thackwray, W. G., Town Electrical Engineer, P.O. Box 8, Kokstad, E.G.
 Theron, W. C., Municipal Electrical Engineer, P.O. Box 37, Worcester, C.P.

- Turner, H. T., Town and Electrical Engineer, P.O. Box 121, Umtali, S.R.
 Turnbull, A. F., Town and Electrical Engineer, P.O. Box 35, Vereeniging, Tvl.
 Van der Merwe, F. J., Municipal Electrical Engineer, P.O. Box 44, Ladybrand, O.F.S.
 Van der Walt, J. L., Town Electrical Engineer, P.O. Box 94, Krugersdorp, Tvl.
 Van der Spuy, J., Town Electrical Engineer, P.O. Box 21, Odendaalsrus, O.F.S.
 Vergottini, P. L., Municipal Electrical Engineer, P.O. Box 15, Brakpan, Tvl.
 Verschoor, D. R., Town and Electrical Engineer, P.O. Box 36, Butterworth, C.P.
 Verster, J. J., Town and Electrical Engineer, P.O. Box 26, Polgarden, Tvl.
 White, J. H., Municipal Electrical Engineer, P.O. Box 107, N'Doia, N.R.
 Wilson, J., Assistant City Electrical Engineer, P.O. Box 423, Pretoria, Tvl.
 Woolridge, W. E. L., Town Electrical Engineer, P.O. Box 24, Harding, Natal.
 Williams, A. H., Assistant Electrical Engineer, P.O. Box 45, Springs, Tvl.
 Waldron, F. R., Municipal Electrical Engineer, P.O. Box 57, Umtata, Tembuland.
 Waddy, J. C., Assistant City Electrical Engineer, P.O. Box 399, Pietermaritzburg, N.

ASSOCIATES

- Adams, C. H., P.O. Box 132, Oudtshoorn, C.P.*
 Andrew, W. M., c/o. E.S.C., P.O. Box 667, East London, C.P.
 Ashley, T. P., c/o. Queen's Hotel, Queenstown, C.P.
 Burton, C. R., 34 Memorial Road, Kimberley, C.P.
 Campbell, A. R., P.O. Box 584, Johannesburg.
 Clinton, J. S., P.O. Box 4648, Johannesburg.
 Coulthard, R. D., P.O. Box 4453, Johannesburg.
 Conradie, D. J. R., P.O. Box 1009, Bloemfontein, O.F.S.
 Dalton, G. A., 111 Eckstein Street, East, Observatory Extension, Johannesburg, Tvl.
 Dawson, C., Electricity Supply Commission, P.O. Box 2268, Durban.
 Ewer, Col. G. G., 174 Edmonds Road, Durban, Natal.
 Ferreira, N., Town Engineer, P.O. Box 21, Sasolburg, O.F.S.
 Foden, A., Manager, E.S.C. (Border Undertaking), P.O. Box 667, East London.
 Foley, C. B., c/o. Electrical Engineer, P.O. Box 35, Vereeniging, Tvl.
 Geyer, J. H., P.O. Box 1403, Port Elizabeth.
 Gyles, J. H., "Bodriggy," Moyeni Road, Gilletts, Natal.
 Heasman, G. G., P.O. Box 77, Fort Victoria, S.R.
 Lutsch, W. J. F. S., c/o. Faculty of Engineering, University of Stellenbosch, C.P.
 Marehand, B., P.O. Box 223, Witbank, Tvl.
 Mercier, G., P.O. Box 42, Monze, N.R.
 Milton, W. H., P.O. Box 1091, Johannesburg.
 Mole, E. W., P.O. Box 3386, Johannesburg.
 Muller, H. M. S., P.O. Box 112, Upirigton, C.P.
 Nicholas, I. J., 74a Ebdon Street, Queenstown, C.P.
 Powell, W. N., 104 Marlene Mansions, Abel Road, Berea, Johannesburg.
 Phillips, J. W., P.O. Box 1731, Bulawayo, S.R.
Rothman, J. J., P.O. Box 200, Kimberley.
 Simpson, H. G., Engineering Department, Searles, Ltd., Great Brak River, C.P.
 Theron, G. C., P.O. Box 1, Vanderbijl Park, Tvl.
 Tubb, B. H. J., P.O. Box 1699, Salisbury, S.R.
 West, J. A., "Edgerton," P.O. Box 24, St. Michael's, South Coast, Natal.
 Wright, G. R. E., P.O. Box 465, Benoni, Tvl.
 Williams, J. T., P.O. Box 1617, Pretoria. *440/1205, Natalque Court, King's Cross, Salisbury, S.R.*
 Williams, V. E., c/o. Merz & McLellan, P.O. Box 606, Kimberley, C.P.
 Wylie, R. J. S., c/o. E.S.C., Rand Undertaking, P.O. Box 103, Germiston, Tvl.

THE ASSOCIATION OF MUNICIPAL
ELECTRICITY UNDERTAKINGS
OF SOUTHERN AFRICA

DIE VERENIGING VAN MUNISIPALE
ELEKTRISITEITSONDERNEMINGS
VIR SUIDELIKE AFRIKA

AGENDA AND PROGRAMME

29th ANNUAL CONVENTION

to be held in the
CITY HALL, PRETORIA

from the
3rd to 6th MAY, 1955

AGENDA EN PROGRAM

vir die
29ste JAARLIKSE KONVENSIË
wat gehou sal word in die
PRETORIASE STADSAAL
vanaf
3 tot 6 MEI 1955

AGENDA FOR ANNUAL GENERAL
MEETING

1. Election of President.
2. Venue of next Convention.
3. Election of Vice-President, Executive Council, Sub-Committees and Representatives.
4. Annual Report of Secretary and Treasurer.
5. Retiring President's Valedictory Address.
6. Presidential Address.
7. Reports of Sub-Committees and Representatives.
 - (i) World Power Conference (Local Committee).
 - (ii) Electrical Wiremen's Registration Board.
 - (iii) S.A. Bureau of Standards.
 - (iv) Wiring Regulation Committee.
 - (v) Overhead Lines Code of Practice.
 - (vi) Coal Allocation Committee.
 - (vii) Safety Precautions Committee.
 - (viii) Tariffs Survey Committee.
 - (ix) Recommendations Committee for New Electrical Commodities.
 - (x) Amendments to Constitution.
 - (xi) Papers.
8. Appointments of Auditors.
9. General.

AGENDA VIR DIE ALGEMENE JAAR-
VERGADERING

1. Verkieping van President.
2. Vergaderplek vir volgende Konvensie.
3. Verkieping van Onder-president, Uitvoerende Raad, Onder-komitees en Verteenwoordigers.
4. Jaarverslag van die Sekretaris-tesourier.
5. Afskeidsrede van die Aftredende President.
6. Presidentsrede.
7. Verslae van Onder-komitees en Verteenwoordigers.
 - (i) World Power Conference (Plaaslike Komitee).
 - (ii) Raad vir Registrasie van Draadwerkers.
 - (iii) Suid-Afrikaanse Buro vir Standaard.
 - (iv) Komitee vir Bedradingsregulasies.
 - (v) Gebruikskode vir Bogrondse-leidings.
 - (vi) Komitee vir die toekenning van Steenkool.
 - (vii) Komitee vir Veiligheidsmaatreëls.
 - (viii) Komitee van Ondersoek na Elektrisiteitsstawe.
 - (ix) Komitee vir aanbevelings oor nuwe Elektriese Toerusting.
 - (x) Wysiging van die Konstitusie.
 - (xi) Verhandeling.
8. Aanstelling van Ouditeure.
9. Algemeen.

ASSOCIATION OF MUNICIPAL ELECTRICITY UNDERTAKINGS OF SOUTHERN AFRICA

RETIRING OFFICERS

President: G. J. MULLER, Bloemfontein.
Vice-President: D. J. HUGO, Pretoria.
Immediate Past Presidents: J. C. FRASER, Johannesburg; A. R. SIBSON, Bulawayo.

Engineer Members: D. A. BRADLEY, Port Elizabeth; C. G. DOWNIE, Cape Town; C. R. HALLE, Pietermaritzburg; J. E. MITCHELL, Salisbury; J. L. VAN DER WALT, Krugersdorp; J. C. DOWNEY, Springs.

Cities or Town Represented: Bloemfontein, Cape Town, Krugersdorp, Port Elizabeth, Pretoria, Pietermaritzburg, Salisbury, Springs.

NOTE.—The Town is elected and not the individual Councillors.

AFTREDENDE AMPSDRAERS

President: G. J. MULLER, Bloemfontein.
Onder-president: D. J. HUGO, Pretoria.
Oud-presidente: J. C. FRASER (Johannesburg); A. R. SIBSON, Bulawayo.

Ingenieurslede: D. A. BRADLEY, Port Elizabeth; C. G. DOWNIE, Kaapstad; C. R. HALLE, Pietermaritzburg; J. E. MITCHELL, Salisbury; J. L. VAN DER WALT, Krugersdorp; J. C. DOWNEY, Springs.

Stede of Dorpe Verteenwoordig: Bloemfontein, Kaapstad, Krugersdorp, Port Elizabeth, Pretoria, Pietermaritzburg, Salisbury, Springs.
L.W.—Die Stad of Dorp word verkies en nie individuele Raadslede nie.

MEMBERS OF SUB-COMMITTEES AND REPRESENTATIVES

Sub-Committees:

Papers:

G. J. MULLER, President; D. J. HUGO, Vice-President; A. R. SIBSON, Past President.

Wiring Regulations Committee:

J. C. DOWNEY (Convenor), G. J. MULLER, C. R. HALLE, J. L. VAN DER WALT, C. G. DOWNIE, J. E. MITCHELL.

Electrical Wiremen and Contractors Legislation Committee:

J. C. FRASER (Convenor), D. A. BRADLEY, C. G. DOWNIE, J. C. DOWNEY.

Tariffs Survey Committee:

J. L. VAN DER WALT (Convenor), C. G. DOWNIE; A. R. SIBSON; J. C. DOWNEY with co-opted members.

Representation Committee:

J. C. FRASER (Convenor), J. C. DOWNEY, D. J. HUGO, J. L. VAN DER WALT.

Amendments to Constitution and Rules:

G. J. MULLER (Convenor), J. C. FRASER, D. J. HUGO.

Recommendations Committee for New Electrical Commodities:

D. J. HUGO (Chairman), J. C. FRASER (Vice-Chairman).

Representatives:

World Power Conference (Local Committee): J. C. Fraser.

Coal Allocation Committee: D. J. Hugo, J. C. Fraser (Alt.)

Electrical Wiremen's Registration Board: J. C. Fraser.

Overhead Lines Code of Practice: J. C. Fraser, J. L. van der Walt (Alternate).

Safety Precautions Committee: J. C. Downey, J. C. Fraser (Alt.).

Meter Testing Code: J. L. van der Walt, S.A. Bureau of Standards: J. L. van der Walt, J. C. Downey (Alt.), with power to co-opt.

LEDE VAN ONDERKOMITEES EN VERTEENWOORDIGERS

Onder-komitees:

Referate:

G. J. MULLER, President; D. J. HUGO, Onder-president; A. R. SIBSON, Oud-president.

Komitee vir Bedradingsregulasies:

J. C. DOWNEY, Belêër; G. J. MULLER, C. R. HALLE, J. L. VAN DER WALT, C. G. DOWNIE, J. E. MITCHELL.

Komitee vir Wetgewing insake Draadwerkers en Bedradings-kontraktante:

J. C. FRASER, Belêër; D. A. BRADLEY, C. G. DOWNIE, J. C. DOWNEY.

Komitee van Ondersoek na Elektrisiteits-tariewe:

J. L. VAN DER WALT, Belêër; C. G. DOWNIE, A. R. SIBSON, J. C. DOWNEY, met gekoopteerde lede.

Komitee vir Verteenwoordiging:

J. C. FRASER, Belêër; J. C. DOWNEY; D. J. HUGO; J. L. VAN DER WALT.

Wysiging van Konstitusie en Reëls:

G. J. MULLER, Belêër; J. C. FRASER, D. J. HUGO.

Komitee vir Aanbevelings oor Nuwe Elektriese Toerusting:

D. J. HUGO, Voorsitter; J. C. FRASER, Onder-voorsitter.

Verteenwoordigers:

World Power Conference (Plaaslike Komitee): J. C. Fraser.

Registrasieraad vir Elektriese Draadwerkers: J. C. Fraser.

Komitee vir die toekenning van Steenkool: D. J. Hugo, J. C. Fraser (Alt.)

Gebruikskode vir Bognonde-leidings: J. C. Fraser, J. L. van der Walt (Alt.)

Komitee vir Veiligheidsmaatreëls: J. C. Downey, J. C. Fraser (Alt.)

Gebruikskode vir toets van Elektrisiteitsmeters: J. L. van der Walt.

Suid-Afrikaanse Buro vir Standaardde: J. L. van der Walt, J. C. Downey (Alt.), met magtiging om mede-lede te kies.

ASSOCIATION OF MUNICIPAL ELECTRICITY UNDERTAKINGS OF SOUTHERN AFRICA

PROGRAMME

Monday, 2nd May, 1955:

- 9.00 a.m.: Meeting of Executive Council in Committee Room, City Hall.
8.00 p.m.: Informal gathering at Culemborg onwards Hotel of delegates and their ladies.

Tuesday, 3rd May, 1955:

- 9.00 a.m.: Registration and issue of Papers.
10.00 a.m.: Welcome by His Worship the Mayor and official opening of the Convention by Dr. F. J. de Villiers, Chairman, Electricity Control Board. Election of President. Venue of next Convention. Election of Vice-President.
10.30 a.m.: Refreshment Interval.
11.00 a.m.: Official Photograph (City Hall Steps).
11.30 a.m.: Election of Office Bearers. Retiring President's Valedictory Address.
12.30 p.m.: Luncheon adjournment.
2.30 p.m.: Convention resumes. Annual Report of Secretary and Treasurer. Presidential Address.
3.30 p.m.: Refreshment Interval. Reports of Sub-Committees and Representatives.
4.30 p.m.: Adjourn.
5.30 p.m.: Civic Cocktail Party, (Supper Room, City Hall).

Wednesday, 4th May, 1955:

- 8.30 a.m.: Meeting of Executive Council in Committee Room, City Hall.
9.30 a.m.: Convention resumes. Communications from Council. Appointment of Auditors. Paper by R. S. Dunstan, B.Sc. (Eng.) (Rand), M.I.E.E., on "Rural Distribution of Electricity by the Pretoria Electricity Undertaking."
10.30 a.m.: Refreshment Interval.
11.00 a.m.: Discussion on Mr. Dunstan's Paper.
12.30 p.m.: Luncheon Adjournment.
2.30 p.m.: Engineer's Forum.
3.30 p.m.: Adjourn and Refreshments.
8.00 p.m.: Convention Dance (Pretoria Country Club, Waterkloof).

Thursday, 5th May, 1955:

- 8.30 a.m.: Meeting of Executive Council in Committee Room, City Hall.

PROGRAM

Maandag, 2 Mei 1955:

- 9.00 vm.: Vergadering van die Uitvoerende Raad in die Komiteekamer van die Stadsaal.
Vanaf 8.00 nm.: Informele byeenkoms van Afgevaardigdes en hul gades in die Culemborg Hotel.

Dinsdag, 3 Mei 1955:

- 9.00 vm.: Registrasie en Uitreiking van Referate.
10.00 vm.: Verwelkoming deur Sy Edelagbare die Burgemeester, en amptelike opening van die Konvensie deur dr. F. J. de Villiers, Voorsitter van die Raad vir Toesig op Elektrisiteit. Verkieping van President. Vergaderplek vir die volgende Konvensie. Verkieping van Onder-president.
10.30 vm.: Pouse. Verversings.
11.00 vm.: Amptelike Foto. (Stadsaal Trappies).
11.30 vm.: Verkieping van Ampsdraers. Afskeidsrede van aftredende President.
12.30 nm.: Verdaging vir middagete.
2.30 nm.: Werksaamhede word hervat. Jaarverslag van die Sekretaris-tesourier. Presidentsrede.
3.30 nm.: Pouse. Verversings. Verslae van Onder-komitees en Verteenwoordigers.
4.30 nm.: Vergadering Verdag.
5.30 nm.: Skemerparty, (Soepee-kamer van Stadsaal).

Woensdag, 4 Mei 1955:

- 8.30 vm.: Vergadering van die Uitvoerende Raad in die Komiteekamer van die Stadsaal.
9.30 vm.: Konvensie-werksaamhede word hervat. Aankondigings van die Uitvoerende Raad. Aanstelling van Ouditeure. Referaat deur R. S. Dunstan, B.Sc. (Eng.) (Rand), M.I.E.E., oor „Buitestedelike Distribusie van Elektrisiteit deur die Pretoriase Elektrisiteitsonderneming.“
10.30 vm.: Pouse. Verversings.
11.00 vm.: Besprekings van mnr. Dunstan se Referaat.
12.30 nm.: Verdaging vir middagete.
2.30 nm.: Ingenieursforum.
3.30 nm.: Verdaging. Verversings.
8.00 nm.: Konvensie-dans (Pretoria Country Club, Waterkloof).

Donderdag, 5 Mei 1955:

- 8.30 vm.: Vergadering van die Uitvoerende Raad in die Komiteekamer van die Stadsaal.

ASSOCIATION OF MUNICIPAL ELECTRICITY UNDERTAKINGS OF SOUTHERN AFRICA

- 9.30 a.m.: Convention resumes.
 Communications from Council.
 Paper by O. D. Gorven, B.Com.,
 A.I.M.T.A. (S.A.), A.C.I.S.
 (City Treasurer's Department, Durban) on "Depreciation and Renewals Funds."
- 10.30 a.m.: Refreshment Interval.
- 11.00 a.m.: Discussion on Papers.
- 12.30 p.m.: Luncheon Adjournment.
- 2.30 p.m.: Visit to Bureau of Standards or
 A.S.E.A. Electric S.A. (Pty.), Ltd.
- 5.30 p.m.: Braai vleis (Fountains).
- Friday, 6th May, 1955:**
- 8.30 a.m.: Meeting of Executive Council in
 Committee Room, City Hall.
- 9.30 a.m.: Convention resumes.
 Communications from Council.
 Discussion on Papers and any other
 business.
- 10.30 a.m.: Refreshment Interval.
- 11.00 a.m.: Discussion on Papers and any other
 business continued.
- 12.30 p.m.: Convention closes.

LADIES PROGRAMME

- Monday, 2nd May, 1955:**
- 8.00 p.m.: Informal gathering at the Culem-
 onwards: borg Hotel of delegates and their
 ladies.
- Tuesday, 3rd May, 1955:**
- 10.00 a.m.: Assemble for official opening of
 Convention.
- 10.30 a.m.: Refreshments.
- 11.00 a.m.: Official Photograph.
- 5.30 p.m.: Civic Cocktail Party (Supper Room,
 City Hall).
- Wednesday, 4th May, 1955:**
- 10.00 a.m.: Tea at Fountains Kiosk and visit to
 Voortrekker Monument.
- 8.00 p.m.: Convention Dance (Country Club).
- Thursday, 5th May, 1955:**
- 10.00 a.m.: A morning's entertainment at the
 Pretoria Women's Club (Sanlam
 Buildings, Corner Pretorius and
 Andries Streets).
- 2.30 p.m.: Visit S.A. Bureau of Standards or
 A.S.E.A. Electric S.A. (Pty.), Ltd.
- 5.30 p.m.: Braai vleis (Fountains).

Friday, 6th May, 1955:

- 10.30 a.m.: Assemble for refreshments at City
 Hall and closing session of Con-
 vention.

- 9.30 v.m.: Konvensie-werksaamhede word her-
 vat.
 Aankondigings van die Uitvoerende
 Raad.
 Referaat deur O. D. Gorven, B-
 Comm., A.I.M.T.A. (S.A.) (Stads-
 tesouriersafdeling, Durban), oor
 "Waardevermindering- en Her-
 winningsfondse."
- 10.30 v.m.: Pouse, Verversings.
- 11.00 v.m.: Bespreking van Referate.
- 12.30 nm.: Verdaging vir middagete.
- 2.30 nm.: Besoek aan Suid-Afrikaanse Buro
 vir Standaarde of Asea Electric
 S.A. (Edms.), Bpk.
- 5.30 nm.: Braai vleis (Fonteine).

Vrydag, 6 Mei 1955:

- 8.30 nm.: Vergadering van die Uitvoerende
 Raad in die Komiteekamer van die
 Stadsaal.
- 9.30 v.m.: Konvensie-werksaamhede word her-
 vat.
 Aankondigings van die Uitvoerende
 Raad.
 Bespreking van Referate en enige
 ander sake.
- 10.30 v.m.: Pouse, Verversings.
- 11.00 v.m.: Bespreking van Referate en enige
 ander sake.
- 12.30 nm.: Konvensie word afgesluit.

PROGRAM VIR DAMES

- Maandag, 2 Mei 1955:**
- Vanaf Informele byeenkoms van Afgevaar-
 8.00 nm.: digdes en hul gades in die Culem-
 borg Hotel.
- Dinsdag, 3 Mei 1955:**
- 10.00 v.m.: Vergader vir die Amptelike Opening
 van die Konvensie.
- 10.30 v.m.: Verversings.
- 11.00 v.m.: Amptelike Foto.
- 5.30 nm.: Burgerlike Skemerparty (Soepe-
 kamer, Stadsaal).
- Woensdag, 4 Mei 1955:**
- 10.00 v.m.: Tee by die Fonteine Kiosk en be-
 soek aan Voortrekker-monument.
- 8.00 nm.: Konvensie-dans (Country Club).
- Donderdag, 5 Mei 1955:**
- 10.00 v.m.: Gesellige-byeenkoms in die Pretoria-
 se Dames Klub (Sanlangebou, h/v.
 Pretorius- en Andriesstraat).
- 2.30 nm.: Besoek aan die Suid-Afrikaanse
 Buro vir Standaarde of A.S.E.A.
 Electric S.A. (Edms.), Bpk.
- 5.30 nm.: Braai vleis (Fonteine).
- Vrydag, 6 Mei 1955:**
- 10.30 v.m.: Vergader in die Stadsaal vir ver-
 versings en die sluitingsessie op
 die Konvensie.



D. J. HUGO, Pretoria
President, 1955-1956.

THE ASSOCIATION OF MUNICIPAL ELECTRICITY UNDERTAKINGS OF SOUTHERN AFRICA.

PROCEEDINGS OF THE TWENTY-NINTH CONVENTION, 1955.

The Twenty-Ninth Convention of the Association was opened in the City Hall, Pretoria, by Dr. F. J. de Villiers, Chairman of the Electricity Control Board, at 10.00 a.m. on Tuesday, 3rd May, 1955.

Representatives of 70 Councils attended the Convention, including 48 Councillors, 73 Engineer Members, 1 Honorary Member, 10 Associates, 24 Delegates or Representatives of Government Departments, other supply authorities, etc., Commercial Representatives, 15 visitors and others, and 135 ladies — a total of 386.

CIVIC WELCOME.

PRESIDENT (Mr. G. J. Muller, Bloemfontein):

Good morning, Ladies and Gentlemen. Goëie môre, Dames en Here. Dit is my besonder aangensam om by hierdie geleentheid aan u voor te stel die Burge-meester van Pretoria, Raadslid Muller. Raadslid Muller het, by al sy werksaamhede, so goed gewees om vanmôre by hierdie geleentheid ons vergadering te open.

It gives me much pleasure to introduce to you His Worship the Mayor, Councillor Muller. Councillor Muller will open the proceedings and then introduce to you the speaker of the morning, Dr. de Villiers. His Worship the Mayor will now take the floor.

HIS WORSHIP THE MAYOR OF PRETORIA (Councillor H. Muller):

Mr. President, Ladies and Gentlemen, Pretoria feels very honoured this morning by the presence of so many powerful men; perhaps I should have said power men or men of power. Supposing that when you left your various towns and cities you gave instructions that all power be cut off, we would tonight have experienced a complete black-out in Southern Africa, but I know that that will not be the case. On the contrary, I am quite sure that your presence here will con-

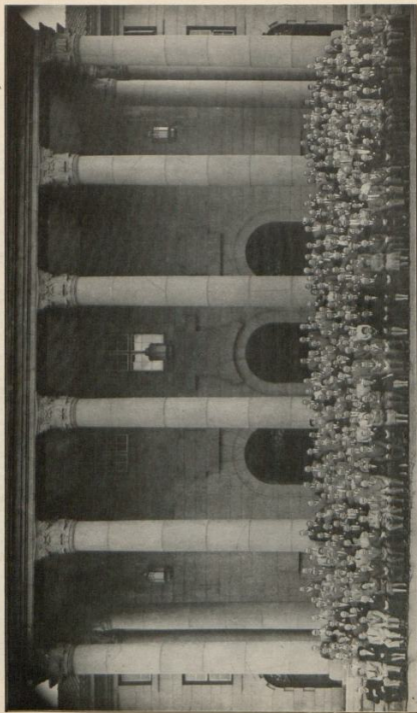
centrate the limelight on Pretoria for a few days and I also know that the fact that you are having your Convention here, will be one of the highlights of our centenary year.

It is a long time, in fact, it is too long ago since your Convention last met in Pretoria. We were, therefore, very pleased when you accepted our invitation to hold your Convention in Pretoria this year (hear, hear!), and the City Council is grateful that it will be intimately associated with your stay in our city.

To me it is a great honour and a great pleasure to extend to you a very sincere and a very cordial welcome to Pretoria. Your Association is undoubtedly one of the major and most important Municipal Associations. This is so on account of the essential service electricity undertakings render to ratepayers and other consumers of electricity. But, in addition to that, you are actually an Association of Municipalities in that Municipal Councils are the main members represented in your organisation. Whatever you decide, is therefore the joint effort by Municipal electrical engineers — the experts, on the one hand, and the Councillors, who are definitely non-experts, on the other hand.

Whenever Councillors and officials co-operate and when they co-operate sincerely, as is your happy experience, the communities they serve, must inevitably benefit. I am sure that your recommendations are bound to carry much weight and that they must have an important bearing on the work of all local authorities.

Mr. die Voorsitter, Dames en Here, die afgevaardigdes het, in die eerste plek, hierheen gekom om te luister na geleerde referate en toesprake en om self deel te neem aan daardie besprekings. Om daard'e rede gaan ek nie probeer om aan u vanmôre 'n re'eraat te lewer nie. Daar is nog 'n ander rede waarom ek dit nie



1st Row (L. to R.): E. J. Smith (Standerton); G. B. Heunis (Standerton); Mrs. G. B. Heunis (Standerton); D. D. Brown (Roodepoort-Maraibus); J. McGibbon (N'Dola); C. E. K. Young, J.P. (Pietermaritzburg); Mrs. B. A. Acton (Pretoria); C. E. Acton (Pretoria); S. H. Millar (Bulawayo); A. R. Sibson (Bulawayo); C. G. Downie (Cape Town); P. D. Santillano (Cape Town); A. Howell (Newcastle-upon-Tyne); Mrs. A. Howell (Newcastle-upon-Tyne); Dr. H. Muller (Mayor, Pretoria); D. J. Hugo (President, Pretoria); Mrs. H. Muller (Mayores, Pretoria); Dr. F. J. de Villiers (Pretoria); Mrs. F. J. de Villiers (Pretoria); J. F. Fraser (Johannesburg); Mrs. J. C. Fraser (Johannesburg); Morton Jaffray (Salisbury); E. C. Lynch (Salisbury); L. P. Davies (Springs); J. C. Downey (Springs); C. Kinsman (Durban); C. R. Halle (Pietermaritzburg); M. C. Dames (Krugersdorp); J. F. Heese (Krugersdorp); A. T. Taylor (Johannesburg); J. F. C. Castelyn (Bloemfontein); E. C. Klepp (Johannesburg); J. F. Lategan (Heidelberg); J. D. Jordaan (Heidelberg).

2nd Row (L. to R.): P. L. G. van den Hoogen (Pretoria); M. L. Rutter (Roodepoort-Maraibus); J. G. F. Erikson (Estcourt); Mrs. J. G. F. Erikson (Estcourt); P. C. Asselbergs (Ermelo); G. Phillips (Cape Town); J. H. Chemaly (Queenstown); Mrs. V. E. O. Barratt (Queenstown); V. E. O. Barrett (Queenstown); E. L. Smith (Boksburg); A. McPhail (Johannesburg); Mrs. R. W. Kane (Johannesburg); Mrs. R. N. F. Smut (Pretoria); R. W. Kane (Johannesburg); Mrs. T. Kramer (Potchefstroom); —————; Mrs. J. C. Downey (Springs); Mrs. P. A. Giles (East London); Mrs. A. T. Taylor (Johannesburg); P. A. Giles (East London); H. T. Turner (Umtali); Mrs. F. Stevens (Ladysmith); F. Stevens (Ladysmith); R. G. Ewing (Johannesburg); W. Bellad-Ellis (East London); R. G. Large (Vryheid); Mrs. C. W. Suckling (Johannesburg); Miss S. Sibson (Bulawayo); Mrs. Q. R. Nothard (Johannesburg); Mrs. H. D. T. Harris (Johannesburg); Mrs. A. C. Grant (Johannesburg); Mrs. C. R. Burton (Kimberley); Mrs. C. Kinsman (Durban); Mrs. J. Wilson (Pretoria); H. Schapira (Mossel Bay); E. R. Stocks (Mossel Bay); J. Iverach (Grahamstown); Mrs. J. I. Inglis (Pietersburg); Mrs. R. V. Bailey (Edenvale); H. J. Schwim (Kroonstad); D. R. Pretorius (Parys).

3rd Row (L. to R.): —————; H. J. H. Nethersole (Johannesburg); S. J. Whybrow (London); F. R. Waldron (Umtata); H. R. Sissons (Umtata); C. N. Sims (Strand); A. H. Durr (Pretoria); —————; J. T. Williams (Pretoria); Mrs. J. T. Williams (Pretoria); T. Kramer (Potchefstroom); Mrs. S. de V. de Villiers (Robertson); D. Lees (Benoni); —————; Mrs. A. C. Tilley (Johannesburg); —————; Mrs. S. McCracken (Johannesburg); G. Richardson (Johannesburg); Mrs. E. McWilliam (Pretoria); Mrs. R. Mercer (Worcester); W. Rush (Vryheid); C. R. Burton (Kimberley); G. E. H. Jones (Mafeking); P. H. Newcombe (George); J. C. Heunis (George); U. J. Cronjé (Graaff Reinet); G. A. H. Schaftenaar (Graaff Reinet); A. E. Lawrence (Johannesburg); L. Dreyer (Westonaria); J. I. Inglis (Pietersburg); V. Terblans (Boksburg); J. A. Mathews (Kimberley); C. J. Close (Johannesburg).

4th Row (L. to R.): J. S. Woosley (Vereeniging); J. C. Callie (Vereeniging); M. Hewitt (Johannesburg); G. Tilch (Johannesburg); W. J. Hill (Johannesburg); T. M. Moeke (Piet Retief); P. C. Grandin (Gatooma); A. Staithorpe (Gatooma); T. A. Robinson (Johannesburg); E. C. Enfield (Johannesburg); Mrs. J. A. Mathews (Kimberley); R. N. F. Smit (Pretoria); S. de V. de Villiers (Robertson); R. L. Barry (Robertson); A. J. Thompson (Salisbury); A. J. Levy (Johannesburg); H. J. de Villiers (Johannesburg); S. McCracken (Johannesburg); E. McWilliam (Pretoria); R. Mercer (Worcester); C. W. Suckling (Johannesburg); Mrs. J. L. Rothman (Ficksburg); —————; Mrs. D. R. Verschoor (Butterworth); A. Botha (Mafeking); D. R. Verschoor (Butterworth); H. Prins (Johannesburg); C. H. Adams (Oudtshoorn); S. H. Lowe (Port Shepstone); L. Jawno (Kimberley); L. Fitcher (Kempton Park); M. R. Marot (Johannesburg); A. A. Middlecote (Pretoria); R. V. Bailey (Edenvale); R. H. Jones (Edenvale); E. W. Dixon (Germiston).

5th Row (L. to R.): N. A. Potgieter (Middelburg, Tvl.); Mrs. N. A. Potgieter (Middelburg, Tvl.); E. E. de Villiers (Witbank); J. R. Stayte (Newcastle); J. L. McNeil (Stanger); F. H. Tyler (Germiston); H. Boneschans (Germiston); C. Lombard (Germiston); D. C. O. Brune (Pretoria); J. D. Dawson (Uitenhage); D. G. Calder (Uitenhage); C. K. Burrow (Johannesburg); A. L. Sanders (Johannesburg); G. A. Dalton (Johannesburg); T. R. Park (Port Elizabeth); G. Withers (Johannesburg); K. M. Johnston (Johannesburg); —————; Prof. G. R. Bozzoli (Johannesburg); —————; K. B. Yuill (Johannesburg); E. T. Price (Johannesburg); J. Monks (Johannesburg); H. D. T. Harris (Johannesburg); J. L. Rothman (Ficksburg); O. D. Gorven (Durban); M. S. Marson (Durban); Mrs. R. M. O. Simpson (Durban); Mrs. M. J. Prins (Johannesburg); Mrs. K. M. Fisher (Bethlehem); K. M. Fisher (Bethlehem); K. W. J. Halliday (Port Shepstone); W. J. Hampson (Johannesburg); Mrs. H. M. S. Muller (Uppington); H. M. S. Muller (Uppington); W. D. Hutty (Johannesburg); J. van der Spuy (Odendaalsrus); B. B. Kenney (Port Elizabeth); T. H. Kaiferty (Johannesburg); J. D. C. Baxter (Kimberley).

Remaining Rows (L. to R.): G. H. Boyle (Johannesburg); G. Roesske (Johannesburg); A. W. Allen (Johannesburg); L. F. Boyack (Pretoria); T. C. Stoffberg (Pretoria); J. W. Kok (Johannesburg); G. A. Lotter (Louis Trichardt); A. MacArthur (Knights); Dr. C. H. Roux (Louis Trichardt); J. Wilson (Pretoria); Mrs. H. G. Val Davies (Johannesburg); H. G. Val Davies (Johannesburg); G. Walmsley (Johannesburg); M. Wegener (Johannesburg); Mrs. J. D. C. Baxter (Kimberley); J. A. Macques (De Aar); A. C. Grant (Johannesburg); T. R. Strawson (Johannesburg); E. J. McKechnie (Johannesburg); G. R. de Lange (East London); T. R. J. Bishop (Johannesburg); F. van der Merwe (Ladysbrand); Mrs. T. J. R. Bishop (Johannesburg); J. J. de Haas (Pretoria); J. Marshand (Witbank); R. W. Kilfoil (Pretoria); J. S. Craig (Greytown); M. N. Kirberger (Bethul); J. M. Gericke (Krugersdorp); E. Crole (Johannesburg); Mrs. J. S. Craig (Greytown); J. R. Cherry (Randfontein); W. N. Powell (Johannesburg); W. Theron (Worcester); R. C. Viviers (Johannesburg); V. H. Woods (Vereeniging); A. E. Torrance (Johannesburg); A. C. Tilley (Johannesburg); R. V. Lord (Johannesburg); F. L. Knobel (Pretoria); E. L. Mole (Johannesburg); R. S. Dunstan (Pretoria); Mrs. E. L. Mole (Johannesburg); Mrs. R. S. Dunstan (Pretoria); J. A. Barnett (Johannesburg); P. N. Wickerman (Johannesburg); T. R. Johnson (Johannesburg); S. G. Redman (Johannesburg); E. F. Partridge (Johannesburg); E. de C. Pretorius (Stellenbosch); Mr. Pistorius (Johannesburg); J. J. le Roux (Rustenburg); P. L. Vergottini (Brokpan); P. A. McIntjes (Rustenburg); A. Solomon (Pretoria); R. W. Barton (Welkom); J. A. Morrison (Springs); F. Cator (Johannesburg); H. W. Chatterton (Vereeniging); W. Rossler (Kroonstad); A. T. Williams (Johannesburg); G. Williams (Johannesburg); G. Yates (Vereeniging); Dr. J. T. Hattingh (Johannesburg); D. M. Nobbs (Port Elizabeth); A. F. Turnbull (Vereeniging); W. Nicholls (Pretoria); H. D. Cameron (Pretoria); M. le Roux (Pretoria); J. Lownie (Johannesburg); J. Zolkov (Johannesburg).

gaan doen nie en dit is, naamlik, omdat ek voel dat Pretoria se saak in baie veilige hande is, en hier dink ek nie net aan ons eie afgevaardigdes, ons Elektrotegniese Ingenieur en sy bekwame helpers en die Voorsitter van ons Handelskomitee nie, maar ek dink ook hier aan ons eregas vanmôre, dr. Francois de Villiers. Hy is, gelukkig vir ons, ook 'n ou Pretorianer. As ek dit sê, dan bedoel ek nie dat hy oud is nie, maar dat hy darem al lank in Pretoria woon. Ek moet u waarsku van hom — hy is een van daardie min mense wat in werklikheid nog so jonk is as wat hy lyk.

Ek wil ook van hierdie geleentheid gebruik maak om dr. de Villiers baie hartlik geluk te wens met die verowering van die Havenga-Prys vir 1955. Soos u weet, het hy die Havenga-Prys gekry vir navorsing op gebied van Industriële Skeikunde en die Tegnologie en nog baie ander prestasies wat hy behaal het. Ons wens hom almal baie hartlik geluk daarmee. Soos u weet, is dr. de Villiers Voorsitter van die Raad van Toesig op Elektrisiteit. Hy en sy Raad is die mense van wie ons lotgevalle tot 'n baie groot mate afhanklik is en sonder hulle goedkeuring en toestemming, sou geen elektrisiteitsonderneming sy werk kon onderneem nie.

Pretoria is in dié baie gelukkige posisie dat ons geen appeltjie te skil met dr. Francois en sy Raad het nie. Intendeel, ons is hulle baie dank verskuldig vir die feit dat hulle aan Pretoria 'n lisensie gegee het om elektrisiteit te lewer aan 'n gebied wat, sover ek kon vasstel, groter is as enige ander gebied wat aan 'n plaaslike bestuur toegeken is. Dit is dus vir ons almal, maar in die besonder vir Pretoria, 'n baie gunstige voorteken dat dr. de Villiers ons vanmôre gaan toespreek.

Voordat ek hom aan die woord stel, laat my toe om u almal nogeens baie hartlik te verwelkom en die wens uit te spreek dat u 'n geslaagde kongres en 'n baie aangename verblyf in Pretoria sal hê. Dr. de Villiers sal nou aan die woord kom. (Applous.)

DR. F. J. DE VILLIERS:

Mnr. die President, u Edelagbare die Burgemeester, dit is vir my 'n groot voorreg vandag om die Kongres te open en

ek wil u van harte bedank vir die mooi gebaar. Dan wil ek die Burgemeester, dr. Muller, hartlik bedank vir die gelukwense. Dit is natuurlik na jare van hard werk en swoeg dat 'n mens eers so'n toekenning verkry, veral bietjie ouerige mense, soos ek. In elk geval, ek waardeer dit en dit dien tot verdere aanspooring vir die paar skofte wat nog voor lê.

Nou, die eerste vraag wat u dikwels vra is nie, „Wat gaan die man sê?“ nie, maar gewoonlik „Hoelank gaan hy praat?“ Dit laat my dink aan jare der jare gelede toe ons 'n kongresganger aan huis by ons gehad het en hy het met heelwat bagasie daar beland. As belangstellende gasheer, toe ons nou koffie drink op die stoep, toe vra ek hom, „Maar, Oom, hoelank gaan u nou hier vertoef?“ Hy sê, „Nefie, ek gaan net my sê sê, dan trap ek“. Dit was toe bemoedigend gewees, maar hy het ongelukkig baie sê-goed gehad — hy het die hele week daar by ons deurgebring. Maar ek gaan u nou nie vanoggend hier so lank besig hou nie.

Die elektrisiteitsbedryf is so belangrik, dit gryp so in in ons hele volkslewe, dit het so'n belangrike uitwerking dat my pleidooi hier vanoggend is dat dit uit individuele belangstelling uitgellig moet word, dat die hele benadering vandag moet wees dat dit 'n nasionale saak is, dat dit 'n nasionale industrie is en ons partikuliere aktiwiteite moet inpas, moet ingeskakel word by 'n breër nasionale patroon. Dan alleen kan ons verseker wees van 'n nasionale rasonele elektrisiteitsvoorsiening. Ek wil baie graag hê ons moet almal die ou sakkie wat ek hier wil bepleit vandag, goed begryp en daarom gaan ek in Engels praat.

One of the great benefits of a Conference of this type is that it takes you out of the confines and limitations of your particular undertaking and broadens your horizon. As you discuss the bigger and more important issues at stake, you are reminded of your broader national responsibility, especially where you have to deal with a commodity like electricity, the supply and distribution of which vitally affect every section of the community, in fact, the whole socio-economic structure and development.

You have already accomplished much and I think South Africa can justly be proud of what has been accomplished in South Africa by ESCOM, by the Municipal undertakings and by the various industrial concerns.

Hence, what I am going to say this morning must not be taken as a criticism of your efforts up to date, but must be viewed rather in the light of the fact that, with the rapid economic development in this country during the last few years and your tenacious efforts to keep up with the phenomenal increase in demand of this vital commodity, the time has come to pause a while, having reached the top of another hill, to take a deep breath, to view your future task in the light of modern developments and future demand and to determine where your particular activities fit into the broader national supply of the Union.

You will, no doubt, find that you have outgrown the smaller and more confined local and provincial interests and that you can now only effectively plan for the future — each in your own particular sphere — when you view your particular task against the background of a bigger national plan of electricity generation and distribution.

Nothing must be allowed to impede or retard progress in the supply of electricity. Every use must be made of modern technological developments in order to ensure the highest possible degree of efficiency, as so many other countries overseas are now doing.

When I was overseas some weeks ago I discussed this particular question of development and demand with Prof. van Staveren, the Netherlands Electricity Chief, and he assured me that the electricity industry is one of the industries in Europe which have recovered most rapidly since the war. They got going immediately after the war and within seven years they doubled their output capacity. But now you can regard Europe as having settled down and the trend to-day is towards a steady increase in demand. If you watch the curve, you will find that the rate is about 7% per annum increase, which means that you have to double capacity there every ten to twelve years.

If we look at the modern technique and developments in the electricity supply industry used to cope with the increasing demands, we are especially impressed by the efforts that are being made to interconnect power stations and expand reticulation on a national and international scale, thus exploiting the advantages of larger and more economic power stations and the large-scale increase in long-distance bulk transmission of electricity.

Technical development during the last few years, especially the use of higher temperatures and pressures, has resulted in a definite decrease in the average fuel consumption per KWh. and an appreciable rise in thermal efficiency. The average figure, according to the O.E.E.C. reports, is expected to be about 25% by 1958 (that is in the Western European countries).

In this connection it is interesting to note that the new station coming into operation at the T.V.A. (Tennessee Valley Authority) at Gallatin this year, will generate at 9250 B.T.U. per KWh., a permanent efficiency of 37%.

There is another firm going one better — the Philadelphia Electric Company has ordered from the Construction Company in America the erection of a boiler with a steam capacity of 700 tons per hour at a pressure of 6,000 lbs. per square inch, at a temperature of 1,200° F. This boiler will deliver steam to a 275 MW turbo-generator to be supplied by Westinghouse Electric Company. It is estimated that the efficiency will be no less than 40.7%; the costs will be about £58 per KW. This, as you will realise, is fast approaching the practical limits of efficiency and capacity set by the laws of thermodynamics.

There is definite evidence that the whole tendency in the world to-day is to go for larger and larger units; the Reports of the Organisation for European Economic Co-operation indicate that very clearly. In those Reports they are now already considering boilers of 45 to 100 ton steam capacity per hour and turbogenerators below 40 MW as "small" units.

We may, in this regard, note the fact that ESCOM has ordered eight boilers for the Taabos Power Station of 290 ton steam per hour capacity and eight generators of 60 MW each.

The largest unit in production in 1953 was one of 105 tons per hour capacity and 40 MW generators and I believe that the highest efficiency obtained during that year, at Hex River, was just over 23%, and in 1954, 24.34% thermal efficiency. These compare very favourably with some of the European figures and may indicate that in South Africa, in regard to equipment at any rate, we are keeping in step with modern developments.

This, however, is not quite the case when one considers the inter-connection of power units and the integration of supply by means of transmission lines. As has already been mentioned, there is a strong tendency all over the world to inter-connect power stations and to expand networks on a national and international scale. The British have decided to build a supergrid of 275 KV to ensure nation-wide rationalisation and co-ordination. The American Gas and Electric Company has a 330 KV network. In Western Europe the long-distance transmission voltage is generally 220 KV, with the tendency in Germany and France to go to 380 KV, the same as in Sweden, where you have a long transmission line from North to South, over 600 miles — that is also 380 KV.

The progress in regard to ultra high tension bulk transmission has during the last few years been very promising, and much will probably also depend in regard to future development on the mutator capabilities to convert alternating to D.C. current.

As you probably know, a project is at present under consideration for linking Great Britain with Europe by means of a high tension cable and a lot of tests have already been carried out to prove the practicability of this scheme (hear, hear!). Later, when I mention a few notes with regard to the position in Britain, you will find out why it is necessary to take this step.

The possibilities of developing power exchange on an international scale are fast developing. For example, besides occasional exchanges between many of the European countries, some permanent exports have been taking place on a fair scale, especially between Austria and

Germany, where you have long-term contracts. One contract provides for 1,000 million KWh generated in the Vorarlberg and in the Tyrol Mountains.

In addition, arrangements have been made between Germany, France, Belgium, the Netherlands and Switzerland for the interchange of power to the extent that Austria and Switzerland were able to export over 14% in the case of Austria and over 11% in the case of Switzerland of their total production.

Norway, with its large hydro resources, is considering the construction of large power stations to export power to Denmark and Sweden.

It is obvious that when we view what is done in America and Europe, we find everywhere a strong tendency to generate electricity in very large units, with corresponding high efficiency and preferably close to fuel resources, and then to transmit by means of high tension lines to the main consuming centres and to link up, so far as possible, all distributors into a national and international reticulation system.

Such, briefly, appears to be the modern world tendency to ensure the most efficient, economical and rational supply of electricity.

The advantages of inter-connecting power stations, especially in a country like South Africa, are so obvious, that I need only mention a few here this morning.

For example, by sharing stand-by capacities, the capital costs of power station equipment are greatly reduced. The large, strategically positioned power stations, having higher load factors and consequent higher efficiencies, lead to lower costs per unit produced. Also, an important factor is that the best possible use can be made of our national resources, especially of our large deposits of low grade coal. Extensive reticulation is also useful in cases of emergency and when there is an unbalance of power supply in certain sections, a surplus of electric power in one area can be sent to the demands of other areas which are less fortunate.

Appreciable economies can be effected by concentrating production at the more modern production unit and using the less

efficient generation plant only as reserve and during periods of peak demand.

Rural electrification will be effectively stimulated and promoted by the development of extensive networks.

While transmission has been effected in this country at 132 KV, it is quite apparent that for bulk transmission in a large regional or national grid, higher voltages will have to be considered due to the long distances. The choice seems to lie, at this stage, between the standardised voltages of 220, 275 or 380 KV.

220 KV transmission has been developed extensively on the continent during the last decade. As we have already noticed, at the upper limit 380 KV is the highest voltage at present used for bulk transmission. However, careful consideration would have to be given to the performance of such lines in South Africa, due to our own particular climatic conditions and, more especially, the high altitude, and, combined with the dry, dust-laden air during the winter months.

It is most probable that 275 KV or 380 KV would be most suitable for long-distance bulk transmission in this country, but it is quite definite that much more research will have to be carried out before this question can be decided and I recommend that further high tension research be initiated in this country, with special reference to transmission line problems.

While, generally, the advance made in overseas countries can form a sound basis for development of the electricity supply in South Africa, there are two points which we should always bear in mind when such comparison is made:—

- (1) The sparse population of our country and consequently the low consumption per square mile per annum; and
- (2) the exceptionally low price of coal. In 1953 the consumption in the Union, with its 472,000 square miles, was about 13,000 million KWh, i.e., about 27,000 KWh per square mile per annum, whereas, in the case of countries such as Great Britain, Switzerland and the Netherlands, the corresponding figure is about 900,000 KWh. The actual consumption per square mile in the case of the Union is,

therefore, only 3% of that in the industrial countries in Europe.

We have, however, to take into consideration the fact that there are certain areas in the Union with a fairly dense population, such as the Pretoria/Rand/Free State area, the Western Province, the Central and Southern Natal area and the Port Elizabeth/East London area.

We thus have three or four separate electricity supply areas, each of which could be developed into an integrated regional supply system, but it is imperative that the necessary provision be made now already to ensure adequate co-ordination and rationalisation and all obstacles to achieve this end, must be removed, even if it means the amendment of our Electricity Act.

Of all the present inter-connected areas, the Transvaal/Free State area promises early development due to the start already made in this direction and also to the large concentration of mining industry in this area. Further, only last week my Board approved of ESCOM's proposal to amalgamate the two Natal undertakings, where one can now expect the early development of a large integrated regional network.

Rural electrification has become an urgent demand and every effort must be made to assist our farming community in their progressive mechanisation programme and one of the best ways to further such rural projects, is by means of the development and the expansion of network supplies, even if such extension slightly exceeds the economic margin.

The second point is the exceptionally low price of coal in the Union, which makes it less urgent to exercise such strict fuel economy as in the U.S.A. and Europe, with their high coal prices. And this also means that we must expect the harnessing of nuclear energy for the production of electric power much later than in overseas countries.

Only last month David Liellenthal of T.V.A. fame, who later became the Chairman of the Atomic Commission, said that, in his opinion, it may take twenty years before atomic power will be able to compete with other sources of energy.

The O.E.E.C., in its latest Report, also

said that although countries in Western Europe are considering this question, there will only be a few experimental plants with a very limited output.

If these statements are appropriate of the U.S.A. and Europe, where coal prices are more than double those of the Union, then it is obvious that the Union is still a long way from the economic utilisation of atomic power for the production of electricity.

It is interesting, however, to notice the case of Great Britain; she is having an increase in the problem of bridging the gap between production and demand — coal production and electricity demand. Every effort is being made there to bring nuclear power production into commercial use so soon as possible. They have a long programme; they have recently published a White Paper — I am not going to go into detail there. You are acquainted with the Calder Hall Experimental Power Station there, the power plant of 150 MW, costing about £15 to £20 million. To indicate to you how serious is the problem in Great Britain, by 1970 or slightly beyond that, the coal required to generate power for Britain, will be over 100 million tons per annum. And you can see that there are limitations to this sort of thing; that is why Britain, more than any other country, is taking this possibility of harnessing nuclear power much more seriously.

It must be realised that on the horizon there is thus the prospect of a revolution in electricity generation and that in the next twenty years, significant changes in the economics of power supplies may result, due to the development of atomic power stations. Bulk transmission of electricity over very long distances may then not be so easy to justify against fuel transport, as such costs for atomic stations will, of course, be low.

It is obvious, from what has been said previously, that full use is being made of the latest technical developments, especially by those countries which are faced with the problem of expensive fuels for electricity generation. But, to me, the most important step towards obtaining a reliable economic electricity supply, has been the development of networks and

grids, whereby large power stations have been inter-connected with high tension transmission lines. This is also the main point of my address this morning and my earnest appeal to you is that everything possible should henceforth be done to plan and co-ordinate the supply of electricity in this country, so that each step taken by any particular undertaking, will immediately or, at any rate, at some later stage, fit into a broader regional scheme or national scheme.

We have, in fact, outgrown the early stages of development of isolated and unco-ordinated efforts. The time has come when the electricity supply of this country has become so widespread, the demand so great and the whole question so vital to the socio-economic development of this country, that we must all work together for the establishment of large regional grids, and we must support all efforts that will promote their formation and expansion, such as the inter-connection of power stations, bulk transmission of electricity and the adoption of standardised equipment, frequency and voltage of generation, transmission and distribution. The formation of such large networks would in no wise interfere with the local powers and operations of any private undertaking or urban local authority.

Technological developments have, as we have seen in the earlier part of this address, led to transmission of electricity over distances exceeding 600 miles, thus making it possible to develop large national grids in overseas countries, and also the interchange of energy between different nations. Hence, it is not a far-fetched idea to think of the different large regional networks in this country being inter-connected at some future date by a super-grid system. In fact, my Board has already had an application for the supply of electricity to Southern Rhodesia.

It must, however, be admitted that revolutionary changes in methods of generation may, to some extent, render such inter-connection on a national basis unnecessary, but the first step to be taken, is that of planning and co-ordinating the supply on a regional basis.

We are well aware of the important

part a sound, reliable, cheap electricity supply will play in maintaining a high standard of living and in raising the level of industrial productivity. It is, in fact, an important national industry and, as such, its development and functions must be conceived on a national basis.

I believe this important task needs the united efforts of all of you who so diligently serve the cause of the industry and I appeal to you for your closest co-operation.

I now have great pleasure, Mr. President, in declaring this Convention duly opened and wish you every success in your important deliberations. (Applause.)

MR. MULLER (Bloemfontein):

Mr. Mayor, Dr. de Villiers, on behalf of the Association, I would like to thank you for your extremely illuminating address. I have no wish to discuss the address (it is not correct), but I must thank you for doing two things: No. 1, drawing the curtain on the magnitude of the schemes that are being developed in other parts of the world and your plea for co-ordination of supplies in South Africa in the national interests.

Terwyl ek na dr. de Villiers geluister het, het die grappie by my op gekom; u het dit miskien al baie keer gehoor, maar ek kon nie help om so'n bietjie daaroor te glimlag nie. Die haan het 'n volstruiseier gekry en met veel moeite het hy dit by die henhok ingerol. En toe hul'e nou daarna kyk en gewonder het daaroor, toe sê hy: „Dit is net om te wys wat kan gedoen word!”

Nou, Dames en Here, Doktor het ook hier voor ons 'n baie groot eier geroel om te wys wat in ander dele van die wêreld gedoen word, maar ek wil hom tog verseker (en ek dink die ingenieurs sal daar by my staan) dat as ons die medewerking van sy Raad het, die Elektrisiteitsvoorsieningskommissie en ons eie Rade, dan sal die ingenieurs sorg dat die eier daar kom. Baie dankie, Doktor. (Applous.)

Ladies and Gentlemen, we must now proceed to the first function of this Convention, that is the election of the new President. I have much pleasure in asking for nominations for the position of President of this Association for the coming year.

Met genoeë vra ek vir benoemings vir die pos van President vir die nuwe jaar.
MR. J. C. FRASER (Johannesburg):

Your Worship the Mayor, Dr. de Villiers, Mr. President, Ladies and Gentlemen, at the last Convention Mr. Hugo was unanimously elected our Vice-President. To-day I am privileged to ask you to accept Mr. D. J. Hugo, Pretoria's City Electrical Engineer, as your President.

Mr. Hugo's long membership with the Association and his many years of service as an Executive Council member, makes it almost unnecessary to say any more of his ability to hold the office of President.

Johannesburg, being a suburb of Pretoria, has afforded me the opportunity of appreciating the sincerity and ability with which Mr. Hugo carries his responsibilities, and I think the Association would be very fortunate in having him as their President.

Dirk, as he is commonly known to many of us, is reserved and shy, not fond of publicity, always hiding his light under a bush. With the determination and spirit of adventure of his ancestors he has worked his way up from the shores of South Africa to the honoured position of the City Electrical Engineer of the administrative capital of South Africa.

He was born in Natal, educated in Potchefstroom, he graduated at the Witwatersrand University and finally entered the service of the Pretoria Municipality some twenty-five years ago.

Pretoria City Council have been very fortunate in having the services of an Engineer of Mr. Hugo's capabilities to guide and direct their Electricity Department during the last seventeen years, a period of phenomenal growth.

It is with the greatest confidence that I nominate Mr. Hugo as your President for the ensuing year.

ALDERMAN A. MORTON JAFFRAY (Salisbury): Your Worship, Mr. President, Ladies and Gentlemen, having known Mr. Hugo for some ten or twelve years, I have had ample opportunity to weigh him up. I have a great admiration for his quiet efficiency and if he is shy and retiring, I suggest that might be a little change from what we have had occasionally in

the past! (laughter).

And so, Mr. President, it is also with complete confidence that I take this opportunity of seconding Mr. Fraser's proposal. (Applause).

PRESIDENT (Mr. G. J. Muller Bloemfontein): Are there any further nominations? If there are no further nominations, it affords me very great pleasure to declare Mr. D. J. Hugo elected as the President for the incoming year. (Applause).

Dit is my besonder aangenaam om na 'n hele aantal jare dit reg te kry om die ketting om mnr. Hugo se nek te hang!

(On receiving the Chain of Office, Mr. Hugo assumed the Chair in place of Mr. Muller). (Applause).

PRESIDENT (Mr. D. J. Hugo, Pretoria): Mr. Mayor, Dr. de Villiers, Ladies and Gentlemen, later in the day's proceedings I shall be delivering a formal address, when I hope suitably to express my appreciation of being placed in this position.

For the present, therefore, may I sincerely thank my proposer and seconder for their kind remarks and many I thank you all for conferring this honour on me.

My first duty, unfortunately, is to make reference to obituaries which occurred during the year. Dr. Dobson, one of the foundation presidents of this Association, died last year. Recently, we were shocked to hear of the death of Mrs. A. R. Sibson, the wife of one of our immediate Past Presidents. Within the last few days we also heard of the sudden death of Mr. E. V. Perrow. Mr. Perrow was not a member of this Association, but he frequently attended these Conventions, either as a representative of the South African Institute of Electrical Engineers or as Chairman of the Safety Precautions Committee.

As a tribute to their memory and as an expression of sympathy to those who have been bereaved, I ask you to stand for a few moments.

In happier vein, I heartily welcome our distinguished visitors who represent Engineers' Institutions, supply authorities, Government departments and scientific bodies. You will appreciate that I cannot mention them all by name. May I also say how privileged we are again to have

at our Convention a representative of Messrs. Merz and McLellan and I warmly welcome Mr. Arthur Howell, of Newcastle-on-Tyne, one of the firm's senior partners. At one stage I thought that all five our honorary members were going to be present, but, so far as I know, Mr. Kinsman is the sole representative. Mr. Horrell did intend being present, but he has been seriously ill and I am sure you will join me in wishing him a speedy recovery. However, he has sent his congratulations to the incoming President and his best wishes for a successful Convention.

We have received a number of apologies, but time is getting on and I think we shall leave those until after the tea-break.

The one item I would like to take now is the venue of our next Convention. Alderman Morton Jaffray, of Salisbury, has already indicated that he has something to say on that subject.

ALDERMAN MORTON JAFFRAY (Salisbury): Mr. President, Mr. Mayor, Ladies and Gentlemen, ten years ago almost to the day, this Convention assembled in what was then a small town lying to the North of the Limpopo, the capital city and mother city of Southern Rhodesia. At that time we were a little bit nervous of inviting the Association of Municipal Electrical Undertakings to come to Salisbury, but we did our best and though I believe the delegates attending did not think very much of the show, nevertheless Salisbury thought it was not too bad!!

For a year or two now we have felt that it was our turn once again to be the host town, more particularly now that the Central African States have federated and Salisbury, the Federal Capital, has developed enormously. Not so enormously, though, that we have had to have power from the Union of South Africa!! However, in the last month or two quite a deal of spade work has been done and we feel reasonably confident that we can make a success of another Convention in Salisbury.

We are still a bit short of hotel accommodation and it has been suggested to me that we might lay in a stock of tents

or run up a few pole and daga huts here and there! However, I hope you won't take that very seriously. It is a fact that my City Electrical Engineer is concerned with the question of distances, some of the delegates will have to travel to and from meetings. I have suggested to him that all those who are housed within twenty-five miles of the conference hall, can walk and for those accommodated between twenty-five and a hundred miles from Salisbury, we shall probably have to arrange some transport!

So, Mr. President, it is with a great deal of pleasure, on behalf of my Council, that I extend a very warm welcome to the Association of Municipal Electrical Undertakings to hold its thirtieth Convention in Salisbury in 1956. (Applause).

PRESIDENT (Mr. D. J. Hugo, Pretoria): Thank you, Alderman Jaffray. Are there any other invitations?

THE AUDIENCE: No! (Laughter).

PRESIDENT: Do you agree, then, that we visit Salisbury next year? (Applause). Alderman Jaffray, will you please convey our appreciation to your Council and tell them that we shall be very happy to hold our Convention in Salisbury next year.

Gentlemen, I am also going to hold over the election of the Vice-President until after the tea interval. There is one short announcement. Immediately after tea the official photograph will be taken, so when the warning bell rings, will you please proceed to the City Hall steps. We shall now adjourn for tea and I invite the Mayor and Mayoress to join us.

10.40 A.M.: ADJOURN FOR TEA.

Proceedings Resumed at 11.40 a.m.

PRESIDENT: I have been asked to announce that the proofs of the photograph will be available this afternoon.

I understand that some of our official visitors would like to convey greetings at this stage and I therefore give them that opportunity.

Mr. J. ETTERS HANK (Johannesburg): Mr. President, and Gentlemen, on behalf of the South African Institution of Mechan-

ical Engineers, it gives me great pleasure to, first of all, thank you for your invitation to be present here at this very important Convention and to convey to you the Institution's good wishes for a very successful year of office and to all the members of the Convention present, a very happy Convention and a very successful week of business. Thank you very much.

MR. J. LOWNIE (President of the South African Institute of Certificated Engineers): Mr. President, and Gentlemen, I have very great pleasure in thanking you, on behalf of my Council, for the opportunity of attending your Convention. The proceedings are interesting and I wish you every success in your year of office.

PROF. G. R. BOZZOLI (Johannesburg): Mr. President, I represent an Institution which I think has very close links with this Convention, that is the Institute of Electrical Engineers in Johannesburg. My Institute would like me to convey to you their very best wishes for a successful Congress and to express the certainty that the Congress will be of great value to all concerned and I thank you very much indeed for your invitation to attend.

PRESIDENT: Gentlemen, if there are no further speakers, then I intend proceeding to the next item on the Agenda, that is the election of Vice-President and I call for nominations for the office of Vice-President.

Mr. A. R. SIBSON (Bulawayo): Mr. President, Gentlemen, it gives me very great pleasure to nominate Mr. J. E. Mitchell, City Electrical Engineer of Salisbury, as the Vice-President for the ensuing year.

Mr. Mitchell is unfortunately not with us today, he is overseas, but I understand that he has no rooted objection to being elected as Vice-President and therefore I do make this nomination. I think it is probably appropriate that having had as your President during this present year, the City Electrical Engineer of the capital of the Union of South Africa, you should have next year the City Electrical Engineer of the capital of another territory, which lies a little further to the North.

Some remarks have been made about the psychological make-up of our newly elected President and I think that one can say that if the pendulum has swung towards modesty and retirement, then perhaps it may swing back again a little later.

MR. J. C. DOWNEY (Springs): Mr. President and Gentlemen, I have much pleasure in seconding the nomination of Mr. Mitchell as our Vice-President.

PRESIDENT: Are there any further nominations? In that case, I have much pleasure in declaring Mr. Mitchell the Vice-President for the ensuing year. (Applause.)

Mr. E. C. LYNCH (Salisbury): Mr. President, Ladies and Gentlemen, it gives me great pleasure to thank you, on Mr. Mitchell's behalf, for this honour which you have bestowed upon him. Unfortunately, as you have heard, Mr. Mitchell is unable to be present and so I am representing him, being his Assistant.

Well, it is an ill wind that blows nobody any good and it has afforded me the pleasure of attending this, my first Conference, and I also have to tell you that Mr. Mitchell has given me a message which he would like me to read to you, as he anticipated this honour:

"It is with mixed feelings that I write this prior to my departure overseas, because I shall miss very much not being at Pretoria, especially to see how our new President, who has dodged that honour so long, acquits himself in the Chair.

My own impression is that he will make one of our best Presidents because he has had so long to study so many who have gone before him. I also feel he will get through the business of the Convention with the utmost despatch, the quicker to join me here in the Old Country.

It occurred to me that if things went according to the usual pattern, there would be one speech missing, that being the one of thanks by myself to you all for electing me to the high honour of Vice-President. If things do not go according to plan, no-one will be any the wiser, as this speech will not have been made and will have been torn up. So, if you are listen-

ing to this, I have already been elected. (Laughter.)

Of course, it is very nice to have the honour this year without having any of the work. I wonder how many can realise the hours put in by the Executive, who always have to get up an hour or so earlier than anyone else and stay behind when everyone is enjoying themselves. I shall, of course, miss seeing all the ladies, bless them; they do brighten things up, though at times they sober some of the members down, and I shall miss seeing the change in hats and styles. I do not believe many are observant enough to know whether the same hat turns up at the same function, but don't worry ladies, I shan't tell!

I am looking forward to seeing you all in Salisbury next year, although, like your new President, I could have done without the extra work. I have no doubt, however, that with the experience of Alderman Morton Jaffray behind me, things should be relatively simple.

Alderman Morton Jaffray has been the Councillor member for Salisbury at these functions now for ten years, although unfortunately, he had to miss the Pietermaritzburg one when I was overseas and things were not going too well in Salisbury, and I feel that the Executive might give some thought to giving credit to such Councillors as Alderman Morton Jaffray and Councillor Young of Pietermaritzburg for their very long service as members of the A.M.E.U. (Applause.) It might be that they could be rewarded with Honorary Membership after ten attendances and I had thought of asking for an alteration to the Constitution to allow for this.

In again thanking you for my election to the Vice-Presidency, may I say that I shall do my best to live up to the traditions set by my very worthy predecessors?" (Applause.)

PRESIDENT: Ladies and Gentlemen, the next item on the Agenda is the Valedictory Address of the retiring President, Mr. G. J. Muller and I call on Mr. Muller to present his address.

RETIRING PRESIDENT'S VALEDICTORY ADDRESS

By G. J. MULLER, City Electrical Engineer, Bloemfontein.

In choosing a subject for a valedictory address to an association such as ours with a membership comprising both directors and technical officers of undertakings, and a friendly association with the commercial fraternity, I have endeavoured to provide some appeal for the divergent interests. I trust you will find "Load Building" such a subject.

During the past decade most Electricity Undertakings have struggled with varying degrees of success with plant shortages and rapidly increasing loads, and according to authoritative opinion this position is not likely to be completely stabilised in the next ten years.

Looking back ten years, Councilors will remember import control, late contracts and consequent criticism from the public only too vividly. Engineers in charge of electricity undertakings will recall struggles to get plant on order and to squeeze the maximum out of what they had available. Engineering firms will look back to a seller's market, but also to strenuous efforts to satisfy an ever increasing demand against many odds. In all not a time to look for new business, while unavoidable business caused such a headache.

All the efforts over these years have, however, not been without effect. Supply is gradually creeping up on demand. Commerce is adjusting itself to a new era of selling instead of taking orders, while Councilors and Engineers may with profit devote some thought to the load that the plant they have provided and planned, will supply.

Some twenty years ago Municipal Electricity Undertakings were also spending considerable time and thought on load. The main concern was however, not how to supply the load, but what new load could be found to supply.

Commercial and Municipal advertising had taken effect, the Public began to realise that electricity could be used for many purposes besides lighting and much enjoyment was derived by all concerned

in buying and selling all kinds of electrical equipment which were destined to have a profound effect on the general standard of living.

Starting with electricity mainly as source of light, any other load was bound to improve the load factor and reduce the cost per unit. With reduced cost, electricity became still more attractive and gradually electricity undertakings become quite useful sources of revenue for the public coffers.

Any relief to the general rate fund being a popular subject with every Municipal Chairman of Finance, it is not surprising that enthusiastic engineers of the "Electric light" days had little opposition to their schemes for bringing the benefits of electric power to every home, business or factory.

Advertising, showrooms, demonstrations, assisted wiring — hire of equipment — and hire-purchase schemes, all contributed their share in bringing electricity where engineers wanted it to be, but only their persistent efforts to provide even better service kept it there, and made the use of electricity so general that we now find whole townships without a single chimney. Even on farms and agricultural holdings electricity is rapidly replacing other forms of light and power.

Against this background of an electrically minded public and greatly increased cost of plant and equipment the general approach to new load must to-day differ considerably from that which proved so successful in the years between the two world wars.

Ideas on future load can be developed under the following headings:—

- (a) The function of a Municipal Electricity Undertaking.
- (b) Sources of Load — their nature and possibilities.
- (c) Objects and methods of building or shaping future load.

The Function of a Municipal Electricity Undertaking.

Every Municipal Electricity Undertaking is financed from funds borrowed on the

security of ratable value of property and is therefore owned by the ratepayers and operated on their behalf by the Council for the benefit of the particular urban community. It is a public service in the same sense as Water Supply and transport. These services are generally referred to as "Trading Undertakings". Actually they are only trading undertakings in so far as they sell a commodity.

The basic function of the electricity undertaking is thus to make available to the community an adequate and reliable supply of energy at the lowest possible cost.

In the course of years it has however, become a generally accepted practise to appropriate a portion of electricity revenue for the relief of rates. While this may not be basically correct, there is, with the limited taxing powers of local authorities, much to be said for this procedure as a means of spreading the burden of taxation more evenly on all citizens.

This need to make a profit has made the Electricity Undertaking more truly a "Trading undertaking" with the normal business urge to increase turnover. This in turn has no doubt paved the way for the now quite common rural development by Municipal electricity undertakings.

With the sanction of established practice the function of a Municipal Electricity Undertaking is now, to make available an adequate and reliable supply of electric energy within the municipal area and any further areas which can be supplied with advantage to the undertaking, at a cost which will yield a fair contribution to relief of rates.

Municipalities have on various occasions complained that government and provincial responsibilities are gradually being shifted on to their shoulders, and the thought has occurred to me that in shouldering the capital burden of supplying beyond their boundaries, they have accepted a responsibility which might well have rested on the shoulders of the National electricity supply authority, the E.S.C., if some basis of co-operation between the National and local authorities could be found.

Sources of Load.

The load on the electricity undertaking can generally be split into two sources—Load within the Municipal area from Townships and load beyond the Municipal boundary from supply areas approved by the Electricity Control Board.

The first class of load must be accepted on an economic basis, or the undertaking would fail in its primary function. The second class is voluntarily accepted on a basis agreed to between the parties and approved of by the Electricity Control Board.

Urban load may be sub-divided into domestic, business and industrial load, each of which may be further dissected into lighting, heating and power.

Domestic Load is to-day predominately a heating load with a relatively small proportion of power and lighting. The latter is, for the present purpose, of little interest and need not be further discussed.

The "power" portion is derived from domestic appliances with an occasional borehole pump or hobby machine. Items such as refrigerators and radio's must obviously be left out of consideration when contemplating load shaping and from the load building angle they also do not need any specific effort as they come on as fast as dwellings arise. Pumps, washing machines and hobby plant are not tied down to time, and although a relatively small proportion of the load, could make quite a useful contribution in a load shaping and building drive.

Air conditioning is a new type of load which may soon show up on the domestic horizon, and would merit some study.

Heating, the most important domestic load, comprises cooking, water heating, ironing and space or comfort heating.

Domestic "comfort heating is mostly a late afternoon and evening load and somewhat sporadic, depending on weather and domestic circumstances. For these reasons storage heating for this purpose would not be practical and the load must be accepted when it comes. "Heat Pump" units would greatly reduce this seasonal load, but cost seems to rule this out for the present. For undertakings with a morning peak, it would not be unwelcome, provided there is a fair margin

between morning and afternoon load. For systems with an evening peak, this type of load is expensive, but must be accepted as an inalienable part of domestic load, the only bright spot being, that it continues for some hours after cooking and therefore tends to improve domestic load factor.

Tuesday morning seems to be universally reserved for ironing, and for systems with a morning peak, Tuesday generally produces the highest load for the week, unless of course it rains on Monday. I doubt if coercion or propaganda will persuade housewives to break this ancient custom. The remedy here seems to rest in the hands of our commercial friends. Electric roll ironers reduce this quite strenuous task to a "sitdown" job and this seems to have the effect of spreading the ironing time, I have even heard of it becoming an evening "pastime".

Electric cooking is now almost universal in larger undertakings, and no one grudges the housewife this modern comfort, nor do we mind taking over the annual winter battle for coal.

The domestic tariff is however usually one of the lowest on the list and cooking imposes a considerable demand at a very modest load factor.

Propaganda for the more efficient use of electric ranges would therefore not be out of place. I would like to see the trade, stressing oven-cooking more than they do. The new large capacity ovens seem to invite this as a sales point and housewives will probably be more interested in economy than the size of turkey they can roast.

Electric storage cookers would be the ideal solution, if the trade could provide a satisfactory article. To the undertaking it would be an ideal load, and for the housewife it would provide complete security from the annoyance of an occasional "trip" at awkward times. Such an appliance was actually marketed, but for some reason never became popular. It should however not be beyond human ingenuity to design a really efficient article, which should find a ready market, with so much of the housing provided to-day by the state or the local authorities.

Water heating is about the only load

on Municipal undertakings which has been subjected to control to some extent. The reasons are obvious. The load can only be obtained at a low tariff, although coal shortages have loaded the scale somewhat in favour of electric heating, and with suitable design satisfactory service can be rendered on a control basis. To councillors and engineers who have not seriously considered the possibilities of this item of load, I would recommend a study of Mr. Mitchell's paper on super-imposed control.

Commercial Load is generally subject to higher tariffs, probably on the basis of "what the traffic will bear" and to some extent the low load factors and unpredictable rises which were associated with this class of load. A thunderstorm which quickly darkens the sky may cause a rapid rise of load of considerable dimensions. In our case this is often in excess of 1,500 KW. With the modern tendency to use artificial lighting throughout the day, and with the very great diversity the business power load, business light and power is an asset worthy of some encouragement.

Business space heating, specially in undertakings with a morning peak, is however quite a different matter. It is a rapidly increasing load, with practically no diversity and only lasts about three months of the year. Although justifiable, it is not practical to sell units for this purpose at four times the average price, and some other solution must be found to avoid unnecessary capital expenditure on a load of this nature.

Storage heating, either heating units or floor heating on a minimum tariff appears to be the solution. The former has been successfully tried out in offices in my area, and with reports from overseas, I am led to believe that, correctly installed in suitable premises it should be successful in South Africa.

The initial cost is still somewhat high, but it is even now many times less than the cost of plant to supply the more usual forms of electric heaters, and falls on the party who needs the heating instead of the general public.

Industrial Load is diligently sought by most municipalities, more for the sake of

the industry than the load, although the latter is on the whole not unattractive, and occasionally offers real plums.

This class of load is very varied in nature, covering motors of all types and sizes, Arc and spot welding, process heating including electric boilers, electrolytic processes, etc., it follows that individual loads vary greatly in magnitude, power factor and load factor.

Control of this class of load is difficult, but not impossible with sufficient incentive.

Rural Load generally covers all three of the classes referred to above, and only differs from town load in that it is more spread out, and in the first instance its supply is not obligatory. It follows therefore that this class of load is only accepted if a proportionately increased revenue can be earned, generally about 25% more than from similar load within the municipal area.

Reasons for and Methods of Load Building.

Load building is of a dual nature. It obviously aims at increasing the sale of units, but also implies shaping the load with definite object in view.

The reason for trying to increase unit sales, since undertakings are expected to produce a profit, is quite clear. Why engineers should however, want to patter around with the demands of their consumers is generally somewhat obscure to the latter and often also to the councillors who represent them.

The average person is used to buying and selling goods at so much each, per pound or per gallon, and is used to the idea of a discount on a wholesale order. It therefore appears strange and unfair to him that electricity should be sold on a basis which yields a different price per unit for almost every consumer. Technically this may be explained in terms of "Load factor", "power factor" and diversity. I prefer to say that no two loads are identical from the supply point of view, but range in an infinite variety between the extremes of a very large load taken for a very short time and a small load taken continuously.

Further, some types of load have the peculiarity of imposing a greater burden

on the system than others of a similar power or rate of energy consumption and finally the time incidence of different classes of load is different, some classes of load coming and remaining on concurrently resulting in a total drain on the system practically equivalent to the sum of the individual loads, while in other classes the high and low rates of drawing power fit into each other so that the total is only a fraction of the sum. In this connection it should also be remembered that the station and system must be capable of supplying the highest rate of power consumption every day and every year even if it only persists for half an hour. Additional load at this critical time can therefore only be met at the cost of further capital expenditure, while load required when the system is lightly loaded can be catered for with practically no additional capital cost.

It follows then that, while all load offered will be accepted at a price, encouragement will be reserved for new load which will involve the minimum capital expenditure, or for existing load, which by altering its time of incidence will enable the same plant to cater for new load. In other words the object of load building is to provide the maximum service with the minimum capital expenditure.

Load building, or the attraction of new desirable load and the alteration of existing load to reduce the cost of providing such load, is effected by advertising, service and attractive terms.

Advertising or propaganda may emanate from both the Electricity Undertaking and commerce.

I include the latter because I am convinced that it would be to the advantage of all concerned if the load policy of the undertaking is understood and supported by the electrical trade.

It must be obvious that if the cost of electricity can be kept at a moderate level, the public will benefit, and will be more receptive to the appeal of electrical equipment and the financial affairs of the undertaking will be placed on a firm footing.

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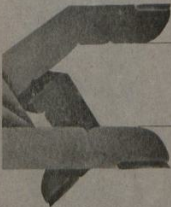
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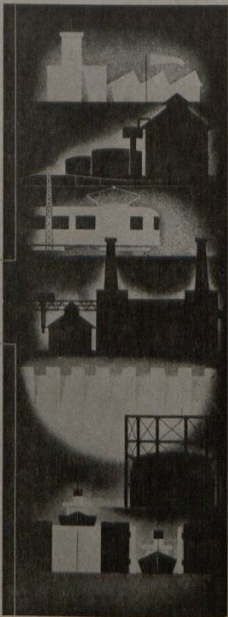
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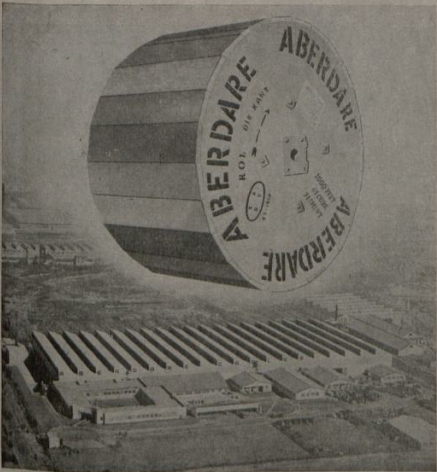
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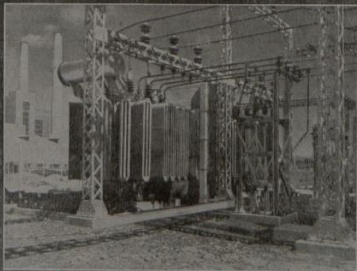
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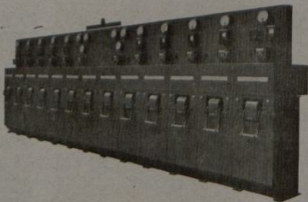
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electricity at a constant voltage and as free as possible from interruptions rests with the undertaking and it is their duty also to attend to any complaint in this respect as expeditiously as possible.

The undertaking may go further and set a good example by using the equipment they advocate, wherever the opportunity occurs.

Under present conditions there seems to be no call for assistance from the undertaking in the sale of electrical equipment as the trade can sell as much as they can provide on their own terms. A sale should also imply service and for this reason I would like to see the sale of electrical equipment in the hands of concerns who can give sound advice to customers, see that the article is safely installed and properly used and can provide any service which may subsequently be required.

There is not only a "printer's devil" but also an "Electrical Devil" that sees to it that cables blow up at 1 a.m. or other awkward times and that stoves, etc., go out of order over week-ends or public holidays when it is often difficult to get the required service. May I suggest that Electrical Contractors' associations consider the institution of a joint "on call" service after hours.

Attractive Terms are now usually available from the trade. In fact, commerce has on occasion been blamed for making buying so easy that the unwary land themselves in debt.

Favourable terms from the electricity undertakings can only take the form of suitably framed tariffs. The tariffs must be so framed that they cover all costs including the required contribution to rates, and theoretically they should be based on the cost of service, so that each consumer pays the cost of the energy supplied to him plus the same percentage contribution to relief of rates. This is seldom strictly applied in practice, other factors often swaying the balance in favour of one class of load or the other. The domestic use of electricity for instance is now considered so essential for comfort and convenience at home, that both business and industrial consumers, with an eye on their own domestic comfort do

not object to a smaller proportional contribution from domestic supply. Similarly, but not quite to the same extent, industry receives some special consideration.

Having decided on relative contributions expected from each class of consumer and the cost per unit in the morning, afternoon and night, it now remains to frame tariffs which will produce the correct revenue from each class of load. A two part tariff, based on KVA demand and energy consumption is generally accepted as the fairest to both parties, except in isolated cases where a consumer takes the bulk of his load off peak. This could be dealt with in two ways, either by providing a switching arrangement on the demand element or by separate metering without demand, the load used exclusively "off peak".

The latter is preferred as it excludes surprise loads, the supply being switched off during peak hours as in the case of water heaters.

The metering of demand is however not economic for small consumers and various makeshifts have been employed, e.g., room basis and H.P. charges. A much more accurate and very simple method would be to replace fuse cutouts by miniature circuit breakers, and basing the standing or demand charge on the rating of the breaker required to maintain supply. The only possible objections that could be raised are cost and time required for the changeover, provided the breakers have a fair time delay between closures to prevent damage by "pumping".

Considering the heavy capital cost of the undertaking, I would not advocate investing any further capital in consumers equipment in hire purchase, renting or other ways, but where a consumer is involved in extra expenditure to suit special metering it would be competent for the undertaking to make concessions on the cost of the Municipal service.

I hope that engineer members will forgive me for speaking on this subject without using figures, curves not even once mentioning "kilowatts", but if this conversational talk will serve in future to throw some light on their well intentioned reports to Council, I may yet have the pleasure of earning their thanks.

PRESIDENT: May I call on Mr. C. R. Hallé to propose a vote of thanks to our retiring President for his address?

Mr. C. R. HALLE (Pietermaritzburg): Mr. President, this is the second time I have listened to a Valedictory Address by Mr. Muller and, as you see it is having a habit-forming effect on his wisdom and power of observation. In Bloemfontein last year he said that happiness does not depend on what you have; it depends on what you are contented with. And I think that, on behalf of you all, I can say we are very contented with Mr. Muller and his words of wisdom and advice he has given us and I am, therefore, very happy, on your behalf to propose a vote of thanks for his Valedictory Address. (Applause.)

PRESIDENT: Thank you, Mr. Hallé. Will Councillor Castelyn please second the vote of thanks?

COUNCILLOR F. J. C. CASTELYN (Bloemfontein): Mr. President and Gentlemen, I would like to second this proposal and to thank Mr. Muller for his illuminating address delivered to this Convention. It is rather difficult for laymen fully to appreciate and to understand the complex nature of the problems encountered in electricity undertakings, and Councillors do not always appreciate the extent to which problems have to be solved before electricity can be made available for the various functions and fulfilments that these days of development call for from our power stations.

Die veld wat mnr. Muller dek in sy rede is omvattend en ek wil dit nie hier behandel nie. Hy het veral die belangrike aspek van die verskillende vragte waarvoor in die hedendaagse kragstasie voorsiening gemaak moet word, behandel, en ek dink u sal met my saamstem dat hy gesigspunte wat van die grootste belang is, baie helder geskilder het.

Bloemfontein is geen uitsondering op die reël nie as daar verwys word na groot-skaalse na-oorlogse ontwikkeling en, om u 'n idee te gee tot watter mate ons ons ontwikkelingsvermoë moes en nog moet verhoog, verstrekk ek graag die volgende besonderhede:

Mr. Muller is die man na wie die Bloemfonteinse Stadsraad moes opsien vir leiding

en advies in verband met die beplanning van ons kragstasie-uitbreidings wat noodsaaklik geword het teneinde te kon voldoen aan die steeds toenemende aanvraag. Mnr. Muller was nie bereid om die woord „kilowatt” in sy rede te gebruik nie, nou sal ek dit maar vir hom doen.

In 1951 was die ontwikkelingsvermoë van ons stasie 24,000 kws., wat onvoldoende was om aan die steeds groeiende vereistes te voldoen. Die vermoë is toe verhoog tot 31,500 kws. deur die installering van een 7,500-kws. turbine, waarmee gegaar is die vervanging van die bestaande verkoelingsdamme met twee moderne verkoelingsstorings. Hierdie laaste stap het veral noodsaaklik geword omdat dit heeltal duidelik was dat daar onmiddellik voortgegaan sal moet word met verdere uitbreiding aan die kragstasie.

Die belastingbetalers het toe reeds die nodige magtiging aan die Raad verleen om verdere kapitale lenings aan te gaan vir hierdie doel en die Raad het besluit om 'n langtermynplan aan te pak sodat uitbreidings in so 'n volgorde kan geskied dat Bloemfontein verseker sal wees van voldoende krag in die toekoms. Volgens hierdie plan, wat reeds goedgekeur is, sal ons kragstasie in 1960 instaat wees om 91,500 kws. te ontwikkel.

Hierdie grootskaalse uitbreidings is hoegenaamd nie eie aan Bloemfontein nie, en enige ontwikkeling bring sy probleme mee. Dit is om hierdie rede dat ons baie dank verskuldig is aan mnr. Muller vir sy bydrae tot die oplossing van sodanige probleme.

Ek wil hom gelukwens met die leersame aanhalings wat ons besonder waardeer. Sy erns, bekwame leiding as President, stem ons tot dankbaarheid en dit is vir my 'n voorreg om aan te sluit en om hom, namens die vereniging, te verseker van ons opregte dank en waardering vir sy geduld, sy tyd en vriendelikheid wat hy, as President, aan die dag gelê het. Dankie, mnr. Muller. Thank you, Mr. President. (Applause.)

PRESIDENT: The next item on the Agenda is the election of the Executive Council. We have the President, the Vice-President, Mr. J. E. Mitchell, and two immediate past Presidents, Mr. Muller and Mr. Sibson. You will appreciate that Mr. J. C. Fraser is no longer eligible. I now

call for nominations for the six Engineer members to serve on the Executive Council. You all have ballot papers in your folders.

The following were duly proposed and seconded:—

- R. W. Kane, Johannesburg.
- D. M. Nobbs, Port Elizabeth.
- P. A. Giles, East London.
- R. M. O. Simpson, Durban.
- J. C. Downey, Springs.
- J. L. van der Walt, Krugersdorp.
- Chris G. Downie, Cape Town.
- C. R. Hallé, Pietermaritzburg.
- C. Lombard, Germiston.

PRESIDENT: Will Mr. Fraser and Mr. Kinsman kindly act as scrutineers, please. Gentlemen, the result of the election will be announced after the luncheon adjournment. Just before we adjourn, may I say once again that I would like to thank very much indeed the Presidents of the major Engineering Institutions for doing us the honour of attending this morning. I am also very grateful to them for their good wishes.

12.35 P.M.: ADJOURN FOR LUNCH.

Proceedings Resumed at 2.30 p.m.

PRESIDENT: Gentlemen, I have pleasure in announcing that the following have been elected as engineer members of the Executive Council:

- R. W. Kane, Johannesburg.
- Chris G. Downie, Cape Town.
- J. C. Downey, Springs.
- J. L. van der Walt, Krugersdorp.
- C. R. Hallé, Pietermaritzburg.
- C. Lombard, Germiston.

Those who have not been elected at least have the consolation of spending an extra hour in bed in the morning!

In terms of our Constitution, Johannesburg, Cape Town, Springs, Krugersdorp, Pietermaritzburg and Germiston are entitled to representation on the Executive by a Councillor member, so will the Councillors for those towns and cities please note that the Executive Council meets at 8.30 tomorrow morning.

I take the opportunity, too, of thanking our scrutineers, Mr. Fraser and Mr. Kinsman.

ANNUAL REPORT OF SECRETARY AND TREASURER.

To the President and Members of the Association.

Gentlemen,

I have the honour and pleasure of submitting to you the Annual Report, together with the Revenue and Expenditure Account and Balance Sheet for the financial year ended 28th February, 1955.

Obituary.

I regret to have to record the passing on of Dr. J. H. Dobson, an Honorary Member of the Association and a founder and first President of the Association of Municipal Electrical Engineers (Union of South Africa) as it was known in 1915 and until 1935 when the title was changed to The Association of Municipal Electricity Undertakings of South Africa and Rhodesia.

Twenty-Eighth Convention.

The Twenty-Eighth Convention of the Association was held in Bloemfontein from Tuesday the 11th to Friday the 14th May, 1954. The Convention was officially opened by the Honourable, the Administrator of the Orange Free State, Mr. J. J. Fouché, and was followed by an address by Sir John Hacking, M.I.E.E., Ex-Deputy Chairman (Operations) B.E.A. Power Production in Great Britain.

A total of 260 members, delegates and other visitors attended the Convention.

I would like to take this opportunity to express the sincere appreciation and thanks of the President, members of the Association, delegates and visitors to His Worship the Mayor and the City Council of Bloemfontein, for the most enjoyable entertainment provided, and from remarks overheard, I hope it will not be out of place to particularly mention the outing to Mazelspoort for the Folk Dancing, Braai-veis and visit to the Mazelspoort Observatory. Last, but not least, we appreciate the splendid way in which the ladies were catered for and the facilities made available for holding our meetings and we convey our sincere thanks to those officials who made our stay in Bloemfontein very pleasant indeed.

Papers.

Two papers were presented—"General Distribution Problems" by P. Wrigley, M.A. (Cantab), A.M.I.E.E., Salisbury and "Some Design Features of the New Thermal Power Station For the City of Bloemfontein" by C. E. Hafele, B.Sc. (Eng.) A.M.(S.A.)I.E., Bloemfontein. These papers were well received and perusal of the discussions recorded in the Proceedings will bear this out.

Engineer's Forum.

The Engineer's Forum, the second occasion on which it was an item on the Convention's Agenda was again a marked success and it is hoped that members will maintain their interest in this subject, as the general opinion is that bringing Engineers' troubles to Convention to be ventilated is undoubtedly beneficial to all concerned.

1955 Convention.

An invitation from the City Council of Pretoria which will be celebrating its Centenary during 1955 to hold the 1955 Convention in Pretoria, was unanimously accepted.

MEMBERSHIP.

The following new members were elected during the period 1st March, 1954, and 28th February, 1955:—

Engineer Members.

J. W. Ross, Electrical Engineer, Winburg, O.F.S.

J. C. Waddy, Assistant City Electrical Engineer, Pietermaritzburg, Natal.

A. C. Simpson, Electrical Engineer, Walmer, C.P.

Transfer from Engineer Membership to Associate.

A. Foden, Ex-City Electrical Engineer, East London, C.P.

Transfer from Associate to Engineer Membership.

J. McGibbon, Electrical Engineer, Ndola, N.R.

The comparative figures of membership for years 1953/4 and 1954/5 are:—

	1953/54	1954/55
Councils	107	108
Engineer Members	100	102
Hon. Members	5	5
Associates	34	32

Urgent Appeal to all Speakers at Conventions.

All speakers at Conventions are urgently appealed to to make every effort to expedite the return of corrected cuttings of what they are recorded to have said at conventions to the Secretary at the earliest possible moment.

It must be pointed out here that interest in and the value of the recordings in the proceedings are almost entirely lost as a result of the long intervals between the time at which the conventions were actually held and the receipt of the proceedings by members, delegates and others who might be interested, more especially, as in the interim a large percentage of the contents of the proceedings have already appeared in other publications a long time before the proceedings could be circulated..

In the circumstances, it is hoped that all concerned will wholeheartedly co-operate with the Secretary and give him every assistance to ensure that there will, in future, be no unnecessary delay in having the proceedings printed and despatched.

Financial.

Financially the Association is in a very sound position and I am pleased to be able to record that the response to the conditions agreed to at the last Convention, under which Companies may be invited to attend future Conventions, has been most satisfactory and our thanks are due to those Companies who so readily accepted the conditions.

Once again, I wish to thank Council Members and Advertisers on behalf of the Executive Council and Members for their financial support and the keen interest they continue to show in the Association's welfare.

As I will be relinquishing the position of Secretary and Treasurer in the near future, this will be the last Convention I will be able to attend officially. I wish to take this opportunity of thanking the President, Past Presidents and Executive Council Members under whom I have served for their advice and assistance and to express my appreciation of the courtesy at all times extended to me.

Last, but not least, may I also express

my sincere thanks and appreciation to all members and delegates from the various Institutions, Government Departments and Commercial Organisations, etc., whom I met at Conventions during the past ten years, for the friendly and courteous manner in which I was always received and which I feel will be the case as far as my successor is concerned.

In conclusion, I wish the Association every success for the future and may it grow from strength to strength.

I remain,

Mr. President and Gentlemen,

Yours faithfully,

A. T. TAYLOR,

Secretary/Treasurer.

PRESIDENT: Thank you, Mr. Taylor. Gentlemen, may I say that we shall refer to the fact that Mr. Taylor is retiring at a later stage in our proceedings. I would ask someone please to move the adoption of the Secretary's report?

Mr. D. A. BRADLEY (Port Elizabeth): Mr. President, Gentlemen, we have had read today a very concise report of the activities of the Association over the past twelve months and I do not know that I can add anything to it, except to say a word of commendation for its compilation in this manner.

The financial side was not read out in detail, but we are assured (I have a copy in my hands) that the financial position is most healthy and so, with those few remarks, may I submit through you to this Convention the adoption of the Secretary/Treasurer's Report for the year ended 28th February, 1955.

PRESIDENT: Councillor Acton, will you please second that?

COUNCILLOR C. E. ACTON (Pretoria): Mr. President, I have much pleasure in supporting the mover for the adoption of the Report of the Secretary and Treasurer and the relative accounts and Balance Sheet for the year under review. I have no comment to offer, except, to say or to suggest whether, in the light of the excellent position of the accumulated funds, it is the intention of the Executive Committee—I say it facetiously, admittedly—to investigate

the implications of the undistributed profits tax! (Laughter.)

PRESIDENT: Thank you, Councillor Acton. Is there any discussion on the Secretary's Report? Is it agreed that we adopt the report?

AGREED.

Gentlemen, we have received certain apologies and greetings and I would ask Mr. Muller to read those to you.

Mr. G. J. MULLER (Bloemfontein): Mr. President, I have certain messages before me.

Mr. Milton of the E.S.C. sends the following message:—

"Best wishes for successful conference."

Also from Mr. D. J. R. Conradie:—

"Regret unable to attend. Best wishes for a successful Convention."

Mr. E. Poole, Honorary Member, Durban.

Then we have the following communications to the President, asking that apologies be made for them:—

Mr. and Mrs. Eastman are unable to attend; Mr. Rossler of Cradock, Mr. Mitchell of Salisbury, Mr. Gripper of Port Elizabeth are all overseas (the last three). Mr. Tom Ashley, an Associate Member, is also unable to be with us. Electrical Engineer, Vrede, C. F. Hafele, Deputy City Electrical Engineer, Bloemfontein. They ask to be excused.

In addition to the apologies, etc., recorded above, greetings and advice of inability to attend were received from the following:—
Council Members.

Aliwal North, Dewetsdorp, Gwelo, Harrismith, Livingstone, Matatiele, Nigel, Paarl, Port Alfred, Somerset East, Springfontein, Upington, Ventersdorp, Vryburg, Winburg, Windhoek.

Government Departments, etc.

G. C. Molyneux, Chief Mechanical Engineer, Rhodesian Railways.
Ministry of Commerce and Industry, Salisbury, S.R.

Commercial Companies.

North & Robertson (Pty.), Ltd., Heine-mann Electric (S.A.), Ltd., S.A. Porcelain Insulators Manufacturers' Association (Pty.), Ltd., Waygood-Otis (S.A.), Ltd.

ASSOCIATION OF MUNICIPAL ELECTRICITY UNDERTAKINGS OF SOUTHERN AFRICA.
BALANCE SHEET—28th FEBRUARY, 1955.

<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">1954</td> <td style="width: 70%;">Accumulated Funds — — — —</td> <td style="width: 20%;"></td> </tr> <tr> <td>£2,477</td> <td>Balance at 28th February, 1954</td> <td style="text-align: right;">2,812 2 10</td> </tr> <tr> <td></td> <td>Add: Excess of Income over Expenditure for year ended 28th February, 1955</td> <td style="text-align: right;">498 9 8</td> </tr> <tr> <td style="border-top: 1px solid black;">335</td> <td></td> <td style="border-top: 1px solid black;"></td> </tr> <tr> <td>2,812</td> <td></td> <td style="text-align: right;">3,310 12 6</td> </tr> <tr> <td>4</td> <td>Subscriptions and Advertising Paid in Advance — — — —</td> <td style="text-align: right;">10 0 0</td> </tr> <tr> <td></td> <td>Creditor — — — —</td> <td style="text-align: right;">25 6 2</td> </tr> <tr> <td>20</td> <td>1955 Convention Representation Fees — — — —</td> <td style="text-align: right;">708 10 0</td> </tr> <tr> <td style="border-top: 1px solid black;">£2,816</td> <td></td> <td style="border-top: 1px solid black; text-align: right;">£4,054 8 8</td> </tr> </table>	1954	Accumulated Funds — — — —		£2,477	Balance at 28th February, 1954	2,812 2 10		Add: Excess of Income over Expenditure for year ended 28th February, 1955	498 9 8	335			2,812		3,310 12 6	4	Subscriptions and Advertising Paid in Advance — — — —	10 0 0		Creditor — — — —	25 6 2	20	1955 Convention Representation Fees — — — —	708 10 0	£2,816		£4,054 8 8	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">1954</td> <td style="width: 70%;">Presidential Badge — — — —</td> <td style="width: 20%; text-align: right;">✓ 1 0 0</td> </tr> <tr> <td>£ 1</td> <td>Nominal Valuation</td> <td></td> </tr> <tr> <td>57</td> <td>Furniture and Fittings — — — —</td> <td style="text-align: right;">✓ 51 15 0</td> </tr> <tr> <td></td> <td>At cost less depreciation</td> <td></td> </tr> <tr> <td style="border-top: 1px solid black;">£2,255</td> <td>Investments — — — —</td> <td style="border-top: 1px solid black; text-align: right;">2,348 10 0</td> </tr> <tr> <td></td> <td>Fixed Deposits at United Building Society including interest accrued</td> <td></td> </tr> <tr> <td>24</td> <td>Debtors — — — —</td> <td style="text-align: right;">✓ 477 7 0</td> </tr> <tr> <td>479</td> <td>Cash on Hand and at Bank — — — —</td> <td style="text-align: right;">✓ 1,175 16 8</td> </tr> <tr> <td></td> <td></td> <td style="border-top: 1px solid black; text-align: right;">£4,054 8 8</td> </tr> </table>	1954	Presidential Badge — — — —	✓ 1 0 0	£ 1	Nominal Valuation		57	Furniture and Fittings — — — —	✓ 51 15 0		At cost less depreciation		£2,255	Investments — — — —	2,348 10 0		Fixed Deposits at United Building Society including interest accrued		24	Debtors — — — —	✓ 477 7 0	479	Cash on Hand and at Bank — — — —	✓ 1,175 16 8			£4,054 8 8
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G. J. MULLER, Chairman.
A. T. TAYLOR, Secretary/Treasurer.

To the Members of the Association of Municipal Electricity Undertakings of Southern Africa:

We report that we have examined the above balance sheet with the books and vouchers of the Association for the year ended 28th February, 1955; that we have satisfied ourselves of the existence of the securities; and certify that, in our opinion, the above balance sheet is properly drawn up so as to exhibit a true and correct view of the state of affairs of the Association as at 28th February, 1955, according to the best of our information and the explanations given to us and as shown by the books of the Association.

Johannesburg,
19th April, 1955.

(Sgd.) SAVORY & CO.
Incorporated Accountants
Auditors.

ASSOCIATION OF MUNICIPAL ELECTRICITY UNDERTAKINGS OF SOUTHERN AFRICA.
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 28th FEBRUARY, 1955.

1954			1954		
8	Audit Fees	8 8 0	£1,062	Subscriptions	£1,092 0 0
10	Bank Charges	6 7 10	96	Interest on Fixed Deposits	93 7 8
151	Convention Expenses	150 16 1		B.E.A. Journal:	
3	Insurance	2 9 0		Subscriptions received	1 16 0
6	Depreciation—Furniture and Fittings	5 15 0		Cost	1 12 10
23	Printing and Stationery	37 1 2		Proceedings:	
24	Postages and Telegrams Rent	26 18 0		Advertising — Net	502 0 0
48	Rent	48 0 0		Sales	195 15 0
117	Secretarial Expenses	82 2 11			
530	Secretary's Salary	582 12 0			
13	Telephone	16 8 8			
—	Executive Committee Expenses	18 1 4		131	Less: Cost of Printing
15	Subscriptions	15 0 0			787 15 0
335	Excess of Income over Expenditure transferred to Accumulated Funds	498 9 8			474 16 2
		£1,498 9 8			312 18 10
£1,289		£1,498 9 8	£1,289		£1,498 9 8

(Sgd.) SAVORY & CO.
 Incorporated Accountants
 Auditors.

PRESIDENT: The next item is the Presidential Address and I ask Mr. Muller to take the Chair whilst I deliver my address.

MUNICIPAL ELECTRICITY UNDERTAKINGS AND THE FUTURE.

PRESIDENTIAL ADDRESS.

By Mr. D. J. Hugo, Pretoria.

My first words must be to express to fellow members of the Association of Municipal Electricity Undertakings my deep appreciation of the honour you have done me and the Pretoria City Council in electing me your President for the ensuing year. It will be my sincere endeavour to do all I can during my term of office to further the interests of our Association.

The occasion of this Convention is made all the more pleasing by the presence here to-day of many old friends and distinguished representatives of other Institutes and of Government Departments. To all of you I extend a very hearty welcome.

This also is the first Convention at which representatives of engineering, manufacturing and commercial organisations are attending, not as guests, but as commercial delegates. Them, too, I heartily welcome in their new capacity.

It is 24 years ago since a Convention of Municipal Electrical Engineers was last held in Pretoria and it is of interest that on that occasion 79 delegates and visitors attended. To-day more than four times that number are present.

You will appreciate that I am tempted to trace the growth and development of the Pretoria Electricity Undertaking since last we met here in 1931. Suffice is it to say, however, that the output of Pretoria's Power Stations has increased by twenty times from 40 million units in that year to some 860 million during the present financial year. Over the same period of 24 years the maximum demand has increased from 9,800 to 155,000 kilowatts and revenue from £195,000 to £2,100,000.

This growth is characteristic of most Municipal Electricity Undertakings in the Union — both large and small — and reflects the general development of our country.

In 1953, the sum of the maximum loads, supplied by municipalities generating their own power, amounted to nearly 800,000 kilowatts, whilst the sum of the maximum demands of those local authorities supplied by the Electricity Supply Commission was about 400,000 kilowatts. In 1953, therefore, the needs of consumers of the Union's Municipal Electricity Undertakings amounted to close on 1,200,000 kilowatts.

Bearing in mind the predictions that have been made of further mining developments and increased industrial productivity, and, that expansion of the electricity supply industry is a prime necessity for continued national development, an average rate of growth of Municipal Undertakings of 8 per cent. per annum can safely be predicted for at least another two decades.

A compounded rate of increase of 8% per annum is equivalent to doubling the output of power every 9 years, so that, in less than 20 years time the requirements of the Union's local authorities will be in the order of 4,800,000 kilowatts.

In other words, in the next two decades the amount of generating and distribution plant that will have to be available to satisfy the requirements of consumers of electricity supplied by local authorities will be four times the plant capacity presently installed for this purpose.

In order to emphasise the significance of the magnitude of the predicted demand of municipal consumers of roughly 4,800,000 kilowatts by 1975, I would mention that the aggregate installed capacity of all the Electricity Supply Commission's power stations at the end of 1953 was a little under 2,000,000 kilowatts.

Taking a figure of £70 per kilowatt for generating plant and £60 per kilowatt for distribution plant, capital expenditure by 1975 on the additional 3,600,000 kilowatts of equipment that will be needed to supply municipal consumers will amount to the staggering figure of £470 million, which does not take into account replacement of any of the 1,200,000 kilowatts of plant presently in use.

This figure of £470 million is six times the capital value of municipal generating and distribution plant in commission at

present. It exceeds by 50% the present gross loan debt of all the municipalities of the Union and is roughly four times the capital expenditure incurred by Escom up to the end of 1953.

As already indicated, Escom now generate one-third of municipal requirements and it is more than likely that in the near future more municipalities, overawed by the capital requirements of their electricity undertakings, may deem fit expedient to purchase supply in bulk rather than continue generating their own requirements.

It is evident that for the Electricity Supply Commission and Municipalities a major task lies ahead of continuing to develop an efficient, economical and co-ordinated system of electricity supply and distribution throughout our country. Between them, even if my predictions are only reasonably correct, they will have to carry additional municipal load amounting to 3,600,000 kilowatts in 20 years time which, on the average, means the commissioning of 180,000 kilowatts of new generating plant every year.

I have only sketched the future picture on broad lines but the indications are that individual municipal electricity undertakings would be wise to study the trend of their load growths and form some idea of the thousands, or millions of pounds they will have to raise for power station and/or distribution plant and equipment over the next twenty years. It would be wise also to consider the part their own undertakings could play in the national scheme.

The advent of nuclear power generation in no sense eases the problem of financing the vast expansion programme necessary to keep abreast of future power demands. Certainly no municipality is in a position to incur the unpredictable expenditure on a nuclear power station which will make very much more substantial inroads on capital resources than the conventional coal-fired station.

In a country of vast spaces and many natural resources, but with a comparatively small population, transport presents peculiar difficulties and to the extent that nuclear power replaces coal, the burden on the country's transport system will be

relieved. From this aspect alone, therefore, the construction of nuclear power stations at the coast must of necessity receive serious consideration. Nevertheless, the transport of more and more coal for a long time ahead will still have to be faced.

Thus far, I have touched on only one aspect of future developments in the electricity supply industry as it affects Municipalities, namely, the very heavy drain on capital resources. There are many other aspects of the task ahead, one of which is the training and acquisition of suitable personnel in the shape of engineers and engineering technicians. This will probably present an even bigger problem.

We are all aware of the acute shortage of engineers which now exists in all branches of engineering and the authoritative predictions of the position becoming very serious in the immediate future.

With tremendous industrial expansion and developments in the field of engineering the demand for engineers, highly trained both technically and practically, exceeds the supply. A world-wide shortage of engineers has resulted and in the Commonwealth South Africa has been hardest hit by this shortage.

In the past, the engineer himself has been too modest. Imbued with a spirit of service to mankind which the practice of the engineering profession affords he has, in the process, created the impression that his work is a vocation in which rewards for his services are only of secondary consideration. In consequence, the engineer has been underpaid and in the process his status has suffered. The result is that engineering as a career, notwithstanding encouragement in the shape of bursaries and scholarships at Universities and Technical Colleges now fails to attract youth in sufficient numbers to a profession involving many years of study and arduous training.

In a recent article on "The Shortage of Qualified Engineers and Technicians in South Africa", Dr. A. J. A. Roux, Director of our National Physical Laboratory, assesses the shortage, basing his conclusions on a comprehensive national survey conducted by the Research Bureau of the

Department of Education, Arts and Science.

Dr. Roux does not attempt to forecast the position beyond 1960. His figures show that in 1960 all employer categories in the Union will require nearly 11,000 Electrical and Mechanical Engineers, whereas, only about 7,000 trained engineers will then be available to fill these positions leaving a shortfall of some 4,000 engineers in the electrical and mechanical branch.

Municipal Electricity Undertakings can, however, take solace in the fact that their needs are modest and represent only about 15% of the 11,000 posts.

Municipal Undertakings should, therefore, be able to satisfy their requirements for engineers provided the remuneration is made sufficiently attractive. The adoption of this expedient, which naturally will in no way help immediately to alleviate the overall national shortage, will have serious repercussions.

Nearly all municipalities have in operation grading schemes whereunder positions in the various municipal departments are weighted against each other, generally somewhat arbitrarily, and graded accordingly.

When the shortage of engineers becomes acute, as it will do very soon, the regrading of engineering posts in the municipal service will lead to dissatisfaction in other branches of the service and also no doubt to opposition from municipal employee associations.

I am sorry I can offer no solution to such a problem, the root cause of which lies in the status of the engineer and his essentiality in our present civilisation not having been adequately recognised in the past.

It is unfortunate that the position is in process of rectification by the law of supply and demand, and, I must express the hope that this fact will be duly recognised, and that, the higher salaries which engineers must command in the future will not create the impression, that the engineering profession is merely taking advantage of yet another advantage.

Bold planning to meet future demands for electricity has been a characteristic of

municipal policy in the past and, in this way, Municipalities have made no small contribution to the economic and industrial development of the country. As a minor example, I record the fact during 1954 Johannesburg and Pretoria between them exported 390 million kilowatt-hours to the Rand Undertaking of the Electricity Supply Commission for the use of the gold mining industry.

A continuance of the policy of bold planning for the future will present many grave problems for municipal electrical engineers and their Electricity Committees.

Already the Electrical Engineer finds that he is becoming increasingly unpopular with his Municipal colleagues who are responsible for providing the other services and amenities of rapidly developing cities. A very large share of the capital expenditure authorised by the Union Treasury each year must be allotted — because of the essentiality of the service — to electricity supply, whilst other municipal services find that they are called upon to reduce their capital needs, in order to permit of the Electricity Department receiving its full quota. This is generally unavoidable because of commitments entered into some years back.

Unfortunately in the electricity supply industry the ratio of capital outlay to revenue is inherently extremely high so that electricity undertakings will continue to account for an increasingly greater proportion of municipal capital expenditure, quite apart from the fact that expansion of this activity still outstrips all other municipal services.

I have found it desirable to stress only two vital problems — finance and personnel — which municipalities will have to face as a result of the dynamic development of the electricity supply industry in our country.

It is necessary to repeat what has often been emphasized before that much closer collaboration between the Electricity Supply Commission and municipalities will become essential in the years ahead.

At the Convention held in Johannesburg in 1944, this Association formulated a comprehensive policy for closer and more

official collaboration with the Commission. Unfortunately nothing came of the resolutions adopted which now only stand as a monument of foresight in the Association's proceedings.

The Commission act as technical advisors to the Provincial Administrations on municipal power schemes for which loans have to be raised and a close and friendly relationship between the Commission and individual municipalities has resulted.

I visualize something, however, that goes beyond friendly contacts. Escom is by far the biggest producer of power in this country whilst the municipalities cater for the needs of probably more than 80% of the total number of individual consumers. It seems only reasonable, therefore, that these two organisations—Escom and the municipalities—each representing special and large interests, should meet regularly around the Conference table.

As a first step in the direction of closer collaboration, I would advocate the establishment of a body (voluntarily on the part of the two parties and consisting of representatives of the Commission and of municipalities) which would meet regularly for the discussion of problems of mutual and national interest. I do not suggest that this body, initially at any rate, should have any legal powers.

I also appreciate that if this Association, now or at some time in the future, should decide to support the suggestion, representations to the Commission on these lines would, in the first instance, have to be made through the United Municipal Association.

On the other hand, the Electricity Supply Commission may, at some time, consider it advantageous, in the national interest, to make the approach to the appropriate Municipal Association.

These are but a few thoughts on the future of an industry whose problems whether financial, administrative or technical certainly never diminish nor lack interest.

Mr. G. J. MULLER (Bloemfontein): I would like to thank you, Mr. President, for your very illuminating address. These are my personal thanks and I now have much

pleasure in calling on Mr. C. G. Downie to propose a vote of thanks from the Association.

Mr. C. G. DOWNIE (Cape Town): Mr. President, Gentlemen, you heard mentioned this morning two capital cities, the capital of Southern Rhodesia, where the next Convention is to be held, and Pretoria, the administrative capital of South Africa. As you know, South Africa has another capital; I refer to Cape Town, the mother city and legislative capital of the Union.

The idea that I should propose the vote of thanks to our President's valuable and thoughtful address, springs, I think, from the fact that I represent the legislative capital and that it would be appropriate, therefore, that I should undertake this very pleasant duty. I feel it a great privilege to have been called upon to second this vote of thanks to our friend, Dirk Hugo.

It is obvious that he has been thinking about several very important matters which have been exercising the minds of all Municipal electrical engineers. At the beginning of his address he very lightly refers to his own undertaking. He modestly tells us that the Pretoria electricity undertaking has grown twenty times since 1931, but, Mr. President, you have not told us that Pretoria actually is the biggest Municipal electricity undertaking in the country. It covers an area of 1,500 square miles. It sells more electricity than the Mother City does today. Our President had the pleasure of telling me a little while ago that Pretoria now beats Cape Town; it is second only to Johannesburg as a seller of electricity, although I cannot help wondering whether the quality of the "juice" here isn't better than it is in Cape Town because Pretoria is able to get a higher price for it, notwithstanding the fact that Cape Town pays more than double what power stations pay for coal in this part of the Union!

Pretoria has been very progressive in the matter of electricity supply, particularly in regard to the rural areas around Pretoria. The extent of the City of Pretoria itself is a matter of about seventy square miles; whereas, as I said before, the whole of the area of supply covers 1,500 square

miles. You will learn from the paper which is to be presented to you tomorrow by Mr. Dunstan, Pretoria's Rural Distribution Engineer, just how progressive this City has been. We in Cape Town have been very impressed by that paper and some of our engineers have learnt quite a lot from it already.

Our President has referred to the growth of electricity undertakings in this country. They are going to require a lot of money—£470 million—which averages out at about £23 million a year over the next twenty years. Although this may seem somewhat alarming, I think it should be within the capacity of this country and those outside the country who are prepared to invest in South Africa. We should not worry about getting the capital; I personally think it will come; it must come because the country cannot develop any faster than its electricity undertakings. To enable us to carry on industrially, for mining, for the transport services, for commerce, for our domestic life, we must provide the electricity which these services will require, and that in turn means that the requisite capital must become available to enable Electricity Undertakings to be extended.

I do think, however, that the other matter to which our President has referred, namely the shortage of man-power, and the shortage of technical staff is a very serious one. Today electricity undertakings are competing for the available technical man-power of the country. One notices, for example, advertisements in the press for Shift Engineers at a certain salary. About six months later the same undertaking advertises the position again at a salary slightly higher. Advertisements for the same job have appeared even a third time with the salary still higher. Well, Mr. President and Gentlemen, this cannot go on. Something must be done and I therefore suggest that our Association should take up the matter very seriously in the interests of Municipal undertakings. Perhaps our Executive may take the tip and decide to do something about it.

Our President referred in his address to statistics that were quoted by Dr. Roux,

which show how alarming the position is. And again, Prof. Bozzoli, in his Presidential Address to the South African Institute of Electrical Engineers referred to the fact that at the end of October, 1954, 64 posts were offered as open to the 1954 graduate class in Electrical Engineering alone by 24 South African firms and organisations. In addition to that there were another 20 openings for graduate engineers overseas. Now, that makes 84 openings altogether for graduate engineers, but the number of graduates offering for those 84 posts, was only 24.

I can tell you this, too, Gentlemen, that Cape Town University last year produced one final Electrical Engineering student. This year again there will be only one final Electrical Engineering student!

I sometimes wonder what the reason is for this state of affairs. Why aren't young fellows seeking a career in our profession? Is it that there is not enough encouragement in the teaching of science and mathematics at schools for boys to think of following a career in engineering?

Maybe the young lad today has a business mind. He wants to know what he is likely to earn in later years, but he finds that the other professions are more remunerative than the engineering profession. It seems to me that we shall have to do something about raising the status of engineers and also see to it that the engineering profession becomes better paid, or at any rate just as well paid as are some of the other professions.

As I have said, Mr. President and Gentlemen, this is a very serious matter and I think that the Association should take it up immediately. Perhaps it is one which should be dealt with at national level, but we should not remain complacent over it.

The third matter dealt with by the President in his very valuable address was that of co-operation between ourselves and the Electricity Supply Commission. One sees on the Rand here two outstanding examples of co-operation which now exists between big Municipal undertakings and Esacom. Pretoria is now pumping electricity into the Rand undertaking and provision exists for the opposite to occur when Pretoria needs assistance from the Rand

Undertakings. Arrangements have also been made for the Johannesburg undertaking to help the Rand undertakings and *vice versa*.

Another instance of co-operation is that which you have probably heard about which has been in existence at the Cape for the last 23 years. In 1932 the Cape Town City Council and Escom decided to "pool" their generating plant and resources for 25 years. The object of these pooling arrangements is to avoid the duplication of spare plant capacity that would otherwise occur besides enabling plant to be operated to better advantage from a cost of production aspect. I think I am entitled to say that the "pooling" of the power stations at Cape Town has resulted in the saving of capital outlay running into several millions of pounds and a total saving in operating costs are estimated at close on a million pounds over the 23 years as compared with what the costs would have been under conditions of independent development and operation of the parties concerned. This arrangement, however, comes to an end in May, 1957. The scope for co-operation between Undertakings always exists, however, even though it may be no more than to help one another in cases of emergency.

Well, Mr. President and Gentlemen, in making these few remarks, I thought I would just expand on what you have said to us in your address. It has been most valuable and thought-provoking and it therefore gives me the greatest pleasure to propose a vote of thanks to you on behalf of all of us at this Convention. (Applause.)

Mr. G. J. MULLER (Bloemfontein): Thank you, Mr. Downie. May I now call upon Councillor Markman to second the vote of thanks?

COUNCILLOR A. MARKMAN (Port Elizabeth): Mr. President, I have been trying to find out on what basis Port Elizabeth has been nominated as the seconder. The proposer does it on the basis of being administrative, the seconder on being legislative. We in Port Elizabeth pride ourselves on being a friendly city, so shall I assume that it was out of a spirit of friendliness that you have

allowed Port Elizabeth to second this vote of thanks?

Dit verskaf my genoëe, mnr. die President, om die bedanking te sekondeer vir u interessante toespraak, asook om my waardering uit te spreek vir die tyd en moeite wat u so ooplopend aan die voorbereiding daarvan bestee het.

I would like expressly to congratulate you, Mr. President, on presenting so forcibly two aspects, namely capital expenditure and shortage of staff. These two major factors are naturally as much the concern to us, as Councillors, as to you as Engineers, and we, therefore, on this particular subject, meet on an absolutely common ground of approach.

May I take this opportunity (it will only take me three or four minutes to do so) of passing some comments, which I will admit may be coloured by representing a Councillor's viewpoint.

Our difficulty, as Councillors, is that we must view the whole picture of electricity undertakings, combined with the other services which our Municipality render; we then have to balance one against the other, just as the Union Treasury does in relation to the whole country.

The result is that we may well find that we are reluctantly compelled to curb expenditure on electricity extensions as well as on other Municipal undertakings, in order to come within the margin of the capital market, otherwise the Union Treasury may well have cause to assume full control and to do so for us in our stead at a future date.

Now, how can you, as Engineers, assist us? Since the ratio of capital outlay to revenue, as you explained, Mr. President, is inherently extremely high in the electricity supply industry, it may be wise for you, as Engineers, to give very serious thought to reducing this ratio by *retention* of old and *reliable* plant for a few more years, before incurring capital commitments, and this despite the acknowledged increased efficiency of modern equipment.

Mr. President, your prediction of an average increase of 8% per annum is acknowledged—we in Port Elizabeth have found an increase of 10% per annum on the previous consumption—a most frighten-

ing figure to any Council's Finance Committee.

But may I reiterate a Councillor's viewpoint of caution, because progress extensions at this rate, even only a few years ahead, may be dangerous.

We will (and you will have to help us) have to constantly watch and consider whether and where a demand of this order can arise, bearing in mind that the world has not yet overcome the accumulated demands which arose during the war years and thereafter as a result of the disruption and destruction of capital. In about two years' time we must meet and again take stock of the position, not necessarily because of the possible depression, but because of a slowing up in growth, which would also result in the slowing up in the growth of electricity undertakings, despite the increase in use to which we know electricity is being placed.

I would, further, Mr. President, on the basis of your address, like to make a most serious and earnest appeal to those commercial representatives who are present today and to stress to them that this position in which we all find ourselves, is, in fact, surely a challenge to them, as manufacturers (and I think that you, as Engineers, if you were manufacturers, would accept it as a challenge) to develop scientific ways and means of reducing the terrific capital costs of plant and equipment, so that cheap and abundant supplies will become more readily available.

The increase of £20 per kilowatt installed to approximately £100 (and we know of areas where it is much more) is fantastic and we must crave the co-operation of you commercial representatives, through your manufacturers, to conduct a research to find ways and means of obviating this, or a still further increase.

Lastly, Mr. President, you have referred to Escom. May I, with all personal emphasis, support and welcome your suggestion of co-operation with Escom. I have, in my capacity as Chairman of the Port Elizabeth Electricity Committee, had close contact with them recently and I have found them to be most understanding and co-operative. The form, extent and manner of the possible association is one which

would have to be very carefully considered by the Executive; I personally visualise at the outset the form of co-operation for the purpose of discussing and finding ways of meeting problems which are found to be common to the Supply Commission and Municipal undertakings.

Mr. Hugo has emphasised the shortage of engineers. May I make an admission—that, in my opinion, had the profession been made more financially attractive in the first instance by Municipalities, Municipal undertakings may not have been suffering the staff shortages which they do at present. Mr. Downie has mentioned the fact that there is only one Electrical Engineer qualifying in Cape Town. I submit that a young man cannot help but be influenced by the financial approach. He knows that if he becomes a Civil Engineer and enters into industry, he knows exactly what industry is prepared to offer him. He sees these very low salaries which are being offered to Electrical Engineers of today and we do feel that the Municipal undertakings, the Municipalities, in particular (the Councillors), are realising the situation and that they will, I hope not too late, assist to alleviate this position.

We must ensure the stability by creating also forthwith (and this is merely a suggestion, as a matter of urgency) vacancies in all major undertakings for *pupil engineers*, the object, of course, being that the pupil engineers would receive a larger income than apprentices. This is becoming increasingly necessary, as apprenticeship, we know, is absolutely insufficient.

Many thanks again, Mr. Hugo, for directing our thoughts along the lines of these problems, which are in our minds continually, which thoughts must be analysed and adequately dealt with for the future welfare of the electricity development in our country.

May I, Sir, avail myself of this opportunity of wishing you a happy year of office and, above all, may Providence grant you good health to carry out the arduous duties which your appointment will entail, but which we know full well will be conducted by you for the definite continued success and welfare of this Association. Thank you, Sir. (Applause.)

Mr. MULLER (Bloemfontein): Thank you, Councillor Markman. The President will resume the Chair.

PRESIDENT: Thank you, Mr. Muller, for taking the Chair during my absence and thank you very much indeed, Mr. Chris Downie and Councillor Markman, for your kind remarks. Copies of the address, Gentlemen, will be placed on the tables during the tea interval.

Mag ek meld dat indien afgevaardigdes belangstel in 'n Afrikaanse weergawe van hierdie rede, afskrifte daarvan by die Inligtingstoonbank beskikbaar is.

3.30 P. M. ADJOURN FOR TEA.

Proceedings Resumed at 4 p.m.

PRESIDENT: Take your seats, please, Gentlemen. Gentlemen, we come now to the reports of Sub-Committees and Representatives, the first being the World Power Conference and I shall ask Mr. Fraser to present that report.

Mr. J. C. FRASER (Johannesburg): Mr. President and Gentlemen, this is a resumé of the activities of the World Power Conference during the period 1954/1955.

The Brazilian Section of the World Power Conference held a meeting during the period 25th July to 31st July, 1954, followed by technical tours and excursions up to 10th August, 1954.

No representatives from the South African Section attended, nor were any papers submitted by the South African National Committee.

The large number of papers submitted by other sections covered the following subjects:—

1. Planning of the Electric Power Industry, stressing Hydro-Electric Schemes and the complementary part that should be played by Thermo-Electric plant.
2. The Electric Power Industry in Tropical and Sub-Tropical Regions, with discussions on the influence of climatic features on the design, construction and treatment of electrical equipment. This section included much information on gas turbines and Diesel plant.
3. Natural and Derived Fuels.
4. Wind Power.

5. Solar Energy.

6. Uses of Electric Energy — furnaces, rural and industrial development.

7. International Hydro-Electric Developments.

The Statistical Year Book No. 7 of the World Power Conference, covering the period 1950-1952, was published and contains statistics of the resources, production, stocks, imports, exports and consumption of power and power sources in all the countries of the world for which it was possible to obtain information.

The power sources included are coals, brown coal and lignite, peat, coke, manufactured fuel, wood, petroleum, benzoles, alcohols, natural gas, manufactured gas, water power, and electricity. The statistics of production, stocks, imports, exports, and consumption relate to the years 1950, 1951, 1952, and, where available, 1953; revised statistics for earlier years are shown in some cases. The statistics of resources supplement, and some cases replace, those presented in Statistical Yearbook Nos. 4, 5 and 6.

A limited number of copies of this Year Book are available for purchase at the offices of the Electricity Supply Commission, Escom House, Rissik Street, Johannesburg, at the price of £2 each.

Notice was received that the Fifth (Plenary) Conference of the World Power Conference is to be held in Vienna from 16th to 23rd June, 1956, at which the theme will be "World Energy Resources in the Light of Recent Technical and Economic Developments".

Any members who may be in Europe at the time and will be interested to attend the Conference, are advised to notify the Secretary of the South African National Committee at P.O. Box 1091, Johannesburg.

The Yugoslav National Committee has invited the South African National Committee to be represented at the meeting of the Yugoslav Section during 1957, at a date to be announced later, the theme to be "Power as a Factor of Development of Under-developed Countries".

PRESIDENT: Thank you, Mr. Fraser.

Are there any comments on that Report, Gentlemen? (No comments.)

Electrical Wiremen's Registration Board: That rests with you, too, Mr. Fraser.

Mr. J. C. FRASER (Johannesburg): Mr. President and Gentlemen, I am indebted to the Chairman of the Board, Mr. R. N. F. Smit, Chief Inspector of Factories, for furnishing me with the facts upon which it has been possible for me to make these few remarks. The Report contains the details of the year's work and a number of tables and will be printed in full in the proceedings of the Convention.

Membership:

The membership of the Board remained the same as the previous year: Mr. R. N. F. Smit, Chief Inspector of Factories, Chairman; Messrs. H. R. Townsend, T. D. Bowness, E. E. Wentink and J. C. Fraser. Mr. A. F. Strauss from the Department of Labour, was replaced by Mr. J. M. Cornelius in April of last year.

Meetings:

The Board held twelve meetings during the year under review.

Applications for Registration:

The Board dealt with 618 applications, 160 more than the previous year. Of the 618 applications, 550 were accepted for examination and 325 were registered during the year, making a total of 5,799 registered wiremen at the end of 1954.

Examinations:

There were four written and ten practical examinations held during the year. A point of interest with written examinations is the low percentage of passes recorded (26.3%).

Mr. President, I am of the opinion that the majority of failures are largely due to, firstly, the number of immigrants who are unable to master either of the two official languages in the period in which they have given themselves to pass the examination. Secondly, and this is a far more serious one, and that is the number of South Africans who take this section of the examination far too lightly; they will not concentrate on the theoretical side of their trade. For the practical examinations we had as high a figure as 86.6% passes.

Returns in terms of Section 17 (2) of the Act:

It is not generally appreciated that a wireman has to advise the Board each year before the 31st March of his residential address and whether he continues to practice as a wireman; non-compliance with this provision is a punishable offence.

Any assistance our engineers can render by reminding and, in fact, insisting upon wiremen in their area being registered each year, would assist the Board to compile a more accurate register.

Determination of Areas:

The magisterial districts of Lichtenburg, Paarl, Montagu, Vrededorp, Koppies, Robertson, Aliwal North, Standerton and Volksrust were determined by the Minister. The Minister is considering a further 44 districts.

Prosecutions:

Section 19 (1) of the Act lays down that wiring work carried out in a determined area must be inspected by the supplier. In five cases action was taken against persons who failed to obtain the supplier's authority to perform wiring work.

Legal action was also taken against nine persons who employed non-registered wiremen within the determined areas and against fifteen persons for performing wiring work without being in possession of registration certificates.

A supplier notified the Board that in three instances legal proceedings had been instituted in respect of contraventions of the Municipal Electricity By-laws.

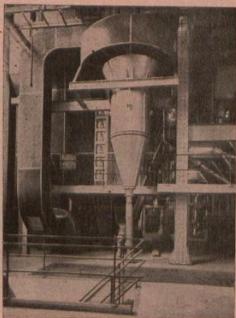
Personal:

At the end of last year, my third term of three years expired and as I am no longer an Engineer in constant Municipal employment, I was not eligible for nomination. I am happy, however, to inform you that the Association nominated Mr. R. W. Kane, my successor, to fill the vacancy and the Minister has been pleased to appoint him. I am quite sure that the interests of the Association will be well looked after and that the Board will benefit by Mr. Kane's experience and I wish him all success.

I would like to thank the Chairman and



Right shows one of the SIROCCO Cellular S.F. type Grit Collector which are installed between the economisers and the Air Heaters of the Boiler Plant. The Primary Collector is in the background and can be recognised by the six small access doors up the side of the Collector. Dust Hoppers will be seen underneath the Collector and also underneath the incoming and outgoing flues. Secondary flow is provided by the Booster Fan (shown in the bottom left hand corner of the Photograph) which pulls the shunted volume of flue gas through a Secondary "D" type Collector (shown in the centre foreground) and returns the shunted gas, which is then thoroughly cleaned, to the main flue. Collectors, such as these, have been installed on many other major South African Power Stations in addition to British and Commonwealth installations.



PRETORIA MUNICIPAL
POWER STATION "B"

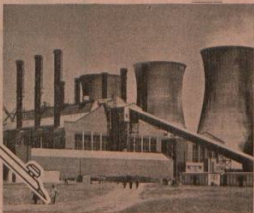
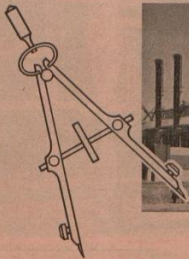


Left shows one of the Secondary SIROCCO Air Fans. Each Fan handles approximately 11,000 c.f.m. against 11 in. watergauge and absorbs 31 H.P., and is direct coupled to a Motor running at 1,440 r.p.m. The Fan impeller is mounted between two SIROCCO ring-lubricated water-cooled, white metal-lined spherically seated bearings. The drive is transmitted through a spring type coupling.

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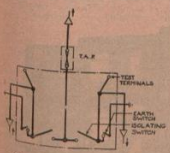
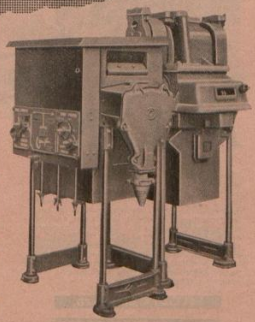
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The illustration above shows the connection diagram.



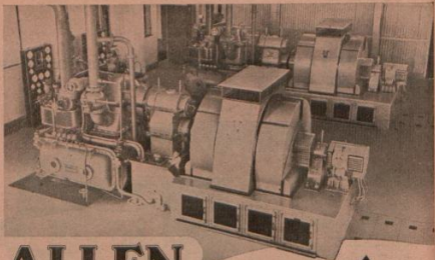
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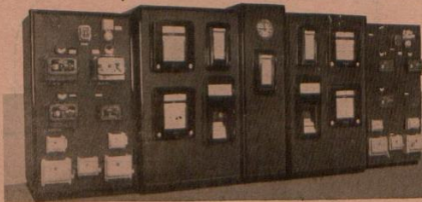
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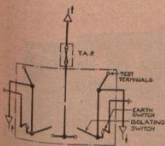
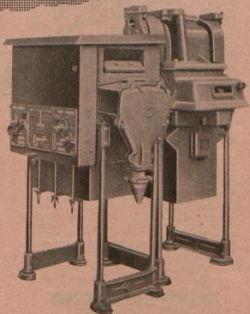
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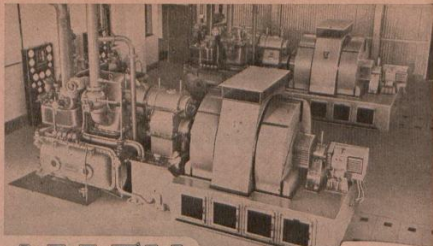
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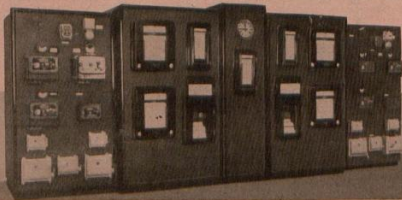
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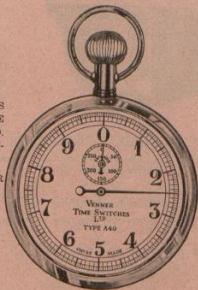


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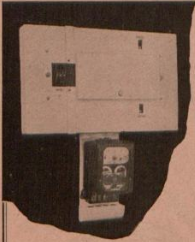
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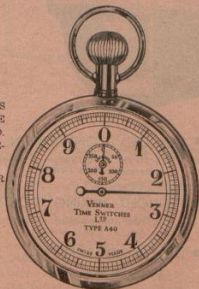


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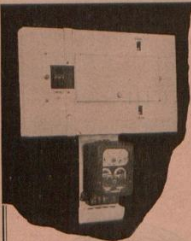
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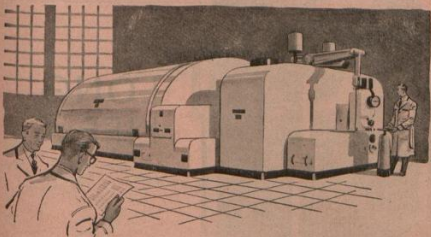
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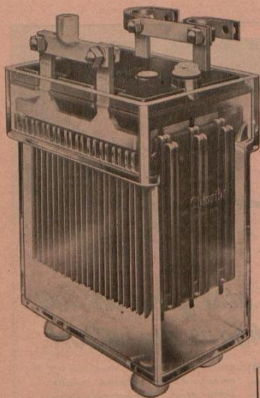
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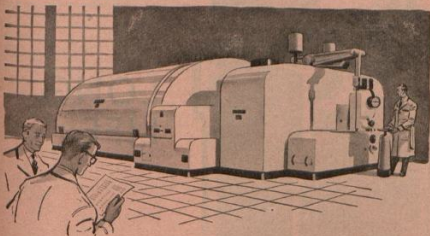
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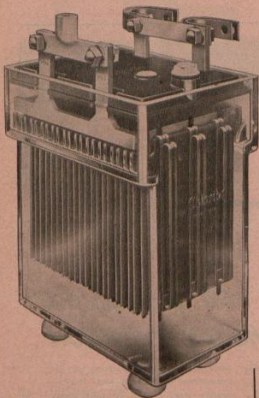
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members of the Board for the support and consideration that they have given me during my term of nine years. It has been a very pleasant one and I have been very happy to work with my colleagues.

My thanks are also due to the clerical division of Mr. Smit's department, particularly Miss Walker, the Secretary of the Board, for continued assistance and advice throughout the years.

Finally, I would like to thank members of the Association for affording me the opportunity to serve them on this important Board. Thank you, Mr. President. (Applause.)

PRESIDENT: Thank you, Mr. Fraser, and also thank you for your work on behalf of the Association in this connection. Gentlemen, are there any comments on that Report?

ELECTRICAL WIREMEN'S REGISTRATION BOARD.

ANNUAL REPORT, 1954.

Membership and Meetings of the Board.

1. Mr. R. N. F. Smit, Chief Inspector of Factories, was appointed Chairman of the Board for the year, 1954, the members then in their third year of office being Messrs. J. C. Fraser, H. R. Townsend, T. D. Bowness and E. E. Wentink, whilst Mr. A. F. Strauss, selected by the Minister as a member in terms of Section 3 (1) (b) for his administrative experience, he'd office from January to March, and was then succeeded by Mr. J. M. Cornelius, also of the Department of Labour.

2. The Board held eleven ordinary meetings and one special meeting, and the Examinations sub-Committee met on eight occasions during the year.

Applications for Registration.

3. The attached Table I gives details of applications for registration considered by the Board during 1954, as well as comparable figures in respect of the previous fourteen years of the Board's existence. In connection with the 618 applications considered, the Board approved of registration in four cases in which exceptional

circumstances existed, justifying exemption from the prescribed examination. 550 Applicants were accepted for examination; 18 applications were refused on the grounds that the applicants had had insufficient training and experience in wiring work, whilst in 46 cases the Board deferred its decision pending receipt of such experience.

4. Reference is made in Table II to the number of registration certificates issued. Of a total of 5,799 wiremen registered as at the end of 1954, exemption from examination had been granted to 2,402, the majority of whom were at the inception of the Act already holders of wiring certificates or licences issued by suppliers and thus, in terms of Section 12 (1) (e), entitled to registration. In the case of the other 3,397 registered wiremen, registration was approved after the applicants had passed the prescribed examination.

Examinations.

5. An analysis of the 3,397 candidates successful in the examinations is given in Table III, from which it will be seen that—

- 92 candidates were required to write Sections I and II only;
- 287 candidates were required to write Section I only;
- 504 candidates were required to do the Practical test only;
- 506 candidates were required to write Section I and to do the Practical tests;
- 2,008 candidates were required to do the full examination.

6. Of the 2,893 candidates who have thus far written Section I 2,020 (69.7%) succeeded in passing at the first attempt, comparable figures in respect of Section II being, 1,442 (68.6%) out of a total of 2,100, and in respect of Part B (the practical test), 2,841 (94.1%) out of a total of 3,018.

7. Figures relating to the examinations held in 1954 are given in Table IV.

8. Four written examinations were held during the year, the proportion of successful candidates being comparatively small, viz. 225 out of 856 (26.3%).

9. At the beginning of the year, eight

practical examinations were scheduled. Later it was found necessary to hold an additional examination at Johannesburg and Cape Town to overtake the backlog of candidates awaiting examination at those centres. Of the 374 candidates who attended in all, 324 (86.6%) passed.

Returns in Terms of Section 17 (2).

10. In terms of Section 17 (2) of the Act, every holder of a certificate is required to give notice not later than the 31st March of each year of his residential address and whether he continues to practice as a wireman. Section 28 makes non-compliance with this provision a punishable offence. In Table V details are given of the position in regard to these returns. It will be seen that at the end of 1954 only a small percentage (24.7%) of registered wiremen had complied with the requirements of the act in this respect.

Determination of Areas.

11. During the year, the magisterial districts of Lichtenburg, Paarl, Montagu, Vrededorst, Koppies, Robertson, Aliwal North, Standerton and Volksrust were determined by the Minister in terms of section *eighteen* of the Act, as areas in which the provisions of sections *nineteen* and *twenty* should apply.

12. Notices were published of the Minister's intention further to extend the areas thus covered by determining after the expiry of one year from the date of the relevant notice, the magisterial districts of

Mossel Bay, Worcester, Odendaalsrus, Welkom, Barberton, Bethal, Brits, Carolina, Christiana, Ermelo, Heidelberg, Lydenburg, Middelburg (Tvl.), Piet Retief, Randfontein, Soutpansberg, Waterberg, Bethelhem, Ficksburg, Harrismith, Ladybrand, Parys, Senekal, Dundee, Eastcourt, Klipriver, Vryheid, Albert, Beaufort West, Caledon, Ceres, De Aar, Gordonias, Graaff Reinet, Kingwilliamstown, Kuruman, Malmesbury, Middelburg (Cape), Queenstown, Riversdale, Somerset East, Swellendam, Umtata, Vryburg.

Prosecutions.

13. Section 19 (1) of the Act lays down

that wiring work carried out in a determined area must be inspected by the supplier. In five cases action was taken against persons who failed to obtain the supplier's authority to perform wiring work.

Legal action was also taken against nine persons who employed non-registered wiremen within determined areas and against 15 persons for performing wiring work without being in possession of registration certificates.

A supplier notified the Board that in three instances legal proceedings had been instituted in respect of contraventions of municipal electricity by-laws.

Mr. R. N. F. SMIT (Chief Inspector of Factories, Pretoria): Mr. President, as Chairman of the Board, I should like to thank Mr. Fraser very much for the able way in which he has presented the main activities of the Board. I should also like to take this opportunity of thanking all the members, who did a sterling job of work last year.

At the end of the year the Board lost the services of Mr. J. C. Fraser on his retirement, and of Mr. Townsend and Mr. Wentink. While Mr. Wentink was only a member for one year, Messrs. Fraser and Townsend had both served the Board for a very considerable period (Mr. Fraser for nine years and Mr. Townsend for five years). On behalf of the Board and my Department, I wish to express my sincere thanks to both these two gentlemen for their very valuable services.

I also wish to add my personal thanks—and this goes particularly to Mr. Fraser—for his sympathetic help when I assumed Chairmanship of the Board towards the end of 1950, knowing very little of its activities. He assisted and guided me in many ways, for which I shall always be very grateful.

I hope, Mr. President, that this does not sound too much like an obituary notice; I hope that will not be necessary for many, many years yet so far as Mr. Fraser is concerned, but I feel that I must express my gratitude to Mr. Fraser, without whom I might have had a very sticky passage at times.

That is all I have to say, Mr. President, and if I may take the liberty, I would like you all to join with me in thanking your late representative, Mr. Fraser, in the usual way. (Applause.)

PRESIDENT: Thank you, Mr. Smit. Any questions or further discussion on that Report? Overhead Lines Code of Practice: Mr. J. C. Fraser.

Mr. J. C. FRASER (Johannesburg): Mr. President and Gentlemen, this is an easy one; I have very little to report. No meetings were held during the twelve months. There is under consideration the creation of an Investigation Committee by the Institute of Electrical Engineers to go into the question of a Code of Practice for sub-stations and overhead lines and I hope that your representative will be able to report progress at the next Convention. Thank you.

PRESIDENT: Thank you, Mr. Fraser. Mr. Downie, are you in a position to give a report on the Coal Allocation Committee?

Mr. C. G. DOWNIE (Cape Town): Mr. President and Gentlemen, this Report is intended to give some indication of what the position has been over the past twelve months in regard to coal supplies in so far as those Municipal electricity undertakings having coal fired power stations are concerned.

As you probably remember, at the start of the winter last year there was some apprehension as to whether or not we were going to get enough coal to see us through the winter. We were under the impression that the position would become such as to make it necessary for supplies of electricity to be rationed. Fortunately that position did not arise, but it did call for the Coal Allocation Committee to interview the Minister of Transport in July last year. We were all very worried about the position. Arising out of the meeting with the Minister of Transport in Pretoria, the Coal Allocation Committee issued a public statement and I think it would be as well if that statement were to appear in the records of this Association as it also records what the position was during most of the preceding twelve months. I am going to read it:—

"On the 2nd July, 1954, at the Union

Buildings, Pretoria, the Coal Allocation Committee had discussions with the Hon. the Minister of Transport, the members of the Railway Board and the Acting General Manager of Railways, when the shortage of coal supplies affecting the country in general was brought to their notice.

It was pointed out by the Railway Administration that, in view of the heavy transport demands made for the conveyance of all classes of traffic, it was not possible for sufficient transport to be placed at the disposal of the coal mines to enable the coal suppliers to meet the inland requirements of the country.

Under these circumstances, the Coal Industry had no alternative but to continue the rationing scheme which was brought into force earlier in the year, but it would be on a more restricted basis, a basis which has the full approval of the Coal Allocation Committee.

This rationing will continue until such time as there is a material improvement in transport.

The efforts of all concerned will be in the direction of making the best possible use of the transport which can be made available to the coal mines. Special steps are being taken by the Minister and the Administration to improve the transport position as quickly as circumstances will permit so that the Railways will be placed in a position to cope more effectively with the future transport needs of the country.

In the meantime the Railways are adopting various expediency measures to improve the position with existing facilities, amongst which are the chartering of ships to enable the locomotive coal requirements for Cape Town to be supplied by sea, thereby expediting the movement of traffic.

Moreover, the position is being assisted by coal being transported by road haulage from Transvaal collieries to consumers within reasonable distance. To compensate in part for the additional cost of road haulage, the Price Controller has agreed to an increase of 5d. per ton on coal sold from Transvaal and Orange Free State collieries to create a pool out of which road haulage will be subsidised to a certain extent.

The Committee under the Chairmanship of Mr. W. J. Lamb, consist of representatives of the Railways, the Natal and Transvaal Coal Suppliers, the Electricity Supply Commission, Municipal Electricity Undertakings, the Federated Chamber of Industries and the Minister recently agreed to include representatives from the Transvaal and Orange Free State Chamber of Mines and the Association of Chambers of Commerce."

That, Mr. President, Ladies and Gentlemen, describes the position as it has been up to now.

With regard to coal stocks held by power stations, the position up to about a month ago, was about the same as it was this time last year. If anything, taking the quantities in reserve at the bigger power stations as being representative, the coal in reserve is slightly less.

Since I last reported to the Convention, there has been a change in the Chairmanship of the Committee. Mr. Atkinson, as you probably know, who was President of the South African Chamber of Industries, succeeded Dr. de Villiers as Chairman of the Coal Allocation Committee and in July Mr. W. J. Lamb, a prominent Johannesburg businessman, who is also prominent on the Stock Exchange, succeeded Mr. Atkinson.

The Coal Allocation Committee has met regularly every month and has been doing its job very satisfactorily. One of the Committee's terms of reference is that it must see to it that the priority consumers—the Railways and the Power Stations—get their requirements. I have no reason to doubt that during the rest of this year, the Power Stations will get the supplies of coal they require if not altogether in quality, at least in quantity. I also know how the Railways are co-operating and the coal mines are being most helpful as well. The System Managers of the Railways in the various centres are well aware of the difficulties, and, speaking for the part of South Africa from where I come, I can pay tribute to the Railways for the way in which they are performing their functions under the very difficult conditions which prevail today.

For the coming winter some of us, in order to enable enough coal to be made

available to all consumers, have agreed to accept coal of a lower quality.

Anyway, Mr. President and Gentlemen, we are in the hands of a very good Committee and as I said last year, I have no reason to doubt that our requirements will be met during the ensuing year. (Applause.)

PRESIDENT: Thank you, Mr. Downie. Would anybody like to comment on Mr. Downie's Report? (No Comment.)

CONVENTION ADJOURNES AT 4.25 P.M.

Wednesday, 4th May, 1955 (9.30 a.m.).

PRESIDENT: Good morning, Gentlemen. Before proceeding with our Agenda for today, I have one or two announcements.

The Executive Council this morning considered the question of Provincial representation on the Executive and they feel that as the elections went yesterday, the Free State is not adequately represented, in the sense that Mr. Muller, being a past President, is *ex officio* a member of the Executive, but, in accordance with our Constitution, his Council is not represented. Accordingly, your Executive Council have decided to co-opt Councillor Castelyn of Bloemfontein as a member of the Executive in order to give adequate Provincial representation in so far as the Free State is concerned.

I do not know whether we noted an apology yesterday from Mr. J. L. van der Walt of Krugersdorp. Mr. van der Walt did explain to me a few months ago that he was going on long leave and was very sorry that he would have to miss this Convention. I took the liberty of telling him that we would miss him both at the Executive meetings and at the Convention.

Mr. John Wilson, my Deputy, who is a Rotarian, has asked me to announce that the Pretoria Rotary Club meets on Thursdays at quarter to one at the Assembly Hotel.

We are going to make an effort this year to publish our proceedings much earlier than has been the case in the past. Accordingly, speakers will be given a month in which to check the proofs. If they do not return the proofs within a month, their contribution will either be deleted (I don't think we shall be quite as

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drastic as that!) or the proofs will then be edited by the paper's sub-committee.

I think that disposes of the formal announcements this morning. Regarding the appointment of Auditors, your Executive Council recommends that we reappoint our present Auditors, Messrs. Savory and Co. Do you all agree to that?

AGREED.

Gentlemen, we come now to the paper by Mr. R. S. Dunstan on Rural Distribution of Electricity by the Pretoria Electricity Undertaking." By way of introduction, Mr. Dunstan is the Distribution Engineer in the Pretoria Electricity Department. He is now in charge of both urban and

rural distribution and, incidentally, our supply area is 1,500 square miles, not 2,500 square miles, as one speaker said yesterday.

When Pretoria was granted a licence for this area of 1,500 square miles, the Council decided to establish a separate rural distribution section and at that time (I think it was round about 1947) Mr. Dunstan was placed in charge of that department. He had a wonderful opportunity therefore, of gaining experience in rural distribution and I think he made very good use of that opportunity, as I feel his paper shows.

I now have much pleasure in calling on Mr. Dunstan to present his paper.

TABLE I
APPLICATIONS FOR REGISTRATION

Year.	Number of Applications considered.	exempted from Examination.	Decisions of the Board.		Deferred pending Receipt of Further Data.
			Accepted for Examination.	Refused.	
1940 to 1944 1945 to 1949	3,540	2,403	868	400	248
1950	3,089		2,337	349	
1951	460		338	122	
1952	372		349	37	
1953	509		27	417	
1954	458	20	387	17	22
	618*	4	590	18	34
	9,046	2,454	5,276	666	350

* Including 42 in respect of which decision had been deferred during previous years.

TABLE II
REGISTRATION CERTIFICATES

Year.	Registration Approved Applicants having been Exempted from Examination.	Registration Approved after Applicants had Passed the Prescribed Examination.	Total.
1940-1944	2,351	2,507	2,684
1945-1949			2,050
1950			433
1951			282
1952			27
1953	20	313	333
1954	4	321	325
	2,402	3,397	5,799

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ANALYSIS OF 3397 CANDIDATES WHO HAVE BEEN SUCCESSFUL IN THE EXAMINATIONS.

TABLE III

Sections of Examination which Candidates were Required to do.	Number.	Section I: 2803 Candidates.						Section II: 2,100 Candidates.						Part B: 308 Candidates.			
		Successful after						Successful after						Successful after			
		1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4
		Attempt(s).						Attempt(s).						Attempt(s).			
Full Examination— i.e. Sections I and II and Part B	2,008	1,308	350	148	57	18	13	1,380	372	148	63	23	21	1,800	112	6	—
Section I and Part B	506	375	102	39	7	2	1	—	—	—	—	—	—	481	21	1	1
Part B only	504	—	—	—	—	—	—	—	—	—	—	—	—	468	25	—	—
Section I only	387	208	68	4	3	3	1	—	—	—	—	—	—	—	—	—	—
Section I and II only	92	59	19	6	3	4	1	62	17	9	3	2	1	—	—	—	—
TOTALS	3,397	2,020	581	177	70	27	18	1,442	380	157	64	25	23	2,841	158	7	2

TABLE IV

(A) WRITTEN EXAMINATIONS, 1954

Number of notifications issued	1,943
Number of entrants	925
Number of entrants who failed to attend	69
Number of candidates who wrote the examinations	856

SUMMARY OF RESULTS

Section(s) of Examination on which Candidates were Required to Write.	Number of Candidates.	Number of Candidates who Passed.			Failed.
		Sections I and II.	Section I.	Section II.	
Sections I and II	501	97	25	108	271
Section I	293	—	100	—	193
Section II	62	—	—	28	34
TOTAL	856	97	125	136	498

Number of candidates who by passing the written examination became eligible for the practical examination or (if exempted therefrom) for registration — 225 (26.3%)

Number of candidates who failed in one or both sections of the written examination, and were required to re-write —

Sections I and II	271
Section I	301
Section II	59

631 (73.7%)

(B) PRACTICAL EXAMINATIONS, 1954

Number of Entrants.	No. of Examinations Held.	Number of Successful Candidates.
374	9	324 (86.6%)

TABLE V
 RETURNS IN TERMS OF SECTION 17 (2) OF THE ELECTRICAL
 WIREMEN AND CONTRACTORS ACT

1943—1954

Year.	Registered Wiremen.		Returns Received to End of Year.										Returns Received to end of 1954.			
	Num-ber.	Cumulative Total.	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	Cumulative Total.	Percentage.
1940	725	725	25	22	19	33	56	6	20	28	42	108	114	133	133	18.3
1941	780	1,505	28	51	13	37	39	2	16	20	26	69	28	82	215	14.3
1942	192	1,697	8	12	2	11	14	3	2	5	9	26	25	35	250	15.3
1943	178	1,876	—	44	10	13	16	1	7	7	11	17	19	21	271	14.4
1944	208	2,084	—	—	37	24	22	4	12	12	17	13	26	34	305	14.6
1945	218	2,302	—	—	—	62	25	3	9	11	25	21	29	25	339	14.3
1946	350	2,652	—	—	—	—	—	—	10	13	25	41	45	40	465	14.7
1947	501	3,153	—	—	—	—	—	—	34	33	39	104	112	95	572	16.0
1948	618	3,771	—	—	—	—	—	—	107	37	37	93	93	107	779	15.3
1949	572	4,343	—	—	—	—	—	—	—	126	68	120	143	96	968	16.1
1950	453	4,796	—	—	—	—	—	—	—	—	104	186	167	159	827	18.0
1951	282	4,858	—	—	—	—	—	—	—	—	—	164	145	135	962	19.8
1952	283	5,141	—	—	—	—	—	—	—	—	—	—	145	139	1,101	21.4
1953	333	5,474	—	—	—	—	—	—	—	—	—	—	—	234	1,335	24.7
5-474			61	120	86	182	264	30	217	344	414	972	1,531	1,355		

RURAL DISTRIBUTION OF ELECTRICITY BY THE PRETORIA ELECTRICITY UNDERTAKING

By

R S DUNSTAN

B.Sc.(Eng.), M.I.E.E., M.(S.A.)I.E.E.

1.1. HISTORICAL.

The first power station in Pretoria was commissioned in 1892 and generated direct current which was distributed in a limited area embracing what is now the central portion of Pretoria. In 1922 the Mitchell Street Power Station, three miles from Church-Square, commenced the generation of alternating current and made possible the subsequent rapid expansion of the associated distribution system. Not many years were to pass before a 6,600 volt underground cable was laid eastwards to Silverton; a distance of six to

seven miles. In 1929 an 11,000 volt underground cable was laid to the Municipal Quarries at Bon Accord, nine miles northwards and in 1932 an overhead 11,000 volt power line was constructed southwards to the farm of General J. C. Smuts at Irene. The latter line is of interest since it was the first high voltage power line in South Africa for which locally grown and treated wood poles were used. With these cables and overhead power line as a basis reticulation schemes were commenced in the townships of Silverton, Pretoria North and Lyttelton and rural

distribution schemes at 3,300 volts were constructed in the Willows and Lyttelton Smallholdings — Zwartkop areas. A 33 kV, wood pole overhead power line to the town of Brits was completed in 1939 and with Government financial assistance an 11 kV, line was constructed to the Bavianspoort Internment Camp in the early part of the war. In 1947 the above schemes comprised all the distribution work which had been achieved outside the municipal area. Some of the equipment and power lines were in a bad state of repair owing to the curtailment of maintenance work during the war years and it was becoming increasingly difficult to maintain supplies of electricity to consumers. The map, Figure 1, indicates the development to 1947.

1.2. GRANT OF LICENCE FOR PRESENT SUPPLY AREA.

During the early part of 1947 an application was submitted to the Electricity Control Board by the Electricity Supply Commission for a licence for the expansion of its area of supply northwards. This application covered areas which were already being supplied by the Pretoria City Council and a counter application was made to extend the Council's supply area to a radius of 25 miles from Pretoria. After negotiations with Escom, the application was successful and the City Council became the licensed undertaker for the supply of electricity in an area of 1,500 square miles and extending from Brits to Premier Mine and Hamanskraal to Pinedene but excluding Premier Mine itself.

1.3. CREATION OF RURAL DISTRIBUTION SECTION.

To ensure that the development of the rural areas should receive full consideration the Council established a separate Rural Distribution Section under the control of a senior engineer. The aims of the section were to investigate and expand the rural distribution system to cover the whole of the supply area and to supply electricity to every possible consumer however small. The section was establish-

ed in July, 1947, with the appointment of a Rural Distribution Engineer. At the commencement there was no staff or equipment but within a few months a foreman and nucleus of a construction gang had been assembled. Within four months construction had been commenced on an 11 kV, overhead line and since then never less than one major scheme has been under construction at any time.

2. PLANNING.

2.1. PREPARATION OF PROGRAMME.

At the commencement the new section was deluged with applications for supplies of electricity from individuals, farmers' associations and owners of townships and each applicant expected his demand to be gratified immediately. It was soon clear that it would be essential to prepare a programme of the order in which it was proposed to construct distribution schemes so as to have definite information available for applicants and to stop the flood of correspondence. The latter was becoming a serious problem and accordingly a personal survey of the supply area was made. Within a few weeks many hundreds of miles had been covered on roads, tracks and across country and a comprehensive idea obtained of the residential density, areas being developed, roads and configuration of the ground.

The topography and development indicated the obvious routes for main power lines and a plan of the proposed routes, which was prepared early in 1948, is still being used.

2.2. MAPPING.

An early difficulty was an almost complete lack of suitable maps. At first use was made of military maps but farm boundaries and sub-divisions were not shown and the maps were inaccurate with regard to the positions of roads. Since the chief information required was the sub-divisions of the main farms and the roads and rights-of-way it was decided to prepare a map of each main farm to a scale of 1/7500. The detail information required was obtained by tracing the records in the

Surveyor-General's Office and this information was used to build the required map. These maps have proved to be essential and are used for all planning and working plans.

Later a very excellent and complete map of Pretoria and environs was prepared by the City Engineer's Department. The map consists of eight sheets to a scale of 1/25000 and is printed in four colours. In addition to roads and subdivisions of the land; rivers, contours and plantations are shown and the maps are a valuable addition to the information available.

2.3. GENERAL DECISIONS WITH REGARD TO METHODS OF DISTRIBUTION.

When considering the general principles which should be adopted for the construction of the distribution system a close study was made of the existing lines and equipment. The majority of the existing distribution was at 3300 volts with 3 phase transformers feeding a common low voltage network. Protective nets were provided between the high and low voltage conductors and the multitude of wires complicated the construction. All the high voltage fuses had been bridged and the transformers were being operated in parallel on both the high and low voltage sides. Line and transformer faults were numerous and operation of the system was a nightmare. An examination of the loads being supplied indicated that the majority of units were being sold for heating, lighting, refrigeration, incubation, domestic purposes and other essentially single phase loads. The following conclusions were reached:—

1. Distribution should be at the highest practical voltage which in this instance is 11,500 volts.
2. The design of the overhead lines should be simplified by a reduction in the number of wires.
3. Protective nets should be eliminated wherever possible.
4. Transformers should be fused singly or in groups on the high voltage side.
5. The demand of the average con-

sumer could be met by a single phase supply.

6. Transformers should be placed within two hundred yards or so of each consumer to ensure good voltage regulation. In effect electricity should be reticulated at high voltage.
7. Transformers should only be operated in parallel on the low voltage side if either their high voltage protection is inter-connected or remote indication can be given of operation of the protection. Therefore, fuse protected transformers should not be operated in parallel.
8. Poles of different materials, e.g., wood and steel should not be used in conjunction in the same area.
9. Cross-arms and insulator pins on wood poles should be unearthed.

A decision was made that as far as possible single phase supplies only would be available to consumers except in cases where the engineer considered that it would be advantageous to give a three phase supply or it was proved that a motor exceeding 10 H.P. was required. This decision at first met with violent opposition from consumers and engineers mainly on account of the cost and difficulty of obtaining single phase motors. However, arrangements were made for the local manufacture of motors and with persistence the policy came to be accepted by all concerned. It has proved to be justified and to have the following advantages:—

1. Overhead mains are simplified and, therefore, fewer faults occur.
2. Small transformers supplying two to five consumers can be placed near the consumers. There is thus better voltage regulation and less copper in low voltage mains.
3. Blowing of a high-voltage fuse interrupts the supply completely and there can be no damage to motors through a partial supply.
4. Costs are reduced by an amount estimated to be between 25 and 30%.
5. Transformer loading conditions result in more efficient utilisation of the transformer material.

The only disadvantage is the cost of the single-phase motors but this is offset by the higher cost of control gear and auxiliary equipment for three-phase motors.

2.4. PROVISION OF CAPITAL FUNDS.

It has been the practice in Pretoria for a very long time that the Council provides the capital funds for the constructions of the mains and requires the consumer either to give a guarantee of revenue or pay capital charges in addition to the charge for electricity. This system has such overwhelming advantages of both justice and simplicity that it has withstood all attempts to alter it and in particular the difficulties during the last war when it became necessary to permit consumers to construct their own mains owing to the shortage of material and labour. The advantages of the system may be summarised as follows:—

1. A public body such as a municipality has an advantage over individuals, groups of individuals or farmers' associations in the raising of loans for capital expenditure.
2. The Council owns the power mains and equipment without any doubts and it is perfectly clear to all employees what is to be maintained and who is responsible for accidents and maintenance.
3. The Council retains the initiative to dictate policy, that is, the Council may use existing mains to supply additional consumers, extend the mains, remove them, alter the supply circuits, standardise equipment and consumers' voltage, etc., without having to consult the consumers being supplied.
4. No disputes can arise with consumers about the repayment or refund of capital moneys.
5. Administration is simplified which is vital to the operation of any business.
6. The real job of the undertaking, which is the supply of electricity, is not hindered by financial complications.
7. The consumer is required to give a guarantee of revenue the guarantee

can be determined to cover the capital charges or to subsidise or to load the cost of supply as desired.

2.5. GUARANTEES.

It is generally agreed amongst electricity authorities that if a scheme has an annual turn-over of 20% or more of the capital expenditure it is a payable scheme. This is a very rough figure and can vary widely for different schemes and there can also be wide differences of opinion as to the definition of capital expenditure. However, any scheme where the consumer is required to give a guarantee equal to 20% of the capital expenditure will certainly form a valuable section of a supply undertaking.

Until the year 1947 it was the policy of the Council to require consumers to give a guarantee that the annual revenue would be at least 20% of the estimated capital expenditure. These guarantees were within the capacity to pay of the majority but not of all consumers in an area and 100% saturation could not be attained. By 1947 the cost of mains had risen to a level where the guarantee based on a 20% turn-over was beyond the capacity to pay of the majority of consumers and proposed schemes never reached fruition. When the Rural Distribution Section was established the question of guarantees was examined in detail. It was found that when electricity became available in an area, building followed and the original number of consumers was doubled in some five to seven years. A successful attempt was made to persuade the Council to apply a guarantee equal to an annual turn-over of 10% of the capital expenditure. This would imply that initially there would be a loss but after a few years the scheme would become payable. The guarantee was thus reduced to a figure within the capacity to pay of the average consumer and it was anticipated that 100% saturation could be attained. It can be claimed that this experiment has been justified since it is rare to find a house or pump in a reticulated area which is not connected and the revenue and number of consumers have exceeded expectations.

In the case of rural townships the owner is required to agree to pay the difference between the actual revenue received from consumers and the guaranteed revenue.

It will be noted that guarantees have been referred to as annual guarantees. Previously the guarantee was checked once per annum against the revenue received from a consumer. This rapidly became a major clerical undertaking and led to many disputes with consumers who were required to pay large deficiencies. To eliminate these difficulties consumers are now required to accept that a minimum charge equal to one-twelfth of 10% of the capital expenditure be applied to his account each month. In this way it is ensured that the guarantee is met month by month and it is applied automatically by the accounts clerk in the normal course of his duties.

2.6. TARIFFS.

Originally consumers outside the municipal area were required to pay town charges plus a surcharge of 100% but in 1938 the surcharge was reduced to 25%. The fact that they were required to pay any surcharge was always a source of annoyance and led to many complaints. It was also found that the application of town charges plus a surcharge to rural supplies led to a multiplicity of tariffs being applicable to farms and to the installation of batteries of meters. There was also a real danger of leads carrying low-priced units being tapped for other uses particularly when overhead open connections were used between buildings. Accordingly a suitable opportunity was taken to amend the domestic tariff for rural townships by adjustment of the basic and unit charges to provide the same effect as the surcharge of 25%. This tariff is now as follows:—

- (a) A charge of 3/- per month per B.H.P. of installed motors.
- (b) A basic charge of 2/6d. per month per 250 sq. ft. of floor area.
- (c) An energy charge of $\frac{1}{4}$ pence per unit.

This amendment, although no real con-

cession was made, resulted in a diminution of complaints.

At the same time a special tariff was introduced to cover the supply of electricity to farms and smallholdings and this single tariff covers the supply of electricity for all uses on a farm or smallholding. It is as follows:—

- (a) A charge of 3/- per month per B.H.P. of installed motors.
- (b) 40 units per month at 5d. per unit and the balance of units per month at 1d. per unit.

It should be noted that this tariff does not require the measurement of any floor area and with a single-phase supply only a single meter is necessary to measure all electricity consumed. The tariff has proved to be very successful.

2.7. SERVITUDES.

In the past great difficulties had been experienced owing to the indefinite nature of servitudes for power lines and the neglect to have proper servitude agreements signed and registered. Even to this day major power lines exist on private ground and the Council's right to construct them has never been protected. Accordingly, one of the first tasks was to organise a system for the registration of servitudes and a system based on that in use by the Victoria Falls and Transvaal Power Company was adopted. Under this system the owner of the ground signs an option in favour of the Council to construct a power line along an approximate route. The power line is then constructed and after completion it is surveyed and the servitude diagram is submitted to the Surveyor-General for approval. The approved diagram is forwarded to the Council's solicitors for the preparation and signature of a servitude agreement and registration of the agreement with the Registrar of Deeds. Even though the Council granted the Electricity Department authority to work directly with its solicitors the period from the signing of the option to the registration of the agreement is anything from four years upwards with the above system. The

delay is due to the procrastination of the legal fraternity, the death of owners, the sale and transfer of the property, sale of the surface rights but not mineral rights, subdivision of the property, etc., and all efforts to reduce the delay have been unavailing.

Later it was learned that the Registrar of Deeds would register a general servitude against a property without the submission of an approved servitude diagram. After many conferences a system was devised under which the owner signs a power of attorney authorising the Council's solicitors to complete a servitude agreement on his behalf and grants a general servitude for a power line across his property. Immediately the solicitors proceed to obtain the consent of any bondholders and to register the servitude and the work is complete in a few weeks. The power line is constructed subsequently and its actual position on the property becomes the servitude granted. A further advantage is that if it later becomes necessary to move the line or construct an extension the servitude agreement covers the work if the approval of the owner is first obtained.

Authority was obtained from the Council to pay for servitudes either by an annual rental based on the length or a lump sum payment also based on the length. However, when bargaining for servitudes advantage is taken of the fact that the Council intends to supply electricity and the servitude must be granted to achieve this object. In stubborn cases neighbours assist in the campaign and it has never been necessary to pay a rental. In one case a lump sum payment was made but that was in the days before the organisation was mature or the engineers had grown tough.

2.8. PLANNING OF TYPICAL RURAL SCHEME.

2.8.1. Determination of Area.

The first step to design a rural scheme is to determine the area to be included. The original general survey of the Pretoria area indicated where the population was most dense

and the most suitable areas to be reticulated. It had already been concluded that work should be proceeding simultaneously at two or three points and experience soon indicated that design and construction should be limited to an area of manageable size. Hence it is the practice to limit the area of a scheme to the boundaries of a main farm which varies from eight to twenty-five square miles. At any one time several schemes may be in various stages of completion from planning to construction.

2.8.2. Canvassing.

The engineer allocated to design the scheme now visits the area and studies the roads, rights of way, trees, telephone lines and other obstacles and marks details of the position of each house, pump or other load on the plan. The occupier of each house is requested to complete a questionnaire which gives useful information with regard to the owner and his address and the probable load. At this stage the engineer must be able to give authoritative information with regard to the type of supply, tariff and probable minimum charge.

The most suitable transformer positions and routes for the main and spur lines can be chosen and marked on the plan to enable a supply to be given to every portion of the farm. The way-leaves across private ground will be clear and are obtained in the majority of cases on request. If the owner proves to be unco-operative there are a number of ways by which the desired result can be obtained and there is only one instance in which a complete deadlock was reached.

Farmers' Associations have been most willing to assist in canvassing and to obtain way-leaves and permission to remove trees. However, the assistance they can render is limited and it is essential for personal contacts to be made by the engineer and for him to examine all routes personally.

2.8.3. Estimates.

From time to time the cost of various types of overhead lines and of standard transformer constructions are estimated and at rare intervals an opportunity occurs to check the estimated cost against the actual cost of the work. Using these unit costs an estimate can be prepared of the total cost to build those portions of the complete scheme which will be required to supply the consumers found during the canvass. The estimated cost per consumer can be determined and the minimum monthly charge is calculated.

The minimum charge determined in this way is applied to every consumer connected at the commencement or during later stages of development of the scheme. As soon as the majority of the overhead lines have been constructed and transformers have been erected the cost to connect a new consumer is often only the cost of the connection, but the minimum charge is still applied.

2.8.4. Layout of Scheme.

All the information required is now available to prepare a master plan of the whole scheme and working plans of the initial work to be done. The master plan does not leave the office since it is the key to future extensions to the initial work. The plans are

prepared on 1/7500 scale maps and show the routes of all high-voltage lines, the type of line to be erected, the transformer positions, rating and type of transformer, which plots are to be connected to a particular transformer and high-voltage fuse and link positions. Any obstacles or points of interest are noted on the plans.

Quantities of the most important materials are determined roughly and the Stores Department advised so that the materials can be ordered in addition to normal purchases. It is not the practice to prepare detailed lists of all the various items required and in fact this would be impossible from the type of plans prepared. Every effort has been made to reduce the office work to a minimum and to use the energies thus saved for greater production in the field.

2.8.5. Applications for Official Approvals.

Simplified copies of the working plans are prepared for submission to the Provincial Roads Engineer to obtain permission for the location of lines where necessary within the road reserve and for road crossings. When reticulating electricity to smallholdings it is essential that lines be erected in roads and experience has proved that in all cases it is advantageous to construct lines along roads mainly for ease of access and for further development.

Simplified copies of the working plans are also submitted to the Postmaster-General in terms of the Factories Act in order that he may state the points where protective devices are required and to examine the scheme for interference with projected telephone exten-

sions. A tendency is becoming apparent for the Post Office engineers to demand ground clearances over the whole of a scheme in excess of statutory requirements and to demand horizontal clearances greater than the width of rights of way. The task of rural distribution engineers is no sinecure and apparently trivial demands such as these can render their aims impossible to achieve and the cost of their schemes prohibitive. Since it is the rural dweller who will be deprived of a supply of electricity it behoves him and his associations to protest now before such a stranglehold is applied to electricity undertakings that the expansion of rural electricity distribution schemes ceases.

If it is necessary for an overhead line to cross a railway track detail drawings of the crossing in plan and elevation are submitted with the request to the South African Railways. Permission is invariably granted and the crossing is recorded as a servitude in the Consolidated Rights Agreement between the Council and the Railway Administration. Rail crossings are always provided with a safety net below the conductors but the normal line tensions and factors of safety of conductors are continued uninterrupted over the crossing. Only copper or copper-coated wires are used for conductors and nets at rail crossings.

We are fortunate in Pretoria that, being the administrative capital, senior officials of the above organisations are readily available for verbal discussions. Amicable personal contacts have been established and often a little friendly discussion and

explanation in advance determines the official reply.

2.8.6. Construction.

After completion of the design work by the engineer a construction gang is allocated to the area. A gang comprises a chargeman electrician, who is responsible on site for organisation and progress of the work, two to six electricians and their natives, pole-planter operator, camp natives and additional natives as required. The composition of the gang varies with the work in hand, for example, as pole planting is completed the pole-planter operator leaves and the number of electricians is increased for conductor stringing.

Each chargeman is provided with a 2-ton truck, camp huts, portable lavatories, picks, shovels, crowbars, etc., rope blocks and tackle, draw tongs and draw vices and each electrician has his issue of personal tools and ladder. The camp is established at a convenient point and is used mainly for the storage of materials and an operating base. The gang is transported daily to and from the camp and although the number of working hours is reduced thereby the output of work, owing to greater satisfaction among the men, does not suffer.

The lines to be constructed are set out by the chargeman and his foreman who are advised by the engineer where necessary. Corner pole positions are marked by means of a steel peg in relation to known survey beacons and intermediate pole positions are determined by the chargeman. It may seem peculiar to permit the chargeman to undertake the setting out of the work, but the policy has proved to be

valuable to promote personal interest and to develop initiative. Frequently the charge-man is given the duty of approaching farmers to settle details such as the placing of stays and the personal contacts made and the experience gained in negotiating have created a fine spirit of independence. The chargeman is also responsible for lists of material he requires from time to time as the work proceeds and he is in trouble with his foreman if there is any delay due to materials not been ordered on time. This system has enabled the engineer to be relieved of a great deal of routine work and he can be used for more effective and creative work.

Two earth-boring and pole-planting machines of the auger type are in use and each machine is in charge of its own operator. The machines are equipped with winches for lifting poles into holes and have eliminated large numbers of natives. In good, red soil a 20-inch diameter hole can be excavated in 2½ minutes and the total time for planting a concrete pole, including aligning the machine and pole and back filling, is as little as 12 minutes.

Figure 2 shows a concrete pole being lifted into a hole by means of a pole-planting machine. These machines can also be used for the rough excavation of stay holes leaving the minimum finishing work to be done by hand. They have also enabled a method to be developed for the planting of poles in black turf and clay to eliminate all subsequent movement and leaning of the pole. A 20-inch diameter hole is drilled one foot deeper than the depth to which the poles are to be planted and a twelve-

inch layer of gravel soil is placed in the hole and stamped. The pole is then placed in position and the hole is back-filled with gravel soil. None of the black turf excavated is replaced in the hole. Poles erected by this method have been in position for five years without movement.

Simultaneously with the erection of poles, work proceeds on the erection of cross arms, insulators, stays, etc., to prepare the poles for conductor stringing.

As far as possible conductors of all types are purchased on wood drums of a size to fit the cam-type jacks illustrated in Figure 3. The jacks were devised by a foreman in the Rural Distribution Section and the principle will be clear from the photograph. They enable a drum to be lifted in a perfectly stable manner in a matter of minutes. Conductors are paid out in three methods depending upon the type of country and access to the line:—

1. A single conductor is pulled out by manpower.
2. Three conductors are pulled out by lorry simultaneously.
3. The drums are mounted on the lorry and the conductors run out either singly or simultaneously as the lorry is driven along the route.

Conductors are run out on the ground and with the light conductors used it has not been found to be necessary to use snatch-blocks.

Conductors are tensioned to span — sag — tension — temperature curves which have been prepared for each size and type of conductor using Hattingh's Universal Sag Stress Chart and the design conditions

specified in the Factories Machinery and Building Works Act. In practice in the field it has been found more convenient to prepare a single composite curve from the above curves which covers the tensioning of all conductors except aluminium. The composite curve is arranged to give the same sag with different conductors and a factor of safety which varies between the limits of 2.0 to 2.5. This simplification has eliminated confusion and errors during conductor tensioning and the only equipment required by the charginer is a thermometer and a copy of the composite curves. The correct tension is determined either by sighting the sag or by measurement of the tension by dynamometer depending on the circumstances.

Transformers are erected and connections to consumers are made only when required to commence the actual supply.

In schemes where they have been used steel poles are painted normally as construction is being completed but all poles are numbered as soon as possible after erection. Cross-arms and other metal work is hot galvanised but where this is not possible cold galvanising is applied. The aim is to eliminate all painting and in rural schemes using only concrete and wood poles the only painting still necessary is numbering of the poles. An attempt is being made to avoid painting numbers on wood poles by the use of cast metal letters nailed to the poles.

3. METHODS OF DISTRIBUTION.

3.1. GENERAL.

The rural areas around Pretoria consist of an intimate mixture of townships, of which there are seventeen being supplied,

smallholdings and farms. A number of the townships bordering on Pretoria are reticulated as portions of the urban system but the mains to the remainder form an integral part of the rural distribution system. Consequently the Rural Distribution Section has been required to construct mains of various types and to use a number of methods of reticulation. The townships treated as portions of the urban system are supplied by underground 11 kV cables with group connected, circuit breaker controlled, pole-mounted transformers feeding overhead low voltage mains. Steel poles are normally used in these townships. Other townships are supplied by means of overhead 11 kV power lines on the same poles as low voltage mains with pole-mounted, fuse controlled transformers. These transformers each supply its own isolated area. Wood poles are normally used. In rural areas, that is plots exceeding 2½ morgen and farms, supply is by means of overhead 11 kV concrete pole main lines which follow strategic and accessible routes. Three and single phase spur lines on wood poles are teed off the main lines along such routes that each plot and sub-division can be supplied. Small single phase transformers are mounted on the main and spur lines in such positions that up to four plots can be supplied from each transformer with the minimum of L.T. mains. Fuses are used for the protection of spur lines and individual transformers.

The above methods and types of line were not adopted from the beginning but have evolved by a process of trial and bitter experience. Accordingly a great variety of types of line, equipment and methods will be found.

Electricity is supplied to the rural network at suitable points where the main 11 kV urban cable distribution system can be tapped. At present there are ten such points located in main distribution substations feeding eighteen main lines. The supply to each line is controlled by an Auto-reclosing oil circuit breaker of the solenoid closing, weight closing or motor closing type. It is generally inconvenient to commence an overhead 11 kV line adjacent to the substation and the

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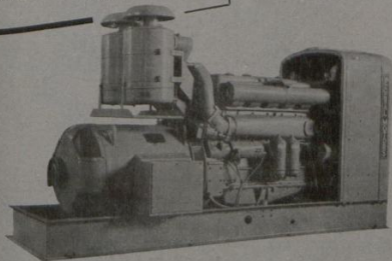
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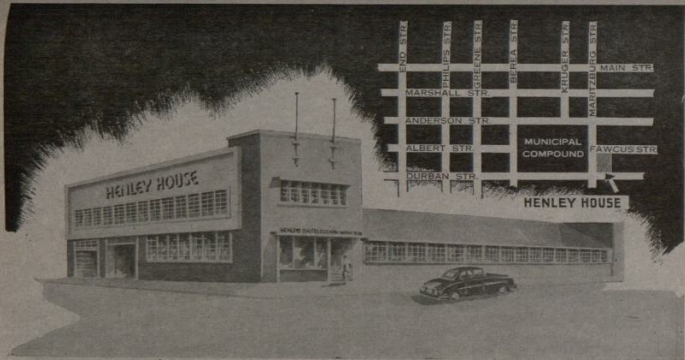
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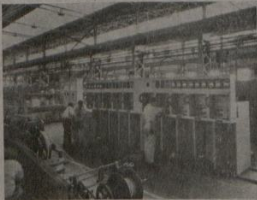
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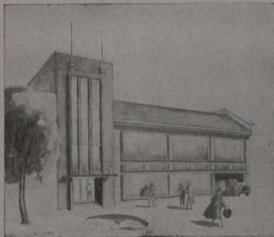
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first section of the majority of lines consists of a length of underground cable.

Figure 4 shows the high voltage lines in existence at present and graphically shows the work accomplished during the past eight years.

3.2. TYPES OF 11 kV. MAIN LINES.

A considerable number of types of main lines have been constructed and from the experience gained the standard type of main line now used incorporates concrete poles, a bow type of cross-arm and suspension insulators. The poles have a length of 31 feet 6 inches and are of the hollow span taper type with a top diameter of 5 inches. The reinforcement is bonded to a short copper tail at the base and to a final nut at the top. Poles are planted to a depth of 5 feet and each pole is provided with a small earth mat consisting of a length of scrap copper wire sweated to the tail and wound helically around the base of the pole. Figure 2 shows the erection of a concrete pole.

The bow type of cross-arm can be seen in Figures 5 and 6 and consists of straight lengths of angle iron overlapped at the corners and welded. A jig is used during welding. At present these cross-arms are being protected against corrosion by cold galvanising but an investigation is being made as to whether hot galvanising would be an advantage. The hooks for the support of the lower conductors during tensioning should be noted and also the horns to control the earth wire during erection and tensioning.

Two 7-inch diameter disc insulators are used per phase and both toughened glass and porcelain insulators are in service. Both types suffer damage from stones, catapults and flashovers.

This type of line is constructed with an average span of 300 feet and a 7/064 galvanised steel or 3/104 copper-coated steel earth wire is used.

As mentioned numerous types of main lines have been built and steel poles with bow arms, steel poles with wishbone arms, steel poles with plain cross-arms and pin insulators and also wood poles with similar fittings can be seen.

3.3. TYPES OF 11 kV. SPUR LINES.

Wood poles and pin type insulators are used exclusively for spur lines with the conductors in a horizontal plane. Poles are 32 feet long and are of Grade A strength with a top diameter of five to six inches. Cross-arms are of the tubular steel type with two diagonal struts attached to the pole with a coach screw for stability. The cross-arm is standard for high and low voltage work and is drilled to accommodate either three high voltage or four low voltage insulators. The cross-arm is 42 inches long and results in a conductor spacing of 18½ inches with a three-phase 11 kV. line but no trouble has been experienced with this small spacing on spans up to 300 feet.

Spur lines are single- or three-phase as necessary, no earth-wire is fitted and the cross-arms are not earthed.

3.4. TRANSFORMERS.

The most common size of transformer in use is a single-phase 10 kVA unit and some 550 have been purchased. Its capacity and overload rating is sufficient to enable four smallholdings to be supplied and to permit of the transformer being placed close to the consumer. However, a number of 15kVA and 25 kVA single-phase transformers are in use at points where the load has proved to be too great for a 10 kVA transformer.

A number of 10 kVA transformers are fitted with stoneware tanks without high voltage insulators and containing a minimum of oil. They are extremely light and are easy to handle and erect but care must be taken that the tanks are not damaged.

Three-phase transformers are 25 kVA, 50 kVA and 100 kVA while a few 15 kVA units have also been used to effect conversions from 3,300 volt to 11 kV where consumers have already been receiving three-phase supplies.

Steel tank transformers are fitted with conservators and externally operated off-loop tap changing but such fittings as explosion vents, drain valves, and thermometer pockets have been eliminated to achieve simplicity and low cost.

Transformers up to a rating of 25 kVA single-phase are mounted on single poles and are equipped with either pole clamps or cross-arm hangers. Transformers with a rating exceeding 25 kVA are platform mounted between a pair of poles.

Typical transformers and their mounting can be seen in Figures 6, 7, 8 and 9.

3.5. LOW VOLTAGE MAINS.

Until recently low voltage mains in townships have been of the usual horizontal construction using the standard 42-inch cross-arm. However, the mains in all new townships are of vertical construction with a conductor spacing of 7 inches. For many years it has been the practice to use vertical construction in rural areas. Wood poles are drilled on site for the attachment of bobbin insulators by means of galvanised steel bolts but no deleterious effects have been noticed from this practice.

For low voltage mains in townships 30 ft. Grade B strength poles are used and for mains in rural areas the poles are 28 ft. Grade B strength.

Where single-phase low voltage mains are erected below high voltage mains it has been found to be most simple and least troublesome to use P.V.C. insulated conductors for the low voltage mains and to eliminate the protective net. However, where the low voltage mains are three-phase it is more economical to revert to a protective net.

At one point where considerable trouble was being caused by strips of bark, the removal of the net and the erection of P.V.C. insulated low voltage conductors cured the trouble completely.

3.6. CONDUCTORS.

Copper, aluminium, copper-coated steel and galvanised steel conductors are in use. Main lines are equipped with either .1 sq. inch or .05 sq. inch copper conductors having strandings of 7/136 or 3/147 respectively. The conductors used for spur lines may be either .025 sq. inch 3/104 stranded copper, 3/104 stranded copper-coated steel or 7/064 stranded galvanised steel depending upon the importance and

load. Solid No. 4 gauge copper is generally used for low voltage rural lines and solid No. 4 gauge and .1 sq. inch 7/136 stranded copper for low-voltage mains in townships.

Primary standard conductors have been adopted in preference to secondary standards since it has been found that burning of strands is one of the two main causes of conductor failure. The larger diameter of the strands in these conductors results in greater heat conductivity and less burning in the case of an arc and, therefore, the conductor is more robust.

Aluminium conductor having a stranding of 7/1228 has been used in one township for low-voltage mains. The average span is 200 feet and no trouble has been experienced except in one instance where a phase to phase fault burnt a conductor. The conductor was found to be easy to erect but its low melting temperature is a disadvantage in the case of an arc.

Great economy has been effected by the use of galvanised steel conductors. The conductor is the ordinary 30 ton stranded steel wire used generally for earth wires and is purchased in lengths of 8,000 feet. It must be used with a clear understanding of its limitations. Since the material is magnetic the skin effect with alternating current will vary with the magnitude of the current and the resistance will be a variable quantity. Also the inductance of the circuit is independent of the conductor spacing. Therefore, it is not possible to calculate voltage drop or current rating. However, from published experimental results on similar material it has been possible to conclude that a 7/064 conductor can be used safely for 7½ amps. over a distance of 3 miles with a voltage drop of some 500 volts. This represents a single-phase load of approximately 100 kVA which is a useful rural load. However, it is possible that greater currents could be used without excessive voltage drop and one three-phase circuit is in operation transmitting 300 kVA over 3 miles without trouble. The saving of conductor cost is spectacular and amounts to 82% for a single-phase line with copper at £330 per ton and assuming that the minimum size of copper which can be used with

safety is .025 sq. inch. Under Transvaal weather conditions the life is indefinite. provided the galvanising is not damaged through excessive current or heat, and similar wire has been in use as earth wire for upwards of twenty years.

3.7. PROTECTION.

Each main line originating at a sub-station equipped with metal clad switch-gear is controlled by an automatic re-closing, solenoid closed, oil circuit breaker. These breakers are fitted with periodic reclosing relays set to give two reclosures before lockout. If the breaker remains closed for a pre-determined period the expended shots are recovered. Other main lines and some of the major spur lines are controlled by weight operated re-closing breakers. Each breaker has five reclosures and although not perfect a large number of lockouts have been avoided.

Each single phase spur line is fused at the point where it leaves the main line. Drop out expulsion fuses are used with fuse elements having a rating of 15 amps. or 30 amps. It has been found that fuses of this rating will withstand surge currents encountered on the spur lines, and will clear a line fault before lockout of the auto reclosing breaker controlling the area. Three-phase spur lines are not fused but are linked or controlled by a weight-operated breaker.

Individual transformers are fused, also with drop-out expulsion fuses, but with a fuse element related to the transformer rating. The smallest fuse element in use has a rating of 3 amps., that is four times the full load current of a 10 kVA transformer. With larger transformers it is endeavoured to limit the fuse element rating to less than 3 times full load current.

For protection against surges and lightning, surge divertors are fitted at each point where a transformer or cable is connected to an overhead high-voltage line. The characteristics of the divertors in use have been chosen to ensure that under the maximum anticipated surge current the surge voltage applied to the transformers and cables is lower than the impulse withstand voltage of the equip-

ment but at the same time the divertors will re-seal against the maximum possible line voltage. Before the general installation of divertors it was common for a few transformers to be damaged during each storm but today the loss amounts to two or three per season. Low-voltage divertors are installed at transformers only where a considerable length of low-voltage mains is connected.

High-voltage surge-divertors are connected to the line terminals of the transformer fuses and even with the low fuse element rating in use the blowing of fuses under storm conditions is comparatively rare. The earth terminals of the divertors are bonded to the transformer tanks, the earthed secondary terminal and to an earth plate.

3.8. PURCHASE AND ORDERING OF MATERIALS.

Expansion of existing schemes and the construction of new schemes is a continuous process. Accordingly it has been found to be most convenient to purchase materials in bulk lots and not in the definite quantities required for specific schemes. Under this method the central stores hold a stock of each item and replenish the stock when it falls to a pre-determined level. The chergeman constructing a scheme requisitions suitable quantities of material as and when required and endeavours to reduce to a minimum the materials awaiting erection at his construction camp or along the routes of the lines. It is considered that in this way the danger of theft or loss of material is reduced to a minimum.

4. FAULTS AND OPERATING EXPERIENCE.

4.1. LIGHTNING.

In the early stages lightning was a serious difficulty and the damage to transformers and the maintenance of supplies was a problem. The latest developments in lightning protection had not been studied and the usual practice was being followed of shielding by means of earth wires on all lines and the placing of surge divertors at intervals along the lines. The most usual forms of damage were transformer winding failure, bushing breakages,

insulator punctures, insulator flashovers followed by breakage of conductors due to the power arc, cable failures in the vicinity of the end boxes and blowing of all high-voltage fuses in an area during a storm. Following the appointment of an engineer who had studied surge phenomena during his training, it was decided to instal surge divertors at the terminals of all transformers and at cable ends. The divertors are purchased to a specification which correlates their flashover and surge discharge voltages to the transformer and line insulator surge withstand voltages. The results have been very good and little damage is now suffered by transformers, cables or line insulators.

Figure 10 shows damage caused to a pole by lightning before the erection of conductors.

4.2. FAILURE OF POLES.

There have been no epidemics of failures of poles and the failures which have occurred have been isolated instances. Occasionally a wood pole rots at ground level after being in service for three to five years. Since these are isolated cases in a batch of poles, it is concluded that the pole concerned was either improperly seasoned or treated. Steel poles in townships are subject to the usual ground level corrosion, but this trouble appears to be absent in rural areas. No deterioration of concrete poles has yet been noticed.

The major reason for damage to poles is collision with motor cars.

4.3. FATIGUE OF CONDUCTORS.

A series of fatigue failures of conductors occurred at two points and approximately the same time. The lines concerned consisted of No. 4 solid copper conductors with suspension insulators and a span of 300 feet and the break was at one of the U-bolts of the suspension clamp. A preventive cure was found by the application of home-made armour rods consisting of the six outer strands of a length of scrap 7/8 galvanised steel stay wire. The six outer strands were removed and the centre straight strand of the stay wire was rejected. The outer strands, which retained their helical form, were reassembled on the conductor with-

in the suspension clamp. No other binding was applied and no further fatigue breaks have occurred.

In Figure 5, which shows the bow type cross-arm, a sample of the armour rod has been fitted to one of the suspension clamps.

4.4. INSULATOR FAILURES.

At one stage surge punctures of high-voltage pin-insulators caused much trouble. The trouble is now found only with pole-mounted links, high-voltage fuses and an occasional insulator which receives a direct lightning strike. The improvement is ascribed to the reduction of opportunity due to the omission of earth wires on wood pole lines and the general application of surge divertors. The latter appears to have reduced the severity of surges on the system.

4.5. FUSE FAILURES.

The unnecessary blowing of high-voltage fuses can be a source of great inconvenience and was common in the early days. In spite of the great increase in the number of fuses in service the interruptions to supply are now very few and can be handled without delay by the breakdown staff on normal duty. The reduction in the number of faults is undoubtedly due to the installation of surge divertors and it is not considered economically justified to try to improve the continuity of supply at the present time.

4.6. FAULT LOCATION.

In the event of the failure of supply to a whole area caused by lockout of a main circuit breaker it can be a difficult problem to locate the fault in possibly some thirty to forty miles of high-voltage mains and sixty or more transformers. If no information is available the breakdown staff first attempt to close the main auto-reclosing breaker and are permitted one shot. If the breaker trips steps are taken to sectionalise the line and locate the faulty section before detailed examination is commenced.

Each main line is divided into a number of sections by means of single pole, stick operated, pole-mounting links which divide the main lines into convenient sections of one to two miles in length. When the

fault has been proved to be permanent the first set of links is opened and the auto-reclosing breaker is closed. If the breaker now remains closed the fault is not in the first section. The second set of links is opened and the first set of links, which are alive, is closed. The breaker will not trip if the fault is not in the second section. However, if the fault is in this section the breaker opens and the operator has a period of 20 seconds to re-open the links before the breaker closes again automatically to energise the first section. This process is repeated until the faulty section of the main line is located.

To reduce the travelling required to locate faults extensive use is made of V.H.F. radio communication and four vehicles used exclusively for rural work have been fitted with the equipment.

4.7. SYSTEM OF CONSUMER IDENTIFICATION.

In a small system a consumer who reports that his supply has failed can be identified by his name and the area in which he lives. However, as the system grows and the number of consumers increases it becomes difficult for the breakdown staff to know or locate each consumer. The difficulties become greater as properties are sold or the staff changes with time.

Accordingly it was decided that a system must be devised that would enable any consumer to be located without hesitation by a stranger. The first method to be evolved was the division of a map of the area into a grid of squares having sides of half a mile. Each square was denoted by its ordinates and each consumer in the square had his grid number attached to his main switchboard. He was required to quote his name and grid number when reporting a supply failure. The system was based on a central point in Pretoria and was capable of indefinite extension in all directions. The system failed for the reason that a stranger could not go infallibly in the dark on a stormy night to a particular point in the country that he had seen on a map some while previously.

The second method, which is in use

today, is based on the numbering of the poles of the high-tension lines. Each main line has a name which is abbreviated to a code letter and each pole is numbered from the commencement of the line. The position and point of commencement of the main lines is known to all the staff. A spur line is numbered from the pole on the main line to which it is connected and its poles are also numbered from the commencement. Thus pole P/21 is the twenty-first pole on the Pyramid Line and pole P/21/13 is the thirteenth pole on the spur line commencing at pole P/21. As the lines become more complicated the numbers become formidable but by following the lines and numbers any required pole can always be found. The reference number allocated to a consumer is the number of the pole on which the transformer which supplies him is mounted and the system is now well understood by consumers.

5. CONCLUSIONS.

The work done on the rural distribution of electricity by the Pretoria Electricity Undertaking has resulted in the accumulation of a great deal of knowledge and experience of the problems involved in supplying electricity to all consumers in a rural area; and it can be emphasised again that the aim has been to supply every consumer, great and small, rich and poor. Whereas a few years ago the design, development and construction of a scheme was a problem involving much hard work, the task today is comparatively straightforward and simple. It has been proved that a policy of simplification, not only of the types of lines and equipment, but also of construction methods and organisation, leads not only to a better and more reliable supply, and hence a more satisfied consumer, but also to a more reliable, contented and efficient staff. Many of the simplified methods of line erection and of construction in use have been suggested, and the details have been worked out, by the artisan staff who are enthusiasts at their work.

The methods of distribution used with small single phase transformers close to consumers has resulted in the voltage at a rural consumer's premises being at least

as excellent as the voltage at the premises of his counterpart in town. This point is gradually being appreciated by the supplier of electrical apparatus who is realising that it is not necessary for him to supply apparatus of a lower voltage rating to allow for a non-existent voltage drop.

The assumption made at the commencement that development of the land and the construction of houses would follow the mains has been amply justified. It is only necessary to mention the Derdepoort-Kameeldrift Scheme which was designed for 90 consumers and today supplies 240 or a small area of Haakdoornboom where some three miles of line was built to supply a problematical 4 consumers and now has 31 consumers connected including a high-voltage supply to a granite quarry.

The conclusion has also been reached that the job of supplying electricity to individual consumers is one for the local authority whose staff know the country, the people and the requirements. It is definitely a task which cannot be handled by a remote central organisation to which all problems must be referred for decision. The system adopted by Pretoria under which a lump sum is voted for a scheme, and the engineer is left to decide the details within that expenditure, has proved to be most productive of results and entirely satisfactory. No time is wasted in unnecessary discussion, correspondence or planning but all effort is creative. It has been essential to give the engineer responsible for a scheme wide powers to make decisions and agreements about details with consumers and the time saved has more than justified the few small errors made.

It is impossible to prove or disprove whether the rural distribution of electricity is financially profitable. The indications are that at present tariffs, all schemes operate at a loss since a proportion of power station and urban distribution costs should be debited against all rural schemes. However, these proportions are open to endless discussion and argument and finality can never be reached. It is clear though that the supply of electricity to rural areas is a

social improvement of advantage both to the health and economy of the nation. As such the extension of the rural electricity mains is the responsibility of the central government and local authorities should not be required to finance such extensions on the security of the rateable property of their towns. The growth of rural distribution would be greatly increased if capital funds at low rates of interest were to be made available to approved local authorities for this purpose by the central government.

The laws controlling electricity undertakings require revision to protect and not hinder the distribution of electricity as distinct from the transmission of electricity. Electricity distribution is the Cinderella of the essential services, harried by a bureaucratic central organisation of the Post Office, permitted to erect mains along road reserves by courtesy of the various Roads Departments, opposed by the owners of land and yet expected to produce a continuity of service unexcelled by any other achievement of mankind. Why should it be wrong for a distribution engineer to construct a power line nearer to a telephone line than a distance determined by a telephone engineer and yet be right for the telephone engineer to construct his telephone line exactly beneath a power line? When will portions of the road reserves be set aside for the use of essential services such as electricity, water and telephones? The electricity undertakings should not be required to beg for permission to construct their works but should be in legal possession of all the rights and powers required if the expansion of electricity distribution in South Africa is to progress faster than the snail's pace evident today.

The views stated in this paper are those of the author and do not necessarily represent in every instance the official views of the Electricity Department.

Thanks are expressed to the City Electrical Engineer of Pretoria, for permission to present this paper and to the members of the staff of the Electricity Department for their willing assistance in its preparation.



Fig. II



Fig. V

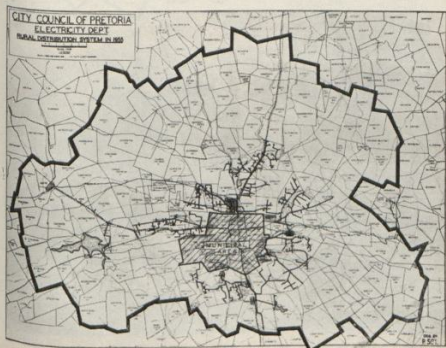


Fig. IV

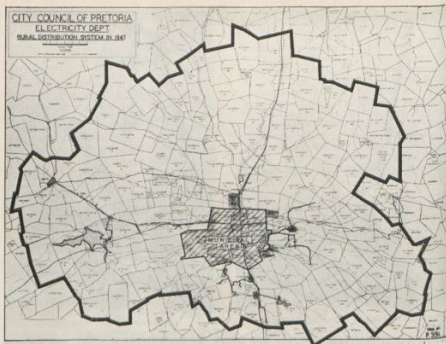


Fig. I

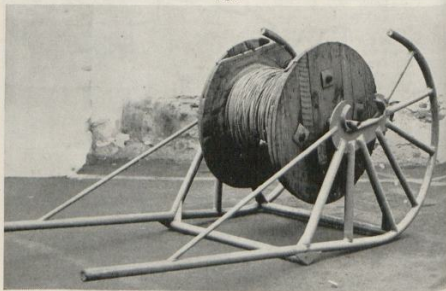


Fig. III



Fig. VI



Fig. VII

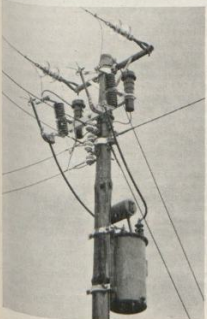


Fig. VIII

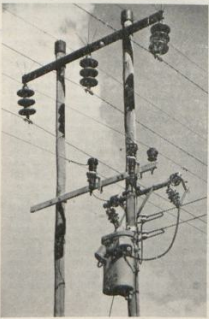


Fig. IX

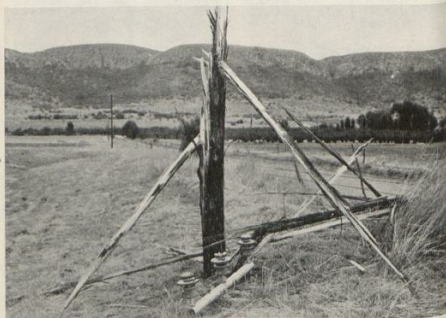


Fig. X

Mr. President, Lady and Gentlemen, the paper I wrote has been reproduced and it has been circulated to all the delegates who are here to-day and accordingly I do not propose to read the paper word by word, because you have all done that and it would merely be wasting time. I propose to talk roughly on the lines of the paper and to tell you in my own words what we have done, and of some of the problems we have met in this job of rural distribution in Pretoria.

I shall admit right now that things have not gone smoothly at times; everything has not always been right; we have made mistakes. Most papers that are read claim everything to be absolutely perfect. We have made a lot of mistakes, but we have learnt from those mistakes and we do not repeat the mistakes. Anybody can make a mistake once, but he must not make it a second time.

In 1947 the Council was granted the licence to supply electricity over an area of 1,500 square miles.

Now, when you say 1,500 square miles, I do not suppose it means very much unless you start to work it out in a circle. But our area of supply extends from the other side of Brits to beyond Premier Mine and that gives you an idea of the size — that is nearly 50 miles across; from North to South, it is something like 35 miles. It is a very big area, particularly when you find you have to cover it under fault conditions.

Having obtained that licence, the Council naturally had to do something about it and that is where the Rural Distribution Section was created. Up to that date rural distribution was merely an adjunct of the town distribution. There was nothing special about it, it was the absolute Cinderella of our work. If we

had spare men or spare material, we might use them in the country. But from 1947 onwards it became a separate section, with the separate object of supplying electricity in rural areas.

The section, when we started, was on a very modest scale; I think I had a desk and myself and a lot of unanswered correspondence! The existing rural distribution system was working after a fashion. It had suffered during the war years through very little maintenance; it was in comparatively bad condition because we had not been able to give any attention to it and the first year was a very black time. We were out in the country all the time, in all sorts of weather, crawling through barbed wire fences, falling into holes and generally learning the hard way, but thoroughly enjoying ourselves.

To-day we have got a lot further than that. We are supplying electricity in seventeen townships outside the Municipal area and of those seventeen townships, four or five of them are Municipalities in their own right. We have also reached the stage with the true rural distribution where we can supply any consumer over an area of about 350 square miles. That represents not a tremendous proportion of our total supply area, but it is a very large proportion of the inhabited or thickly inhabited portion of our supply area. I should say we are about halfway through the fairly well inhabited areas of our supply area.

Now, we spent the first few months in thought — thinking what to do and how to set about the job. One of the first conclusions to which I came was that the first duty of an electricity undertaking was to supply electricity to every consumer in its supply area. There is a very great tendency to say: "We shall supply only those who can afford to pay, only those who can afford to use a lot of electricity"; in other words, to pick the eyes out of an area. If you pick the eyes out of an area, you will never supply the smaller consumers; they are always neglected and they never receive a supply. And I decided right at the beginning that our duty was to supply every consumer, it did not matter how big or how small. That has been the basic principle on which

we have worked right from the start.

It means to-day that we have consumers connected to our mains where the whole house is no bigger than the average garage. But a consumer even with a house so small is worth £30 guaranteed revenue per year to us and it is worth it, because all the little ones add up. Anybody can supply electricity to a few big concerns; we supply Iscor, it is a very easy job to supply electricity to Iscor, because they distribute it themselves and we supply a tremendous lot. But it is a different proposition to supply one kilowatt each to about 20,000 consumers; it is a different idea, it is a different scheme and there is a lot more work in it.

Now, our policy of connecting 100% of the consumers in any area, has actually been very successful. One can ride through the areas of supply to-day and find that we are somewhere near 98% saturation. It is very rare to find a house that has not got a supply of electricity.

The methods we have used to obtain the density of connection that we have obtained really consisted of reducing our guarantees or our requirements of what the consumer was required to guarantee. Up to 1947 we used to require a consumer to give a guarantee that he would produce revenue equal to 20% of the capital expenditure. In a supply area that is averaged out, because some consumers cost practically nothing to connect and some cost a lot.

But the 20% guarantee, which was quite practicable before 1939, became impossible after the war. — The prices of labour had gone up, the prices of material had gone up — and the 20% guarantee meant that we were asking consumers to guarantee somewhere in the region of £60 to £100 of revenue per annum. Now, that is all right for the rich people, the "eyes" of the job, but it is not all right for the average man in the street, the average farmer, the average small-holder; he cannot afford to pay it. If you ask for a guarantee of that size, he merely says: "I don't want your electricity". And he'll sit longer than you can sit and you'll never build your scheme. If you start by asking too big a guarantee, your negotiations with consumers become

protracted and you get what this country suffers from in electricity supply — talk and more talk and still more talk and nobody gets anything done, there is nothing created.

So, we decided that we would have to take a risk there. We had noticed in Lyttelton Smallholdings, which lies to the South of Pretoria, that we originally built the scheme for about seventeen consumers. By 1947 we had something like sixty consumers. Now, that was over a period of twelve years. We also noticed it in Willows. So we put our arguments to Council and persuaded the Council to agree to a guarantee of revenue of 10% per annum of the capital expenditure, on the principle that if we started like that, we accepted a loss at the beginning. But you will connect 100% of your consumers; you will also encourage other people to live in that area and as it does not cost so much to connect future consumers the turnover will gradually rise from the original 10%.

One thing we had to decide, if we were going to build mains on a large scale and expand rapidly, were our actual methods of construction. One of the first things we did was to buy a pole-planting machine; it has been operating now for nearly seven years and it still digs a hole as fast as it did in 1948/49, when we got it. And that is what has speeded the work up tremendously. We now have two machines and we are hoping to get a third, solely for planting poles.

We went into the question of pulling up the actual wires, the tensioning of the wires. Normally it is done by brute manpower; it makes the work at the pole top tough work, hard work, which requires a young man and a fit man. We bought tackle of all kinds, we didn't stint money, and to-day the men no longer know what hard work is.

We have also gone into the question of handling of reels of wire, the handling of poles, the placing of poles along the routes of the lines with special trailers; all these things have helped to speed up construction and the faster we can construct the lines, the lower the cost. Now, to try to give you an idea of how fast we have been constructing in certain

cases — possibly most of you have seen our concrete pole lines. Those concrete poles weigh about 1,100 lbs. each and a gang of four men and a charginer and about eight or ten boys, constructed two miles of that type of line in ten working days — finished, complete. Admittedly, the conditions were perfect — along a road, with no trees — but that is fairly rapid going, for four men and a charginer.

We also had to consider the question of how we were going to engineer these schemes. The classical method of expanding an electricity system is that you survey the country and you prepare plans. Having prepared plans, you draw the scheme in great detail and you place every pole on the plan, you place every stay, you prepare material lists, you see all the consumers, you talk to all the consumers, you argue with every consumer, you write letters to all the consumers and generally, by the time you get to the stage when you are ready to start constructing, you are fed up with the whole business. We decided we had to improve that.

If we are planning a scheme in an area, one engineer is allocated to that job, it is his job to get to know the area, the cut-up of the land, the owners of the land, where all the pumps are, the houses; we don't go to the people if we can keep away from them, because they like to talk and to drink coffee. He sets out his lines, he fixes his transformer positions. There is very little check on him, we check the general scheme and give him full authority to do pretty well what he likes. When his plans are complete, they are passed to the construction side to proceed with.

Now, the dealing with the consumer is a very important point. At one stage or another the engineer has to meet every consumer, and when he meets him, he must be able to say: "We are going to supply electricity in this area, it will cost you about so much per month, you will be subject to a minimum charge and your tariff will be so and so". And there must be no maybes or ifs about it. If there is a maybe or an if, you start correspondence or you have to go back to tell him what the actual figures are. That

is a very important point. We pay practically only one visit to a consumer and we do not see him again, we don't want to see him.

We had to redesign all our lines. All the old designs, were not satisfactory for rapid construction, they were not economic and there had been no progress.

We also had to consider very carefully the question of nets. A protective net between a high tension and a low tension is one of the main sources of trouble. Trees are usually considered to be the main source of the trouble — I do not think so. The tree itself may be the fundamental cause, but it is not the actual cause of a fault. The net is affected by a branch and it is either pushed down against the low tension below or it is pushed up against the high tension. And I do not know what is contrary about protective nets, but they always freeze on to the conductors that they touch — and you have to find that at night!

We also found that a fault in the consumer's premises led to the stringer wires of the net carrying the fault current and a steel wire carrying a heavy current, gets hot and with the expansion, the net sags.

So, we decided that the only thing with nets, was to eliminate them if we possibly could. The first step towards eliminating them, was to take out the spreader wires. The normal practice is to put a spreader wire about every 18 in.; we work on three spreaders per span — previously there were about thirty. That reduced to one-tenth the troubles produced by spreaders.

When the Post Office engineers look at our nets, they say: "Do you call that thing a net?" Yes, we call it a net, it does the job. We also, in certain cases or in the new construction, eliminate nets altogether by the use of insulated wire for the low tension. Just after the war P.V.C. insulated wire came on to the market and we have used P.V.C. insulated wire for insulating the low tension. We have never had a moment's trouble with it.

We had to consider servitudes. I paid a visit to the old Victoria Falls Transvaal Power Company Survey Department, to see the way they were doing it and it was very fortunate that I went over,

because I escaped a pitfall which I think they fell into and I think the Commission are in to-day. If you pay a rental for a servitude, you have to make a payment every year. All those payments for servitudes fall due on different days. That means you have to establish a staff to pay the servitudes. When a piece of land across which you have a servitude, is cut up, say, into six portions; the servitude payment has to be divided amongst the six new owners. And what frightened me that day in Johannesburg was when a bundle of papers was knocked off the top of a filing cabinet — it consisted entirely of cheques for 5/., for 3/6 which were servitude payments. So I made up my mind then that we would not pay for servitudes if we could avoid it and we do not pay any rentals. We have the authority from the Council to pay, but we just tell the consumer that we won't pay rentals.

At the beginning, too, we had to recruit staff. It was just at the time when Engineers were not too easy to get and it is not much easier to-day. But to-day we seem to have better luck than we did then. The first Engineer we got was Mr. J. L. van der Walt, who is now at Krugersdorp. I think he had a look at our rural areas and then got himself a job in Krugersdorp! At any rate, it was a year before we got another man and since then we have never looked back.

We had one foreman to start with and I borrowed a few electricians, but since then we have never been short of electricians. We get complaints from all round the country that they cannot get artisans, but we have never been short. I do not know what it is — whether they like the work. It is very healthy in the country and they all look very fit. It may be the way we treat them, because even an electrician, even a lorry-driver, even a Native labourer is a human being and he has to be treated correctly. We work on certain principles — that the workman is a human being and that he has to be talked to like a human being; there is no shouting at a man. He also works better if he knows who is giving him his instructions. Every man has one superior only to whom he is responsible.

That has worked very well. I think that the men are satisfied, they are happy with that, but it has certainly paid dividends with us, because the turnover of men is not great. I have had electricians with me now for seven years, who are still quite happy to stay doing the same job.

In the early days we also had trouble with lightning; it was one of our biggest headaches. When I took over, the existing rural distribution at that stage suffered very badly from lightning. Lightning arrestors had been placed in accordance with the usual practice, on the corners of the lines, where the line turned, or on the ends of the line. With the newer system we first followed the same procedure. We would have a lightning storm — it would be perfectly clear in Pretoria some miles away in the country and we would spend eight hours replacing transformer fuses. So we had to do something about that. We decided that the only way was to apply our lightning arrestors actually on the transformers. To-day we have all our transformers, all our cable ends, connected to overhead lines, fitted with lightning arrestors. And lightning has practically ceased to be a problem.

A big storm can pass over a country area and we may get two, perhaps up to six fuses blown — and there are hundreds and hundreds of 3-amp fuses in operation. A 3-amp fuse is smaller than you would use in your own house and it is a very delicate fuse to use in country areas.

It seems that to-day the main cause of the blowing of a fuse of that rating is the capacity surge into the windings of the transformer. But the damage to transformers has practically disappeared.

Cable faults — well, our cable is safer in the country than it is in town, I think. But, generally, we consider that we are no longer frightened of lightning. We do not say that we have mastered it completely — I do not think anybody ever will — but we are no longer frightened of it and we feel that we can control what it does to us.

We feel to-day that we have solved the majority of our big problems. We have an organisation which is organised down

into groups, into working gangs; every man knows what he has to do and knows our methods of construction. Our foremen and our superintendents know the methods of working; the engineers know how to set about a job and the only thing that holds us back, is the allocation of money.

In 1947, we turned over, for our new rural work, to a single-phase system of supply. Now, that decision was a very important one. It has created a tremendous lot of interest, I have had lots of enquiries from all over South Africa about it, I believe it has been copied by other people, but in my mind I have no doubts that it was the correct decision to make. We reached the decision after studying the complications we were getting with the 3-phase systems, particularly in the Willows area, to the East, and in the Lyttelton Smallholdings area, to the South — with nets and a complicated construction. A 3-phase line, that has high tension at the top of the pole, then a net and then 3-phase four-wire low tension underneath, has a minimum of nine wires. It is possible also to have a tenth wire, an earth wire.

With the single-phase system that we are using (we are using the phase to phase system) — we only have the two high-tension wires, no net and perhaps two-low tension wires (not in every case do we have two-low tension wires). An 11,000-volt line of that nature is practically proof against any contact between conductors. It will trip on earth leakage protection if a tree branch touches the line, but that is about all.

The use of the single-phase system, has enabled us to use small transformers placed near the consumers and it is not very often that we are required to run the low-tension conductors below the high tension. Normally the low tension leads off at right angles to the high-tension line, straight to the consumer's premises or up a farm boundary. And that, in itself, that slight simplification of construction and a simplification of method, reduced our line faults until to-day we can say quite definitely that we experience more faults with underground cable inside Pretoria, in the Municipal area, than we

do on overhead lines in the country. The length of overhead line and the length of cable is comparable.

There is also another great difficulty with 3-phase supplies. If a fuse blows or a line breaks anywhere along the system, you almost invariably receive a demand from the consumer, plus an account attached, for rewinding his motor. It is quite a serious problem, I think other people experience it too; the burning out of 3-phase motors can become a very serious thing and it is always the supply authority who is blamed. We have a clause in our by-laws saying that we are not responsible for interruptions or partial interruptions in supply, but that does not stop the consumer; he will always claim. And every letter from the consumer requires an answer. It consumes the time of your engineers, it consumes the time of your typists.

I do not know if anybody has ever considered how much it costs to write a letter, but I think it costs quite a lot of money. And if you can stop the consumer from writing a letter — the consumer who has got a complaint or the new consumer — you can use your time more usefully; it is an economy in itself.

With the single-phase system the burning out of motors practically ceases. When I wrote the paper, I was congratulating myself that I could not remember ever having received a complaint about a burnt-out single-phase motor. I got it on Monday, the first one! But it was not entirely our fault. The particular consumer runs a dairy farm and, like all people in this world, he took the lowest tender for wiring his premises and the lowest tender, of course, included for the smallest copper and most of the voltage drop was on his own installation. But it was a disappointment to spoil our record.

There is also the question of cost. To construct single-phase lines, with a reduced number of conductors, with reduced work at the pole-top, definitely must reduce the costs. We cannot get a comparison to-day because we have not built 3-phase lines in competition with single-phase lines, so we cannot say what the actual saving is, but we estimated it at between 30% and 35%. I cannot give

you definite figures for that, because, as I say, we have not got the present-day cost of 3-phase lines which are comparable.

There is another very big saving, too, in favour of the single-phase system and that is the utilisation of material. All the materials we use — the copper, the steel — have to be dug out of the ground, they have to be mined, they have to be treated, the metal has to be produced, it has to be worked as a metal, which is all human labour. There is only a certain amount of material available in this world and it is part of our job, as engineers, to use that material to its very best advantage.

I have been criticised for using the single-phase system on the grounds that 3-phase supply is required for motors and that 3-phase supply is required for stoves. I'll admit one thing only and that is that a 3-phase supply is preferable for a motor. It produces a very simple and elementary motor, because of the automatic rotating field with a 3-phase supply, but the motors do not represent the majority of the load. The major load on any system goes into heating, heating of one kind or another. It may be an incubator, it may be a brooder, it may be an electric stove, it may be a water heater, it may be a domestic radiator, it may be lighting — those are all heating applications — and every one of those applications is a single-phase application.

PRESIDENT:

Gentlemen, if Mr. Dunstan will excuse us, I have had a signal that the tea is ready, so we shall adjourn now.

10.45 A. M.: ADJOURN FOR TEA.
Proceedings resumed at 11.15 a.m.

PRESIDENT:

Take your seats, please, Gentlemen. There is just one short announcement before Mr. Dunstan resumes. The proof of the photograph is now available. The lady representative from the photographer will be here this afternoon at 3.30 to take orders. Will you proceed, please, Mr. Dunstan.

MR. DUNSTAN:

Mr. President, Lady and Gentlemen, we were discussing the use of single-phase.

Actually, in Pretoria, we are using the phase to phase single-phase system. We have found that it reduced our costs, improved our reliability, we get less faults and we are generally perfectly happy to use it. There were complaints from the consumers at the beginning that they could not get single-phase motors; that has all been settled.

The system we are using is not the ultimate in economy. There is also the single-phase system which is used in America — that is the phase neutral system. Under that the neutral wire is a common wire for the high tension and the low tension — that is a further economy that can be effected. There is also a system which is in use in Australia — that is the phase and earth return — and that, I think, represents the actual ultimate in economical construction. It consists of a line of poles with an insulator on the top and a single wire. Now, I do not think we can ever get further than that, but I hope that some day some engineer in South Africa will have the courage to try one of those systems. I would like to see the Australian system — the phase-earth.

In the paper itself I omitted giving any costs. Now, that was done purposely.

Our method of working is that we issue an order to construct a whole scheme. In that scheme will be the construction of 11 kV main lines, single-phase spur lines, perhaps possibly 3-phase spur lines, the installation of transformers — it all goes under the same job number, the cost is all lumped together — and it is very hard to extract the cost of one particular line, say the main line or a particular spur line. We have done it on occasions, but we are not prepared to guarantee the accuracy.

But with regard to the cost of a whole scheme, that, again, can be given at a stage when we complete the original scheme, but after a couple of years, we can no longer get the total expenditure in a particular area. After a few years there have been so many extensions and additional jobs done on it, that it is a very major piece of work to extract all the costs and add them up.

Now, for those of you who are inter-

ested: In 1948 we built a section of single-phase line, with steel conductors and ran it as a test job to find the cost. The actual cost was £248 a mile. We have had a lot of arguments ever since 1948 as to whether that was a true cost; I say it was, because we had to cut hundreds of trees along the road reserve to make way for the line. But others say that it is not fair because the men knew it was a test job. Personally, I think it is a bit high.

Then, those of you coming from the North have probably noticed the main line leading into Bon Accord (it is 6.15 miles long). We took the cost of that separately and that cost us £5,980 for 6.15 miles, i.e. £975 per mile and that was in the year 1952/53. That is a very fair cost for a main line.

When we estimate, we estimate high and the estimated costs (representative) that we would use to-day are:—

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With regard to the financing of rural schemes, this is a very sore point and it involves not only us engineers; it involves Councillors and it involves Town Treasurers, and I hope that all the Town Treasurers in South Africa will at some time see what I have written. It seems to be a normal procedure for practically all Treasurers to say, as soon as it is proposed that a line be built to a new consumer: "Well, make him pay for it".

That, to my mind, is entirely the wrong approach to the problem. When you buy a bag of coal, you order it from the supplier of coal and he delivers it to your house, he carries it in and he tips it in your yard. He does not ask you to buy the lorry! The price you pay for that bag of coal includes your share of the transport costs. Now, when a man wants to buy electricity, he does not want to buy a power line which is the means of delivering the electricity. The tariff he pays for electricity, includes a proportion

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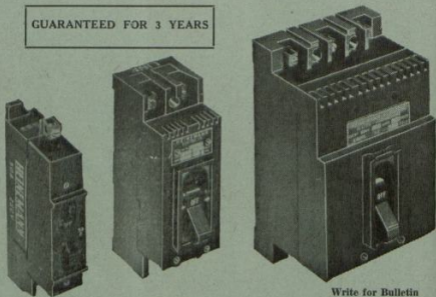
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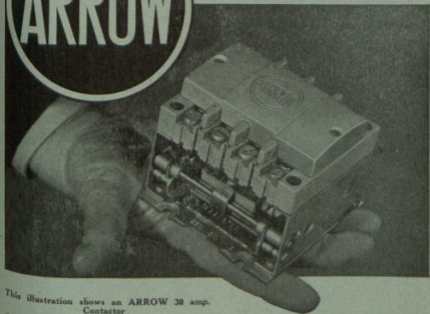
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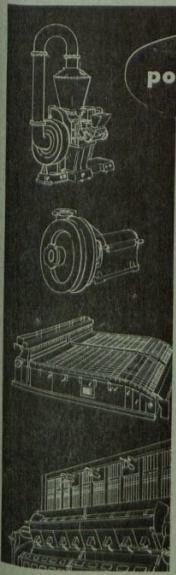
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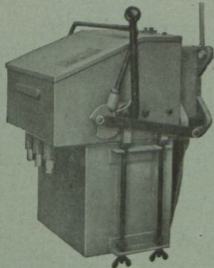
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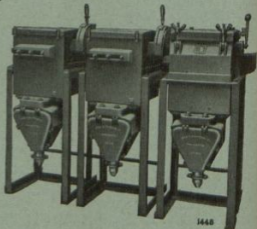
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of the capital charges on the capital that was spent to supply him. Why ask a particular consumer to pay twice?

The job of all of us is to sell electricity. It is not to sell a power line. And, therefore, it does not really matter where the capital comes from, so long as you don't demand it from that consumer. It introduces all sorts of other problems, too. If you ask the consumer to pay for the line, he owns it. I know some people say: "We tell him to pay for it, but we tell him that we own it". Is that honest?

But there is a very, very serious drawback in asking the consumer either to pay the whole capital cost or to contribute towards it. When you take a supply of electricity to any consumer, in the country or in town, he is going to have to incur certain expenditure to be able to use that electricity — he has to wire his house, he may have to buy motors, equipment, stoves. To wire a house costs him £100, minimum. He may have to run overhead lines on his farm. He has to buy motors; if he buys a refrigerator, it costs him up to £120; if he buys a stove, it will cost him £75 to £100; if he buys a water-heater, it will cost him £75. In other words, he has to possess a certain amount of capital.

Now, if you do the foolish thing of telling that consumer: "We want £100 or £500 capital contribution from you", you have taken his capital away. How is he going to use your electricity? In other words, you cut your own throat.

The only sound way is to follow normal financial practice and that is, the authority or the City Council (the undertaking) must provide the capital, must build the line to deliver its product and recover its capital charges and redeem its loans through the price it charges for electricity. That, to me, is just common sense. But City Treasurers always say: "Well, the money is coming from the place where they ordinarily get it — they raise another loan for it!

Other people say: "Right, let the consumer provide the capital and we shall pay him back over a period of time as he uses electricity". Now, that is another complication.

If capital is obtained from the consumer, on the principle that you will pay him back over a period of time, you start a complete bookkeeping and accounting section in your Treasurer's Department, just to deal with such repayments — that is a complication all for nothing, a special complication and you gain nothing by it, you make no profit or anything else.

There is another method (we tried this one in Pretoria): We made the man pay a quarterly capital charge. Well, that is fair enough, but the quarterly capital charge must not be adjustable. Another variation of that is to make the man provide the capital and you refund capital to him if anybody is connected to that line. All right, you run a line from A to B. The consumer at B provides the capital. C comes along and wants a supply from that line and you connect him. B then wants some of his money back. All right, you can make the calculation then and you can give him a proportion of his money back. D comes along and wants a supply, so B and C say they want some money back. Now where do you get to? One more consumer and it becomes beyond calculation, you cannot calculate it, until you know the cost of every inch of wire and every shackle insulator on your system and you don't know that. It is foolish to introduce these complications. Let the undertaking find the money and collect their charges through the tariff.

There is also a very big point that I would like to make here and that is the question of contributions by the Central Government to the financing of rural distribution. With every election we have, all the parties aspiring to become the Government of the country, promise one thing to the farmer — you have all noticed it — rural electrification. I have never yet met a man, a politician or anyone else, who knows how it is going to be done, they don't know, they haven't the remotest idea.

Some years ago an amendment of the Electricity Act was brought in and I do not think that it is worth the paper on which it is written. The only practical way in which the Government can help (and they require or they want the rural

areas electrified) is in good, solid financial assistance and the best way they can do that, is to advance the capital to approved authorities and by approved authorities I would include every Municipality which is prepared to do something — to finance rural extensions. If they advance money on that basis, interest should be at the rate of 1% or less.

The ratepayer of Pretoria or of any other town would be perfectly justified in objecting to his Councillors raising a loan on the security of his property to finance extensions into rural areas, by which other people will benefit. That is the position as we face it to-day—the property in Pretoria is being used as security for loans to finance extensions outside. Actually, to my mind, it is good business in the long run, but nevertheless the ratepayer would have the right to object.

In conclusion, in my paper I have dealt with certain dealings we have to have with people like the Post Office, Provincial Roads and National Roads. These bodies do not seem to realise that electricity is a service; it is an essential service to the community. When you are dealing with large blocks of power, like the Commission, lines can go right across country. When you are dealing with reticulation or rural distribution, which is reticulation at high voltage over a widespread area, you must follow the roads, you have got to keep on the roads, because the houses will be close to the roads. The roads are the means of access and they should be the means of access for the essential services. And the essential services are telephones, water and electricity. Although I give electricity last, I still think that it is the most important.

We actually have, or seem to have very few rights to use the roads. We have to go to National Roads, we have to go to Provincial Roads and ask very nicely: "Please may we put a line on your road?" In Pretoria we have had wonderful co-operation from the men engaged therein, the actual engineers with whom we have to deal, but the policy of the Department is, "It is our road, it is our reserve; you go somewhere else". Now, I think it is time that legislation was made very

clear on that point and should grant rights to electricity undertakings to use the road reserve. The Electricity Act does include a clause (Clause 48 of the Electricity Act), which gives the authorised undertaker the right to plant poles, to break up streets, etc., and he has to give certain notices to the controlling authority. At the end of that paragraph a street is defined as "a street in any township or a road controlled by any body".

I am only an engineer. To me that seems to give me the right to go to the National Roads Board and give them the requisite 30 days' notice that we are going to build a line on their road. But no lawyer will ever make a decision on it, they will not commit themselves. And there is too much at stake to risk it. If we were to give notice to the National Roads Board that we intended to put a line on a road and they fought it and we lost, we would never get another line on a road. And it would affect you people, too. I think it is a thing which should be taken up at a higher level than one undertaking; there should be some decision on that point, because it is not right that electrical engineers should have to go along like paupers begging for rights.

Of course, we also have a certain amount of trouble with the central organisation of the Post Office, again not with the Engineers. They want to push us away and away; you know, "We're telephones; you go over there somewhere". But the interesting part is that after having tried to push us away, they are still prepared to build their telephone lines right under ours and we have had cases where they have planted poles right beneath our lines and where their wires actually touch our wood poles. They will not allow us to come within so many feet, but they do that. I know there is a question of inductive interference and so on (the telephones must look after their telephone services), but I feel that a lot more latitude can be given officially by the Post Office. In America the same poles are used for electricity supply and for telephones. If they can get over the problem, so can our Post Office. Incidentally, we have never had a

case in our rural areas where we have caused telephone interference — and in some cases we are 15 ft. from the telephone poles.

In closing my remarks, I would just like to sum the whole thing up by saying that I think the motto for rural distribution is "Simplify"; simplify everything you do, simplify your line construction, simplify your methods of construction, simplify your guarantees, simplify your tariffs, simplify everything you do, and when you feel that you have simplified everything, then start again and simplify yet more. It is only simplification that produces reliability, that reduces your faults and enables you to expand your system without too much, what shall I say, hard labour. Thank you. (Applause).

PRESIDENT: Thank you, Mr. Dunstan. May I call on Mr. Kane to propose a vote of thanks.

Mr. R. W. KANE (Johannesburg): Mr. President, Mr. Dunstan, Ladies and Gentlemen, I feel particularly honoured on being asked to propose a vote of thanks to Mr. Dunstan for his very interesting and informative contribution to the proceedings of this Convention.

Mr. Dunstan graduated with distinction at the Witwatersrand University in Mechanical and Electrical Engineering and followed this with a pupil engineer's apprenticeship at a large and well-known firm in Britain. At the end of his pupilage, he was retained as a junior engineer by the firm until he returned to South Africa. In 1933 he joined the Pretoria Municipality as a Junior Engineer. I do not possess details of his subsequent career, except that in 1947, when the rural scheme was developed, he was Rural Distribution Engineer, but it is obvious that he has maintained his high record of achievement and, as Distribution Engineer, is now in charge of all sections of the Electricity Department, excepting generation.

I think I should interject at this stage — this is a prepared contribution on Mr. Dunstan's paper — he has given us a precis of his paper (at least, I think he started out to do that), but he really gave us a very interesting talk on his problems, his reasons, more detailed, than

he gave in the paper and, in effect, his precis, I think, has been an excellent contribution and I hope that it will also be recorded in the proceedings of the Convention. This summary of the problems and the approach to the solutions will be of very great interest to our Councillor members, who hear us talking from time to time about various problems and I hope that he has made some of this a little bit clearer to them.

His comments on single-phase versus 3-phase, particularly in domestic or similar cases, I fully support. I think that is the general trend now throughout the country, to go as far with single-phase as possible, particularly at the end-use.

I am interested in this super Australian distribution, single wire distribution. I should imagine that on certain farms, where you have a pumping system from a borehole to the dam, we shall be able to install or take tapings off that pipe-line to get our 32-volt radio to work, the odd shaving apparatus or anything we want along that line. I shall go on with my main contribution.

When areas of supplies are considered, it is obvious that Johannesburg is very small fry when compared with certain other towns and particularly Pretoria. Please forgive me if I make comparisons between Pretoria, Johannesburg and other large cities, because I firmly believe that each and every one of us has adequate reason to be proud of our individual achievements, all based on our predecessor's adoption of policies that have been considered the ideal compromise for various conditions.

Our President in this case, whom I cannot refer to as a predecessor, as he has held his post since about 1938, has been the individual who has accepted a change of policy, no doubt recommended and accepted after many discussions with his staff and the Council of Pretoria can be sincerely congratulated on the outcome of their decisions.

The change in policy to which I refer is, of course, the simple statement that the Department can exist on a system of ten years' payability, whilst other towns are more conservative and prefer four or five years. In effect, Pretoria is prepared

to face a small loss in the initial stages to reap the benefit in later years.

Mr. Dunstan, in his precis, of course, preferred to rather comfortable estimating (I think he said "high" estimating), which I rather gathered cut this period of ten years down a little bit.

In addition, the City of Pretoria has every reason to be proud of its Electricity Department in their bold approach to the acceptance of an area of supply of approximately 1,500 square miles — more than ten times that of Johannesburg and more than double that of some coastal towns. Entering into this phase just after a war period, with its associated difficulties of material supplies, building control problems, labour shortage and, last but not least, the very troublesome problem of hopeful and persistent applications for supply which inevitably arise with the change, it augurs well for a Municipality with a mere one hundred years' background.

Pretoria has had the courage to adopt a system of reticulation not normally expected from a large city, where others tend to ensure a system as near perfect as possible despite initial cost, for the very laudable reason of supply continuity and the minimum of maintenance troubles. Their courage appears to have been justified when one considers that Pretoria — installed capacity approximately 180 MW — has very few competitors in the Union who can claim the admirable record of being able to meet all demands during the post-war decade. The details of Pretoria's rural reticulation make very interesting reading and, in particular, the use of steel conductors, surge diverters, transformer spacings and single-phase supplies is of considerable interest.

He has enlarged, too, on his desire to get rid of nets, or his very simple nets, and I think that is very interesting, too. He also referred to his pole-planting machine. I saw one of them this morning; he refers to two and a possible third one — I was not able to determine when I saw the machine this morning whether he has pole-planting equipment, separately driven and mounted on a standard truck or whether it is a truck, where the one engine does both jobs, that is, takes

the pole-planting equipment to the site of the work and then operates the pole-planting equipment. Perhaps he will tell us about that later on.

I am sure that there will be a lot of discussion and interest in the facts that Mr. Dunstan has put before us and I hope other contributors will forgive me if I take the unfair opportunity of asking a few questions on Mr. Dunstan's paper and querying a few points by virtue of my opportunity of being, as it were, first in the field.

I am anxious to know to what extent other Municipal activities are included in the 1,500 square miles, or are these limited to the electricity activities? I note that the City Engineer prepared a complete and excellent map of Pretoria — was this prepared solely for the Electricity Department or for other reasons?

In the short time available, I have not been able to determine how Pretoria's consumption per consumer is established, but it is remarkably high compared to other cities in the Union. I have a table here, which I hope will be printed in the proceedings; I took a few of the major towns and I trust that the figures that they gave and the Department of Census are correct, because I know that my calculations are correct:—

TOWN	Units	Units
	per Consumer per Annum	per Head of Population
Cape Town, 1952 ...	7,154	1,238
Durban, 1952	8,061	1,088
Bloemfontein, 1953	6,547	712
Port Elizabeth, 1952	9,001	956
Johannesburg, 1953	10,581	1,030
Pretoria, 1953	11,224	1,879

It will be noted that Pretoria is highest, taking either units per consumer or units per head of population. Could it be that the figures include supplies to Escom, Iscor and the Railways and, last but not least, are all our various Government buildings in Pretoria perhaps a little bit generous in their consumption of electricity as they exist on taxpayers' money? They are remarkably high figures for an

area of 1,500 square miles, which obviously is not saturated yet. Does it only apply to Pretoria Municipal area, as distinct from the area of supply?

If my figures and surmise are correct, can Mr. Dunstan provide an explanation? Perhaps the method of minimum guarantees encourages consumers to attempt to get their money's worth?

I can well appreciate the problems associated with single-phase supplies to rural areas and the availability of motors to suit such requirements. Mr. Dunstan does say that by negotiation suppliers ultimately agreed to co-operate — perhaps he can elaborate on the time taken to effect this co-operation and perhaps the methods used. He referred to honesty a little earlier on and I am just wondering, did he arrange with the Urban Distribution Engineer that there would be restricted supplies or none at all unless co-operation existed? In any case, does he get comparisons from rural consumers regarding the relative costs of single-phase equipment versus 3-phase?

I fully appreciate the tactics in adopting a special tariff for rural areas that does not blatantly advertise a 25 per cent. surcharge. However, are there any difficulties in applying the 3/- per month per B.H.P. or 250 square feet floor area rule when these might easily be augmented without knowledge of the Department?

What happens to the minimum 10 per cent. monthly charge in change of ownership? Any difficulties there?

In preparing simplified copies of working plans for submission to the Province and the Postmaster-General, has he encountered a body known as the Peri-Urban Areas Health Board or doesn't this apply to his 1,500 square miles? In some cases, he said, there were no plans at all and it seems to me that in certain parts of his 1,500 square miles, he gets away with murder; in other parts he has to toe the line!

May I also ask why copper or copper-coated wires are used at rail crossings for conductors and nets?

Under construction, reference is made to site and labour organisation. What provisions are made, if any, for what may be termed country allowances, or are the

daily working hours reduced by travelling from Pretoria in working time? When a scheme is completed, are arrangements made for maintenance personnel to be domiciled in the rural areas or are all complaints handled from the city? If the latter, are the consumers satisfied with somewhat (I assume) prolonged outages?

Regarding the dual use of porcelain and toughened glass insulators and the fact that both types suffer damage from stones, catapults, etc., is he in a position to indicate which type is preferable in view of the troubles experienced?

What are stoneware transformer tanks?

What is meant by the statement that wooden poles drilled at site for attachment of bobbin insulators have not suffered? Does it mean that some holes are not used initially?

Johannesburg has no experience in the use of overhead services employing P.V.C., but it is noted that P.V.C. is used for low tension mains in certain circumstances. How long has this been in vogue and if for a considerable period, has any information been obtained on the effects of sun, weather, etc., on P.V.C., even if this type of insulation has been to the Bureau of Standards?

I think that Mr. Dunstan referred to using it just after the war and I do not think that the Bureau of Standards had a specification in those days.

Regarding thefts of material on construction sites, it is considered that thefts are reduced to a minimum. What is a minimum? Does this mean a certain percentage loss is accepted or do such thefts occur at irregular intervals?

Under Fault Location, the reference to one shot reclosure rather implies that breakdown staff operate remote from any system of control. Is this the case? Perhaps Mr. Dunstan could elaborate on the type of control system employed.

Finally, it is deeply appreciated that a reference is made not only to the keen enthusiasm of various chargehands, but also to the fact that certain improvements have been suggested and developed by enthusiastic artisan staff.

No organisation can be complete without a variety of types from the labourer to the professional engineer, each definite-

ly dependent on each other and their individual characteristics and, although it is obvious that final details and decisions arise from the professional engineer, it is with interest that one notes the appreciation recorded to the chargemen and workers. Pretoria will go far whilst this spirit exists.

I trust my questions have not been too boring and, in conclusion, I desire to congratulate not only Pretoria on the achievements of their Department, but on the very interesting and outstanding paper and précis presented by Mr. Dunstan to which we have had the privilege of listening.

I have great pleasure in formally proposing a vote of thanks to Mr. Dunstan and may he and his staff continue from strength to strength. (Applause).

PRESIDENT: It looks as though I shall now have to ask someone to propose a vote of thanks to Mr. Kane for his paper! Mr. Simpson, will you please second the vote of thanks?

MR. R. M. O. SIMPSON (Durban):

Mr. President, Mr. Dunstan and Gentlemen, I hope I am not going to be expected to propose a vote of thanks to both, now that you have suggested it! But I am very, very pleased indeed to have the opportunity of seconding this vote of thanks to Mr. Dunstan for his extremely interesting paper.

He has dealt with an aspect of a Supply Undertaking, which physically covers a large area and is closely in contact with the people. It is also subject to the maximum interference, due to the demands of the public and also from natural causes and I trust that it will give rise to very interesting discussion.

Pretoria is undoubtedly to be complimented on adopting such a progressive policy in its rural areas, particularly bearing in mind the area of supply; they are double Durban's — we are about half the semicircle, they have the full circle (Durban's area is about 700 square miles).

Their policy adopted will undoubtedly involve a small return on the capital expenditure in the initial stages, but it does encourage consumers to connect to the mains which will increase this return quickly.

I propose to briefly mention several points in which I was particularly interested which are common to problems which we have experienced in the Durban area.

Planning: I can fully sympathise with Mr. Dunstan in his problem arising from the lack of efficient plans. We meet with exactly the same difficulties in the Durban area and it has caused considerable trouble. Latterly, we have obtained very good results from a policy of working in close collaboration with the Surveyor-General and with local surveyors as areas are opened up and conditions in this regard have considerably improved over the last few years.

In one particular case, when we had an extension to make to an area of which, to my knowledge, no suitable plan existed, it was found that the particular company had carried out an aerial survey of all their properties for irrigation purposes this information was made available to my Department and was found to be extremely useful. In this country aerial photography of difficult areas for over which overhead lines have to be built could, with advantage, be used more frequently.

With regard to planning, there is one other aspect which is in the form of a question here as well: Mr. Dunstan made reference to the fact that they supplied electricity in certain townships. I would like to know what policy is being adopted to provide for the transition of the area from rural to suburban. We may be experiencing this to a greater extent in Durban than Pretoria due to the areas being developed being confined to three main strips, North Coast, South Coast and inland following Main Road and Railway. The two remaining sections of land on either side being mainly Native reserve territories. Due to this concentration development is probably more rapid once roads and services have been extended into an area, so what starts off as being rural in outlook in the course of a few years becomes suburban.

Just from the point of view of interest, we have a very useful working arrangement with the Provincial Authorities and with the local surveyors, all sub-divisions and approval of townships is vested in the private Townships Board, and local

authorities in whose areas we supply electricity forward all sub-divisional plans that are submitted to them by surveyors and owners of properties.

My Department may consider what requirements are necessary to provide electricity in the particular area such as sub-station sites, servitudes, etc., both for the present and the future. In this manner we endeavour to reduce the difficulties in obtaining these facilities in the future when the area is more densely occupied. It is an attempt at long-range planning; it may lead us into some trouble when further sub-divisions take place, but generally I think it will be of great benefit.

Dealing with mapping, I mentioned earlier regarding co-operation with the Surveyor-General; this authority has standardised the scale of his records at 1/2500, we have adopted this scale and have built up records of nearly all the areas showing the position of mains, etc., which can also be used for planning extensions.

I fully support Mr. Dunstan's plea for simplicity in the construction of overhead lines, this is very essential, and single-phase is undoubtedly the most suitable for rural distribution and in many cases in the suburban areas with a lower loading density.

In the Durban area (I don't know whether you have got this problem here) we have latterly come up against the problem of sugar farmers in our northern areas who want to put in irrigation. And there, whilst we would very much favour single-phase, we are being forced to 3-phase to cater for their demands, which, so far as I can see at the moment, will require a supply suitable for 20 to 80 H.P. motors and probably double that in some cases. Fortunately there are not very many of them, so should not experience much difficulty in giving this supply.

With regard to the construction of lines, simplicity using single-phase construction will undoubtedly reduce troubles. Mr. Dunstan mentioned bluegums, these are also one of our main troubles in the Kloof to Botha's Hill area, just outside Durban; we find that the bark is blown over long distances and even with single-phase and the earth boards fitted below each pin type

insulator to short out the line in the event of a breakage, causes trouble in the event of bark being blown on to the wire until it touches the earth guard. In addition, if your phase spacing is a little close, the bark is blown on to it and stays there until the evening mists and then faults.

To overcome this, we have carried out investigations into spacing of lines with a view to providing the minimum satisfactory spacing in order that this type of fault may be reduced in number.

I was interested to see the suggested method of earthing with spirals of old copper wire round the base of each pole, it is an exceptionally good idea and should help in dry situations.

With regard to wooden poles, we use a large number in Durban area of supply where the atmosphere is conducive to rusting, the type of pole undoubtedly is of the utmost importance, steel is to a large extent being replaced by concrete or gum. We are experiencing difficulty in obtaining group A poles and I notice that all high tension extensions are carried out using Group A poles. I would like to know whether Mr. Dunstan is also experiencing difficulty in obtaining this type of pole.

With regard to the financial return in relation to the cost of lines, Mr. Dunstan made a point that he does not favour the policy of charging a line out to its consumer on a pro rata basis, because when refunds are made, as other consumers are connected your remaining capital is reduced in stages until the share becomes too small to handle. This latter policy is the one generally adopted in the Durban area to overcome that inherent trouble of the never ending balance. We give two poles free for each consumer who connects (that is for poles erected along a registered road or servitude) and in this manner, as each new consumer connects two of the original poles are made free poles and the original payee refunded their original cost until eventually the whole lines becomes a free line. We have found this system has worked very well up to the present time.

Latterly, as companies have opened up areas and formed townships, they have guaranteed the cost of extensions in these

townships and in the above manner, and on the basis of two poles being provided free per consumer, after approximately half the plots are occupied, a sufficient number of free poles are available to complete the installation without further cost to the company. At that stage we are assured of a reasonably satisfactory financial return. This scheme has also worked well.

We have also made extensions on the basis of a guaranteed monthly or annual return on capital expenditure in some cases.

With regard to the life of the installation I would like to know what is the expected life of his overhead lines.

Servitudes — these always present a problem, any land transactions are always very difficult and lengthy and I shall just quote one amusing incident we experienced in this regard. We carried out an extension of the supply mains to a mission and were very careful to ensure that the route of the line did not cross other than Native reserve territory and even solicited the help of the Department of Lands who made no reference to any privately owned land existing en-route.

Unfortunately, at some stage or other, a Native had been sold a freehold property and unfortunately a pole was planted in his grounds. He kept quiet until the line was finished and then came in and wanted an outright payment, which is our general policy in respect of servitudes, to avoid any annual payment troubles. He stated that he wanted just a little annual rental of about £6 a month. He wouldn't take less so the pole was moved.

Pretoria is fortunate in not experiencing troubles with rusting. I notice that cold galvanising is used for your steel work. We have found in Durban that there is no alternative to hot dipped galvanising and we have standardised on this for all the steel work that is used on overhead lines.

This corrosive atmosphere has also detracted from the possible use of galvanised steel conductors. Galvanising only lasts about six years and even less in places near the sea.

The use of Auto-reclosing switches is a very sound policy. We have adopted the same policy in Durban, on the secondary lines, weight-operated reclosing switches are used but they do suffer from the disadvantage of being non-resetting.

The paper is one of extreme interest and it gives me very great pleasure in seconding the vote of thanks so ably proposed by Mr. Kane, and, in conclusion, I would like to express the hope that the discussions following will be extensive and interesting. Thank you, Mr. President. (Applause.)

PRESIDENT:

Gentlemen, you have heard the vote of thanks ably proposed by Mr. Kane and seconded by Mr. Simpson. Will you please show your appreciation by clapping? (Applause.)

Mr. Dunstan has told me that he would prefer to reply immediately to individual speakers rather than replying to the discussion at the end, so I now give him the opportunity of replying to them, to the queries raised by Mr. Kane and Mr. Simpson.

MR. DUNSTAN:

Mr. President and Gentlemen, Mr. Kane asks whether the City Engineers has any activities outside the municipal area to cause him to prepare maps of the area. Actually, the City Engineer has a few very small activities outside, the main activities being the supply of water to certain townships and he is establishing new sewerage works to the North. Those are about the only activities that take him outside, but at the same time, the plan was prepared for regional planning in the Pretoria area. There was a proposal to extend our Municipal boundary a long way outwards.

With regard to the questions Mr. Kane asks about figures, with his permission, I would like to leave that over, because the paper is written on rural distribution; the figures cover the activities of the whole of the Electricity Department.

I would mention though that we are selling about 44 million units per annum in rural distribution at the moment.

With regard to the supply of single-

phase motors, we started off in the middle of 1947. By the end of 1947 there was no sign of a single-phase motor, they could not be obtained anywhere. That was when we started negotiating with one particular manufacturer to make them in South Africa. They agreed to do so and by the end of 1948, single-phase motors were freely available in Pretoria and once that firm had got under way, they had a monopoly. It was not long before other South African firms started to make them and the importers started to import and the troubles disappeared. It was just breaking the ice.

With regard to the doubt Mr. Kane has whether we can apply or keep up to date with our 3/- per B.H.P. or the floor area charged, I think that ties up with the methods of installation inspection that we use. I believe that we have about the most severe inspectors in South Africa. Our Inspection Department works on the basis that nobody may do any work in Pretoria until he first reports to them. They do not go and inspect when he has finished the work; they go and have a look before he starts and they turn up at odd times while he is working. The result of that is that most of the electrical contractors in Pretoria know that they are going to get into a row if they don't report and the majority of work which is carried out, is reported to us first.

At the same time, within the Municipal area the building inspectors keep us informed of all building plans. In outside townships we have only the honesty of the contractor to report work or if the Inspector is in that area and sees building progressing on any house or any extension going on, he immediately investigates.

The 3/- per B.H.P. — again, that is reported by the contractors. I don't know whether they go in fear or what it is, but they do report if they are putting in a motor. We consider that we get about 90% to 95% of the changes notified, so the loss is not very great.

We are also helped by the meter readers; they let us know if they see anything happening.

With regard to the change of ownership, there is no difficulty at all. If you apply an annual guarantee to a

particular connection or supply, then you will get difficulties with change of ownership, but you won't get it with our system, because each month the guarantee is applied as a minimum monthly charge. If the consumer moves out of the house another one must come in and the guarantee is applied to him. So, it does not matter who the occupant is, the minimum charge applies to the connection and there is no difficulty at all.

We have heard of the Peri-Urban Areas Health Board. We work in conjunction with them, they don't worry us. They admit in this area that they would rather we supplied and reticulated electricity in townships than they did it and they give us all the help we want, except when it comes to sanitary inspectors.

With regard to the reduced hours by travelling from Pretoria, it definitely reduces the working day, but we still transport workmen every day to the site of the job. We accept it, but it is better than trying to organise camps in the country.

With regard to faults, all faults are attended to from town, from the central area. Our fault organisation for attending to consumers' complaints, consists of radio controlled three-quarter-ton light delivery vans. If a complaint comes in from either the country or the town, the nearest man is directed to attend to it. "A prolonged outage" is capable of many definitions. I believe that on the South Coast of Natal a short interruption used to be defined as three days and a long interruption as about a fortnight. (Laughter.) Well, with our radio-controlled vans, we anticipate that we can get a breakdown man to any point in the present area supplied within a matter of one hour. I don't think that is a long interruption, because there are eight thousand seven hundred and something hours in a year and even if you have total outages of 100 hours in that year, it is still a very good record. And I do not think that any consumer round here can say that he is out, for odd interruptions, for more than five hours in a year; for a major interruption, he may be out for twenty-four hours.

With regard to types of insulators, we

have no preference and provided they are to specification, we buy them on price.

With regard to the drilling of wooden poles, all authorities and the Forest Products Institute say that you must not drill a pole after it is creosoted. The theory is that you let in the moisture and the germs and you start rotting of the pole at that point. The idea is that you should have your poles dressed, scarfed, drilled and cut to length before creosoting. We have never noticed any trouble with cutting poles or drilling holes.

With regard to P.V.C. insulated wire, we have carried out certain tests on it. The original wire we used is not to S.A.B.S. specification, because there was no specification. But we erected some test samples in January, 1949; I had them tested yesterday. We have two samples of the old AMEE wire, insulated with cambric, and two P.V.C. insulated wires. Yesterday the AMEE wires all broke down at 18 kV R.M.S. (there were four tests on each length of wire):—

No. 8 P.V.C. wire (black) broke down at 30 kV at one point, 34 kV at the next point and withstood 40 kV at two other points;

No. 10 P.V.C. wire (red) broke down at 38 kV, 37 kV, 24 kV and 29 kV;

and that is after being in the open air for over six years.

With reference to fault location, our system of dealing with faults, as distinct from consumers' complaints, is to have men on stand-by duty continuously (24 hours a day, seven days a week). We have six teams; each team has a leader and under him he has two foremen or chargemen who act as supervisors in his team and he has three pairs of electricians. If anything occurs, say a line trips in the country and is locked out, the team leader will choose the pair who have the most experience either of that district or of that type of work. He will arrange for them to be called out, they report at the yard, collect their lorry and they attend to the job.

They normally report back, either by the sub-station telephone or by radio, what they have found — that the breaker is locked out — and the team leader will

give permission for the one shot. If they cannot contact him they are allowed the one shot themselves. If the breaker does not remain closed, the team leader will then issue further instructions, either by 'phone or by radio.

With regard to Mr. Simpson's remarks, I like his idea about the aerial survey. I actually have thought about it for the rural areas, but we have had an aerial survey made of the town of Pretoria and we use that in our planning for load density. We may later on, of course, apply it to certain areas in the country.

I am not quite certain what the question was about the transition from a rural area to a town. I think Mr. Simpson means the actual laying out of a township in an area that was previously rural. Well, we cannot anticipate those things. We do not normally make any provision.

If we know that a township has been laid out, when we are developing an area, it is worked into the scheme as we develop, right at the beginning.

I like Mr. Simpson's arrangements to examine the plans from the Surveyor-General's office in advance. We have not got that, I am afraid. Usually the first intimation we have that smallholdings are being laid out, is a noticeboard at the side of the road advertising the plots or a man will turn up with a plan in his hand and say: "I am going to build a house there, when am I going to get a supply?"

With regard to bark causing faults on lines, we have two or three places where trouble occurs. The worst incidence is on the Johannesburg road which is lined with bluegum trees. We solved the difficulty there by removing all steel poles, building the line with wood poles with high tension on the top and unearthed cross-arms.

We removed the net and put P.V.C. insulated low-voltage underneath in vertical construction. That particular portion is one of the most reliable townships we

have and we have never had any further trouble.

Group A poles are extremely difficult to get. The delivery period is about nine months, so it means anticipating requirements and thinking a long way ahead. But we do get them and they come from Mr. Simpson's area, from Pietermaritzburg.

We have also tried the two poles per consumer free and we don't like it and I don't think we ever want to know it again. It results in small extensions being made continuously in a township. When you try that sort of business, you find after a few years that your lines down a road are like a dog's hind-leg and there is only one way to get straight and that is to rebuild — and to rebuild, means spending your capital again.

The life of power lines — well, we do not know what the life of the concrete pole line will be; we do not know how concrete will behave, we have not great experience of it yet, but I anticipate that those lines will be good for twenty-five or thirty years.

Wood-pole lines: The Irene line which was built in 1932 is still working and the poles are still good; that is twenty-three years ago. We anticipate that we shall get at least twenty-five to forty years out of a wood pole.

With regard to corrosion and cold galvanising, the Transvaal has one of the finest climates in the world — Pretoria is the finest in the world! (Laughter.) Corrosion is not a problem, very fortunately, for us. That is why we have been able to use steel conductors, because we are not frightened of them failing within ten or fifteen years. We do not even bother to paint steel poles in the country after the original construction. They go black, but they do not rust, like those in Durban rust. And we have found that cold galvanising suits our purpose quite satisfactorily. (Applause.)

PRESIDENT:

Would anybody else like to contribute to the discussion?

MR. A. R. SIBSON (Bulawayo):

Mr. President, I would like to add my thanks to those of the last two speakers

to Mr. Dunstan for yet another of the most valuable papers that we have had presented in past years, and one which will undoubtedly add further lustre to our proceedings.

I was somewhat interested to find that Mr. Dunstan adopts a policy in regard to constructional procedure which I also have found to be extremely useful and that is, roughly, the policy of doing the job first and making the plan afterwards. It saves a good deal of trouble and the plan is usually much more accurate as representing the reality of the situation.

I do not quite know how he gets around the requirements of any financial regulations that may or may not exist in Pretoria, in that it is obvious that he cannot really approach a job with any sort of estimate. Now, there are advantages in that as well, Mr. President; apart from the obvious ones, there is an advantage also to the community as a whole.

If, as our President yesterday suggested, there are personnel who really do take their work seriously — regarding it as a vocation — then unquestionably this procedure will result in a lower cost of production. Any attempt to create estimates in advance by making drawings, drawing up material lists and all the rest of it, is bound, in the end, to result in a higher estimate than might otherwise be the case, because one has to cover oneself against all sorts of unknown things that are likely to crop up. Once one has estimated on the high side, there is a certain danger of one's staff perhaps taking full advantage of the estimate that has been made, whereas if the work goes along almost from day to day the chances are that the job will be done much more cheaply.

And so, I do support the methods that he uses, although I don't quite know how he gets away with it.

On the subject of the contribution by consumers (either capital contributions or something of that sort), Mr. Dunstan feels that the whole issue is easily covered through the tariffs and through the different minimum charges that he makes to different people. I entirely agree with him that it is quite unworkable to consider a proposition of connection fees and

subsequent refunds to an increasing number of persons. I, have, however, referred at previous Conventions to the methods that we have evolved in Bulawayo, and the formula we use, which takes into account the square root of the area of each plot. I shall not burden you with a further account of this; you can find it in the proceedings. I only say that we are continuing to employ this method and have found it extremely satisfactory and successful.

Now, before I sit down, I should like to read to you some notes that deal more with the technical side, which have been prepared by Mr. Summers, my own Distribution Engineer.

He writes: "I have found the author's paper both interesting and instructive, since it gives a representative picture of the activities of a distribution department and it is of technical interest. It is quite impossible for me to comment on the many aspects covered by the author, and I suggest that since continuity of supply is perhaps the one item of prime importance to the consumer and to the power system engineer, I would like to make the following comments on the subject.

The author, after going into many of the pertinent points concerning rural electrification, does not indicate the failure rates experienced with the design of overhead lines described in the paper, and I shall be glad to know if the author has any further information. I would also point out that the conclusions reached in paragraphs 4.1 and 4.4 are, in my opinion, fallacious because the zone of protection afforded by a surge diverter is, *inter alia*, dependent upon the rate of rise of the incident wave and therefore surge diverters cannot give general protection to line insulation.

I have found in Bulawayo that with the small size of earth wire which is normally used on 11 kV rural lines, many failures occur due to the wire either being burnt by a direct lightning stroke or in the course of time by the follow-through current, particularly when slow-speed auto-reclosing is employed to ensure continuity of supply. Experience has indicated that the best proposition is to bury the earth wire to form a counterpoise,

thus reducing the pole footing resistance. This modification results in the simplification of the mechanical design of the pole which has been found by other investigators and has resulted in the development of a special design of rural line in Bulawayo, which is virtually lightning-proof, and it is hoped that further details will be published at a later date.

The principal features of this design are that the conductors are arranged in triangular formation and by means of a simple wood cross-arm, the impulse flash-over voltage of the two lower conductors is increased to approximately 400 kV, and the top conductor is supported by a pin-insulator mounted at the top of the pole, which is protected by means of a gap so that the impulse flash-over voltage is less than 100 kV. Under lightning conditions the gap is flashed over and during this period, the top conductor operates momentarily as an earth wire to protect the two lower conductors. The arc at the gap is instantly suppressed by means of arc suppression coils which have been designed and manufactured by the Electricity Department, with the result that the complete network is not subject to heavy fault currents, high rates of recovery voltage and the system operates without lamp flicker, since the current in the fault consists of approximately 1 amp. of 50 cycle current due to the system dielectric loss and harmonics. This system has been most successful and during the present lightning season, when over 81 storm days have been experienced, not one single fault occurred, although during one very severe electric storm, lasting approximately six hours, no less than 144 arcs were suppressed.

With the author's form of reticulation using single-phase spur lines, it might be undesirable to use this system due to the danger of series resonance, but it occurs to me that the system could, with advantage, be suitably modified to suit the author's arrangements, and to give the same high standard of supply. I suggest that one phase of the 11 kV supply should be permanently earthed and the neutral point insulated and then the earthed phase connected to the top conductor, which would be supported by an earthed support

at each pole and the two remaining phases connected to the two lower conductors, which would be supported by means of unearthed pin insulators mounted on a wood cross-arm. This system could be protected by means of two modern high-speed single-phase auto-reclosers associated with the two lower conductors, thus the system would have similar operating characteristics to the one employed in Bulawayo, and at the same time would have the following features:—

- (1) Normal 11 kV transformers having a Basic Impulse Level of 100 kV on a 1/50 microsecond wave can be employed.
- (2) The number of surge diverters, expulsion fuses and links on the system is reduced in the ratio of 3:2, thus allowing a direct saving in capital and maintenance expenditure.
- (3) Similarly, the number of line insulators is reduced in the ratio of 3:2 and, apart from the saving directly incurred, the design of the single-phase spur lines is greatly simplified, since two-thirds of the lines would be equipped with only one insulated conductor and the earthed conductor employed as an earth wire, hence avoiding, under lightning conditions, the complete destruction of supports, which is normally associated with unearthed wood-pole lines. One-third of the spur lines, however, would be equipped with two insulated conductors.
- (4) With reference to paragraph 2.8.5 of the author's paper, where certain difficulties are indicated in respect of the contrary views held by power and telephone engineers, the proposed design would result in improved inductive co-ordination and should greatly assist in the relationship between power authorities and the Postmaster-General. I also consider that where L.T. lines are erected on the same pole as the 11,000-Volt lines, the reduced coupling factor decreases the induced dynamic voltage and surge voltage, which effectively reduces

the number of meter failures on the consumer's premises, particularly where the meter case is earthed.

- (5) It will be appreciated that if the rural system is fed from an existing urban system operating at the same voltage, it will be necessary to instal isolating transformers at the point of supply. This, however, does not appear to be a retrogressive move, since, in most cases, it would probably be convenient to equip the transformers with automatic on-load tap changing-gear with line-drop compensation, to ensure adequate voltage regulation on the rural network, which nowadays appears to be a major problem with most power undertakings, in view of the increasing demand of the rural consumer and to the introduction of the fluorescent lamp." (Applause.)

CR. R. L. BARRY (Robertson):

Mr. President, Ladies and Gentlemen, I want to talk more to the Councillor friends here. In the first instance, I want to thank these gentlemen who have read the papers here for their very enlightened papers, but I think that these papers should have been distributed to us beforehand so that we might also have studied them a bit.

I want to thank Mr. Dunstan for his very valuable report. We at Robertson have a very extensive rural scheme and we also are now connected to Escom, but we have taken the precaution of keeping our rural distribution to ourselves. I think Mr. Dunstan also recommends it and it is one of the most important things for a small community, for a small town, for a district, to keep that rural distribution to itself, because in that way the local authority can develop his district to serve his town.

The demands for agriculture are going further and further ahead, especially if we study the irrigation systems. In our district there is more and more demand for electricity and especially now, with the new developments, not only for pumping for irrigation, but also for the spray irrigation.

I want to say that the most important point in the rural distribution system, to my mind, has not yet been mentioned here. As Henry Ford also puts it, the most important nut on a car is the nut behind the wheel and that is what we Councillors should look on as the Engineer who is doing the job. If you have an enthusiastic Engineer, you can depend on it that your rural system is going to expand and that you are going to get the best results.

Mr. President, I feel that I want to make a confession too. When I, as a young man, came on to the Town Council, we had a very enthusiastic Engineer but he did not enlighten the Council always on what he was doing. He was putting up these lines in the district and the Councillors were always grumbling — they did not know what the Electricity Department was doing or not doing. I tried to work it out and then I figured that we were losing on the electricity supply for the district and I must have been the cause of a lot of trouble to him, with the result that he left us, to our town's loss.

Now, Gentlemen, I want to put forward this plea for the enthusiastic Engineer — that we Councillors have to appreciate him more and give him more latitude to do his work, give him authority and I even want to say that we must not question him too much. When that Engineer left us, let me tell you that the then Mayor, in his farewell speech, said: "Mr. Engineer, there is one fault that you have and that fault is that you do not want to enlighten your Council enough". (At that time I agreed with the Mayor, but not to-day.) And I think, well, perhaps that was a fault in the right direction. I still maintain to-day that but for that fault of his, we would not have had the 130 or 140 miles of rural distribution to-day. Thank you, Sir. (Applause.)

PRESIDENT:

Thank you, Cr. Barry. Cr. Barry, may I just point out that copies of the paper were sent to your Engineer and Town Clerk about a month ago.

CR. BARRY:

I am not referring to that. I am referring to the papers read on that paper.

12.30 P.M.; ADJOURN FOR LUNCH.

Proceedings Resumed at 2.35 p.m.

PRESIDENT: Gentlemen, the only item on the Agenda this afternoon is the Engineers' Forum. I am going to hand you over to our Quizz Master, Mr. J. C. Downey of Springs, just with this remark, that we are going to adjourn at 3.30 p.m.

Mr. J. C. DOWNEY (Springs): Mr. President, Ladies and Gentlemen, if you go through your proceedings of last year, you will see that one job is apparently given out to one member permanently and I refer to Mr. Mitchell of Salisbury. I tried to dodge this job, but unfortunately nobody will take any notice of me.

In the absence of the yellow waistcoat. I thought it was my duty to provide you with a yellow rosette, which I shall put on as the Quizz Master for this afternoon. As you have heard, the President has put a time limit on us, so I shall be as brief as I possibly can and shall call upon each Engineer who has submitted a question, to put the question to you, and you, in turn, will endeavour to answer it for him.

The first I have is from Mr. Halliday of Port Shepstone with regard to a certain query on the wiring regulations.

Mr. K. W. J. HALLIDAY (Port Shepstone): Mr. Quizz Master, my question is not really in the nature of a question; it is more in the nature of a possible improvement of line and installation work. As you will see, according to the Blue Book, by which I am not bound (in Port Shepstone we are only regulated by the Red Book, due to promulgation difficulties as far as the Natal Ordinance is concerned) that two 15-amp plugs must be wired on a 30-amp circuit. In the old Red Book you could have two on a 15-amp circuit.

Now, we heard quite a long talk this morning about simplification and reduction of costs in installation and I do feel that, as suppliers, it is up to us to use, shall I say, a sense of discretion and to apply that properly so far as installation work goes.

We are allowed, in one room, up to a

maximum of six points on one circuit. Now, I think it is due to diversity factor that we can allow six plugs in one room, it is quite reasonable to expect that in, say, two bedrooms and a dining-room, we could possibly allow something similar. And it is from that line of attack that I am trying to put my point.

From the simplification angle, would it not be better, then, for us to embrace the use of miniature circuit breakers and by that we can then limit the current to each circuit. We have, legislation which is, I would say, almost impossible to enforce. In a 5-amp plug which, by normal arithmetic, should carry 1,100 watts, but is only allowed 600, we could turn round then, if that 5-amp circuit were limited with a circuit breaker of 5-amp maximum rating capacity tripping and be quite safe on that.

Instead of then having to run around looking at a person putting a 1,000-watt kettle in a 5-amp plug and saying, "You can't do that here", we would possibly say, "Well, the breaker will trip" and there would be no case of danger to the consumer. The wire would have to be the correct size and there would be no danger, we shall say, of burn-outs, radio interference from over-heated contacts and that type of thing.

I am trying to co-operate with the other supply authority, the E.S.C., in my area. The local representative and I try to get together and make it easier from the contractor's point of view, so that he does not come into town and do one thing and go out of town and do something else.

I would like to hear the views of the Convention, with the possibility of handing to the Wiremen's Registration Board (the Safety Precautions Committee) the alteration of the wiring regulations so that all plug circuits must be protected by miniature circuit breakers and, from that, we would not have to bother about possible diversity factors or over-loading a circuit.

Mr. J. C. DOWNEY (Springs): Thank you. Would Mr. Kane care to comment on this matter?

Mr. R. W. KANE (Johannesburg): Not really, Mr. Downey, because I think there are other people who can talk about it better than I can.

I just want to get one or two facts clear, first of all. I think the real trouble is that Mr. Halliday works under the First Edition and Escom work under the Second Edition. Is that correct, Mr. Halliday?

Mr. K. W. J. HALLIDAY (Port Shepstone): Correct, Mr. Kane.

Mr. R. W. KANE (Johannesburg): I think in his written question he refers to the cost of the installation and was hoping to make it a little bit cheaper. I do not see how his suggestion of miniature circuit breakers is going to help at all.

I am not prepared to comment at this stage about the question of two plugs on a 15-amp circuit or one plug on a 15-amp circuit. I think the real thing against which we have to guard, is that we are not in a position and we don't want to be in a position of chasing around the countryside to see what people use on their plug circuits. But I do think that when you provide a 15-amp plug or a 10-amp plug or a 5-amp plug, it should be wired capable of taking the maximum duty, because it is the end circuit.

Mr. J. C. DOWNEY (Springs): Thank you, Mr. Kane.

Mr. E. C. LYNCH (Salisbury): There is one way of economising in the supply for houses where a number of plugs are going to be wanted, scattered about the house, and that is by the series circuits and in Salisbury it is permitted in terms of the new I.E.E. Regulations to have, I think, it is seven 13-amp fuse plugs on a single series circuit. I think this is probably the best approach to this problem.

Mr. J. C. DOWNEY (Springs): Thank you, Mr. Lynch. Is there any other member who wishes to contribute to this point? Are you satisfied, Mr. Halliday?

Mr. K. W. J. HALLIDAY (Port Shepstone): I am not exactly satisfied, because the I.E.E. Regulations possibly do not quite apply to us. And even with a series circuit, you can have five 13-amp fuse plugs or 65 amps running on the circuit. You would then have to have a conductor possibly capable of carrying 65 amps.

What I am saying is that the miniature circuit breaker would limit. Then your 7036 or 7029 conductor, protected by a 15-amp miniature circuit breaker, would

be absolutely fool-proof protection for that circuit and, as such, you would be running on a more safe and possibly more reliable supply.

Mr. J. C. DOWNEY (Springs): Thank you Mr. Halliday.

Mr. R. W. KANE (Johannesburg): I think it is only fair, particularly for the Rhodesian members, to know that for this series circuit to which Mr. Lynch refers, we use the expression ring main and I think that it means the same thing. There is provision in our Second Edition for reduced wiring capacity for fused plugs in the straight simple circuit. I think we allow two socket outlets on a reduced wiring capacity (7.029) and then on 7.036 they might have four such socket outlets and then on a ring main, not more than ten socket outlets.

"Provided that in private houses or residential flats, having a floor area not exceeding 1,000 square feet, the number of such socket outlets served by such ring, shall not be restricted."

Mr. J. C. DOWNEY (Springs): Thank you, Mr. Kane. Well, Gentlemen, I think we have spent enough time on that one; we shall have to proceed to the next question.

The next one submitted is from Mr. G. Lotter, the Electrical Engineer of Louis Trichardt.

Mr. G. LOTTER (Louis Trichardt): Mr. Quizz Master, Gentlemen, this is not a very big problem—it is in connection with plugs in bathrooms.

With the ever-growing popularity of electrical razors and shavers, various applications have been made for installation of a 5-amp plug in bathrooms, with which to operate these shavers, which, of course, is entirely in conflict with the standard wiring regulations.

Could any of the Engineer members offer a solution to overcome this problem?

I can say that only during the course of last week the Mayor who is now accompanying me to this Convention, asked me to have a plug installed in the bathroom, so I said, "No, that is impossible". And he said, "Well, give me another solution".

Before I comment on the idea I gave to

him, I would like to hear what the other members say.

Mr. J. C. DOWNEY (Springs): Thank you, Mr. Lotter. The President has just passed the word down, "Tell him to shave in bed"!

I can also offer you one little answer to that. You do not require water with a dry shaver, so you do not require to shave in the bathroom.

The matter is open for discussion now, Gentlemen. Have I got to ask Mr. Kane to open fire again?

Mr. R. W. KANE (Johannesburg): I do not know if my reasoning is correct. Mr. Quizz Master, but it does appear to me that somebody goes to a lot of trouble, both overseas and here, in forming certain regulations—you might call them a Code of Practice (it depends on how we all apply these things).

We all get the odd occasion where regulations do not meet the situation. If you are treating them as a Code of Practice and if in your own particular mind you think that the variation from the requirements of the Code, is a safe one (and I emphasise a safe one), then use your own common-sense. I know that the same contractor will want to do the same thing on the next job whether it is safe or not.

I do think that the reason for prohibiting plugs in a bathroom is a very good one. I don't know what height the Mayor is; if he is about 10 feet, I would suggest that he puts the plug in the ceiling! He would be the only man who would suffer from interference with the plug there.

I think that we should try to stick to our Regulations, because, on the whole, the basis is safety. It is not the Town Engineer, it is not the man who got that plug installed—it is the poor lad who comes along later on and tries to use it for something else—a radiator or something like that who will suffer.

Mr. J. C. DOWNEY (Springs): Thank you, Mr. Kane. I do submit, Gentlemen, that it might have been better had the Mayor of Louis Trichardt put the question himself. It would have been quite a change for us to have the Mayor asking questions!

Mr. C. R. HALLÉ (Pietermaritzburg): Mr. President, this is a point I brought up

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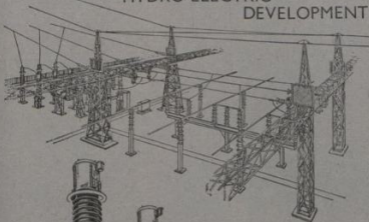
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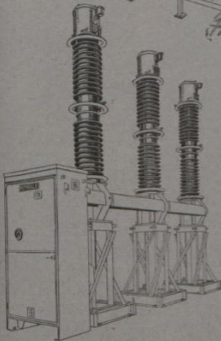
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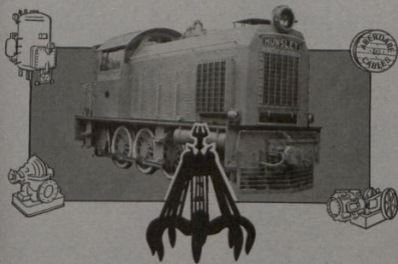
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I think, at the Bulawayo Convention, when I was not quite so sober, about the use of electric tooth-brushes. (Laughter.) This is also going to be difficult without the use of water, though I believe that a well-known Frenchman once said that he always washed his teeth in light wine.

I think we shall find this all solved by the use of plastics. The day will come when you will have plastic water taps, everything plastic and plastic floor covering and the earthing of bathrooms will be of very little consequence (and in kitchens, too).

In the meantime, I suggest that we follow the line of the ladies, who do not go into the bathroom to put on their lipstick, and we should look just as pretty when shaving in the sitting-room!

Mr. DOWNEY (Springs): Thank you, Mr. Hallé. I really thought you were going to say that it was time we grew plastic beards! (Laughter.) No further contributions to this matter? Are you satisfied, Mr. Lotter?

Mr. G. A. LOTTER (Louis Trichardt): Thank you.

Mr. J. C. DOWNEY (Springs): We have another query from the Town Electrical Engineer of Windhoek. Unfortunately, he is unable to be present, so it falls to my lot to submit the question to you.

"We have experienced, on several occasions, the tripping of circuit breakers fitted with overload coils and by-pass time-lag for fuses, without the by-pass fuses blowing.

Would you explain how this happens?"

Well, if he is referring to time-lag, Gentlemen (you all seem to be a bit slow on this point), you have to be particularly careful. We have had experience of switches tripping, fuses not blowing, due to corrosion of the cement which the manufacturer had used in the making of the time-lag fuse and we have had some serious outages in our industrial area over the same thing. There are other causes, of course, in this connection, that we have experienced, but that has been our main cause.

Are there any other engineers who wish to submit?

Mr. G. J. MULLER (Bloemfontein): Mr.

Quiz Master, we have had similar trouble on various occasions. It is obvious, of course, that in a circuit like that, the trip current is shared between the time-lag fuse and the coil. We have found that where these clips have weakened one way or the other or where the fuse is not silvered on the contacts at the ends, where it is plain copper, any oxide or other increase in resistance may bias it to such an extent in favour of the coil, that you trip without a blow of the fuse.

The remedy is silvered ends to the fuses and good springs.

Mr. J. C. DOWNEY (Springs): Thank you, Mr. Muller. Apparently there is very little trouble with time-limit fuses amongst the Engineers.

Mr. A. R. SIBSON (Bulawayo): For the sake of the enquirer, I think what he really wants us to tell him is whether there is any mystic reason why such a thing should happen.

I think we ought to make it quite clear to the enquirer that the switch could not possibly trip electrically unless there was some trouble in the circuit, such as that referred to by Mr. Muller. There is no other mystic reason why the switch should trip electrically.

There is, of course, the possibility of a mechanical trip, due to something wrong with the toggle mechanism and some minor vibration might give rise to that sort of thing. But I think what the enquirer really wants to know is just whether there is any reason which could not ordinarily be explained and we can say definitely that if a switch trips under those conditions, it is because there is something wrong with the tripping circuit, that there is an increase in resistance somewhere, which has resulted in the wrong proportion of current flowing in the two parallel circuits.

Mr. J. C. DOWNEY (Springs): Thank you, Mr. Sibson. Are there any other contributors?

I think, Gentlemen, that that fully explains the problem which our friend from Windhoek has. We shall now carry on with the next question, submitted by Mr. Frank Stevens, Borough Electrical Engineer of Ladysmith.

Mr. FRANK STEVENS (Ladysmith):

Mr. Quizz Master, because of the high cost of copper conductors, the Electricity Department of the Ladysmith Corporation are using a certain amount of aluminium for high and low tension overhead mains.

It is required to know from members with practical experience gained up-country away from the coast:—

- (a) Whether the electrolytic action between aluminium and copper conductors is sufficiently serious to warrant the use of special connectors, which are expensive, bearing in mind the short time after rain that moisture exists at joints, due to the long dry periods in most parts of South Africa.
- (b) Is it found that tinned copper service line taps work loose in a comparatively short time, or that the volt drop at joints is excessive.

Mr. J. C. DOWNEY (Springs): Thank you, Mr. Stevens. Well, there must be some gentleman here with experience of aluminium conductors.

Mr. C. R. HALLÉ (Pietermaritzburg): We have bought about 25 tons of aluminium conductors. We are using it every time the copper conductor is stolen and I can only say that that is proving a success. But I think that the absolute ignorance which I have of the answer to Mr. Stevens' question, proves that our aluminium conductor is not giving any trouble, otherwise I should have heard of it.

I know that we do cover all joints with special non-oxidising grease of some sort and that we have had people trying to sell us very extra special connectors, but we are not using them and are not having any trouble in Pietermaritzburg with aluminium.

Mr. J. C. DOWNEY (Springs): Thank you, Mr. Hallé.

Mr. G. J. MULLER (Bloemfontein): I have had experience of an aluminium line which was up for a matter of eleven years. I still have pieces of it to indicate how little corrosion there was. This line was up with copper cable, Crosby clipped on to the aluminium (the Crosby clips galvanised, plain copper, untinned)—It was not a steel cored—just a plain aluminium conductor—

and after eleven years, there was no sign to indicate that there was anything abnormal happening at that joint. And that happened to be on the Rand; what it would be like at Ladysmith, lower down. I would not like to say.

Mr. J. C. DOWNEY (Springs): Thank you, Mr. Muller. I do know that there are a few engineers present, from the Witwatersrand area, who are using aluminium conductors. Would they care to contribute to the discussions of Mr. Stevens' query? Apparently everybody is shy of this question! That seems to be so far as we can go, Mr. Stevens, since nobody else wishes to contribute.

Mr. FRANK STEVENS (Ladysmith): I am pleased to hear that at least two members have not had any trouble that way.

Mr. J. C. DOWNEY (Springs): Thank you, Mr. Stevens. We shall proceed with the other queries which have been placed on the table, on the question of earthing. The question has been submitted by Mr. J. A. Macques, the Municipal Electrical Engineer of De Aar.

Mr. J. A. MACQUES (De Aar): As you know, Mr. Quizz Master, I have sent round a circular in connection with earthing telling the members what I have encountered down at De Aar.

First of all, the ground formation: We have semi-arid ground there, it is pickable lime formation and shale. I tried to force a rod into the earth—this is pointed out in the typed article circulated to members—we only got down as far as 6 inches.

I was wondering if any member here knew of some mechanical contrivance which we could use to force this rod into the ground.

Secondly, with the water mains earthing: our Town Engineer has used Everite pipes. Now, it is not possible to get an "earth" with this Everite pipe in between service and feeder iron pipes, so I have resorted to using the earthed neutral. I would like the opinion of members on this matter.

Thirdly, from the legal aspect, I am wondering or, at least, the contractors seem to think that the onus is on the Municipality to supply an "earth". Well, it is quite obvious that the appliances

belong to the private consumers and, therefore, I think that they are liable. I have already written about this. I think that members could probably contribute hereto.

Mr. J. C. DOWNEY (Springs): Thank you, Mr. Macques. The query is open for discussion, Gentlemen.

Mr. J. R. CHERRY (Randfontein): Mr. Quizz Master, non-metallic water pipes are being used extensively on the Witwatersrand, but it has been found that the artificial earth of the pipe or plate, electrode type, is of no consequence whatsoever.

The impossibility of obtaining a reliable artificial earth in areas using non-metallic water pipes and the possibility of facing prosecution under the machinery regulations for not adhering strictly to the Wiring Regulations, is naturally of some concern. Efforts have been made to have Regulation 1302 (c) of the Standard Wiring Regulations amended, so as to give full recognition to the multiple earth neutral system, but without success.

Mr. J. C. DOWNEY (Springs): Thank you, Mr. Cherry.

Mr. FRANK STEVENS (Ladysmith): I feel, Sir, that the time is close at hand when supply authorities will have to face up to providing the "Earth" for consumers' installations.

With the advent of composition water mains and the fact that improvised "earths" cannot be relied upon and are sometimes extremely dangerous, the time has come when supply authorities must, I think, set themselves out to provide every consumer with an efficient "earth".

With this end in view, in Ladysmith we have for some years used twin P.V.C. with a bare earth wire alongside for overhead service wires. I am now in contact with manufacturers of P.V.C. outdoor weather-proof wire, with a view to getting Triplex P.V.C. service wire. Triplex wire is being used extensively in Canada and in other countries. We have found that the twin cable with earth wire makes a very much neater service than the usual arrangement with separate wires. Triplex cable should be even more so and will provide the consumer with an efficient "earth".

Mr. J. C. DOWNEY (Springs): Thank you, Mr. Stevens.

Mr. A. R. SIBSON (Bulawayo): Mr. Quizz Master, I would just like to give you, in a few words, the experience we have had in Bulawayo in respect of this problem. Some considerable time ago we came to the conclusion that, at least so far as the rural areas were concerned, it must be the responsibility of the undertaking to provide the "earth" and this has been done for a very long time.

Originally it was done by merely earthing the neutral at each pole (in those days there were steel poles) and requiring that the consumer should earth his installation, also to be neutral. Now, that had certain disadvantages, to which the enquirer has already made reference. The procedure now is that all our neutrals (and this, I may say, is now carried out throughout the area of supply, including the Municipal area) are split into two, each one being half the cross-section of the phase. They run together below the phases and they are inter-connected at each pole and they are earthed at each pole and the phase (if one phase only is used), together with two earthed neutrals, is carried into each consumer's installation. These two earthed neutrals are carried to a block on the consumer's board, which serves as the connection for the neutral service and for all the portions of the installation which are required to be earthed.

Not only do we permit consumers to earth in this way, we require that they shall do so. We have no objection to their providing subsidiary "earth" as well, if they want to, but they must earth to our split neutral system. This has proved completely and entirely satisfactory. Not only does it make the situation much safer for the consumer; it also renders all poles in streets much safer, so that there is not the slightest chance now of any pole becoming "alive" as the result of a phase falling on to a cross-arm or the jumper drooping, or anything like that. Inevitably, when such things occur, the circuit is isolated by the operation of overload protection.

I believe that the situation in the Union is that such a procedure might be illegal

and it is for this reason that I have given you our experience. I think that the Regulation which frowns on multiple earthing, originates really in the minds of Post Office Engineers and comes from the old D.C. days, when such a procedure might have had deleterious effects on Post Office equipment, but it is quite impossible for me to understand in what way multiple earthing in these days of A.C. circuits could ever seriously damage or interfere with any telegraph or telephone circuits. Only perhaps, momentarily, under fault conditions might some interference occur.

As I say, we certainly have done this for many years and we have had no difficulties whatever. It has appeared to me to be the complete answer to the problem.

Just one other small point that might not readily occur to members. I did have the experience once of a plumber working in the Water Department receiving a very severe shock when he was removing a meter. This was in the days when we did permit and, in fact, encourage the earthing of installations to the water system. It is quite easy to see that the continuity of the water system depends upon the piping entering the house remaining intact.

Now, on this particular occasion the plumber was removing the water meter; in other words, he was breaking the continuity of the electrical circuit and at one moment he had got one hand on the one side of the pipe system and his other hand on the other and there happened to be a fault in the installation at the time and it had rather unfortunate results on the plumber.

Mr. J. C. DOWNEY (Springs): Thank you, Mr. Sibson. Are there any other contributors to this discussion?

Mr. G. J. MULLER (Bloemfontein): Mr. Quizz Master, we have admitted the supplier's need to provide an earth for our own peace of mind more than for anything else. In certain of our townships they have used Everite pipes; in others, they have used Johnson joints on cast iron pipes, which have rubber joints. In these cases we have run an earth wire at the same time as the Water Works Department have run their piping and we have provided taps at every consumer's

premises to bridge right across from our buried earth wire across to the consumer's water pipe. In other words, they can remove the meter as often as they like and they can never get a shock from it. The very fact that the wire is buried a matter of about 3 feet underground, even if it is cut, 100 yards of that wire will give you an excellent earth.

We have found, where we have applied this, that earth values have been extremely low.

Mr. J. C. DOWNEY (Springs): Thank you, Mr. Muller. It will be most interesting, Gentlemen, if those of you who have come up against this problem, will contribute and say how you have overcome your difficulties.

Mr. R. M. O. SIMPSON (Durban): In Durban we have had a similar experience over a number of years and have adopted the policy, in the case of overhead services, of running in a separate overhead earth wire, with the overhead service; in underground areas—an earth connection is given off the lead and armours of the cable, in addition to making the consumer provide his own earth plate.

Mr. R. W. KANE (Johannesburg): I think there are two sides to this problem. There is the question of the old existing townships, where our mains perhaps were not (I hope Mr. Smit is not listening!) properly earthed—at least, our poles, and the Town Engineer comes along and replaces an existing water main with this Everite main.

We in Johannesburg have done exactly the same as Mr. Muller; we provide scrap copper for burying in the same trench and bonding to all the water leads.

In newer townships we perhaps have a little bit more elaborate a system than has Mr. Simpson. We have found that we have to provide two earth wires on our poles. Despite what Mr. Dunstan says, we also use those two earth wires as a form of cradle in case one conductor comes down. And from those of cradle in case one conductor comes down. And from those earth wires, through the service connection (which is an underground service connection), through the sheeting of the service connection, we provide an earth terminal

on the consumers' boards. That is in the newer suburbs, the newer reticulations.

This question of legality, or responsibilities, is rather a sticky one and I would like to ask the Engineer from De Aar who controls the water mains in his town? Is it the Railway or is it the Municipality? If it is the Municipality, the Municipality is providing an "earth". It is another department, but nevertheless it is a Municipality "earth" and it must have accepted that responsibility at some stage or other. If the one Department have changed their policy, it looks to me as if he has to accept the responsibility of providing some other means of earthing.

Mr. L. FUTCHER (Kempton Park): Mr. Quiz Master, I feel that the Electricity Department of the Municipality should take over the system as a whole and not rely on the Town Engineer's Department to provide the "earth" by means of water pipes. Therefore, I feel that it is only right that the Electricity Department should run its own earth and not rely on the water pipes.

As you know (there is a tendency now for water systems in the house to be carried out by plastic piping. What is then going to be the result? I think that at this stage we must realise that we have to provide that "earth" and run it around our systems. We are doing that at the moment in Kempton Park and it is quite effective. We do not rely on water pipes at all for earthing.

Mr. P. A. GILES (East London): In the old parts of the town, where the City and Water Engineer is responsible for the water system, earthing is carried out through the metal water pipes. There have been no failures or accidents to date on this system.

In the newer areas where asbestos cement pipes are installed the Electricity Department takes the responsibility for providing the "earth" themselves. Each sub-station is earthed and the neutral is carried right through to the consumer's premises, and the consumer's neutral is connected to it. If the neutral by any chance breaks, which has occurred, occasionally, the supply to the consumer is off. Admittedly, the one end of the service

wire is "alive", but fortunately there have been no accidents on that account. There are 12,000 consumers in East London and I think that the risk of a neutral wire breaking is very small.

Mr. J. C. DOWNEY (Springs): Thank you, Mr. Giles. The matter is still open for discussion, Gentlemen. Well, you seem to be a bit slow in coming up, so I had better give you the experience that we have had in Springs.

In the past, all the old townships were supplied by means of overhead service connections. During the past few years we have changed our system to underground service cables, although we still use the overhead distribution main. We use the multiple earth system for steel poles where the neutral is solidly connected to each pole and when the cable service connection is installed, the neutral is bonded to the lead and armouring of the service cable and fastened to a neutral strap on the pole.

At the consumer's end of the service cable, the lead and armouring are again bonded together with a wire and we provide the consumer with an earth. The installation is treated as a two-wire (or whatever it may be) insulated system, but, as you know, it is *not* such a system.

The consumer is also required to provide a further "earth"—with an earth plate, in terms of the Regulations, or an "earth" to the water mains. Since we have introduced that system, we have no case on record where there has been any shock received.

Mr. Sibson explained to you before, a case they had in Bulawayo of the plumber removing a water meter. We had a similar accident in Springs, but fortunately the plumber only received a shock. He had omitted to apply the earthing straps supplied to him some years previously.

In townships where we have no water mains and where the old overhead system is in vogue, we use the same system as recommended in the Standing Wiring Regulations, with the earthed to neutral.

I might say that, prior to using the multiple earth system in the town, we had had a few accidents, but fortunately they were not fatal to human beings, but fatal

only to animals. Where we have introduced the multiple earth system (earthing the neutrals to every pole), we have no case on record where an accident has occurred. That is the position existing today in Springs.

Are there any other members who would care to contribute to this query submitted by Mr. Macques?

Mr. E. L. SMITH (Boksburg): Mr. Quizz Master, I would like to ask another question, if I have your permission. In Boksburg we have 11 kV distribution and high tension consumers are also supplied with 11 kV. For the past few years we have had quite a number of blow-outs at cable end boxes, up to 3 feet from the cable end, and it usually happens between 12 midnight and 4 a.m. and more often in winter. It looks as though it is a surge doubling back from the cable end box. The cable has been made to specification, 480. It is an unearthed cable used on an earthed system, therefore the insulation should be pretty good.

Now, we have searched high and low for the cause of this phenomenon on the system. For no known reason these blow-outs take place, sometimes three or four on the one cable end box, causing quite a lot of inconvenience. I am just wondering if any of our cable manufacturers here or any other engineer could give an explanation for the blow-out. It never happens on the run of the cable, but as I have said up to 3 feet from the end box.

Mr. J. C. DOWNEY (Springs): Gentlemen, you have heard what Mr. Smith has had to say. Do any of you wish to try to help him solve his problem?

Mr. J. A. MATHEWS (Kimberley): We are experiencing exactly the same trouble that Mr. Smith is experiencing. I am having failures at the rate of about one every four weeks, these occur anything up to 18 inches below the wipe on the cable end box. In my case most of the trouble can be attributed to bad workmanship, bad installation design and damage which has been occasioned to the cable in installing. We have positive evidence of wrinkling of papers, we have evidence of the gland having been put on not quite true with the locating bolts on the box (the cable jointer had to twist the gland). We

have also experience of the mutilation of the cable itself where it has been handled during installation and I think that if Mr. Smith would look more for mechanical maltreatment of his cable, he might find the solution to the problem.

Mr. E. L. SMITH (Boksburg): All these points have been checked—the cable end boxes have been made off by experts and we have had other people on them too, and still it happens. All those points have been checked and it is not bad workmanship.

Mr. A. R. SIBSON (Bulawayo): That is what I thought, too, Mr. Quizz Master, when we had similar trouble. I was quite sure that it was not due to bad workmanship, but in many cases it was subsequently proved, without any doubt at all, that it was.

There is one other possibility and that is if the cable itself is not adequately supported in the near vicinity of the end box, movement can take place due to the cable itself expanding as it heats and cools in service or due to external temperature changes, which impose stresses on the cable at the wipe itself or at some point lower down where the first support is and constant movement of the cable, as the result of these stresses, can ultimately lead to its failure.

I would urge the necessity of clamping the cable all the way along its length to within not less than 12 inches of the wipe, in order to make sure that the cable is firmly fixed and is not subject to movement as the result of any changes of temperature.

But I would say that, generally speaking, the troubles to which Mr. Smith refers, are due to one of two causes—either bad workmanship in the first instance or due to the point which I have just raised.

Mr. E. L. SMITH (Boksburg): May I come back again? The cables have also been well supported, to test the theory out as well. As I have said, the cable end joints have been made perfect. It happens just about 3 feet below the box. It is not the workmanship—that is ruled out. The cable is supported, so could someone else please give me some other theory instead?

Mr. R. M. O. SIMPSON (Durban): Mr. Quizz Master, at one time we experienced

similar trouble and still occasionally experience a failure. Investigating ways and means to overcome the trouble, we found that the main cause was due to careless handling of the box and to make a more robust job we now wipe the armours into the same wipe as the gland on the cable box. This keeps it very firm and removes the possibility of fracturing the lead below the wipe.

Mr. G. J. MULLER (Bloemfontein): Mr. Quizz Master, we have also been unfortunate enough to have some cable box failures, somewhat similar to Mr. Smith's. We have also checked our own jointers. In some cases we have found damp gaps inefficiently made; in some cases we have found rather poor workmanship elsewhere. But these are not the general rule and we are still looking for the final reason for these cable box failures or, rather not cable box failures, but these failures below the cable box.

What tends to make one think that it has to do with the cable rather than with the workmanship, is the fact that we have also had cable failures several hundred feet from the box, with the cable fault from the inside. In other words, it is not the outer layers of the cable, which might have been damaged in handling or in transit or anything like that. It has been sufficiently far to discount the effects of jointing and we have had cable failures from the inside of the cable, where the cable was destroyed from the inside, with just a pencil-point hole showing through the armour.

Mr. J. F. LATEGAN (Heidelberg): Mr. Quizz Master, I have experienced a few faults in 2.2 kV. I have found that at the wiped joint, the insulation punctures and on clearing back, I have found the impregnation dried up for about 3 feet. It may be quite possible that with the erection of the end box on the pole, due to heating affecting the cable (the sun's heat), the impregnation may run down. It would be advisable, where the complaints crop up, to look at the other side of the box inside whether there is not any impregnation running out. That may be an indication that there is capillary action backwards of the impregnation at the pole end of the cable.

Mr. J. C. DOWNEY (Springs): Thank you, Mr. Lategan. If Mr. Dunstan is present, would he care to say a few words on this matter?

Mr. R. S. DUNSTAN (Pretoria): Mr. Quizz Master, I don't know why you suddenly pick on me like that. We have had a considerable amount of trouble and we had an end box fail last Sunday morning. A number of gentlemen seem to question the jointers' abilities; I think you can forget that.

I think that the real fundamental reason for all these cable faults is given in a paper that Dr. Mortlock read to the Institute of Electrical Engineers last Thursday night in Johannesburg.

If any of you have considered examining the cable papers—I think Mr. Lategan said that he had found punctures in the paper—take a sample of your paper and examine it carefully, starting at the paper that is nearest to the conductor. You will probably find a few pinholes. You will find that the hole starts as a small puncture next to the core and that it gradually becomes less and less in size as it works outwards. It may puncture five, ten, twelve layers of paper.

If you examine those punctures very carefully, you will find that there is no burning, tracking, or carbon; it is a pure impulse puncture. I have no doubt in my own mind that there is some system condition that produces a high voltage or a surge voltage on the system and that is what you have to look for.

Now, the point is, how can you prove it and how can you find it? Incidentally, before I go on to that, our trouble always occurs between 1 a.m. and 6 a.m., usually on a holiday and usually at a weekend. That is not a coincidence; that is due to the loading conditions. There is something in the loading conditions that produces a state of either resonance or a surge.

The point we all have to tackle is not to chase the jointer. It is no good chasing the cable manufacturer—you won't get any satisfaction and I don't think it is his fault. We have to find out, first of all, what is the frequency of these surges, what is the magnitude of the voltage and what causes it. Well, I cannot answer any question yet. We are trying to measure

the magnitude of the voltage. If anybody else has any ideas of measuring the voltage, well, we should like to hear of it, too. At the moment we have measured the voltage up to 18 kV R.m.s. Beyond that we do not know.

Mr. J. C. DOWNEY (Springs): Thank you, Mr. Dunstan. I must say that you have confirmed the opinion that I have held for a long time; our faults occur under similar conditions.

But now, since it is twenty-six minutes to four, before the President clamps down on me, I think I had better clamp down on you.

I want to thank you, one and all, for your contributions, particularly the engineers who have submitted queries and those of you who so very kindly have come forward to assist them by answering their problems. Thank you very much indeed, Gentlemen.

PRESIDENT: And my thanks to you, Mr. Downey, for the very able manner in which you have conducted the Engineers' Forum this afternoon. Gentlemen, will you join me in expressing your appreciation, please? (Applause.)

CONVENTION ADJOURNS AT 3.35 P.M.

THIRD DAY:

Thursday, 5th May, 1955 (9.45 a.m.).

PRESIDENT: Gentlemen, will you take your seats, please. Apologies for the late start, but the Executive were very talkative this morning. I have had rather a cryptic message from the Enquiries Desk—it says that only about half the delegates have called for their Alka Seltzer this morning! (Laughter.)

I have had a telegram from Mr. J. C. van der Walt, Krugersdorp, which may interest you. It reads:—

“Hartelik geluk met verkiesing tot President. Mag Konferensie meer suksesvol wees as my visvang.”

I propose bringing on Mr. Gorven's paper at about 10 o'clock and in the meanwhile I want to proceed with the Agenda—Reports of Sub-Committees and Representatives—and I now call on Mr. J. C. Downey to present his report on the South African Bureau of Standards.

Mr. J. C. DOWNEY (Springs): Mr. Presi-

dent, Gentlemen, the Report on the Bureau of Standards I am submitting on behalf of Mr. J. L. van der Walt, as his alternate. These reports have been laid on the table and I do not think there is any need for me to read out any portions thereof (it is quite clear), unless any member has any question to raise.

In dealing with the Meter Test Code, which is a Bureau of Standards matter, I have the following to report:—

It will be remembered that at the Bloemfontein Convention, it was reported that the meter test code was submitted to the Minister of Economic Affairs for his consideration with a view to promulgation.

The Minister has indicated that he is not prepared to promulgate the meter test code at this stage.

The matter, however, is to be reviewed in the future.

I think that covers all the matters with regard to the Bureau of Standards.

REPORT ON WORK OF TECHNICAL COMMITTEES OF THE SOUTH AFRICAN BUREAU OF STANDARDS.

By Mr. J. L. VAN DER WALT (Krugersdorp):

The following list indicates the alterations and additions of the various stages of Codes of Practice and Specifications of particular interest to members of the A.M.E.U., and drafted by the various Technical Committees, on which your Association has been represented. This list should be compared with that submitted to the Convention at Bloemfontein in May, 1954:—

1. New Publications.

(a) Quality Specifications.

Apparatus Connectors for Portable Domestic Appliances	167-1953
Flexible P.V.C. Compounds for Electrical Purposes	175-1953
Re-inforced Concrete Poles for Telegraph Telephone Power and Lighting Purposes	470-1953

- (b) *Safety Specifications.*
 Flexible Cords for Power Lighting Purposes SV.104-1953
 General Requirements for Portable and Industrial Electrical Appliances SV.100-1953
 Portable Appliances for Heating Liquids SV.107-1953

2. In the Course of Publication.

- (a) *Quality Specifications.*
 Cartridge Type Fuse-links for Low and Medium Voltage Electric Fuses.
 Cartridge Type Electric Fuses for Low and Medium Voltages, excluding Fuse Links.
 Immersion Type Thermostats for Electric Storage Water Heaters.
 Low Voltage Porcelain Insulators.
 Paper Insulated Electric Cables for Heavy Duty, 98-1954. (Revision of 98-1950.)
 Rewireable Type Electric Fuses for Low and Medium Voltages.

3. Under Review — Following Comments.

- (a) *Quality Specifications.*
 Intrinsically Safe Electrical Apparatus.
 Lampholders.
 (b) *Safety Specifications.*
 Electric Heating Pads and Blankets.

4. In the Course of Preparation.

- (a) *Quality Specifications.*
 Copper Wire Bar for the Manufacture of Electrical Conductors.
 Heating Units.
 Induction Motors.
 Insulating Tapes.
 Letter Symbols and Abbreviations.
 Memorandum on Giorgi or m.k.s. System of Units.
 Nomenclature in Electrical Engineering.
 Safety Belts.
 Small Domestic Type Lightning Arrestors.
 Stove Wire.
 Transformers.

- Roof Connector Boxes.
 Miniature Circuit Breakers — revision.
 Wall Outlet Boxes.

During the year the Bureau investigated the advisability of the drawing up of a specification for domestic refrigerators, as such a request was received. Among the points to be considered were:—

- Insulation, quality, finish, anti-rust, performance, speed of making ice, noise and standard dimensions.

The Investigating Committee, upon taking a vote, decided against the drawing up of the specification.

Safety Specifications.

It will be noted that the long awaited SV.100 has now been promulgated. It will be remembered that at the previous Convention it was reported that the following nine safety specifications agreed to *in principle* by the Minister of Economic Affairs for promulgation, so as to become compulsory.

- SV.101-1953—Manually Operated Air Break Switches.
 SV.102-1953—Portable Electric Immersion Heaters.
 SV.103-1953—Electric Air Heaters and Radiators.
 SV.104-1953—Flexible Cords for Power and Lighting Purposes.
 SV.107-1953—Portable Appliances for Heating Liquids.
 SV.109-1953—Plugs, Sockets, Outlets and Socket Outlet Adaptors.
 SV.112-1953—Electric Hand Lamps.
 SV.117-1953—Electric Stoves and Hot Plates.
 SV.121-1950—Apparatus Connectors for Portable Domestic Appliances.

The specifications were referred to the Government Legal Advisors, who pointed out that references were made to specifications, not recommended for promulgation, and various other small matters. These were attended to by the Bureau, and a tenth specification has now been recommended for promulgation i.e. Lampholders and Adaptors—SV.119-1950. The specifications have been resubmitted to the Minister of Economic Affairs, and further results are awaited. The promulgation of

these safety specifications will have far-reaching effects on South Africa but is all in the interest of the buying Public.

Quality Specifications.

It will be noted that a specification of Power Transformers is in the Course of preparation. This is of utmost importance to the Municipal Engineers, and your representatives on this Committee will have an immense responsibility placed upon them.

It is also of importance to note that due to a request from the Chief Inspector of Factories, the Bureau is undertaking the drawing up of a specification for Roof Connector Boxes to comply with the Factories Act.

The Revision of Miniature Circuit Breakers is also being undertaken.

The Bureau of Standards has also kept your representative informed, re the activities of the International Electrotechnical Commission on such matters as Standard Voltage; Current Ratings and Frequencies; Specification for series Capacitors for Power System; Photographic Reproduction of Italian Proposed Standards for Switch Devices; Tests for Determining Separate Losses and Efficiencies of Rotary Machines.

The Association's appreciation is recorded for the valuable assistance obtained from its members who have sacrificed their valuable time in representing the Association on the various Technical Committees.

From this report it will be noted that the activities of the Bureau is expanding, and the Association's thanks is due to the Director and Staff for their co-operation, assistance and facilities granted to your representatives on the various Technical Committees.

PRESIDENT: Mr. Downey, I see you also have to present the report of the Wiring Regulations Committee.

Mr. J. C. DOWNEY (Springs): The Wiring Regulations Promulgation Committee: Mr. President, as reported previously, the position is that there have been many amendments to the Wiring Regulations, but the generally accepted principle is that we accept the Wiring Regulations as a Code of Practice only and that no promulgations be entered into.

The position in Cape Town, according

to a report from the Cape area, is that many of them are still using the Red Book as the promulgated Wiring Regulations for the Cape, but the generally accepted practice is to accept the new edition, the Second Edition, with amendments, as the Code of Practice, as stipulated in Regulation 19 of the Wiremen's and Contractors' Act.

The Safety Precautions, Mr. President, which is coupled up with the Wiring Regulations—details of the amendments have been laid on the table and I hardly think it is necessary for me to enumerate them. They are not given in detail; just a few salient points have been brought out, because the Sub-Committee dealing with the Wiring Regulations, have been working on these for some considerable time and at a recent Main Committee Meeting of the Safety Precautions Committee, many of these were finalised and will shortly be in the hands of the printers for the new publication of the Second Edition, with amendments.

PRESIDENT: Thank you, Mr. Downey. Does anybody want to put questions to Mr. Downey on that matter?

REPORT OF SAFETY PRECAUTIONS COMMITTEE.

The Committee met on at least two occasions during the period under review principally to consider the amendments to the second edition of the Wiring Regulations. The amendments are now complete and a revised second edition should be available from the printers before the end of 1955.

The amendments include all alterations suggested and approved from mid 1951 onwards when the present edition was issued.

Important alterations adopted are:—

- (a) Owing to changes in the overall dimensions of V.R.L. cables and the provisions of general purpose and heavy duty V.R.L. standards the table giving conduit capacity has been revised.
- (b) Arising from (a) 5/8 inch conduit will now be acceptable buried in plaster, etc.
- (c) Certain definitions have been altered particularly in connection with specifications and standards.

- (d) Greater discretion has been granted to the supplier in applying the regulation on estimated loading.
- (e) Printing errors have been corrected in Regulations 202 and 1217D.
- (f) The regulations have been altered to specifically authorise the use of aluminium sheathed cables and also p.v.c. sheathed cables.
- (g) The regulations have been amended to necessitate the use of a double pole main switch where a single phase supply is given and generally certain contradictory regulations affecting main switches have been amended. In addition the requirements regarding neutral switching have been clarified.
- (h) Regulation 504 (m) has been the subject of discussions over many years and appears to have originated in a desire to simplify isolation of circuits on a multiphase board. It appears hardly necessary if circuits are clearly marked and has been deleted.
- (i) With the increased use of the so-called miniature circuit breakers the regulations have been amended in several places to permit their more general use.
- (j) The regulation requiring hinged doors on distribution boards has been amended to make it clear that a hinged or other approved door is only required where fuses are in use.
- (k) The notice required under regulation 221 is now required at sub-main switches where the consumer or sub-consumer has access only to a sub-main switch.
- (l) Provision has been made for the use of small bayonet cap or small edison screw lamp holders.
- (m) Regulation 710 has been altered to omit the existing indirect prohibition of liquid starters.
- (n) reference to a specific colour for lights in the safety lighting system in theatres has been deleted.
- (o) Regulations 1210 and 1212 have been altered so that the current rating of control apparatus is associated

with the connected load and not the size of wire as at present.

- (p) Regulation 1217 (B) has been amended by omitting the reference to v.r.i. conductors.
- (q) Regulation 308 has been amended to ensure that service mains and feeders to distribution board are not less than the largest conductors of any sub-circuit.

Tariff Survey Sub-Committee: Mr. Downey, have you a Report on the work of that Sub-Committee, please?

Mr. DOWNEY (Springs): Tariff Survey Sub-Committee: Schedules of tariffs have been received from most local authorities. The scheduling of these tariffs has now been undertaken but, owing to pressure of work, will take some time to complete.

As soon as the tariffs have been scheduled, your sub-Committee will consider this schedule and proceed with their work.

That is all I have to report, Mr. President.

PRESIDENT: Any comment, Gentlemen? Thank you very much, Mr. Downey.

Gentlemen, I have great pleasure in introducing to you Mr. O. D. Gorven. Mr. Gorven is Personal and Technical Assistant to the City Treasurer of Durban: In November last year your Executive Committee decided that we should try to arrange for a paper dealing with financial matters, so that Councillors would also have the opportunity of contributing to the discussion.

We had great difficulty in getting such a paper and by January Mr. Muller and I were really worried.

Fortunately I was told that there was a possibility of Mr. Gorven reading a paper of the desired type. We are very grateful indeed to him for preparing it in such a short time and I now call on him to present his paper. Mr. O. D. Gorven. (Applause).

Mr. O. D. GORVEN (Durban): Mr. President and Gentlemen, I would like, at the outset, to thank you for your Association's very kind invitation to me to present this paper.

I might say, Sir, that it did not cause me all the difficulty that you have men-

tioned, because the basis of the paper was prepared for some other purpose some six years ago and it was merely a matter of endeavouring to bring the paper up to date to show the latest trends.

By and large I think that City Electrical Engineers are more interested in the financial side of their operations than are heads of departments in other spheres. I must say that it was with a bit of trepidation that I accepted your invitation because of that factor.

Now, Sir, had I known that Alka Seltzer was available this morning, I might have done something about it, because, you know, I seem to have a 50-cycle note buzzing through my mind and I can't get rid of it, but I would like to feel, or I would like to think that that 50-cycle note is due, perhaps, to part of those 1,200,000 kilowatts which you Gentlemen control and not to that very excellent function at which we were entertained last night. I am sure that certain of your delegates also have one of these errant notes buzzing in their minds and, with your permission, Sir, I would like to endeavour, with my eye on the clock, to curtail this address very slightly by summarising certain portions of it, which, whilst I feel are interesting and allied to the subject, are not entirely essential to the argument. I shall indicate the paragraphs that I omit.

I am moving right away today from the conventional treatment of this question of depreciation and renewal funds, because that side, I think, is already well known to all you people who are present.

DEPRECIATION AND RENEWAL FUNDS

by

O. D. GORVEN,

B.Com., A.I.M.T.A.(S.A.), A.C.I.S.

Introduction

1. I would like today, to depart from the conventional method of treatment of the subject "Depreciation and Renewals Funds", as the various methods which may be adopted to make financial provision for the writing off or replacement

of fixed assets are well known and can in any event be referred to in any good text book.

2. What I do wish to deal with is the effect of changing price levels on the replacement of fixed assets as this matter has become of considerable importance to all forms of undertaking, whether commercial, industrial or Governmental, due to the differences in price level which have occurred particularly since 1939.

Depreciation and Renewals Funds Defined

3. It is quite common for the terms "depreciation" and "renewals" to be regarded as being synonymous, and to a large extent Local Government legislation and accounting terminology are to blame. In actual fact there is a sharp distinction between a Depreciation Fund and a Renewals Fund, and the degree of importance of this distinction varies directly in accordance with any change of price level which may have occurred since the acquisition of the asset.

4. A Depreciation Fund is, briefly, a fund built up by appropriations from revenue or profits to such a figure as will enable the original cost of the asset, less any proceeds from the sale of scrap, to be written off. This original cost is often referred to as the historical cost of the asset.

5. The Renewals Fund, on the other hand, is a fund built up by appropriations from revenue or profits to such a sum as will, after being supplemented by the proceeds of sale of scrap of the existing asset, be sufficiently high to meet the cost of renewing the asset. This cost is usually referred to as the replacement cost.

6. The distinction is clear. Under the Depreciation Fund system we merely attempt to eliminate the asset from the Capital Account by writing off the net historical cost of such asset over its useful life and when necessary, we purchase the replacement asset from Capital Funds, and charge same to Capital Account at the replacement cost. Under the true Renewals Fund system, however, (except where the asset is not replaced), the historical cost

of the asset is never written off, and instead of the replacement cost being charged to Capital Account, it is charged directly against the Renewals Fund. This Renewals Fund would have been built up by suitable appropriations from revenues or profits, bearing in mind any change in replacement cost which may occur from time to time.

7. In Local Government finance, provision for the writing off of fixed assets is, however, not made through the medium of Depreciation or Renewals Funds alone, as such funds are, in general, only required to be established when the anticipated life of an asset is less than the period of the loan which has been raised to finance the asset.

8. Provision for the writing off of assets financed from loans, for which no Depreciation or Renewals Fund is required to be established, is made by contributing from Revenue Account to a Sinking Fund such annual amount as will, together with accumulated interest, be sufficient to accumulate to the nominal amount of the loan at the end of the loan period. This Sinking Fund is to all intents and purposes the equivalent of a Depreciation Fund, as the amount standing to the credit of the Sinking Fund will be sufficient to write off the historical costs of the assets purchased from the loan to which the Sinking Fund refers.

The Effect on Capital Account

9. In times when prices remain stable over the life of the asset the cost of replacement will equal the historical cost, if an identical asset is purchased, and it would then make no difference to the final result on Capital Account if either the Depreciation Fund or the Renewals Fund basis were used. It is safe to say, however, that in practice, these conditions seldom, if ever, exist, particularly in the case of assets having long estimated lives, and we must therefore accept the fact that two radically different accounting treatments are possible.

10. Whilst the accounting treatment on the Renewals Fund basis, as opposed to the Depreciation Fund basis, applies equally

well whether there is a rise or a fall in price level, I think it is generally accepted that although short-term increases and decreases in price level do take place, the general long-term trend in price level throughout history has been upwards. It is, indeed, this consistently upward trend and the effect which it has had on the capitalisation of undertakings that has focussed the spotlight on the difference between the two possible accounting treatments, and in 1948 Sir William Goodenough forecast a further long-term upward trend when in his address to the stockholders of Barclays Bank, he said:—

“Bearing in mind that managed currencies, coupled with the principle of ‘full employment’, have displaced the automatic checks and balances of the nineteenth-century gold standard, and remembering that a large element in costs of production everywhere is extremely rigid, it would be unwise to think on any other assumption than that the long-term trend of prices will continue to be upward”.

11. This statement could well be repeated today as the conditions then described by Sir William still exists and whilst I shall at times discuss falling prices, I intend to deal particularly with the conditions which arise under the two systems in times of rising prices.

12. If we proceed, then, to examine the effect on Capital Account of the two methods under discussion in times of rising price levels, we shall find that where the Depreciation or Sinking Fund system has been used (i.e. where the asset has been provided for only to the extent of the historical cost), it is necessary to find further capital to cover the excess of the replacement over the historical cost, and it should be appreciated that this additional capital is required purely for the purpose of *maintaining intact the existing assets of the undertaking, and does not in any way contribute towards an increase of the physical assets of the concern.*

13. In the case of the Renewals Fund system, however, the Capital Account is not involved in any way, as the full cost of replacement is borne from the Renewals Fund, and in such circumstances, no

additional capital is necessary in order to renew existing assets. The difference is, of course, that under the Renewals Fund system, the excess of the replacement cost over the historical cost has been provided from appropriations from revenue or profits.

14. In times of rising prices, therefore, the use of the Renewals Fund system is essential to enable the physical assets of the undertaking to be maintained without further borrowing. In times of falling prices, the Renewals Fund system can also quite equitably be used, but it would result in a smaller sum being charged against revenue or profits than the original cost of the asset, and conservative accounting treatment would favour the use of the Depreciation Fund system in order to ensure that the full original cost of the asset was provided for.

The Double Account System

15. To revert, however, to times of rising prices, it is interesting to note that the use of the Renewals Fund system is no new innovation, for the true Double Account system (a modification of which is in general use in Local Government today) relies for its success on such a fund. This Double Account system was the one prescribed overseas by Statute for the accounts of such Parliamentary Companies as the Railway, Gas, Electricity, Water and Dock Companies, in which the capital expenditure was heavy.

16. The object of the original Double Account system was to set out clearly the capital which had been raised for any undertaking and the manner in which that capital had been expended in the purchase of fixed assets. For this purpose, the balance sheet was divided into two sections, the first being termed the Capital Account in which capital receipts and payments were recorded. The balance of this Capital Account, representing the balance of fixed capital in hand or over-expended, was carried to the second section of the balance sheet which was termed the General Balance Sheet. In this General Balance Sheet, the current or floating assets and liabilities were also recorded.

17. Under the Double Account system, depreciation is not provided for in the usual manner, and in theory the cost of all renewals or replacements made in any year should be charged to the Revenue Account of that year, the Capital Account remaining at all times unaltered except where additional capital is raised or additional assets are purchased. The procedure of charging all renewals or replacements of assets against revenue during the year concerned would, however, result in violent fluctuations on Revenue Account, and in order to overcome this undesirable state of affairs, the technique of building up a Renewals Fund was devised, such fund to be built up by making relatively even appropriations from Revenue Account each year. This fund was then available to meet the cost of replacement of assets from time to time, and an adjustment on Revenue Account during the year of replacement of any asset would only be necessary to the extent that the Renewals Fund was too great or too small.

18. It will be appreciated that in order to accumulate the correct amount in the Renewals Fund to allow for the replacement of the asset, it is necessary to make some adjustment for the anticipated increase or decrease in price of the asset as at the replacement date.

19. Discussing this matter in his book "Railway Accounts" published in 1930, C. H. Newton, dealing with the then prevailing practice of calculating renewal provisions on the historical cost of assets said:—

"... The great increase in the cost of wages and materials arising since the war rendered such provisions wholly inadequate for ultimate renewal of assets which were produced originally at comparatively low prices. It became necessary, therefore, in many cases to revise the basis of annual provision, and this was done by taking the estimated renewal cost in lieu of original capital cost. Annual provisions on the revised basis are now generally referred to as 'Renewal' provisions and the accumulated funds as 'Renewal Funds'."

20. The Renewals Fund system has been criticised on the grounds that it is diffi-

cult to determine with any degree of accuracy the amount properly chargeable each year against revenue or profits, particularly in the case of long-life assets. In addition, the system is criticised because cases are rare indeed where the replacement asset is an exact replica of the old, giving doubts as to whether the whole cost or only part thereof should be charged to the Renewals Fund. I shall elaborate on these aspects at a later stage.

21. The remaining noteworthy criticism of the Double Account system is to the effect that inasmuch as the assets continue to be recorded at their original cost in the Capital account, even though they may since have been replaced from the Renewals Fund at a greater or lesser cost, the Balance Sheet does not reflect the true position. This may be so, but we should remember that *the Double Account system does not purport to show the true position*, and that it is designed merely to indicate how the original capital was expended and to ensure that the *value of that capital will be maintained*. In any event a minor accounting adjustment could cause the assets to be shown in the Capital Account at their most recent cost, the balancing item being, of course, a Reserve Account representing the difference between the historical and replacement costs of all assets which have been renewed.

22. I mentioned earlier that Local Authorities today operate in general on a modification of the Double Account system, but whilst the form of Balance Sheet is maintained, the replacement of assets is invariably dealt with on the Depreciation Fund or Sinking Fund system, i.e. the historical cost of the asset is written off from available funds and the new asset is capitalised, any increase in cost being financed by raising additional capital monies.

"Real" versus Money Values

23. It will be appreciated from the foregoing that industrial and commercial undertakings which until the last decade usually worked on the Depreciation Fund system or an equivalent thereof (and many of which today still operate on this sys-

tem) found themselves in difficulties in the immediate post-war years when faced with high replacement costs of assets. The concerns which had been financially prudent and built up large reserves from appropriations from profits and kept such reserves in a relatively liquid form, were not affected to a high degree as they had, in effect, been providing for replacement costs of assets by creating General Reserves from which to meet such and other contingencies. Other less prudent concerns, however, were forced, and are still being forced, to raise additional capital in order merely to maintain existing productive capacity, and some, in face of extreme financial embarrassment, have been forced into liquidation.

24. These aspects have, not surprisingly, been given prominence by economists, who, with their natural devotion to "real" or physical assets rather than the value at which such assets are recorded in £ s. d. have put forward convincing arguments as to the necessity for the general adoption of the Renewals Fund system for replacement of assets, together with further adjustments necessary to maintain the working capital of any undertaking intact without additional borrowing.

25. The economist argues that the original capital was raised to enable the concern to function at a certain physical capacity, and that regardless of any changes in the value of money, this physical capacity must be maintained entirely out of the revenues which the concern produces. If this productive capacity is not maintained entirely out of revenues, the economist argues that *there has been a loss of "real" capital*, because it becomes necessary to raise further capital funds merely to finance the replacement of existing assets and to function at the originally designed capacity.

26. In so far as the replacement of fixed assets is concerned, the economist would, therefore, support the use of the true Renewals Fund, but the accountant on the other hand, takes the view that his function is to record accurately the known facts of any case. These facts, the accountant argues, are always available in the form of the historical cost which

can be written off over the life of the asset as the use of the Renewals Fund basis would necessitate the introduction of several arbitrary and nebulous factors. These arbitrary and nebulous factors would affect asset with some degree of accuracy, where in all probability result in widely diverging conclusions being reached by different accountants on the same set of Accounts, as the degree of adjustment for replacement cost would largely be a matter of opinion. The adjustments would, therefore, be productive of confusion and would result in a loss of confidence in the reliability of published accounts.

27. A further view advanced by the economist is that in times of rising prices, taxable profits are inflated, and that to the extent that taxation is payable on the difference between the depreciation charge allowed for fiscal purposes and the actual charge necessary on a replacement basis, the capital of industrial and commercial undertakings is being systematically taxed away. This problem has been recognised by several Continental countries, including France, Italy and Belgium, (where the degree of inflation has been much more pronounced) and co-efficients for conversion of capital costs to current values have been laid down to enable replacement costs as opposed to original costs to be taken into account in computing the depreciation charge for fiscal purposes. I do not doubt that if the taxation authorities in this country announced that depreciation on replacement costs could be taken into account in computing taxable income, some satisfactory basis of conversion would very soon be devised in order to take advantage of this concession.

28. In any event, the figures of historical cost produced by an accountant cannot be regarded as an accurate measure of the productive capacity of any concern, as any two concerns having identical balance sheets in money values may, in fact, have widely differing real values due to the assets having been purchased in different price eras. This factor must surely cause the accountant some considerable concern, and whilst he would be horrified at the thought of reflecting different assets on the same balance sheet in various curren-

cies such as dollars, sterling or francs, he is nevertheless guilty of a comparable act when he includes on the same balance sheet, assets acquired over a period of years in the form of sterling units of different value, as the value of sterling itself is continuously changing in terms of its power to acquire physical assets.

29. When faced with this charge, the accountant expresses the view that the unit of measurement has changed and that his stewardship demands that the facts be recorded accurately, and in fairness we should remember that the accountant's views are supported by law. On the other hand, however, what accountant, after being told that the distance to a certain village was 3 miles and having walked what in his opinion seemed at least 6 or 10 miles, finally arrived footsore at his destination, would take kindly to the casual explanation offered that the unit of measurement of the mile must have changed. And what finer example of accounting stewardship than to have maintained the real capital of a undertaking intact, and to have shown the final accounts in terms of current sterling units of the same value, thereby making possible true financial comparisons as between different undertakings.

The Trade Cycle

30. The contentions of the economists seem irrefutable. These are further enhanced when one considers the detrimental effects of the use of the Depreciation Fund basis as opposed to the Renewals method in relation to the Trade Cycle.

31. On the upswing of the cycle, when prices are rising, the use of the Depreciation system, with its attendant insufficient charge, results in inflated accounting profits which are frequently distributed in the form of dividends. This apparent prosperity gives an extra fillip to hopes which are already extravagant, thereby aggravating the inflationary trend. On the downswing of the cycle the position is reversed, and the figures may appear more depressing than the facts warrant.

32. The menaces of the boom and slump periods in the Trade Cycle might be considerably moderated by the universal appli-

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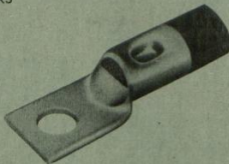
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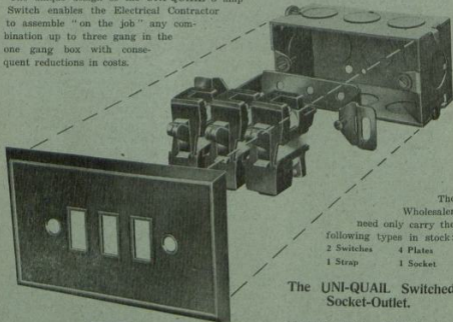
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cation of the Renewals Fund basis of replacement of capital outlay. During the inflationary upswing the very act of making provision at the ruling higher prices would, by reducing the profits available for distribution as dividends, have the effect of restricting the purchasing power of the public, thereby tending to curb the upward movement of prices. On the downswing of the cycle when asset replacement costs are falling the corresponding renewals provision will be less. Thus relieved of a portion of the renewals burden, more profits will be available for distribution, and the increased purchasing power of the public will tend to check the downward trend of prices.

33. Local Government accounting can exercise a similar influence on the Trade Cycle. During the upswing of the cycle, at which stage optimism runs high and money circulates freely, a higher charge against Revenue Account in respect of Renewals, ultimately necessitating an increase in Assessment Rates or tariffs, would serve to reduce the degree of false optimism prevailing and may assist in levelling off the peak. The converse would apply during the downswing, when the Local Authority, by virtue of its sound financial policy, would be in a position to assist materially by reducing rates and tariffs to the extent of the lesser Renewals provision.

The Effect of the Controversy.

34. In all fairness it should be mentioned, however, that a large number of prominent accountants both in Britain and America agree wholeheartedly with the economists that some attempt should be made to present published accounts in a form which will make them comparable, and will make it possible for persons to judge the real value of the undertaking.

35. The various Accountants' Institutes in Britain and America have also dealt exhaustively with this problem. The Institute of Chartered Accountants has in recent years considered the matter on no less than three occasions in its recommendations on accounting principles Nos. IX, XII and XIV. Each of these recommendations represent an advance in the views

of the Institute and each recommendation goes materially further towards meeting the view of the economist in its suggestions than its predecessor. In general the latest view of the Institute of Chartered Accountants is that provision for the replacement cost of fixed assets should be made by way of a general appropriation from profits to reserve account and not as a specific charge against profit and loss account. It is indicated, however, that should accountants choose to supplement the conventional published accounts with further statistics and information in an endeavour to present the current "real" position, then such statements or schedules should be accompanied by fully explanatory notes dealing particularly with the methods by which the figures have been arrived at.

36. The Institute of Cost and Works Accountants was first in the field in 1952 with the issue of a research publication on the matter entitled "The Accountancy of Changing Price Levels" and in this publication, it was recommended that accountants should meet the challenge of business to supply more reliable and useful information to its management by the development and extension of new techniques of compiling, preparing and presenting information, and came to the conclusion that there was no reason why the compilation of information which was free from the influence of changing price levels should not be made by the employment of the principles and practices described in its publication.

37. The recommended principles relating to accounting in terms of comparable values include the following:—

"To provide an account of stewardship in terms of real values and ensure the maximum comparability of accounting data, the money values should be converted into the money values of a previous point in time".

The "previous point in time" referred to was the time at which the capital was originally subscribed or, if the largest subscription of capital was not made at that time, the time at which the largest subscription of proprietorship capital was made.

38. A further recommendation relating to the provision of information for purposes of determining future action, reads as follows:—

“To provide information upon which future action can be determined, the money value should be converted into the money values of the latest date in relation to which the information is prepared”.

39. The Institute furthermore recommends that the results obtained by conversion into different money values should be presented by way of a memorandum statement ancillary to an historical cost, financial or operating statement.

40. A further research publication was issued later in 1952 by the Taxation and Research Committee of the Association of Certified and Corporate Accountants, and indicates that the view of the Incorporated Accountants is that a definite provision should be made in the accounts to meet the proportion of the difference between the original cost and current replacement cost of assets applicable to that year, and that a lump sum transferred from an appropriation account to reserve account should not be relied on to meet replacement costs. This approach meets the wishes of the economist, and indicates that even official accounting bodies are not in agreement as to the appropriate accounting treatment to adopt.

41. The American Institute of Accountants at present shares the view of the Institute of Chartered Accountants, i.e., that no basic change in the accounting for depreciation of fixed assets is practicable or desirable under present conditions, but that provisions for replacement costs should be made by general appropriations to reserve accounts.

42. It is gratifying to note that several world-wide industrial and commercial concerns have taken heed of the warnings of the economists, and have created special reserves to compensate for the fall in the purchasing power of the pound. One of the pioneers in this field was the large group of Lever Bros. and Unilever, Ltd., which embarked on a revised basis of provision for replacement of fixed assets in 1947 at which time the group estimated

that its fixed assets which originally cost £82,000,000 would at that time cost £148,000,000 to replace, and that at the price levels then prevailing, a Depreciation Fund on the conventional system would, when all assets were fully provided for, be £66,000,000 short of requirements. The Company, therefore, created a special reserve of £3,600,000 in 1947 which was necessary over and above the conventional depreciation charge based on the original cost of assets. This huge additional provision related to the reduction in purchasing power of the pound in the year of 1947 only, and did not cover losses of real capital suffered in earlier years.

43. The British Post Office also investigated this problem and reported in 1947/48 that plant which had cost £300,000,000 originally was estimated, at 31st March, 1947, to cost £500,000,000 to replace; and in 1951, Imperial Chemical Industries having revalued its assets, ascertained that the conventional Depreciation Fund system would have resulted in a capital shortfall in the undertaking of £96,000,000.

44. These figures indicate the magnitude of the problem, and emphasise the need for introducing revised accounting techniques in order to ensure that the real value of capital is maintained.

Index Numbers

45. There is no doubt that the problem has to be faced, and the question therefore arises as to what method should be adopted of making provision for these additional replacement costs.

46. Two broad bases immediately present themselves, viz., the re-assessment of replacement costs each year, necessitating revaluation of each asset, or the use of index numbers to convert the money values of the year in which the asset was acquired to the values of the current year.

47. The first method requires little explanation as it would merely require an estimate of the replacement cost from which the amount already provided in the Renewals Fund in respect of the asset would be deducted, leaving a balance to be provided for over the remainder of the life of the asset. This would, however,

be a protracted process, as each asset would require individual attention.

48. The use of index numbers has, therefore, been suggested to facilitate the conversion of the historical cost of an asset to its current replacement cost, and is regarded as being sufficiently accurate. Assuming an asset purchased at a price of £1,000 when the index was, say, 120, the present-day replacement cost would, if the current index had risen to 150, amount to £1,250 (i.e. £1,000 x 150/120). And

if the asset had no scrap value and an estimated life of 20 years, the depreciation charge using the straight line system

which appropriations made at lower indices in previous years fall short of the amount which should at this stage have been accumulated on the basis of the current index. This latter provision can be termed the arrear provision.

49. Such a system to all intents and purposes, constitutes the use of the Renewals Fund system as will be evident from the following figures:—

Cost of asset	— — — — —	£2,300
Estimated scrap value	— — — — —	300
Net cost of asset	— — — — —	<u>£2,000</u>

Estimated life of asset: 5 years.

Year	Index	Provision for year	Additional provision for arrears	Total provision for year	Accumulated provision
		£	£	£	£
1	120	400	—	400	400
2	126	420	* 20	440	840
3	124	413	+ 14 Cr.	399	1,239
4	127	423	† 30	453	1,692
5	132	440	‡ 68	508	2,200
		<u>2,096</u>	<u>104</u>	<u>2,200</u>	

Notes.—* Difference between year 1 and 2 — 20 x 1 = 20
 + Difference between year 2 and 3 — 7 Cr. x 2 = 14 Cr.
 † Difference between year 3 and 4 — 10 x 3 = 30
 ‡ Difference between year 4 and 5 — 17 x 4 = 68

Cost of asset	— — — — —	£2,300
Replacement price 2,300 x 132	— — — — —	<u>2,530</u>
Provision in Renewals Fund	— — — — —	2,200
Add sale of scrap at new price level	— — — — —	330
300 x 132	— — — — —	330
120	— — — — —	—
Total amount available for replacement	— — — — —	<u>2,530</u>

would amount to £50 in comparison with a renewals charge in respect of the current year of £62 10s. 0d. An examination of the latter figures will show that they, too, are directly related to the two indices of 120 and 150. This has led to the suggestion that the depreciation charge should be based each year on the prevailing index, and that there should be an additional provision each year to cover the amount by

50. It is suggested that the figures appearing under the column "Provision for year" should be charged against the Profit and Loss or Revenue Account as representing a fair charge against the year's operations, but that the amounts appearing under the column headed "Additional provision for arrears" should form a charge against an appropriation account as they cannot be regarded as a working expense

during the year under review.

51. Although this system would find favour with the economist, it may be frowned upon because of the substantial charge which can result in any one year from the necessity to make the additional provision for arrear contributions as a result of the index changing. This charge would be particularly great in the case of a long life asset, as any change in the index would be multiplied by the number of years for which the asset had at that time been provided.

52. It should be remembered, however, that any large undertaking would have on charge a substantial number of assets purchased in different years and that whereas the arrear contribution for a particular asset in the latter stages of its useful life may be high, the arrear contribution for a relatively new asset will be low, and the aggregate effect of the additional provision for arrears should therefore not vary to any marked extent in any year because of the different ages of the various assets.

53. Whilst on the subject of arrear provision, it is interesting to note that certain economists and accountants hold the view that provided the accumulated provision in the Renewals Fund is invested in a type of security which will itself change in value approximately in accord-

54. This viewpoint is undoubtedly sound in theory, but it would be exceptionally difficult to find the right type of investment for the Renewals Fund in order to avoid entirely the necessity for arrear contributions and in any event this course of action is not open to Local Authorities which are strictly governed in the type of investment which they may make. However, if the Local Authority provides in full for the renewal of the asset, and does not rely on any interest which may be earned from the investment held by the Renewals Fund, then any interest income of the Renewals Fund can be applied towards reducing any additional provision which may have to be made for the arrear contribution in any one year. Interest earned, but not required in any one year, could be held in reserve against such a future contingency.

55. However, if it is considered that the foregoing method of computation involving arrear contributions would result in too great a burden in any one year, the following system based on the annual re-valuation of the asset mentioned earlier, and the spreading of the balance unprovided at any one time over the remainder of the life of the asset, can be applied. The result of such a basis utilising the same figures as in the previous calculation, would be as follows:—

Year	Index	Net replacement Cost	Accumulated provision	Balance to be provided	Balance of life	Provision for year
		£	£	£		£
1	120	2,000	—	2,000	5	400
2	126	2,100	400	1,700	4	425
3	124	2,067	825	1,242	3	414
4	127	2,117	1,239	878	2	439
5	132	2,200	1,678	522	1	522
						2,200

ance with changes in the price index, no additional provision for arrears will be necessary, as the effective value of the Renewals Fund will increase or decrease in step with the price index, and when required, the investment can be realised in order to provide the necessary cash with which to replace the asset concerned.

56. It will be agreed, however, that the charges so arrived at are not really a fair charge against the operations of the undertaking for the year concerned, as apart from the current year's provision at the current year's index which, as mentioned earlier, I regard as a fair charge, they contain a measure of arrear provision as well.

This matter, could, however, be adjusted in order to show a fair charge in respect of the year under review and the balance as an appropriation from revenues or profits.

57. A general criticism of the index number system has been made on the grounds that it is not possible to utilise any single index in view of the fact that such index would not be true for varying types of capital assets. This may well be the case, and it would therefore be desirable for some responsible body to construct an index or a number of indices of capital goods for use by different undertakings.

58. In general, however, I feel that in the aggregate the provision made under the index number system will go a long way towards meeting the problem, and if it were possible to construct a single index taking all factors into account, (this index would in effect be a true index of the change in value of money), I would be inclined to think that any apparent anomalies arising from the use of this single index would, in fact, not be anomalies, and that the relative prices of the capital assets would in any event have changed under conditions of stable prices due to the demand for the assets on the one hand and the supply thereof on the other (the latter being influenced in turn by the demand for the various factors of production involved).

59. You will remember that at an earlier stage I undertook to deal further with two of the criticisms of the Double Account system, viz., the difficulty of determining the exact replacement cost, and the fact that the new assets are very seldom replicas of the old. In so far as the first point is concerned, either of the systems set out above utilising index numbers would provide a sufficiently accurate result. Regarding the second point, the solution to this problem can also be found in index numbers, for by their use we ensure that the full purchasing power of the capital originally utilised to acquire the asset is maintained. This augmented capital is readily available for use when required, and if it so happens that the new asset is of a better class or is larger than the old, any capital expenditure over and above the provision is warranted; on the other hand if an inferior or smaller article is

purchased, the surplus capital so released may be used without any qualms for other purposes.

The Sinking Fund Surplus

60. I mentioned earlier that in Local Government accounting the raising of a loan carried with it the requirement to set up a Sinking Fund which in effect comprises a Depreciation Fund from which assets may be written off, and that in the case of assets financed from the loan having an estimated life of less than the loan period, an additional provision for depreciation or renewal thereof requires to be made.

61. It will be appreciated that by this process certain of the assets are provided for twice, and to this extent Local Government accounting procedure today results in a surplus which can be applied towards the increased replacement costs of assets.

62. This surplus is, however, not scientifically calculated and in fact it does not arise in the case of all Local Authorities, as it is possible to discontinue renewals provisions when the second asset is purchased, provided that the loan will be redeemed by the time the second asset requires to be scrapped.

63. Although this hidden provision towards financing of replacement costs should be welcomed, it is considered preferable to eliminate the partial dual provision which at present arises, and to provide for the increased replacement costs by building up a scientifically calculated reserve.

The Consolidated Loans Fund.

64. Ignoring for the moment difficulties introduced by rising prices, it would be possible to overcome the problem of dual provision, by establishing a Consolidated Loans Fund on the following lines:—

1. All loan monies raised by the Council would be placed to the credit of the Consolidated Loans Fund which would form a pool from which assets of the Council's various Undertakings could be financed. This pool could be supplemented by temporary

loans from the Borough or Trading Funds if any of these happened to have credit balances available for investment.

2. Whenever an asset is purchased, a separate loan in respect of its capital cost is made by the Consolidated Loans Fund to the relative Council Fund or Undertaking, the loan period being equivalent to the estimated life of the asset.

3. No Renewals Fund is required and the Undertaking would merely depreciate the asset, less scrap value, by appropriate charges to Revenue Account over its life, and would each year repay to the Consolidated Loans Fund the amount equivalent to the depreciation written off. (Whether the asset and loan are shown at the reduced figures each year in the books of the Undertaking, or whether they remain at the original figures offset by the accumulated depreciation and repayments shown in separate accounts, is merely a matter of accounting treatment).

4. No Sinking Fund would be established to provide for the repayment of loans raised, but the Consolidated Loans Fund would be managed in such a way as to ensure that it had sufficient cash available to meet loan repayments as and when due. To this end, it may be desirable for certain of the Consolidated Loans Fund monies to be invested in gilt-edged securities, and in any event this should be done if the Fund has at any time a large credit balance lying idle.

5. When the asset is finally disposed of an adjustment in respect of the scrap value may have to be made, and the balance of the loan is then repaid by the Undertaking to the Consolidated Loans Fund.

6. Any amounts repaid to Consolidated Loans Fund form part of the capital pool and are therefore available either for the financing of other assets, or for the repayment of any of the loans raised by the Council which may be due.

7. In the case of assets having indefinite lives, the loans should be repaid by the Undertaking over an agreed period, e.g., 50 or 100 years. The necessary appropriations from revenue should be accumulated by the Undertaking con-

cerned in a Capital Reserve Account instead of in a Depreciation Fund, which would ultimately equal the total of such assets, and would free the Undertaking from any future loan burden in respect thereof.

8. A Revenue Account would be drawn up in respect of the Consolidated Loans Fund, and this account would be charged with the total interest paid on the Council's loans, loan costs, loan discount, etc., and would be credited with interest on investments held by the Consolidated Loans Fund. The deficit would represent the net cost of borrowings for the year and would be charged out to the various Undertakings at an average rate on the balances owed by those Undertakings to the Consolidated Loans Fund at the end of each year.

9. Borrowing Powers would, of course, still have to be obtained and would be exercised at the time when a loan is advanced by the Consolidated Loans Fund in respect of the asset purchased.

65. Many overseas centres make use of a Consolidated Loans Fund, and closer to home, the system is in operation in the Cities of Johannesburg and Salisbury. The Cape Municipal Association also has the matter under consideration at the present time. Such a method of financing capital expenditure would eliminate dual provision and would at the same time provide for the depreciation of the historical cost of any asset. In this connection it is noteworthy that Professor P. D. Leake's system of plant and depreciation registers would, with slight modification, be admirably suited for record purposes as it would provide a register of the loan debts of the various Undertakings as well as depreciation written off.

66. Having progressed thus far, it is only one step further to ensure that provision is made for replacement costs as distinct from historical costs. The method of computation of the additional provision has already been suggested and it would be a relatively simple matter to amend Professor Leake's existing system to incorporate the additional factors which would be involved.

67. The procedure just outlined in respect of the Consolidated Loans Fund

would then have to be amplified thus:—

1. The Undertaking would charge against its Revenue Account the excess of the replacement provision over the historical cost provision, and would retain this amount for all time in a Reserve Account.

2. The Undertaking would then lend to the Consolidated Loans Fund an amount equal to such Reserve. This loan would form part of the loan pool and would be available to augment the amount repaid by the Undertaking in respect of the historical cost.

68. *It would, therefore, not be necessary for the Consolidated Loans Fund to raise further monies merely to cover increased replacement costs, and any increase in the borrowings of the Fund would be represented by additional assets acquired by the Council in its programme of expansion.*

Conclusion

69. The effect of inflation and changing price levels on the replacement of fixed assets have been discussed at great length over a number of years, and it is, I think, true to say that the consensus of opinion is overwhelmingly in favour of the necessity for providing for replacement costs. Such controversy as exists is centred around the method which should be adopted of making such a provision.

70. These views notwithstanding, commercial and industrial undertakings have, in general, been slow to recognise the need for maintaining real capital, and local authorities in this country have almost without exception, failed to take cognisance of the problem.

71. The real causes of this failure on the part of commerce, industry and local government are comparable, for in the first two cases it undoubtedly arises from a desire to distribute dividends as far as possible, whilst in the third case the natural reaction of all Councils is to keep rates and tariffs as low as possible. The burdens of replacement costs can, however, not be avoided in the last analysis, and in the absence of adequate replacement provisions, the burdens may fall at a time which is most

inopportune from the undertaking's point of view.

72. In so far as Local Government is concerned, the failure to adopt some capital safeguarding system in times of rising prices can have but one result, viz., that of a disproportionately increasing loan debt with its attendant heavy capital charges, constituting a dissipation of capital at the expense of future generations. Surely this is a state of affairs which cannot be regarded with equanimity.

DURBAN,

February, 1955.

PRESIDENT: Thank you, Mr. Gorven. Mr. Gorven, unfortunately we are very tea-conscious this morning, so I propose adjourning now and immediately after the adjournment, I shall ask one of our members to propose a vote of thanks.

May I, however, just slightly anticipate what he is going to say and congratulate you very heartily on the very clear and able manner in which you have presented your paper. (Applause.)

10.45 A.M.: ADJOURN FOR TEA.

Proceedings Resumed at 11.20 a.m.

PRESIDENT: May I call on Mr. C. G. Downie of Cape Town to propose a vote of thanks to Mr. Gorven, please?

Mr. C. G. DOWNIE (Cape Town): Mr. President, in performing our functions as Electrical Engineers responsible for Municipal electricity undertakings, we are concerned not only with technical matters but also with those of finance and cost. Most of the papers presented to our Conventions cover the technical and commercial aspects of our operations. A paper on Finance and Accountancy now and again, therefore, is very welcome.

Mr. Gorven obviously has put much thought into his paper and also a lot of work. We appreciate very much his coming here today and telling us something many of us did not know before.

Briefly, the paper may be said to draw attention to the fact that capital cost have risen and are still rising, and that, in the writer's opinion, provision should be made in the accounts to accumulate, during the life of an asset, sufficient money

so as to be able at the end of the life of the asset, to renew it without the need for additional borrowing.

It seems to me that this amounts to asking the present generation to bear some of the burdens of future generations. There are differences of opinion on this matter and to quote a typical instance of how we would be affected in Cape Town if this system of Mr. Gorven were to be applied, I shall quote the case of our old Dock Road Power Station, which, within the not too distant future, will have to be demolished.

The loans on this station have already been repaid (they were repaid quite a long time ago) and one wonders whether it would be fair to ask present consumers of electricity to pay more, so that when the time comes to remove the old Dock Road Power Station, we could install equivalent capacity in another station by raising a loan no greater than the original cost of the Dock Road Power Station.

A new station today, to replace that station, would probably cost, I imagine, five times what that original station cost.

If this practice were generally adopted, future consumers of electricity would be presented with brand new and probably much more efficient plant, at a cost to them below the benefits which they will derive therefrom and at the expense of previous generations of consumers.

In commerce and industry, on the other hand, capital is subscribed by shareholders and they are not repaid after twenty or thirty years, as in the case of a local authority. A Depreciation Fund would, of course, be established to pay for replacement of plant at the end of its life, but if capital costs had increased in the meantime, then, unless provision had been made for higher replacement costs, the shareholders would have to be asked to subscribe further capital, or a further capital issue would be necessary. Either method would have a bad effect on the price of existing shares, unless the additional capital requirements could be put down to expanding business.

The proper thing to do, of course, is to maintain the assets in sound working order so that they will not require replacement when the loan is paid off. The use of debt-free assets will then help the future

generation to bear the higher costs on the newer and more expensive assets. At the same time, of course, it is prudent to establish some sort of Reserve or Renewals Fund to finance improvements and pay for extraordinary replacements outside the normal maintenance.

Mr. Govern's paper has given us details of a method of accumulating sufficient funds so that we do not have to borrow more money than necessary to replace an existing asset. I sometimes wonder whether we should not concern ourselves more with seeing to it that we have enough money in reserve, to be used, for instance, to enable existing old plant to carry on for as many years into the future as possible. It might be possible, for instance, to "re-vamp" existing machines. Those of us who have old stations today must think twice before we replace them. A new power station today costs, to start with, over £100 per kilowatt tapering off when completed to something like £70 per kilowatt, whereas power stations before the last war worked out at £20 per kilowatt.

Cape Town's Table Bay Power Station was completed three years ago at a final total cost of £23 per kilowatt. I feel that we should see to it, or try to encourage our City Councillors and our City Treasurers to put more into reserve, to enable us to carry on with our existing plant as long as possible and then deal with the position when that plant comes to be removed, by raising another loan.

Mr. President, Gentlemen, I am sure I am expressing your sentiments when I say that we appreciate very much Mr. Govern's presentation to us of a very valuable paper. It would be well worth reading to his own Association, namely the Association of Municipal Treasurers and Accountants. I do not know whether he would be allowed to do so after having read it to us, but I think it would elicit far more discussion from amongst the members of his Association than it has from us.

In conclusion, on your behalf, I wish to thank him very much indeed for coming up from Durban to present this paper today and I hope that in the future we shall get more papers from the financial folk at these Conventions. Thank you, Mr. Govern. (Applause.)

PRESIDENT: Thank you, Mr. Downie. Mr. Sibson, would you be good enough to second the vote of thanks?

Mr. A. R. SIBSON (Bulawayo): Mr. President and Gentlemen, it gives me very great pleasure to second the vote of thanks so ably proposed by Mr. Downie. The few remarks I am going to make, I shall make briefly because I think it is the aim that as many Councillors as possible should contribute to the discussions on this most interesting paper.

I was very delighted to find an accountant at last thinking in terms of the reduced value of the £ rather than of the increased costs of assets. So often do we get into a mess as a result of thinking purely that prices have gone up, whereas, of course, what has happened is that the value of money has gone down.

I do not know, however, whether he will be successful in inducing any financial authority to publish indices of the real value of money from time to time. I always thought that those were the sort of things that they preferred to keep under their hats. Certain corrosive attacks might result from pensioners and people like that if it were admitted in public that the value of the £ was only a third, shall we say, of the 1939 value.

With regard to the main point raised by the author, which is that some account must be taken in either Depreciation or Renewals Accounts of the depreciating value of the £, I would say that the principles which he has enunciated would apply less and less as the undertaking in question increased in its rate of annual development. But it is most effective, or it is most important in the case of an undertaking that is not developing at all, which applies, perhaps, to many private concerns and factories that merely set out to fulfil a particular purpose and do not have to expand with increasing public demand, but rather leave that to their competitors. In a case of such a factory or any undertaking which is not developing at all, then obviously it is most desirable that some account be taken of the depreciating value of money, because otherwise, when the time does come for a major

re-investment, then the whole capital set-up would be upset.

But where we have an annual increase in capital spending, the matters that concern the author are, I think, automatically taken care of. More broadly, his proposal results in smoothing out a series of steps of expenditure per unit of capital equipment. And that is what he proposes to do to increase the charge against Revenue Account on existing assets in order to reduce the capital cost of future ones—that broadly is the proposition. In other words, smoothing out the steps of increased costs.

Now, where an undertaking is increasing at, say 10% (I have just snatched the figure out of the air) or perhaps more per annum, precisely the same effect, in fact, occurs, because the capital charges—annual charges—on the existing plant, remain a bit lower than they would be under Mr. Govern's proposal, whereas the charges on new plant will be a bit higher, and I suggest that there would not in actual fact be a great deal of difference reflected on the Revenue Account.

Well, I do not want to delay you any further, Mr. President, and I do again wish to express my great appreciation and that of all of you to our colleague from another Municipal Department, who has been good enough to come and live up our proceedings and to make them so much more interesting by his presence. Thank you very much. (Applause.)

PRESIDENT: Mr. Gorven, may I, too, once again thank you for coming to my rescue at such short notice with such an excellent paper.

Gentlemen, you have heard a vote of thanks ably proposed and seconded and I take it that you heartily agree with the sentiments expressed. (Applause.) The paper is now open for discussion.

Councillor P. D. SANTILHANO (Cape Town): Mr. President, this is the first occasion on which I have been privileged to attend your Convention and I should, if it is not an impertinence, like to say how very pleasantly I have been surprised. I was ignorant of your procedure and had expected when coming to Pretoria, to hear

you discuss the purely engineering problems of your industry.

The discussions which have taken place show that you take a very much broader view of your responsibilities. I am particularly glad to find that the economic factors of electricity supply are being fully considered by you. And as long as that continues, I feel that the future of Municipal electricity undertakings will be in secure hands.

With regard to Mr. Govern's address, I very greatly admired his comprehensive and objective treatment of the important problem with which he dealt. There is nothing new in monetary depreciation. Throughout its history it has tended to decline. From 1840 to 1890 we witnessed an usually long period of stability, but through the ages the trend has always been downwards.

Comte comes to mind, a thinker of considerable repute in his day, a century and a half ago, when due to the Napoleonic wars, Europe was troubled with the problem of steadily falling money values. He demanded that in a well-governed community all political power should be placed in the hands of the bankers. Comte, no doubt, regarded the bankers as a cautious breed, not cast in heroic mould, and that they would take care to settle differences in a better way than by indulging in mutual destruction. For, if war comes, even our bankers could not maintain our currencies on a stable basis.

It has been very truly said that sound money is war's first casualty. It is no use blaming Ministers of Finance—they cannot help themselves. They have to provide the huge sums of money which wars require and which do not exist. They, however, have the power to manufacture money and promptly do so. An elementary economic truism is, double the volume of money, other things remaining equal, and you halve its value. That is what we are unfortunately suffering from today, but I do feel that we should do what we can to make provision for this reduced purchasing power of our money.

The aim of Municipal electricity undertakings should be to keep the charges to consumers on as stable a basis as possible.

For electricity is a vitally important commodity, we need it for light, heat and power to industry. Stability will not be achieved unless we take cognisance of the decline in the value of our money. Funds should, therefore, be set aside to provide for the much higher replacement cost, when renewals become necessary.

There are, of course, serious difficulties, but these have to be faced. I am a little afraid that my good friend, Mr. Downie, has been slightly corrupted by the City Treasurer! Municipalities are asked year after year to do more and more and the increased costs have to be financed mainly from rate revenue. I believe that every economist admits that the rate is not a satisfactory form of taxation. The rate was first introduced in Elizabethan England when wealth was held mainly in the form of property. It was, therefore, logical that when money was required a tax should be levied on property. Initially this money was needed to provide for the aged and the sick, a function the Church undertook until the Reformation. Confiscation of Church property no longer enabled them to carry on with this work, hence the intervention of local authorities.

But since those days the duties of Municipalities have grown enormously and they still depend on the rate for their revenue. The simplicity of the rate is that knowing the rateable value, we know exactly the revenue every penny in the £ will produce. The objection is that we live in a society in which there is tremendous variation of income. We have those of very slender means, many under the sustenance level, as well as the wealthy. The rate falls on rich and poor alike, whether house owner or tenant. Certainly, so far as Cape Town is concerned, I should not like to see any increase in the rate, for in my view the lower and middle income groups are already burdened more than they should be.

This limitation of our scope for raising revenue presents a very real difficulty. We have our so-called trading departments—strictly speaking this is a misnomer—for these departments were established to provide the community with such services as water, electricity, markets, abattoirs, etc., on the basis of public ser-

vice and not for the purpose of profit making. Our Finance Chairmen have not an easy task, and when struggling to make both ends meet, sometimes become poachers and rob the hen roosts if they have the chance. Without these raids it would be reasonably simple to make provision for the future without seriously affecting current charges.

We have to remember that we inherited much from our predecessors and it appears to me a clear duty that what we leave to those who come after us shall be in the same good shape.

I, therefore, entirely agree with Mr. Govern that provision should be made for replacement during the life of the asset. It is of course unfortunate that laboriously built up reserves, because of currency depreciation, no longer serve the purpose for which they were created. A sound financial policy would insist that such reserves be increased, so that they will perform the service for which they were originally established.

This was not so generally recognised after the First World War and a number of quite important private enterprises suffered shipwreck through failing to make this provision.

There are times when we must be prepared to deny ourselves present enjoyment in order to build up a sounder asset and this, in the long run, will prove to be the prudent course. I was, therefore, disappointed when our new Finance Minister in his first Budget introduced his Tax on undistributed profits. We are in the midst of rapidly developing industry and encouragement should have been given to retain profits in the industry so as to provide the capital which will be needed for expansion.

It is appreciated that Mr. Louw's action was taken to prevent tax evasion, but it may be asked whether better means could not have been found to secure that purpose.

That, Mr. President, is, I think, all I have to say, but before sitting down, I want to express one hope: When Mr. Govern becomes City Treasurer, I do most sincerely hope that he will not waiver for one moment in keeping to the very sound principles to which we have had the

pleasure of listening today. Thank you. (Applause.)

PRESIDENT: Thank you, Cr. Santilhano. Councillor S. H. MILLAR (Bulawayo): Mr. President, I would like to congratulate the speaker, as has been done by the proposer, the seconder and the previous speaker, on what I must say is a very informative paper. But I would also like to thank the Executive for permitting a paper of this character to be read to this Convention in order that Councillors may take part in the discussions. I have often wondered what the functions of the Councillors at these Conventions really should be. It was my intention to go away a maiden, but in view of the information contained in the paper, I thought that perhaps it ought not to be. Papers are usually of a technical nature, but the character of this one impels me, in fact, to quote the old song that was very popular during the 1914/1918 War, "I want some more, some more, she cried", and I hope that the Executive will perhaps provide papers of this kind at future Conventions.

I do also submit in sincere humility, Sir, that Councillors' contributions should nevertheless not be made unless they can be useful, and perhaps my contribution is also not going to be so useful as one would like. I know that Mr. Sibson has put in many laborious hours teaching me about kilowatts, megawatts, high tension and low tension, etc., and I know just a little about them. I could add perhaps, after yesterday's paper, that I also know a little about rural distribution.

I do not join in the discussion, Mr. President, in order that I might justify the expenses that my City Council have paid for my attendance, because they had already paid them before I came. And, at first sight, perhaps this relates to what our friend from Robertson implied yesterday, when he said that he thought that City Electrical Engineers should be permitted to have the money first and then tell us what they have done with it afterwards—but I do not agree that this is quite on the same plane.

I also do not take part in the proceedings merely to achieve notoriety or anything of that sort, because quite unwittingly

I have become, if one could call it so, a little famous—I got mixed up with the past President, which is the nearest I might ever be to getting into the Chair; they thought that my name was Mr. Muller and they thought that I came from Bloemfontein! But the difference between him and me is quite obvious—he is dark-haired and I am white, if for no other reason!

Now, I am very grateful, Mr. President, for the opportunity of taking part in what I think is an historical discussion (you have made history today) and it is the first time that I have heard that balance sheets do not mean what they say or, rather, that they do not purport to show the true position. And perhaps I could also take a leaf from the previous speaker's comment, when he says that the City Electrical Engineer from Cape Town has been corrupted by the Treasurer—that may be all right for Treasurers, but if Councillors get corrupted, I promise you, they are in a bad way.

Now, to revert to the paper, in Bulawayo much use is made, I think, of the Renewals Fund and it was a Fund to which I attached a great deal of significance until today. But it would also appear, from what has been said, that Councillors should not take too much notice of what the Treasurer tells them about the Renewals Fund, for replacement costs rather destroy its function.

If we could take Mr. Gorven's word for it, the Treasurer might tell us of many things in the balance sheet which may not even be there.

I must say that Mr. Gorven is to be congratulated for his original thought in respect of what he calls his trade cycle, and it is the first time that I have heard that reduced tariffs give ratepayers more money and create an inflationary tendency. As a Councillor, I rather doubt the value of this for inclusion in a re-election manifesto. How this can line up with what we have in Bulawayo and probably in other centres also, namely the rapid expansion of the undertaking and, as has also been previously mentioned, the difficulty that a large number of ratepayers have in making ends meet, is somewhat problematical. I think that every Councillor, even if it is

only when he comes up for re-election, would like to tell the ratepayers that he hopes to reduce electricity tariffs, but by the time the Finance Chairman and one or two others have got cracking he might be able to promise it, but I am quite satisfied that he would not be able to implement it.

Thank you once again, Mr. President, for the opportunity of being able to take part in the discussion. (Applause.)

Mr. P. A. GILES (East London): Mr. President, the paper, to my mind, is clear and well written and the author is to be congratulated on the comprehensive treatment of the subject matter.

I am pleased indeed, to see a precise description of and differentiation between the functions of a Depreciation and a Renewals Fund. Until today I have never really appreciated the distinction between these two funds. The aim of the paper, if I follow it correctly, is to show that it is possible to calculate not only the annual amounts that have to be set aside to write off the value of assets from the books, but also the amounts that would be required to replace those assets, when this fell to be done.

Mr. Gorven has also shown us what a useful device the Consolidated Loans Fund is. This enables the currency of loans from which assets are financed, to be synchronised with the lives of those assets. Thus the necessity for making Renewals Fund payments, in addition to contributing towards the repayment of the loans (Sinking Fund Contributions) is avoided. As is well known, this in practice often means making dual provision.

I feel that a Consolidated Loans Fund is a very good idea and if I could persuade the City Treasurer of East London (or is the Cape Administrator the stumbling block) to adopt this scheme, I should indeed be pleased.

However, I would say that I think that this generation should not be called upon to replace, in its entirety, for the benefit of future generations, assets which have been established and used, because, in my

opinion, posterity should pay for the beneficial use of assets handed over to it.

The generation establishing assets has to pay the interest charges obtaining at the time and to ensure that the maximum use of the assets is obtained meets such maintenance charges as are necessary to maintain them in the near-original efficient condition until the end of their useful lives.

Thus it seems to me that if the redemption periods of the loans from which the assets are purchased are equated to their useful lives, the purpose of the setting up of a Renewals Fund is lost and the fund should not be established. (Now, that is just a technical man's point of view, Mr. President). As a consequence of lower capital charges, by the elimination of the renewal charges, the generation setting up the asset will be able to purchase electricity at a lower price than otherwise.

The paper gives a thought-provoking discourse on the methods of overcoming problems confronted in replacing assets during a period of rising prices. Examples are given of how suggested alternative schemes function and of the arguments advanced by accountants and economists (whom I believe are in the City Treasurers' Departments) for the various suggestions. But I think that the paper could be expanded a bit.

It is interesting to observe that, firstly, in static periods, involving both stability in prices and no technical development (which I do not foresee) Depreciation and Renewals Funds are, in effect, synonymous. The same plant will be replaced at the original price.

But, if prices are rising and technical development is static, the same plant will be replaced at increased cost, which, of course, creates the problem to which the paper gives attention and suggests a solution.

However, if prices are stable and technical advance is taking place (which is what we hope is going to be the position soon), better and more efficient equipment will replace obsolete equipment, possibly at no increase in cost.

However, if prices are rising and technical progress is being made, the outcome

will depend upon their relative rates of increase.

It will be readily appreciated that these possibilities could be extended to cover the contingency of falling prices, and also that there might be variations in the degrees of change.

It must be obvious that an important factor is the time element. The longer the time, the less will political expediences influence the problem, the greater is the possibility of new inventions counteracting increased prices, and the greater will be the effect of increased costs if new inventions are not forthcoming. (Difficult to imagine in this progressive age.) Normally, the shorter the time, the less the extent and possibility of price changes.

I fully appreciate the seriousness of dissipating capital and favour the building up of depreciation reserves when possible. But there are many factors that make any modification of the Depreciation Fund Scheme difficult to introduce. Some of these are mentioned, viz.:

- (1) In spite of all our knowledge, we cannot see far into the future. Consequently, we do not know what technical improvements will take place.
- (2) It is only on looking back that we know when prices started to rise, the extent of the rise and when stability was reached. True, Mr. Gorven has suggested an index figure as a guide, but no account has been taken of the extent to which technical progress, bringing about increased efficiency, counterbalances the increased costs due to rising prices.
- (3) Every generation has its own problems to solve and often our attempts to assist future generations, burden as much as help them. I think we can refer to the replacement of tram services with bus services and capital charges carried on for abandoned tramways and that type of thing. There is no chance of the suggestion put forward, being replaced in that category. On the contrary, I feel that Mr. Gorven's suggestion enables future generations to inherit a more

liquid position, which means that future Councils will not be bound to the extent to which they otherwise would have been. But the present generation has to pay the price of this bonus to the future. To my mind, this is the weakness of the suggestion, particularly as it is one submitted to popularly elected bodies. It is hard to credit that Councillors will incur unpopularity with present voters to ease the burden of future ratepayers. Thus, unless the scheme was compulsorily imposed by some superior body, I cannot see much chance of its being voluntarily adopted by popularly elected governing bodies.

The author has presented a very interesting paper and, to my mind, Mr. President, he has given us some very shrewd interpretations. However, although it is appropriate for the times in which we are living, the paper, I feel, deals with what could be called a transitional problem, a problem born of a period of rising prices and, from a broad, historical point of view, has not the same relevance.

The story of civilisation is undoubtedly one of rising prices. It is, however, also one of rising standards and increasing luxury, provided a great deal, I think, by electricity. Thus, technical advance has more than kept pace with rising prices despite all the destruction of wars.

Therefore, as a technical man, I cannot support, as a general practice, a scheme that would ask the present generation to contribute more than the cost of writing off the assets that have contributed to its comfort and well-being. I feel that it hands on enough to posterity without trying further to increase this by lowering our present standards.

Thank you, Mr. President. (Applause.)

PRESIDENT: Thank you, Mr. Giles. Would anyone else care to contribute to the discussion?

Mr. J. T. WILLIAMS (Pretoria): Mr. President and Gentlemen, Mr. Gorven has based his paper on the thesis that Renewals Funds are necessary for electricity undertakings. Now I want to suggest to you, at the risk of sticking my neck out

a bit, that in the case of Municipal electricity undertakings, they are neither necessary nor desirable.

The outlook outlined by Mr. Gorven is one which was conditioned by company finance. The company is not in the same boat as a Municipal undertaking at all. A company has capital, which it raises and which it never repays and therefore it is the duty of the company to make provision for the maintenance of the value of the assets which it has.

We have to accept the position that inflation is a permanent process, that the value of money is going to go on going down. I believe that we will never again have the violent depressions that we had in the past, which tended to bring up the value of money a little bit, because nowadays there are far more controls—prices are managed, currency is managed—and, in addition, a very large amount of the national income is siphoned off as taxation and it is expended on non-productive uses. The result of that is that a number of consumers are created who are not producers and this tends to avoid over-production, so that we are not likely to have these depressions again.

Now, the effect of inflation is to benefit the man who has property and it is not in the interests of the man who lends money. The man who has property sees his property increasing in value, at least, apparently increasing in value, owing to the falling value of money, but the man who lends money sees his money getting less and less in value. If a Municipal undertaking contributes money to a Renewals Fund, they pay in good money today and in twenty years, when they want to get that money out, it is bad, it has lost half its value. The man who has benefited in the meantime, is the man who has borrowed that money (the Municipality must invest it somewhere and someone has borrowed it) and he has acquired something with it and his debt has been eased by the process of inflation.

Of course, that can be avoided. Mr. Gorven has made the suggestion that it could be avoided by the Municipality using that money to purchase property, but I do not think that the Administrator would

view that very kindly; he would probably say that that is speculation and it would not be allowed.

The Municipality can, however, get precisely the same effect by not saving that money, but by simply raising loans every time it wants to acquire a new asset. Of course, a Depreciation Fund must be established to pay for the asset, but to accumulate additional money, seems to me to be placing an unfair burden on the rate-payers, which they are not going to get back, because that money is all the time losing its value. If the Municipality borrows the money instead, then some other poor blighter has got to pay for that. His money has depreciated and the Municipality get the benefit.

Thank you, Mr. President. (Applause.)

PRESIDENT: Thank you, Mr. Williams.

Mr. J. A. MATHEWS (Kimberley): Mr. President, the paper, although well documented, does not introduce anything new to the experienced observer. It does, however, stress once again the desirability of early and regular financial provision for the replacement of assets, which can only be acquired at a figure far in excess of the original cost.

The writer has even gone so far as to attempt a formula fixing the annual contribution to be made from Revenue or Profits, in order to ensure that the difference between the original or historic and the replacement cost can be adequately met. The formula, however, is much in the nature of a cock-shy and there is no guarantee that the basis of contributions is sufficient to cover the replacement cost of the particular types of assets.

In contra-distinction to the contentions advanced, the view is also held that by redeeming the cost of the capital asset over the loan period, the consumer is only called upon to pay his fair share of the actual cost of establishing and maintaining the undertaking and that any attempt to provide for the increased cost of replacing assets in the future, represents an additional burden, which the consumer of the present should not be required to shoulder.

This attitude is widely supported in the field of local government. As an undertaking develops, the operating costs also

show a steady increase and it would be just as logical to expect the consumer to contribute a proportion. This does not suggest that we should leave it to the future to take care of itself, but it is eminently reasonable and even an accepted policy that posterity should bear its full share of the amenities created for its benefit.

With regard to the contributions to the Reserve Fund, the Electric Power Act of 1922 prescribes that the Fund shall be used "for the replacement of obsolete machinery or plant and generally for the betterment of the plant owned by the Commission or for exceptional repairs or emergencies".

It is suggested that—

- (a) Provision for obsolescence is unnecessary;
- (b) betterment should be financed from Loan Account, so that the cost can be more equitably divided between present and future consumers; and
- (c) insurance cover should be taken out to meet exceptional repairs or emergencies."

In support of the contention that provision for obsolescence is not necessary, the following extract from the "Local Administration Finance and Accounts", by Mr. A. Carson Roberts, puts the matter very succinctly:—

"The origin of obsolescence is invariably an invention of the more efficient methods. In ordinary commercial enterprise it creates a heavy risk, namely that of new competition arising, in which the original capital is expended upon plant so much more efficient that the earlier manufacturer may be compelled to replace costly and unexhausted machinery if he hopes to produce and to sell his product at as low a rate as his competitor.

But a local authority is in the position of a concessionaire, who is not exposed to this form of competition. The Municipal enterprise either has the monopoly or else is the latest entrant. It need not adopt the new invention and it will not adopt it unless it is advised that it will pay to do so. It follows, therefore, that the local authority only stands to gain by new inventions. The more

complete the call for adopting the new plant, the more the profits by discarding the old or, in other words, the greater the obsolescence, the greater the gain."

Mr. Roberts' remarks, I feel, apply with equal force to the Electricity Supply Commission and to Municipal authorities. The Cape Provincial Association recently gave support to a proposal that legislation should be introduced enabling Municipalities to establish consolidated loan funds. It is considered that the Electricity Act of 1922 could also, with advantage, be amended and it would be interesting to hear the author's views on this point. (Applause.)

PRESIDENT: Thank you, Mr. Mathews. Would anybody else like to speak on the address?

Mr. J. C. FRASER (Johannesburg): Mr. President and Gentlemen, Mr. President, I want to thank you, first of all, for the steps you took in arranging for this very valuable paper to be read to our Association. I also want to thank Mr. Gorven for the very excellent paper that he has presented to the Association.

When I first received the copy and read it, I must admit, Mr. President, that it was, to my way of thinking, just a little bit above our heads and I went along to Dr. Holmes, my friend, the City Treasurer of Johannesburg, and discussed Mr. Gorven's paper with him and he gave me a few notes which would make a very fine contribution to our proceedings.

But as my Sinking Fund is in a very low state this morning and the drain on our system due to Pretoria's well organised affairs—Mr. Gorven said that his cycle was about 52 this morning; I am afraid my power factor is very bad too this morning—I would ask you, Mr. President, if you would include these remarks in the proceedings, where they will be more suitably digested. And, in supporting Mr. Downie of Cape Town, that this paper may be published in the Treasury's transactions, I have been asked by the City Treasurer of Johannesburg whether this Association would consider them publishing this paper along with our discussion, which I hope the Executive will consider and that they will make due acknowledg-

ment. Thank you, Mr. President. (Applause.)

DEPRECIATION AND RENEWAL FUNDS.

Notes by Dr. D. I. Q. HOLMES, City

Treasurer of Johannesburg, on Mr. Gorven's paper, referred to by Mr. Fraser.

Mr. Gorven's paper is most interesting to engineers, not so much perhaps from the replacement accounting angle, as from the aspect of maintaining existing stocks of asset units—maintaining the level of productive capacity.

Generalisations in this field are difficult. Circumstances, as always, alter cases. Take, for example, the different circumstances to be borne in mind upon this matter when one considers a gold mine, a manufacturing undertaking, a rentier and the Electricity Undertaking of a local authority.

In the case of a gold mine, no specific depreciation provision is made in respect of the wasting main asset, the ore. Those of you who are fortunate enough to get dividends on our gold mining shares, know that those dividends include a partial return of capital invested, and are not pure profit.

In the case of a manufacturing undertaking, so long as prices generally continue to rise, part of the apparent profit made is the result of using relatively cheaper equipment bought when prices were lower. The manufacturer is benefiting at someone else's expense. Whose expense? Well, the man most obviously suffering, the rentier or pensioner or other person living upon the income from a fixed total of cash lent.

The manufacturers' assets will be used up in production eventually—that is their purpose—and the extent to which they are used up, is legitimately regarded as an expense of production; that is, as depreciation. What he fears, however, is that although he keeps his capital intact by depreciation provisions, he will not be able to buy the original volume of productive capacity with it when the time comes for replacing his working assets. He seeks, therefore, to provide renewal or replace-

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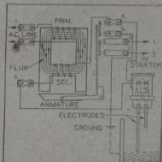


Figure 1—Controlling circuit open, armature down.

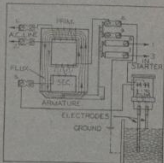


Figure 2—Controlling circuit closed, armature up.

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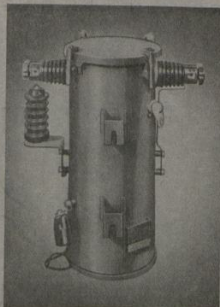
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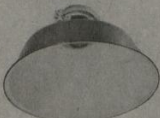
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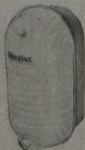
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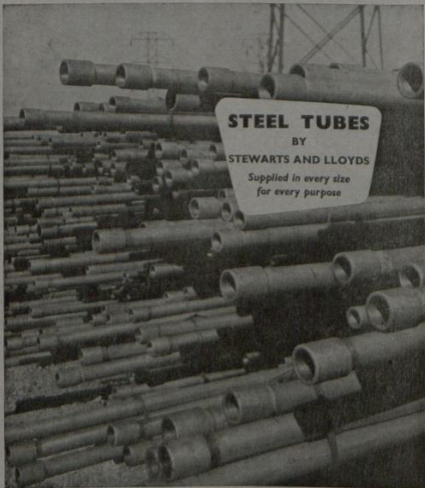
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ment funds in excess of true depreciation provision, for if he does not, the time will come when he will have either to reduce his scale of operations or to introduce new capital, if he can then get it.

Because of the higher general level of prices at which the manufacturer is working, he ought to be making sufficient profits to set aside such additional replacement reserve. If he cannot, then his undertaking is bound to go under eventually, because it must be inefficient or uneconomic or both, and is surviving for the meanwhile out of the "subsidy" of old and relatively cheap capital equipment. As the economists insist, then, the prudent manufacturer should set aside a replacement reserve unless he intends eventually to let his undertaking peter out like a mine, and he will be well able (or should be well able) to make the necessary provision if two dangers can be circumvented. The first danger is that of obsolescence. Technological advances, for example, can make his plant redundant overnight, and this is all the more reason for him to strengthen his reserves while he is able to do so. Precise measurement of the reserve required is, however, another matter.

The second danger is that high taxation may eat into his profit margin so that he ceases to be able to provide the reserves necessary for ensuring that his undertaking will not peter out through lack of working capital. It is this danger that has, in large measure, caused the cry for the formal recognition of replacement accounting overseas.

A discussion of the equity of the case would go very deep, but two salient points must be borne in mind. Firstly, the manufacturer is seeking to retain super profits which come to him merely because of progressive devaluation, and not because of any special effort of his own; and meanwhile the owner of cash is getting less and less return for the wealth he might have used himself, but has chosen instead to allow the community to use.

Secondly, if super profits are appropriated in taxation such taxes are earmarked for capital purposes, the State itself could become a shareholder in the undertakings

affected as and when asset replacements become necessary. Whether this eventual wholesale State ownership is a thing to be desired, is beside the point. The main issue is that the productive capacity of the country could perhaps be sustained. But if the taxes raised from such super profits are distributed among the community (in welfare schemes, for example), the productive capacity of the whole country stands in danger of running down unless the community responds to the "bonus" by working much harder, a thing it would be most unsafe to gamble upon.

What is the case with a local authority, bearing in mind that in South Africa it does not pay Income Tax? The local authority works largely upon borrowed capital, so there is no problem of trying to keep its pattern of shareholders intact. In our experience so far, interest rates (or the value of money in money) have not soared proportionately or even really in sympathy with the rising price level (a value of money in goods and productive capacity). On the face of it we may perhaps generalise thus: if replacement costs rise 100%, then prices generally will tend to rise 100%; and the productive capacity of the new asset will be enough to earn money income 100% higher than was the case with the old asset.

That is to say, if the old asset cost £100 and earned just enough to pay interest of £5, then the new one costing £200, will earn £10 per annum, still enough to pay interest on the new loan, and if loan terms are equated with asset lives, as when a Consolidated Loans Fund operates, the justification for replacement reserves, as such, is very difficult to see.

Supposing, however, the life of the asset has been 20 years. For twenty years the relevant tariff has been based upon a pattern of capital costs that suddenly increase enormously at the end of that time. This is most uncomfortable for the Manager and for the Council or Committee, apart from being a sudden shock to the users of the amenity. The effect should be cushioned by the use of reserves; but I think it doubtful whether, in practice, these reserves should be replacement reserves. A better expedient is a tariff

stabilisation reserve built up over the years in sympathy with price movements.

But even the operation of such a reserve poses the gravest problems. I defy anyone to say what price levels will be twenty years from now with any exactness. To that extent, an adaption of Mr. Govern's system for replacement cost valuation would be useful. We have to bear in mind, however, that he assumes that prices generally, and the cost of capital equipment move in harmony. That may be a very bold assumption indeed when the capital equipment embodies a great deal of some special product like copper, for instance, or when we are working in a field where technological advancement is rapid. On the one hand, new techniques may make new equipment cheaper in spite of general price advances. On the other hand, it may make the working equipment, which is still relatively new, uneconomic, or obsolete, or even redundant.

In practice, then, one is inclined to make reserves as big as the traffic will bear. One way of doing this is to underestimate asset lives for purposes of loan repayment. This, however, has its dangers, too, because it may result in the plant operating for a while with debt-free assets, thereby giving a false impression of running costs, and leading to pressure for reduced tariffs or increased contributions in aid of rates. It may, in such a case, be sound policy to make a continuing contribution to reserve equal to the annual capital charges that have ceased, and to continue with contributions until new loan charges commence. The importance of this argument is increased by the fact that equipment retires in very large batches. A power station, for example, cannot be replaced in minor portions spread over a long period of years.

Harking back to the unearned super profits angle: who should have them in the case of a Municipal electricity supply undertaking? First, and most definitely, they should not go in aid of rates and be thus frittered away. Secondly, they should not be given back to the consumers, for one reason because they will not last. It is one thing to reduce tariffs—complaints are usually few! But it is another thing to put them up again. I think that such

super profits should be retained as a cushion against inevitably rising tariffs later, and as a general reserve contingencies. Just how they are to be measured, we must leave to Mr. Govern and his colleagues. But they should usually exceed provision for bare replacement cost; for, to take the parallel of the manufacturer again, not all his increased profit needs always to be appropriated to replacement reserve.

PRESIDENT: The Executive will have pleasure in doing that, Mr. Fraser. I would like to suggest, though, that you do hand those notes to Mr. Govern during the interval. Perhaps there are some interesting points arising out of Dr. Holmes' contribution which Mr. Govern might like to discuss.

Any further speakers?

Mr. G. J. MULLER (Bloemfontein): Mr. President, I would like to join in thanking Mr. Govern for this very interesting paper. In fact, it made me think very furiously to justify our method of financial treatment in Bloemfontein.

We insure all our property against major damage and provide a Renewals Fund, which I think compares with Mr. Downie's idea of matters, to provide for major replacements which may become necessary and which are beyond normal maintenance and abnormal shortening of the useful life of plant, which may not be foreseen in the initial stages, which, of course, falls rather short of Mr. Govern's vision of the position.

I have, however, in the light of his paper, found an answer to that. The ratepayers actually do guarantee the loans, but it is the consumer who pays the piper and when you look back on the years past, the cost of electricity, say from 1938, 1939, up till today has not increased by any manner of means in the proportion that capital cost has increased and the capital value of money has decreased. Virtually, therefore, the consumer of the future may be and is today in a better position in that his contribution towards this increased value of plant, in terms of money, is virtually a lesser proportion of his income than it was in the years before the war.

And in the light of this argument, I feel

that there seems to be no particular reason why one should at this stage make the present generation provide for sufficient capital to repay the loan and also to provide funds for the increased value of plant to be purchased in another twenty years' time. (Applause.)

MR. H. RODE (City Treasurer of Pretoria): Mr. President, as a Treasury official, I would like to congratulate Mr. Gorven on his being considered sufficiently eligible to address this august body of Electrical Engineers and their associates.

Technical men, be they Electrical Engineers or others, look down on laymen. It is, therefore, indeed a pleasure to see a man who is "just an ordinary Treasury official", also being allowed to address this Association.

I had intended reading Mr. Gorven's paper early this morning, but I was at the party last night. Indeed, it was a very nice party. I enjoyed it thoroughly. So, as with New Year resolutions, I broke this resolution of mine; with the result that I had to form my conclusions on the paper as delivered by Mr. Gorven this morning. For this reason, I cannot comment fully on all the contentious matters that were raised by Mr. Gorven, but will confine myself to one or two remarks of a general character as far as the subject is concerned.

The first is the question of the Consolidated Loans Fund. This has been mentioned on numerous occasions, and people seem to grasp at the idea like a drowning man at a straw.

The Consolidated Loans Fund is definitely not the same as an oil well struck on the town commonage, for it does not produce income. The Consolidated Loans Fund is merely an accounting procedure that facilitates the allocation of money to capital projects. If there is not sufficient money in the Fund, then this is increased by means of borrowings, either internally or from the public. The Consolidated Loans Fund does not create money. It is

simply a means of using loan funds without a lot of red tape.

I think there are many Engineers here whose Treasurers have already adopted this procedure to a certain extent. In Pretoria, for instance, we use the half-yearly accruals of interest and redemption in the Redemption Fund Account in order to finance some of our own loans, and this is virtually the way in which the Consolidated Loans Fund operates. Let me repeat: This fund merely facilitates the funding of capital expenditure, but does not create any money.

Mr. Gorven has mentioned the possibility of extending the life of assets over a more realistic period suggesting that perhaps fifty to a hundred years would be reasonable. The reason why we redeem over thirty years is because this is the maximum period prescribed in our Ordinances.

We Treasurers are usually a conservative lot. We prefer to see an asset with a life of thirty years or more being redeemed in twenty-five years. I think there is generally a tussle between the Treasurer and the Engineer — be he an Electrical or other sort of Engineer — over the reduction of the periods of redemption.

There is another question that of the Renewals Fund. It has been mentioned that a municipality is not in exactly the same position as a Company. A Company has share capital which is permanent. The loans which a Municipality raise should not be compared to share capital. They should rather be compared to the debenture capital which a trading company sometimes must raise in order to finance something temporarily. Or if permanently, then it is in the hope that the extra profits will be sufficient to redeem the debenture loan, thus resulting in more capital as a whole being available to the Company.

So we must bear in mind that the Municipality's loan account is analogous to the Debenture account.

The loan that the Municipality raises to acquire an asset is repayable. At the moment interest rates are round about 5 per cent., and redemption over a period of thirty years is approximately £2 per cent. This means that seven per cent. per annum of the Capital must be contributed to the Redemption Fund each year.

If you wish to redeem this loan, and at the end of thirty years, have sufficient mone yavailable to buy at the same price the identical article without incurring a fresh loan, it will mean that you will have to contribute twelve to fourteen per cent. And if you wish to make provision for depreciation as well, or for the higher cost of the new article, then you would have to provide something like 15% to 17%. Now I think this is a little bit too high. I do not see how any municipal undertaking can work on a profit margin sufficient to cover such a contribution.

On the other hand, I am also one of those shylocks who like to see the shekels come in. And I would very much like to see an addition to the tariff that will provide a certain amount of capital — working capital in the meantime, and then also capital that will be available to reduce the cost at the time when you have to renew or extend the assets.

I think it is a little wrong to say: "Let posterity pay for its own benefits". After all, posterity consists of our own children, and I think that most parents try to leave their children somewhat more than they themselves received; and as such, it is not money wasted. It is money saved. If we can put enough money aside to finance capital works out of revenue to a certain extent, it simply means that the interest and redemption charges on revenue account will be decreased. Otherwise you will find, as in Pretoria, that the total rate income is more or less equal to the interest and redemption that we have to pay.

There is another matter. As prices increase so do incomes increase. For example, in 1924/1925 you could erect

a power station, I believe, for something like £25 per kilowatt, where as it now costs practically three times this amount. But, notwithstanding the increase in prices, I think that people now enjoy a higher standard of living than in 1924. They have more amenities, more luxuries, shorter hours and better working conditions. In all respects they are materially better off than they were in the earlier days.

I think that, even as municipalities, we must follow the market. There is no object in our crying about the price of coal, or the price of a power station, and making a comparison with pre-war figures. For, as mentioned in the paper, it is very doubtful if prices will ever recede to the old level.

With these remarks, Mr. President, I once again congratulate Mr. Gorven on the opportunity that he has had of presenting his paper, full of problems, to such an august body as yours. (Applause.)

PRESIDENT: Thank you, Mr. Rode. Gentlemen, I do not propose ending the discussion now. Perhaps tomorrow morning we may find a little time to discuss this paper further. Mr. Dunstan's paper is also still open for discussion, so if there is any member present who wishes to participate he is welcome to do so now.

Mr. F. STEVENS (Ladysmith): Mr. President, I would like to congratulate Mr. Dunstan on the practical paper he has presented at this Convention, the type which provides ample opportunities for delegates to question or criticise some of the practices described.

I am disappointed that the question of earthing at transformer points was not dealt with more fully, that is in so far as the nature of the ground at various points, the type of earthing conductor installed in each case, the results obtained and, last but not least, the cost, are concerned.

At Ladysmith earthing presents a problem due to outcrops of whinstone cover-

ing three-quarters of the built-up areas, and the advent of composition water pipes. Nevertheless we invariably manage to obtain values between 1 and 2 Ohms at a cost varying from a few pounds, using old cast iron kaffir beer pots buried in water courses, to £20 and more, using several earthing rods or long lengths of buried copper conductors.

In conclusion, I would like to congratulate the designer of the simple yet extremely useful cam type jacks for lifting and supporting small drums of conductors. My Department proposes copying same, providing, of course, that copyright is not reserve. (Applause.)

PRESIDENT: Thank you, Mr. Stevens. Any further contributors to the discussions on either of these two papers?

Mr. R. W. KANE (Johannesburg): Mr. President, I would like to ask Mr. Gorven a question.

Mr. Gorven in his very interesting paper really deals with the rising cost of assets and I wondered what, as a Treasury official, he would advise if, for argument's sake, in a town like Durban they had to acquire an asset of an adjacent village. Say, for argument's sake, that they supplied bulk to that village and finally had to take over the reticulation, would he then strictly work on the historical value of that particular asset or would he allow some form of appreciation as a purchaser?

Mr. H. G. VAL DAVIES (Johannesburg): Mr. President, Gentlemen, Mr. Dunstan is to be complimented on the production of a truly fascinating paper. It shows him to be a man of infinite resource and initiative and reflects a Department which is an integrated whole, operating most harmoniously technically and in that most difficult of all fields, human relations. Mr. Dunstan has obviously achieved almost the millenium where both his own staff and his consumers see eye to eye with one another.

Rural distribution of electricity has, until very recently, been the Cinderella of most undertakings, since the ever-present problem of balancing capital expenditure against revenue, is more acute in this sphere than in any other. The methods by which the Pretoria electricity undertaking have tackled this problem, is an education to us all.

As mentioned earlier in this Convention, the benefits of electric power for all purposes, are now appreciated by the entire population, which includes our Native population, which is becoming increasingly aware of its existence. Farmers are no longer prepared to accept a future without electricity on their farms and increasing pressure is being applied by or farming fraternity, individually and collectively, to make extensive rural distribution a reality throughout the country. When one sees the great strides that have been made in the U.S.A., Sweden and in Britain, the writing is on the wall for us all to see.

In this continent, Southern Rhodesia has made considerable advances in rural distribution and I venture to suggest, has a longer rural route mileage than has the Union at present. As I had some small part in these developments in Southern Rhodesia some years ago, I hope that a delegate from across the border will enlarge on the progress that has been made. I also hope that a rather unusual method of protection of an 11 kV rural line undertaken by the Bulawayo Municipality, will be mentioned in a contribution to Mr. Dunstan's paper. (This was prepared before Mr. Sibson made his contribution.)

In the Union I am sure very few are aware of the extensive rural network of the Durban Corporation over the most difficult terrain and operating under somewhat unusual conditions. (Mr. Simpson has looked after that point.)

Continuity of supply in rural areas is a problem that will not be lightly dismissed by any distribution engineer. It is a problem, which, to the best of my knowledge, has recently and for the first time

been the subject of a lengthy paper read before the Institution of Electrical Engineers in England.

Mr. Dunstan mentions the use of conventional high voltage auto-reclosing oil circuit breakers. These breakers, principally of the weight-operated type, have been available for many years. They are designed to meet the requirements of clearing transient faults, but have two advantages:—

- (a) The small number of operations obtainable before the weight has to be recharged.
- (b) the tripping time of the breaker cannot be varied.

This latter disadvantage means that if a tripping time is selected to prevent subsidiary circuit fuses operating on the occurrence of transient faults, the circuit breaker will automatically lock out in the event of a permanent fault occurring, as the subsequent tripping time of the breaker cannot be delayed to permit the fuse on the subsidiary circuit to melt, thus the resultant interruption in supply cannot be automatically limited.

The Americans pioneered a device known as the recloser, now manufactured in other countries also, which is designed to overcome these shortcomings. Reclosers are continuous in operation and have the characteristics of providing time delay tripping in the event of a permanent fault developing on the network. They thus permit normal fuse discrimination to operate and limit the interruption of supply to the short section of fuse protected network on which the permanent fault has occurred.

Since the cost of maintaining continuity of supply in rural networks is usually a major factor, these devices serve a most useful purpose. They prevent much unnecessary fuse blowing, with consequent maintenance expense in staff and travelling and ensure the maximum continuity of supply.

Mr. Dunstan has not mentioned the use of such reclosers on his network and has indicated that there is no intention at present to increase the present level of continuity on the grounds of cost.

Since the Pretoria undertaking, being the pioneer of single-phase rural distribution in South Africa, closely follows American practice, it would be interesting to learn whether reclosers in place of conventional auto-reclosing circuit breakers have been considered.

I have no doubt that in the last few years Mr. Dunstan has been asked and has learned to answer a very large number and variety of questions put to him by his consumers. One of these must surely have been the very high cost of singlephase motors over one horse-power, as compared with the 3-phase counterpart, and it would be of considerable interest to learn how he and his Department handle this difficult aspect, which I feel sure must react on his Department even more forcefully than it does on the commercial concerns supplying them.

Mr. President, Mr. Dunstan is to be complemented on his paper, which is outstanding for its completeness. (Applause.)

PRESIDENT: Thank you, Mr. Val Davies. I shall arrange, with Mr. Dunstan's co-operation, for him to reply to your contribution, as also to the contribution of Mr. Stevens tomorrow morning.

CONVENTION ADJOURNS AT 12.30 P.M.
FOURTH DAY.

Friday, 6th May, 1955 (9.45 p.m.).

PRESIDENT: Good Morning, Gentlemen. I feel that I have created a record, which I sincerely hope future Presidents will not try to equal and, that is, that I have not been able to start the morning session on time — my apologies!

Secondly, may I say that I am very gratified indeed to see such a good attend-

ance for our closing session. I really think it is the best turn-out I have seen on the last day at any Convention.

Gentlemen, the first item this morning is an announcement on the election of honorary members and I call on Mr. Sibson.

Mr. A. R. SIBSON (Bulawayo): Mr. President, Gentlemen, in terms of the Constitution, the Executive has vested in it the power, from time to time to elect certain of its members or past members as honorary members of this Association. It does this where it wishes to recognise the excellent service that certain members have given during their period of office and it is usual for this election to take place after the member in question has ceased to be actively employed as a Municipal Engineer.

During the last week, the question of the election of honorary members has been under discussion in the Executive meeting and it gives me very great pleasure indeed to announce to you that the Executive have unanimously agreed to elect Mr. J. C. Fraser of Johannesburg an honorary member of this Association.

It hardly needs words from me to support this decision of the Executive, but I could perhaps remind you that Mr. Fraser acted on the Council of this body since 1944 and has given, from my own knowledge of the workings of that Executive, probably more service to this Association than any other two people of whom I can think added together, and there can be no doubt whatever that from Mr. Fraser's past services to this Association, we have benefitted very greatly indeed. It is with very great pleasure, therefore, that we have agreed to elect him as an honorary member.

In addition to Mr. Fraser, it has been decided to recognise a very old member of this Association. Amongst those present at the very first meeting of what was then the Association of Municipal Electrical Engineers—which took place, I think, in

November, 1915—was Mr. W. Bellad-Ellis, at that time Electrical Engineer of Queens-town in the Eastern Province, and those of you who have with you your copies of the proceedings of the last Convention, will find amongst the first pages, a photograph of those attending that first Convention. Amongst those present you will see, sitting on the left, Mr. W. Bellad-Ellis. And it is a great pleasure to know that Mr. Bellad-Ellis is still with us and is, in fact, here this morning.

Mr. Bellad-Ellis retired from Municipal work many years ago, but has been closely associated with practically every small Municipal undertaking in the Eastern Province in the course of the last twenty years or so. My own first meeting with him was, I think, when I was a child, round about 1915, and arose from a little experiment that I conducted, which resulted in failure of supply in the district in which I lived.

I therefore also have much pleasure in announcing that the Executive have decided to honour Mr. Bellad-Ellis by electing him as an honorary member of this Association. (Applause.)

PRESIDENT: Thank you, Mr. Sibson. Mr. Fraser, would you like to say anything?

MR. J. C. FRASER (Johannesburg): Mr. President, Gentlemen, I appreciate to the full the honour which you have conferred on me this morning and my thanks go to you, Sir, the Members of the Executive and to all members of this Association.

My association with the Conventions and the Association's work has been a labour of love. I shall miss you all, and the work attached to the Executive, but I have come to the stage now where I would like to relax and enjoy myself perhaps in another way.

Gentlemen, this has been sprung on me and I have not prepared any vote of

thanks, but I would like you to know that I appreciate this honour, probably one of the greatest honours that I have received in my career, and I shall endeavour to uphold the dignity of the honour which you have bestowed upon me. Thank you all. (Applause).

PRESIDENT: Thank you, Mr. Fraser. Although you look forward to retiring now and not doing much work, I trust I may still call on you frequently for assistance.

Mr. Bellad-Ellis, would you like to say anything?

MR. W. BELLAD-ELLIS (East London): Mr. President and Gentlemen, my hearing has not been too good, but your authorities have taken that into consideration and have been assisting me with hearing aids and it was very pleasant to hear through those hearing aids this wonderful news.

It is true, as Mr. Sibson has pointed out, that I have been associated with these Conventions for a number of years; for the first five or six years I had the honour of being a member of the Council. And then I failed to attend several more, but in the interim, I have picked up others and finally I went to Bulawayo two years ago. My special reason for coming to this was to see how many of the old friends were left and to listen to your deliberations and I find that your troubles are much the same as they were in 1915, they are basically the same.

In those days we were troubled very, very much (I hope I am not digressing by giving you a little ancient history) mostly by tariff troubles and we had that wonderful exponent of tariffs, John Roberts of Durban. What a wonderful man he was with regard to bringing down the price of electricity to such an extent that it could be used for cooking and heating. I do not think that I am wrong in saying that John Roberts was the pioneer of the cheap unit for that purpose.

I did think, when I first came here, that I might just ask a little question and if I am not taking up too much of your time, I shall ask it now. In 1915 I presumed to give a paper on Diesel engines and in that paper I asked a question, to which I am still wondering if I could get an answer, and that is this: I mentioned that fuel oil (as a matter of fact, I am Diesel mad, if you like!) as you probably know, has a calorific value of about 18,500 to 19,000 British thermal units per lb. and our best coal in South Africa is only about 6,000, 7,000 and sometimes 8,000. In other words, a lb. of fuel oil has two and a half times the heating value of a lb. of the average South African coal. And it has often puzzled me why (I asked this question in 1915) our friends at the coast who had plants to increase, should not have considered the use of fuel oil under their boilers instead of coal, which costs a lot to transport to the coast. Mark you, I am speaking now of the coast, and I have often wondered why it was not possible to use fuel oil under the boilers, like they do in motor ships. As a matter of fact, in some of the steam turbine ships, we are still using fuel oil under the boilers. And I have often wondered why it could not be done — to save all that storage of coal, of heavy transport, of the railage costs of coal, and the facility by which steam could be raised very rapidly simply by the twist of a valve.

Now we come to the question of what is going to happen to the power stations which are situated a long way away from the coast. But this seems to be partly solved by the fact that you are getting it delivered from coal very shortly from your plant in Johannesburg. But I would still like to know what the calorific value of the fuel oil obtained from coal is going to be, whether it is going to reach that of fuel oil. Mark you, I said fuel oil, not crude oil; we have no crude oil in this country, except that which is going to the refinery in Durban.

However, that is one of the little things I have still been waiting to see — if at one time or another (I hope to hear) it

will be possible to change over to fuel oil at our coast ports. The answer, of course, is, "Oh, we have not got any in the country, we have only got the coal." However, I still think it is an item, in fact, I think it is, in my opinion, a valuable item that ought to be investigated.

Thank you for giving me that great honour, Gentlemen, and I appreciate it very, very much. (Applause).

PRESIDENT: Thank you, Mr. Bellad-Ellis. Has anybody got a reply to that question which is now forty years old and still remains unanswered?

MR. C. G. DOWNIE (Cape Town): Mr. President, I understood Mr. Bellad-Ellis to say that the calorific value of coal was 8,000 or 9,000 British thermal units per lb. Actually, of course, it is just on 12,000 British thermal units per lb. The calorific value of oil is, say 19,000 British thermal units per lb.

We have thought of this in Cape Town and when we worked it out a little while back, we found that the cost per kilowatt hour in a power station when using oil, would be at least four times what it is costing today to produce electricity from coal.

What Mr. Bellad-Ellis may have in mind is the refinery at Durban which is producing a crude oil (it is a by-product of the cracking process of producing petrol) and attempts that are being made to get some of us at the coast to convert our boilers to use this crude or residual oil. I understand that the intention of the oil companies who are producing this stuff is to charge a price which will make the production of electricity from this oil, comparable with that of producing electricity from coal.

What I am prepared to do, Mr. President, is to write to Mr. Bellad-Ellis giving him information which should answer his queries in this matter at last once and for all!

(The following is the letter which Mr. Downie subsequently wrote):—

With reference to the remarks made by Mr. W. Bellad-Ellis at the Pretoria Convention, following his election to Honorary Membership, on the question of using oil instead of coal, I find that we in Cape Town went into the possibility of using oil instead of coal in July 1951, when there was a serious coal shortage in Cape Town and the power stations very nearly shut down. The conclusion came to was that oil would cost about seven times as much as coal. Today oil is slightly cheaper and coal more expensive but the balance is still five to one in favour of coal, as is evident when comparing the heat value in oil and coal.

The number of B.T.U.'s that one penny will buy with oil costing 1/4½d. per gallon and having a calorific value of 18,000 B.T.U.'s/lb. is 10,100. Coal at 12,000 B.T.U.'s/lb. and 42/6d. per ton delivered at Cape Town gives 47,000 B.T.U.'s per penny. Boiler efficiency on coal and oil would be about the same so that it is immediately evident that oil would cost nearly five times as much as coal.

PRESIDENT: Thank you, Mr. Downie. It is unnecessary for me to say how gratified I am at the election of Mr. J. C. Fraser and of Mr. W. Bellad-Ellis as honorary members of this Association.

Gentlemen, we still have a couple of sub-committee reports of which to dispose. The one is the Recommendations Committee for New Electrical Commodities, of which I am Chairman. I have to report that there have been no meetings during the year, the reason being that, although we have had several applications for the approval of so-called new electrical commodities, they were all items which could comply with either a British or a South African specification. The applicants were accordingly informed that they must have their products tested and prove compliance with the relative specifications.

Are there any queries regarding the

work of the New Electrical Commodities Committee? (No queries).

Another sub-committee report with which we have to deal, is the amendments to the Constitution and I call on Mr. Muller to handle that matter, please.

MR. G. J. MULLER (Bloemfontein): Mr. President, in the light of various suggestions received during the year (and there were unfortunately not so very many), we have drafted an amendment to our Constitution and that has been circulated on this occasion. (You will remember that on the last occasion it was not, for one reason or another). I trust that you have all seen and read this proposed amendment.

In the meantime, however, quite a number of possibilities have been submitted to your Executive and we have felt that the final acceptance of this draft might well be left over to incorporate matters which have occurred to the Executive as such during the last week.

One item I would like to mention to you, however, is on the last page, Clause 9: We propose to redraft that (it is so short that you might well just write it in). Instead of what you find under Clause 9, we propose to insert:—

"Five or more member undertakings may, with the sanction of the Executive Council, form a branch of the Association at any approved centre and shall be subject to the by-laws framed by the Executive Council for the conduct of such branches."

That leaves the field free for the Executive to draft Rules and Constitution for the regional branches in the light of circumstances, as they arise from time to time, and I hope that you will accept the brief version of that paragraph.

PRESIDENT: Thank you, Mr. Muller. Are there any comments on that Report? (No comments).

The next item, Gentlemen, is the Report of Sub-Committees and Representatives — Mr. Kane has something to say on that subject.

MR. R. W. KANE (Johannesburg): Mr. President and Gentlemen, you all have copies of the proposed list of Sub-Committees and Representatives and all I want to state is that there have been one or two alterations to that.

Your Executive proposes that (the second item on the list) Wiring Regulations and Legislation should be deleted entirely for this year at least. And the Committee dealing with New Electrical Commodities — that these new commodities should be handled by the Sub-Committee dealing with Bureau specifications, that is, Messrs. van der Walt and Downey with the power to co-opt.

PRESIDENT: Thank you, Mr. Kane. Gentlemen, are you in agreement with the Sub-Committees and Representatives, as suggested by your Executive. (Agreed).

We now proceed to the item of "General" on our Agenda and there are various items with which I would like to deal. The first is the matter of copper wire thefts and I shall ask Mr. Hallé to speak on that subject, please.

MR. C. R. HALLE (Pietermaritzburg): Mr. President, Gentlemen, this has been dealt with at a previous Convention, but it is still of considerable trouble to us.

In Pietermaritzburg, for instance, when we get a fault outage and the faultsman goes out to replace a fuse, he sometimes finds that he needs to replace about 12 spans of wire in the service line as well, because it has all evaporated into thin air. In the same way, the Council authorised repairs to the lead roofing on the City Hall some time ago and when they went up to do the repairs, they found that the lead roofing had gone. Well, it is pretty tough when you lose the roofing on your City Hall!

This, of course, is not just in Pietermaritzburg. I shall not go into the gruesome details of all the other cities. But it has been proposed that we should do something about it and we find that the Municipal Executive has already taken this matter up. They know that the Govern-

ment is proposing legislation to tighten up the trade in second-hand goods and this is a Resolution we have drawn up:—

"In view of the seriousness of thefts of power cables and copper conductors and non-ferrous metals generally and the interruption of essential services caused thereby, this Convention notes with approval that the United Municipal Executive is taking suitable action with regard to legislation to be promulgated with the object of preventing trade in illegally acquired non-ferrous metals and trusts that this legislation will be so framed as to result in a marked reduction in the losses suffered by Electricity Undertakings due to the theft of copper, etc."

Well, Gentlemen, that is the Resolution proposed and we trust that we have your support.

PRESIDENT: Thank you, Mr. Hallé. Would anybody like to speak on that subject? Do we unanimously adopt the Resolution? (Agreed).

The next item under General is the right of supply in Municipal Areas and I ask Mr. Lombard, of Germiston, to speak on that matter.

MR. C. LOMBARD (Germiston): Mr. President, Gentlemen, under existing legislation, local authorities on the Reef, with the exception of Johannesburg, do not have the sole right to supply all consumers in their respective areas of jurisdiction. This, of course, leads to all sorts of difficulties, which, in view of the short time at our disposal (I know our President has his eye on the clock), I do not wish to elaborate upon. I also do not think that further elaboration is necessary, as all Engineers are only too familiar with the problems which this state of affairs creates.

To mention a few: Firstly, this leads to uncertainty and makes long-term planning impossible. Secondly, with two supply authorities operating in the same area, a certain amount of overlapping and duplication of networks is unavoidable. And this, of course, is undesirable from the technical as well as from the economic point of view.

Mr. President, on behalf of the Sub-

Committee appointed for this purpose, I would like to put the following motion to this Convention:—

"Whereas this Conference of the A.M.E.U., assembled in Pretoria this 6th day of May, 1955, is of the opinion that the interests it represents are no longer adequately served in view of certain provisions of the Electricity Act, No. 42 of 1922, and that the development of Municipality Electricity Undertakings since 1922 has rendered amendments of the Act desirable, to this end it is now RESOLVED that this Convention is unanimously of the opinion that all Municipalities shall have the sole right of supply to all consumers, with the exceptions of mines and Government Departments, within their respective Municipal boundaries, provided the objectives envisaged by the Electricity Act No. 42 of 1922 are not disturbed, and in order to achieve this objective, representations be made, in the first instance, to the Electricity Control Board and thereafter, if necessary, to other bodies or appropriate Government Departments."

MR. P. L. VERGOTTINI (Brakpan): Mr. President, Gentlemen, I have great pleasure in seconding this proposal put forward by Mr. Lombard.

PRESIDENT: Thank you, Mr. Lombard and Mr. Vergottini. Is there any discussion on the matter?

MR. A. F. TURNBULL (Vereeniging): Mr. President, Gentlemen, in support of the motion put forward, I would just like to say that it is generally accepted that any surplus from an Electricity Trading Account is appropriated towards the relief of rates. Electricity tariffs can, therefore, be considered as an indirect form of taxation. If you do not do that, you have to raise money for the finances of the town by some other way.

Now, in Vereeniging we have a case of a consumer supplied direct by the E.S.C. right in the centre of the business area. This consumer is not only in the business area, but within fifty yards of the main Municipal distribution sub-station. Our distribution network passes this consumer on all sides. This consumer, therefore, enjoys all the amenities provided by the local

authority by way of parks and health services, street lighting and so on, but contributes towards the welfare of the town only by way of the usual Assessment Rate.

A consumer across the street contributes possibly the same amount by way of Assessment Rates, but also contributes by way of electricity trading, as he purchases electricity from the Council. You have therefore two consumers enjoying exactly the same amenities, but not contributing equally towards the responsibilities of the Community as a whole. This is not altogether a fair state of affairs.

The Supply Commission naturally owe these consumers a certain amount of loyalty — they were there possibly long before Vereeniging was in a position to supply them — and the consumer also, quite naturally, does not want to be deprived of an extremely low tariff. I do feel that the relatively small additional charge which may be incurred if he took the power from the Council, would not seriously affect that consumer and I feel that every support should be given to the motion put forward by Mr. Lombard.

PRESIDENT: Thank you, Mr. Turnbull. Would anybody else like to contribute to the discussion? May I formally put that motion then, please — is it unanimously adopted? (Adopted).

Establishment of Regional Branches — Mr. Sibson.

MR. A. R. SIBSON (Bulawayo): Mr. President and Gentlemen, I think it is probably fairly well known amongst the members that there has existed for quite a few years now on the Reef a little group of Engineers, Municipal Electrical Engineers, all of whom, or very nearly all of whom are members of this Association and who have found great benefit indeed — largely as a result of their geographical propinquity — from frequent meetings which have enabled them to deal very much more expeditiously with some of the minor local problems that arise from time to time. And this initiative which has been shown by the Reef Engineers has been something which we have looked on with pleasure for some time.

It has occurred to your Executive (and in the draft Constitution which we have

had presented to us by Mr. Muller this morning such provision was, in fact, made) that the idea of regional branches of this Association would be of great value, in addition to the possibility that this particular Reef association might decide to reform itself as a branch of the A.M.E.U. I think the matter is one in which the advantages are so obvious that it hardly needs any discussion at all. This body of Reef Engineers have been in touch with our Executive with a view to provision being made at the very earliest moment for their Association, if they so wish it, to reform itself as a branch of this Association. And I think that all of us would be very glad indeed if this did come about.

Although I agree that it is rushing the thing very much, I want, therefore, to propose to you this morning that, in view of the fact that I am sure all of you will agree in principle with the idea, we might accept now the necessary amendment to our Constitution to enable both this body to which I have referred and any other group of Municipal Electrical Engineers to form themselves into regional branches at the earliest possible moment. The amendment necessary to bring this into effect would consist of a paragraph which would have to be added to our Constitution and which could read as follows:—

“(1) On application in writing being received from the Councillor and Engineer members of not less than five Municipal Electricity Undertakings the Executive Council may approve of the setting up of a Regional Branch of the Association and such Regional Branch may continue to operate under by-laws laid down from time to time by the Executive Council, until such time as the Executive Council may decide that such Regional Branch should cease to exist.

“(2) The Executive Council shall from time to time delineate the geographical area falling under the jurisdiction of a regional branch.”

It is further proposed that the Chairman of any regional branches that are duly and properly constituted, should ex officio be members of the Executive of this Asso-

clation, and it will be necessary to cover that point by adding, in Clause 7 of our existing Constitution under the general heading of "Members of Council" after the words "all of whom shall be Engineer members" the words "The Chairmen of any properly constituted regional branches, six other Engineer members and eight other Councillor members."

These, Mr. President, are the amendments that will be necessary to make possible the setting up of regional branches and, in particular, to make possible the reconstitution of the existing Association of Reef Engineers, should that body wish to take advantage of this provision.

Now, reference is made in this proposed amendment to the Constitution to "by-laws laid down from time to time by the Executive Council." I do not propose to indicate to you now, through shortage of time, what those by-laws would be, but certain by-laws have been drafted and have been approved this morning by the Executive Council and any group of Engineers who wished could, on application now to the Secretary, obtain a copy of those by-laws and so enable them to set about the creation of a regional branch should they so desire.

It is, therefore, my pleasure, Mr. President, to recommend that the proposed amendment to the Constitution, providing for the setting up of regional branches, which I have read out to you should be approved at this meeting.

PRESIDENT: Thank you, Mr. Sibson. May I ask for someone to second that proposal?

MR. G. J. MULLER (Bloemfontein): Mr. President, Mr. Sibson has referred to the Reef Electrical Engineers' Association, which, as an unofficial body, has served a useful purpose and done much useful work over quite a number of years. In fact, in its early years, I was a member. And all this useful work has been done as an unofficial body.

As a recognised branch of this Association, I feel that it could be even more useful and for that reason I have very great pleasure in seconding the motion proposed by Mr. Sibson.

PRESIDENT: Thank you, Mr. Muller.

Is there any discussion on the matter? May I take it, then, that the motion is adopted? (Adopted).

Mr. Stevens, of Ladysmith, has asked whether he may raise a small matter.

MR. F. STEVENS (Ladysmith): Mr. President, I would like to refer to a matter concerning engineering apprentices in the employ of Municipalities and Engineering Concerns.

I am perturbed at the lack of interest shown by many of these apprentices in connection with the technical side of their training.

The refunding of their Technical College or Correspondence Course fees should they get satisfactory reports, appears to be insufficient inducement for them to study.

My own opinion is that the high wages paid to apprentices coupled with the fact that, today, they are assured of work at £50 or more per month immediately they come out of their time, irrespective of whether they have studied diligently or not, is the reason.

Many concerns pay the fees without attempting to recover them from the boys which does not help matters.

I would like to put forward an idea for the consideration of this Association with a view to representation being made to the Minister of Labour for an amendment to the Apprenticeship Act.

I would remind members that in terms of the Act there is no compulsion for an apprentice to study beyond the N.T.C. II examination. This means he has only to pass 3 subjects in N.T.C. I and the same 3 but more advances in N.T.C. II, six papers in all.

The provision made for bringing dilatory lads before the Magistrate is rarely acted upon by Employers and the boys know it. At any rate they could not worry.

The intention is for the Apprentice to pay all fees by way of deductions from his wages as at present, but that a remission of 3 months be allowed off his apprenticeship for each course passed of the National Technical Examinations. For instance, a boy who passed N.T.C. II would come out of his time after 4½ years and those who have passed N.T.C. III 4½ years and so on. This means for each month of

remission they will be earning £50 or £60 instead of £20 or £30 as 5th year apprentices. The total difference in wages is between £120 and £270 which might be sufficient inducement.

This should help relieve the present acute shortage of artisans as well.

I would like the matter referred to the Executive for Consideration.

PRESIDENT: Thank you, Mr. Stevens. The Executive will be pleased to consider the matter.

Ladies and Gentlemen, we still have a little time before the tea interval and as Mr. Dunstan's paper is still open for discussion, this is an opportunity for members to contribute thereto, if they desire to do so.

MR. V. E. O. BARRATT (Queenstown): Mr. President, Ladies and Gentlemen, I ask this question that I am going to ask now with perhaps a little more diffidence than I would have done originally, because, of the Resolution moved by Mr. Lombard of Germiston.

Nevertheless, I have wondered what the position was so far as Pretoria is concerned, with its licence covering so large an area of supply, of 1,500 square miles. It would be interesting to know whether your undertaking has the unqualified right to supply both now and in the future all consumers within the area covered by the licence other than the one exception mentioned, or has the Commission reserved to itself the right to supply certain other types of consumers?

The other question, Mr. President, has been of interest to me, and that is, what is the maximum size single-phase motor supplied or permitted on your rural distribution? Thank you.

PRESIDENT: Thank you, Mr. Barratt. Is there anybody else who would like to contribute to the discussion?

MR. H. J. DE VILLIERS (Escom, Johannesburg): Mr. President, Gentlemen, the Pretoria Municipality has done very well in extending its network, I think, to all the Peri-Urban areas and smallholdings, but Mr. Dunstan has not indicated what he intends to do with the bigger farms, situated further out in this area of supply. This is indeed the big problem

that is also facing Escom at the present time.

We find that we can do something for the farmers when the farms are up to one mile apart, but it is a real problem of reducing costs to the very minimum. Now, we have done so by getting the farmers to indicate on degree sheets the positions of their homesteads. (These sheets are available from the Government Printer). We then plot in the office an approximate route of the power line, which we scale off, and we then communicate to the Secretary of the Farmers' Association or to some interested farmer, the price of giving supplies to these farmers. We select a certain area of about 15 to 20 square miles at a time.

No Engineer visits the area because a rural system of that sort is fairly easy to plan. All you do is to erect a farm line from one farm to the next. If the terms are acceptable, we send a linesman to the area, to start from the starting point and we leave it to him entirely to erect and to give supplies as he goes along. The District Engineer may visit the area once a week to discuss any problems and to make sure that supplies are coming forward.

We construct only wood pole lines; we use the very longest spans possible; we have a wood pole cross-arm, with the 11 kV line conductors in a horizontal configuration, positioned about 3 ft. apart. We even eliminate the clamp for taking the stay at the top of the pole by drilling a hole through the pole and twisting the stay-wire once or twice round the pole and ending in a Crosby clip.

We do not register any servitudes. We do not have a meter-reader coming back with readings and accounts being prepared in the office. The maintenance man visits the area once a month on his inspection, prepares the account and leaves it in the farmer's homestead.

Now, in this way we have been able to supply electricity to farmers up to one mile apart. We see very little chance of supplying the farmers who are two to three miles apart. There are still 86,000 farms in the country, of areas from 5 to 750

morgen, that have to be electrified. We are connecting farms at the rate of 250 per annum at the present time, but this work has been held up a great deal due to lack of capital and shortage of labour.

Escom is all in favour of the Municipalities developing the rural areas around the towns. We do not like the Municipalities picking out the "eyes" and leaving the sparsely populated areas to us. According to Mr. Dunstan Municipalities can supply electricity to the rural areas at prices which shall I say, are below cost, whereas Escom cannot do so under the Act.

It appears to me that Escom should approach some of the Municipalities where it supplies in bulk and ask them to pay just a little extra over and above the standard tariff so that it may use that little extra to subsidise the farmers in the districts. That, I have no doubt, will be to the benefit of the town concerned. I do not know what the reaction would be if Escom did make that approach.

Nevertheless, Mr. President, I would like to extend an invitation to Mr. Dunstan or to any other member of your staff to discuss with Escom any problems on matters concerning rural electrification. That invitation is also extended to all the Engineers present here today. Thank you. (Applause).

PRESIDENT: Thank you, Mr. de Villiers, and also thank you very much for your kind invitation.

MR. J. T. WILLIAMS (Pretoria): Mr. President and Gentlemen, we have all been most interested in Mr. Dunstan's paper, more particularly as the rural electrification scheme which it describes has been built largely on faith, the faith that the provision of electricity would create new consumers and it has actually done so.

I believe that that is the way that the drift from the farms to the towns is going to be stopped; it certainly has been stopped in the Pretoria area. In fact, the process seems to have been reversed and land values have gone up tremendously as a result, no doubt, of the provision of electricity.

There are just one or two little points on which I would like further information. The first one is this matter of lightning

protection. I would like to ask Mr. Dunstan whether he takes into account the impulse insulation level on the line or whether only the transformer is considered. Mr. Dunstan mentioned that any insulator is bought providing it conforms to specification. Does the specification lay down an impulse level for the insulator and also is the impulse insulation level of the wood poles taken into account in any way? Further, is the impulse insulation of the transformer specified? I believe that the standard impulse level of transformers in B.S. is 100 kilovolts, but many manufacturers make their transformers with a lower impulse level and we would like to know a little about that.

Also, what type of lightning arrester is specified?

There is another question in which we are all interested, of course, but I believe there is no answer to it, and that is, does this scheme actually pay?

And, lastly, has the Pretoria Municipality done anything by way of encouraging load? I believe that in Rhodesia they have done a great deal to build load by publicity amongst the farmers, and by arranging with commercial firms to produce and to have available apparatus which the farmer can use, such as milk coolers and hammermills with small motors and that sort of thing. Thank you, Mr. President.

PRESIDENT: Thank you, Mr. Williams. Last opportunity, Gentlemen; any more contributions to Mr. Dunstan's paper?

G. B. HEUNIS (Standerton): Mr. President, there is hardly any other item that delays any scheme more than the time required for obtaining approval by the various authorities, and in this connection I would say that no scheme requires approval by so many authorities as is necessary for the case of rural electrification. During May last year my Council applied for authorities from a certain Government Department and have not received approval yet.

Firstly, you have your own Council to consider, secondly, you have the Postal authority, the Department of Labour, the Union Treasury for loans if required, the S.A. Railways for possible railway crossings and parallel runs, the Provincial

Roads Department for Provincial road crossings and parallel runs, the Director of Air Services where lines are to be built nearby aerodromes, the Electricity Control Board and, where necessary, the Electricity Supply Commission.

At the end of all these endless troubles one might find that the farmer who is to get the supply will only take it provided you carefully by-pass his meadow lands with your power line.

No doubt economies in overhead line construction is one of the most important items with rural electrification. The long lines per consumer required in the district compared with comparatively short line per consumer in towns has made the following items worthy of consideration.

- (a) Substitution of suspension insulators with pin-type insulators effecting a saving of approximately 80%.
- (b) Substitution of steel poles with treated wooden poles effecting a saving of approximately 84%.
- (c) Substitution of copper conductors with either steel or steel reinforced aluminium conductors allowing not only a saving on metal costs but also allowing long-span construction, again resulting in a saving on poles and insulators.

It is particularly in connection with the use of aluminium that I wish to raise a few points.

Aluminium with its higher resistance compared with copper has a larger projected area subjected to wind pressure, secondly, aluminium is much lighter than copper and is consequently thrown about by wind to a far greater extent than copper, thirdly, aluminium has a lower melting point than copper and its fusible properties are such that short-circuits due to clashing of conductors should essentially be avoided. Finally, the higher temperature co-efficient of expansion of aluminium compared with copper results in larger sags in summer. For all the above reasons I would advocate a larger spacing of aluminium conductors compared with that when copper is used.

It is noted that the author has experienced the burning off of an aluminium conductor due to an arc-over and in this

conjunction it would be interesting to learn whether the author attaches any more importance to either the over-current setting of the circuit-breaker or to the time lag period or to both when using aluminium conductor compared with copper.

There is another point which requires consideration and that is where railway lines are crossed. The S.A.R. requirements are that only non-ferrous metals be allowed for crossings. In view of the saving effected by avoiding shackling off aluminium lines on both sides of the crossings and using copper over the crossing it would be interesting to learn what the author's opinion is on the use of either:—

- (a) Plain anodised aluminium (anodised due to the formation of a film of oxide).
- (b) Cadmium-coated aluminium — cadmium being almost level with aluminium in the electrotechnical series.

In cases where steel reinforced aluminium conductor is used, the steel is subjected to more corrosive action than the aluminium over railway crossings. I have been told that the tubing of each conductor by means of either an aluminium tube or a galvanised steel tube for a distance of approximately 15 feet directly above the railway line in order to exclude fume gases from the steel reinforcement has been used and I would be pleased to learn whether the author agrees with this practice and what is done in his own undertaking to overcome the trouble.

PRESIDENT: Thank you, Mr. Heunis. I shall arrange for Mr. Dunstan to reply to the discussion immediately after the tea interval — that is, with the permission of the ladies.

10.45 A.M. — ADJOURN FOR TEA.

PROCEEDINGS RESUMED AT 11.30 A.M.

PRESIDENT: I must apologise to the ladies. I am afraid we are going to detain you a little while longer and I hope you will bear with us.

With regard to Mr. Dunstan's paper, I am sorry that I must now close the discussion. If any of you wish to send in written contributions, you are very wel-

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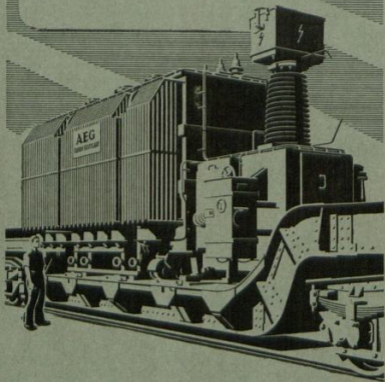
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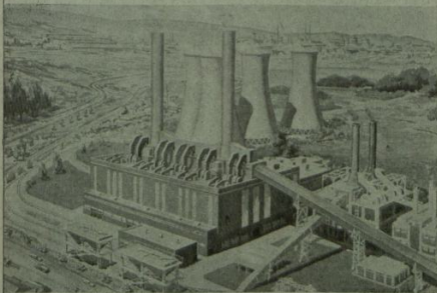


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come to do so and Mr. Dunstan will reply to such contributions through the medium of the proceedings.

I now call on Mr. Dunstan to reply to the discussion.

MR. R. S. DUNSTAN: Mr. President, Ladies and Gentlemen, my time is limited, but before I go on to answering some of the questions that have been asked, I would like to correct one false impression that seems to have been given by my remarks on Wednesday.

With regard to the cost of schemes, the impression seems to have been created that we do not care what a scheme costs. Well, that is entirely wrong; we do care what a scheme costs, but we do not keep costs as a labour of love. We do not keep costs if we can possibly avoid keeping costs or recording them. In other words, we do not make a rod for our own back by keeping costs.

But the whole policy has been to get the maximum distance, the maximum number of miles, the maximum number of consumers, with the minimum amount of money and the whole basis of what I said about simplification and cutting out the paper work is all towards that idea of getting the maximum distance, the maximum number of consumers at the minimum cost.

Mr. Kane asked a few questions. Regarding the first one, dealing with copper-coated wires at rail crossings, another speaker has also mentioned it: The Railways insist on copper wire. We use copper-coated wire as a standard conductor and we utilise that wire for the net. The reason the Railways ask for copper is corrosion due to the fumes from steam locomotives.

Somebody else mentioned aluminium wire, Mr. Heunis of Standerton. I am afraid I have no experience of that. Those of you who use aluminium will have to draw your own conclusions as to whether it would be better or more suitable or at all permissible over a railway crossing.

Theft of material is also another subject that has been brought up. Mr. Kane asks what I mean by minimum theft of material. Well, material is not stolen to a programme; it is stolen at all odd times, just

when you don't expect it. We draw as little material as possible at a time from stores and keep as little material lying around as possible. Then our responsibilities are less and less can be stolen. But it will always disappear when you do not expect it.

I shall give you just one or two instances. When a cable jointer makes his joint, he cuts off about 3 ft. of cable from the end of each cable that he is jointing. This particular jointer was very careful to see that two ends were put on his lorry, that two ends were unloaded from his lorry and that two ends were handed in as scrap — all in order. What he did not notice was that when he cut off 3ft., 2 ft. 6ins. was handed in.

We have also had cases where we have recovered copper wire in old townships, taken it down during the week, collected it in a locked sub-station. On Friday it was all there, on Monday morning it was no longer there — nearly three-quarters of a ton.

Mr. de Villiers, of the E.S.C., I thank you very much for your contribution. I am very interested in your methods of working, but I would like to ask you a question: Why is it that the Commission have not sent anybody along to talk on what they are doing? Have the Commission got anything to hide or are they ashamed of what they are doing? If they had somebody here who could stand up and talk or present a paper to a future Convention, I think the whole of the Convention (and I) would be very interested to hear what they are doing. But if they hide what they are doing — engineering information and knowledge cannot advance, cannot get any further — it is only by getting up and talking and saying, "Well, I was a fool to do that, I made a mistake, we won't do it again" — it is only by discussing our errors that we will ever get anywhere. (Applause).

With regard to the limitations that Mr. de Villiers raised about farms a mile apart, I only know Pretoria conditions, but I would say, "Connect them, there will soon be another farm in the middle." But, of course, I admit that that does not apply throughout South Africa. There are por-

tions of this country where our farms are very big and, like all South Africans, the houses are always in the middle of the farm, not in the corners or in little groups, and that makes it much harder to distribute. But I am only competent to deal with Pretoria conditions and our problems.

Mr. Val Davies has mentioned the use of American type reclosers. Well, I think that Mr. Val Davies missed one point in the paper and that is that our main lines are controlled by solenoid closing, metal-clad switch panels. Those panels are very much more satisfactory even than an American type recloser. They are very much ahead, of course, of the weight-operated breaker.

We have certain spur lines and certain main lines still closed by weight-operated breakers, but I would like to remind Mr. Val Davies that no good Engineer will throw away equipment that is still in use. We have those weight-operated breakers and those weight-operated breakers will have to operate until the lightning catches up with them and they are no more. We know all about reclosers, we know what they can do, what they look like. We know where to get the information, but it is still premature to consider their use, although we shall when the time is ripe and when we need them.

Mr. Val Davies also raised the question of the cost of single-phase motors. I do not want to do the sum for you, but sit down with a piece of paper and work out what it is likely to cost a farmer to equip his farm — you must take his own installation, the cost of his pump, the cost of his refrigerator, of his stove, of his water heater and then add on the cost of his motor. You can take an example with a single-phase motor and with a 3-phase motor and you will find that the difference between the two schemes, that is, the 3-phase and the single-phase motor, is very small. You may even find that single-phase is considerably cheaper on the whole business.

Mr. Stevens raised an interesting point about earthing — I would like to discuss that for a long time, but I have not got the time. In our area we have all types

of soil, we have all types of rock, we have all types of earthing conditions and we have all types of earths on the transformers. We have some that are a fraction of an Ohm and we have some transformer earths (I hope you don't all faint!) that we know are 300 Ohms.

Our lightning protection works perfectly with 300 Ohms in the earth-plate resistance — it does not affect the lightning protection. Where it does become dangerous, is when a fault occurs in the consumer's premises — a voltage then appears between our earthing lead and the ground in the vicinity of the pole where that earth is installed. To overcome that, all rural consumers are required to install earth leakage relays.

Our cam-type jacks that we use for drums of conductor are also used for main cable drums in the town. The jacks used for that are of very large dimensions — they are made in two halves, but we can lift a 5-ton drum of cable in exactly the same way.

Mr. Williams, of Pretoria, raises the question of lightning protection, and I could talk on that for another hour, if you like (I do not think that Mr. President would let me do so). Our lightning arrestors are bought with flash-over values which are lined up with the impulse withstand voltage of the transformers and the insulators. We buy transformers and insulators, taking into account their impulse voltages.

Our normal arrester flashes over on a 1/50 wave in the region of about 28 kV. At maximum discharge current, there is about 60 kV across the arrester, that is across the insulation. We buy arrestors for one discharge at 65,000 amps — that is to the American standards. The difference in price between an arrester that will withstand 65,000 amps once and one that will stand it many times, is quite striking.

The Americans work on the one discharge at 65,000 amps and an arrester costs between £6 and £6.10.0. The British and the Swedes work on an arrester that will withstand 65,000 amps an indefinite number of times and their prices run between £22 and £26.

We have taken no steps at all to encourage load. Again, it is premature. At the moment we are trying to keep people peaceful and quiet until we can possibly give them some sort of supply. The time will come in the future when we will have to get busy on selling electricity; at the moment it sells itself.

Mr. Barratt, of Queenstown, raised the question of whether we have the right to supply everybody in our supply area and the answer is "Yes," including the South African Railways; we supply everybody.

A licence to supply in an area like this, is not granted by the Electricity Supply Commission. The Electricity Supply Commission is an electricity undertaking with exactly the same status that we possess; they have no more rights than we have. The only right granted to them in terms of the Electricity Act is the right to raise loans under certain advantageous conditions. But they have to apply for a licence to supply in exactly the same way as we do.

Mr. Barratt also asked the maximum size motor that we use and the answer there is 10 h.p. single-phase motor. The 10-h.p. motor lines up with the 10 kVA single-phase transformer. In the case of the consumer installing a 10-h.p. motor, it is very probable that there would be a 10 kVA transformer installed in the very close vicinity of his motor.

If there are any other questions that I have missed, they will come up in my written replies in the proceedings. Thank you very much, Mr. President. (Applause).

MR. P. A. GILES (East London): To my mind this is a very interesting and valuable paper and the author is to be congratulated on setting out in a concise form the problems associated with electrification of rural areas. He makes a very strong point that a full investigation of the economic and engineering factors has to be made in the planning stage, as these factors have an important bearing on the ultimate cost of the line. The justifiable use of iron wire as a conductor in certain cases, as described in the paper, is an instance of careful planning.

An important feature in the value of the line to the community and the use

which consumers can make of it is the route taken. The route is decided by several considerations among which is the question of accessibility for maintenance and repair. The easiest access is from a road, but as the authorities in control of roads do not appear to favour the installation of rural lines along the length of the road, it is difficult to obtain facilities although there seems to be no objection to the crossing of the roads at various points should this be necessary.

In the Cape, the road reserves are:—

- (a) National road under the National Transport Commission, reserves 150-ft. to 190-ft.
- (b) Trunk roads, as declared by the Provincial Council, 80-ft. to 100-ft. wide.
- (c) Main roads, 80-ft. reservations under the Divisional Council.
- (d) Divisional roads, 60 Cape ft. wide controlled by the Divisional Council.
- (e) Minor roads under 60 Cape ft., also controlled by the Divisional Council.

I agree with the author that when these considerable reservations are being negotiated and declared by the Road Authorities, it would be a simple matter for the reservation to be increased by say 10-ft. to allow for a servitude along the length of the road for electricity services to the dwellings and townships which in the course of time would abutt on the road. The provision of these servitudes would assist in a large measure in providing electricity supply to prospective consumers in the rural areas who, if they require electric power, should be connected up if this is at all practicable.

I was interested in the advocacy by the author of surge divertors which are installed to reduce the rate of the blowing of fuses and to promote the maximum continuity of supply during lightning thunderstorms and I would be interested in knowing the impulse protection level achieved and the ratio between the lightning voltage passed by the divertors and the impulse withstand voltage of the transformers with new insulation.

REPLY TO CONTRIBUTION

By MR. P. A. GILES.

In reply to Mr. Giles the impulse-withstand voltage of the transformers in use varies with the make and design and lies within the limits of 80 kV to 110 kV for a 1/50 wave. The surge spark-over voltage of the surge-divertors is of the order of 29 kV with a similar wave.

PRESIDENT: Thank you very much, Mr. Dunstan, and thank you once again for your very interesting paper, which will, I am sure, form a very useful contribution to our proceedings. Thank you, too, to all the speakers who took part in the discussion. Is Mr. Gorven available, please?

Gentlemen, I am sorry, time is running out and I shall also have to close the discussion on Mr. Gorven's paper, but again, you are welcome to send in written contributions and I am sure that Mr. Gorven will be only too pleased to reply. I now have pleasure in calling on Mr. Gorven to reply to the discussion.

MR. O. D. GORVEN (Durban): Mr. President, Ladies and Gentlemen, I would like, at the start, to thank speakers of yesterday for the comments which they made on my paper and also for the very constructive criticisms which they made.

There was one point which concerned me particularly in the discussion yesterday and that was this question of the present generation having to carry an additional burden which should fall on the future generation — that is as many speakers put it yesterday.

And the other one was this question of technical progress being such that the costs of electricity have been kept down, notwithstanding the price increases or, as I put it, the reduction in the purchasing power of money.

Now, Mr. President, I feel that those two subjects are really two distinct matters. The question of the change in the value of money, I think, should not be related to technical improvements and technical progress, because, so far as technical progress is concerned, it is from that and from that alone that we can get an improvement in our standards of living.

If prices were stable, we would still get technical improvements, and those would have the effect of lessening the costs which we would be called upon to pay for electricity or for any other service. But mark you, Mr. President, the benefits would only fall to be received when the existing plant was worn out, because you cannot just replace your plant overnight, unless you are going to declare a plant obsolete, in which case a very heavy loss falls on the community right at the outset. So, I feel that technical progress and greater productive effort on our part are the only things that can improve our living standards.

You get this question of robot control, which is causing such concern in the American motor industry, for example. There the workers feel that they are going to be replaced by electronics. My view is that by replacing those men, the men are released for other more important jobs or for additional work in the luxury field which will result from the savings effected as a result of the lower costs following technical progress and that if those jobs are not required to be done, there is more time available for relaxation on the part of workers as a whole, so that you must get an improvement in living standards.

I feel, therefore, Mr. President, that one of the speakers yesterday should not have drawn such a clear distinction between an industry or an organisation which had reached its maximum capacity and was not expanding, on the one hand, and the other industry or organisation which was expanding, because in that expanding industry, although you do not get that same impact in increase of cost of generation or supplies, you nevertheless are in the position where your charges against your Revenue Account are not sufficiently high in the case of the old plant. But the effect is lost sight of by virtue of the fact that you are having a gradual rise by introducing new plant which is necessary for your expanding organisation.

Now, Sir, to come to this question of the change in value of money pure and simple, which really was what I was trying to deal with in my paper, I must admit that I am a bit diffident now about

developing the theme because I see that the ladies are present and I know that there is nothing which could cause the ladies more concern or get them more hot under the collar than the possibility of a rise in the price of electricity or any other commodity!

But I would like to say this, Mr. President, that one of the speakers yesterday quite rightly said that in times of inflation the borrower scores and the lender loses. We find, for example, that a person who erected a house in 1939 and who borrowed money for it, is today paying a very low repayment instalment on his house, and that that repayment instalment is low today in relation to that person's salary, because since 1939, when he was earning, let us say, £40 a month, and was paying £7 a month for his house instalment, he has had an increase in wages, which today probably are in the region of £100 a month. But he is still only paying £7 a month for his house instalment, so that the borrower scores.

On the other hand, you get the man who is investing a portion of his money in, let us say, an insurance policy or in a Superannuation Fund instalment. Now, that man eventually, when he comes to reap the benefits of his savings (he is a lender for the moment — he is lending his money to these organisations, to entitle him to the insurance policy or to the pension), he finds that he is now receiving the benefit of his savings in money which cannot command the same purchasing power as could the money which he originally put into the savings, so that he has made a real loss. So, the statement that we had yesterday was quite correct.

Developing this theme, Mr. President, and, taking an electricity undertaking as an example, the community as a whole, are the borrowers, because they are the persons who pay the electricity charges which are collected and utilised to meet the costs of that electricity undertaking, including the wages cost (which, incidentally, is a current price) your materials cost (much has been talked about coal — and there are other materials involved) — that also is a current price — and the

third factor (apart from overheads of course) in the production of electricity is the capital cost, which is represented by capital charges. If your electricity undertaking was constructed in 1939, the capital charges included in your Revenue Account under the present accounting system, are low in comparison to the true value of that electricity undertaking today. And whilst wages have increased since 1939 to what is the current value today, the costs which he is paying for electricity, have not increased to that same extent, because you have this one element in the production cost which is a fixed charge based on 1939 prices.

To that extent, I feel that the person who is consuming electricity today, is not paying what he should be paying, because in his account which he receives at the end of the month for electricity, there is included only sufficient to meet the original cost of that power station, whereas, in actual fact, in 1955, if you take the real value of the electricity undertaking, which he has, in effect, used (that is, the value at the beginning of the year and the diminished value at the end of the year of the undertaking), you will find that he has used up a certain portion of the physical capacity of that undertaking at today's values and that, therefore, he should be charged in his electricity account, with the cost of capital charges on the basis of today's value of the undertaking as distinct from its original cost.

I do not regard that extra charges as being something which we are paying for the future. I regard that as a consumption of a portion of a physical asset which has a value as at today's date and I think that we should pay for it in terms of today's prices. You will notice on page 10 of my paper, that I indicated there the provision for the year on the basis of the value in a particular year and, in addition to that, I indicated that there should be a back contribution for the losses incurred in earlier years. Now, that back contribution, I do concede, is something which you cannot really say is a fair charge against the current year's operation, because it has occurred due to a change in the value of money in the

current year and you cannot very well recoup it in the current year because it refers to the provisions which should have been made in previous years.

Some people say (and I did make this point in paragraph 53, which I did not read yesterday due to shortage of time), that if you invest your pure current contributions on the basis of replacement costs in a type of investment which in itself changes in accordance with the changing value of money (and I admit that it is difficult — and for Local Authorities illegal at the present time and in any event bad policy — to find such an investment, but you do get certain investments which do vary roughly in step with the change in the value of money), then you do not have to make back contributions, because each time you invest in this type of security the equivalent of the value of the physical position of the undertaking which you have used up, then the security itself commences to change in value in accordance with the change in the value of money; and when you need your new undertaking, you merely realise the security and proceed to construct your new undertaking.

Well, Sir, that is all I want to say on that subject. It is very difficult to argue in front of a group without being able to get the different contrary viewpoints expressed by persons who might want to query what I have said, but I am willing to discuss the matter further with anyone who may wish to do so.

In regard to indices, we do have certain indices already which are capable of being used. You get these published, for example, by "The Economist" and "The Statist." In South Africa we get a cost-of-living index published. Now, I did say yesterday that it was very difficult to compile an index which took all factors into account and I think that I am right in saying that the Government at the present time is reviewing the various components which comprise the cost-of-living index, or which are utilised in the calculation of the cost-of-living index, and they are also examining the weighting of the various factors which are in that index

to try to arrive at something which is a more correct indication of the position.

The cost-of-living index today stands at roughly double the 1939 level, although we think probably that the figure should be more like two and a half or three times. But there are those indices. I myself am not wedded to the use of a single index, although I do feel that that would be adequate and, in any event, very much better than nothing at all. But I did suggest that a body such as yours, Mr. President, could very easily indicate what the capital costs are for electricity undertakings today, as compared with five, ten, fifteen or twenty years ago, and from all those figures you could construct an index.

One of the speakers yesterday mentioned the question of the Consolidated Loans Fund. I hope I did not create a false impression by suggesting that it was anything like a Utopian solution for finance. I did not read the portion of my paper because it was not essential to the argument I was developing. I merely indicated that the Consolidated Loans Fund was a device to eliminate the present practice of providing twice for certain of your assets; that is, once in the Sinking Fund for the redemption of a loan, and, in the other case, in a Depreciation or Renewals Fund for those assets which have a life of less than the loan period. And it was for that purpose only that I inserted it in this paper.

But I did say this — and any person interested in finance, certainly local government finance, which is very conservative, would say so — that to the extent that we have those surplus provisions today, it is a desirable state of affairs, and I would only like to see the Consolidated Loans Fund introduced if it were coupled with a device to provide for the change in the value of money. I think I did say that yesterday and I hope I did not give any incorrect impressions on the matter.

I did also incorporate in my paper the fact that the Cape Province Municipal Association has under consideration the question of the introduction of the Consolidated Loans Fund. They have not reached finality on the matter yet, but

one of the speakers suggested yesterday that they had this matter under consideration and then went further and asked what my views were in regard to incorporating something in the Electricity Act.

Well, so far as local authorities are concerned, to the best of my knowledge, we would not have to amend the Electricity Act at all to enable us to operate Consolidated Loans Funds. It is a financial matter which may be controlled by Provincial Ordinance and we can commence to operate on a Consolidated Loans Fund basis provided the Province grants the necessary powers. And as I mentioned yesterday and would like to repeat today, the Consolidated Loans Fund is only really suitable for large undertakings or organisations.

The Consolidated Fund also has disadvantages. One of these is the financing of short-life assets from the Consolidated Loans Fund. A case in point is a transport undertaking, with a bus fleet which lasts, say, eight or ten years. On the money market, we can obtain far better interest rates by raising short-term loans for that particular type of asset and, therefore, if we pooled all of the loans we raised in a consolidated pool, the transport undertaking would have to pay the average rate of the borrowings, and would not be able to have the benefit of any low rate which we could get as the result of short-term loans being raised, specially for that transport undertaking.

On the other hand, of course, we could still raise a proportion of short-term loans for the Consolidated Loans Fund proper, but then we do lose a measure of security, because we are continuously having to refloat loans to keep Consolidated Loans Fund liquid.

A final point, Sir, was this question of the acquisition of assets in neighbouring towns — this is a big subject (I think it was Mr. Kane who raised it). The principle which was used in Britain in connection with nationalisation of industries, was that the expropriating authority was only required to pay the original cost of the undertaking, less any provision which had been made in respect of that original cost, that is, less any Sinking Fund accu-

mulations or Renewal Fund accumulations in respect of the undertaking. And the argument they used to justify this was that if the Government in Britain paid a greater price than that original net cost, then it would mean that the community was being taxed twice on the surplus of the acquisition price over and above that original net cost.

I do not altogether agree with the general principle, although I can see that the argument which they used had certain merit, because the undertakings were merely being taken over *en bloc* and they were being used for the same community as they served originally. The whole of the nation was being nationalised; it was not a question of a particular portion of the nation.

Now, in the case of a neighbouring township where you are wishing to take over the assets, I would say that in fairness you should pay the current value of those assets that is, their replacement cost, less an allowance for the extent to which the system has depreciated. Although there, again, you can argue that the people who construct that undertaking, probably borrowed money for it and that, therefore, the community, as a whole, would not be penalised if you paid them merely their original cost. In actual fact if the current value were paid, the township would benefit to the extent of the difference between the amount of the outstanding borrowings and the amount received (based on current value).

I suppose that in the last analysis, the fairest thing to do in theory would be for the expropriating or the purchasing local authority to pay that additional value to the borrower, because it really compensates him for the loss in the purchasing power of the £ which has occurred during the loan period, but in practice such a course of action would never be taken.

In general principle, however, I think that we should pay the market value of the undertaking.

There may be points which I have not dealt with, Mr. President, but I know you have not time to take them now, due to limited time available. I certainly have not covered the full ground I would like

to have hovered, but I should be glad to amplify any particular aspect to anyone who may care to approach me.

PRESIDENT: Once again, Mr. Gorven, thank you very much indeed for a most valuable paper. I am sorry that it was necessary for me to ask you to curtail your reply, but if you deem it desirable, please elaborate further in the proceedings.

Ladies, I am sorry, but it is necessary to dispose of one more formal item before we close.

Mr. Taylor, in his report to you, Gentleman, did refer to the fact that he is relinquishing the position of Secretary and Treasurer of this Association and I would like Mr. Kane to tell you what arrangements the Executive have made regarding the secretarial duties.

MR. R. W. KANE (Johannesburg): Mr. President, Ladies and Gentlemen, Mr. Taylor, our Secretary and Treasurer, will be retiring from his post in a few months' time and a Sub-Committee, consisting of Messrs. Fraser and Downey, were appointed in November, 1954, to investigate the appointment of permanent full-time secretaries.

After consideration of the report of the Sub-Committee, your Executive have adopted the recommendation that Messrs. Arthur Tighy, Ewing and Company be appointed secretaries for a trial period of twelve months, as from the 1st July, 1955, and that Mr. Taylor's services be retained until the 31st July, 1955.

The work of the Sub-Committee is greatly appreciated and they have to be complimented on the success of their labours.

PRESIDENT: Thank you, Mr. Kane. I am going to call on Mr. J. C. Fraser to propose a vote of thanks to Mr. Taylor for his valuable services in the past.

MR. J. C. FRASER (Johannesburg): Mr. President: Ladies and Gentlemen, I feel very happy, as one of my first duties since being appointed honorary member, to pay tribute to our Secretary and Treasurer on behalf of the Association for the wonderful work which he has done for this Association.

This Association has been well served

by four Secretaries and Treasurers to date. The first one, I believe, was Mr. Frank Stokes from Johannesburg, the second one was a Mr. Poole from Durban, who is an Honorary Member, and I understand, is still in Durban in retirement; he has reached the age of eighty-one.

Then we had Mr. Horrell, for a period and we have had Mr. Taylor since 1945.

Mr. President, my Association with Andrew, as most of us know him, is almost half a lifetime. When I joined the Electricity Department of Johannesburg, Mr. Andrew Taylor was there — I forget in what capacity it was at that time — but when I took over the general management of the Electricity Department, Andrew Taylor was the Chief Clerk. And I am very glad of this opportunity to say publicly that Andrew Taylor was a tower of strength to me in those days. Now, you can well imagine the importance of such a position as Chief Clerk to the Johannesburg Electricity Department — I think he had the keys to every question.

When Mr. Horrell retired in 1945 I was in the position to ask Mr. Taylor if he would consider taking over the position of Secretary and Treasurer of the Association, because he had had a considerable amount of experience with the activities of this Association through our previous President, Mr. Arthur Rodwell and, as you know, Johannesburg unfortunately is situated in such a place that a great deal of our executive matters do pass through Johannesburg.

Mr. Andrew Taylor took over the secretaryship in 1945, and has served us well since. When he announced a little while ago that he was going to relinquish his position at the end of this year, it fell to my lot to be on the Sub-Committee to look for another Secretary. I want to tell you, Gentlemen, that it was no easy matter getting a man to fill Andrew's place. One or two very competent men in Johannesburg were asked about taking over this job and I, along with each of them, at various times, had a full session with Mr. Taylor in asking them to go through our minutes and books and each one paid Andrew a very high compliment in the way his books and the general af-

fairs of the Association had been kept.

Andrew has been associated with the electrical industry for pretty well all his life. The only break he had that I know of was during the first World War, when he, along with other South Africans of the First South African Infantry Brigade, was captured at Delville Wood. Since taking over the job as our Secretary, he has become known personally to almost every member of our Association, both Councillors, Engineers and also our friends on the commercial side, and I hear them all, at this Convention, giving an expression that they are sorry Andrew is giving it up.

But Mr. Taylor has decided that he is going to retire for the second time in his life and I understand that he will pay far more attention to the game of bowls than he will to the Association's affairs after July this year.

Mr. Taylor, in voicing the sentiments of our Association and particularly of all the members and visitors who attend our Conventions, I am asking you to accept the good wishes of all these people and I am very pleased, Ladies and Gentlemen, that Mrs. Taylor is here today to hear this testimony. We do hope that both of you will enjoy good health and be with us at many more Conventions.

On behalf of the Executive and of the Association, we thank you very sincerely for the work you have put in and also hope that you will have a very happy and long retirement. (Applause).

PRESIDENT: Thank you, Mr. Fraser.

MR. A. TAYLOR: Mr. President, Mr. Fraser, I am so overwhelmed by what transpired at the Executive Meeting this morning and again here that I am unable to say anything else than thank you one and all.

PRESIDENT: Mr. Taylor, may I add my personal thanks to you for the courtesy shown me and assistance you have given me at all times and naturally I join in wishing you and your wife many more happy years together.

May I ask Cr. Acton to come up to the main table, please? Cr. Acton, it gives me very great pleasure to welcome you here this morning as the representative of the Pretoria City Council. I am particu-

larly pleased that this task has fallen on your shoulders, because you are the Chairman of my Committee. It is not necessary for me to introduce you to the members, as you are already well known to all of them.

Cr. Boneschans, of Germiston, has asked for an opportunity to say something.

CR. H. BONESCHANS (Germiston): Mr. President, Ladies and Gentlemen, it gives me great pleasure to propose a vote of thanks, on behalf of Councillors.

We have been together with you powermen to our advantage. We have increased our power knowledge and shall go from here more powerful than ever before. We have also been convinced of the fact that we have the correct conscientious and very able men at the head of all our electrical undertakings and affairs. I am certain that the way in which this Convention tackles problems, must lead to success.

So far as our stay in Pretoria is concerned, I must, in the first place, thank His Worship the Mayor (Cr. Acton representing the Mayor now) for welcoming us in such a way that we felt at home from the very first day. I think we all agree, Gentlemen, that Pretoria can do it. His Worship the Mayor entertained us so pleasantly and effectively that we are still feeling the pleasant after-effects. We shall remember Pretoria as a very hospitable city and a very suitable place (of course, I am including Fountains Valley and Waterkloof) to accommodate a Convention of such magnitude as this one.

I personally enjoyed the braaivleis at the Fountains. It was a lovely evening, with a full moon, and allowed plenty of opportunity for romance, apart from what we were busy with; the dancing was good, but mainly I enjoyed the braaivleis to a very great extent and so did my colleagues.

Will His Worship the Mayor please convey our thanks and appreciation to his Council. A word of thanks to all City Council officials for what they have done to assist in making this Convention the success it became. A special word of thanks to Mr. Hugo, our President, and his administrative staff. Thanks to the Association for the lovely dance and very pleasant evening arranged by them at the

Pretoria Country Club, Waterkloof. We wish our appreciation to be extended to everybody who contributed towards the success of this gathering. I can assure the pretty ladies who so ably served us with tea in the foyer every morning and afternoon, that the tea was far above usual standards, with all due respect, Mr. President, to our Bureau of Standards (laughter). Thanks to the former Executive, also, for what they have done to compute such a fine programme. Thanks to the Chairman for the able way in which he has conducted the proceedings.

Dames en Here, dit is ook vir my besonder aangenaam om hier 'n paar woordjies te rig, namens ons Raadslede van verskillende Stadsrade. Ek hoef nie te herhaal wat ek in Engels gesê het nie — u het dit almal gevolg — en ek dink u sal met my saamstem dat ons in die stad van Paul Kruger, dit werklik geniet het om hier in kongres saam te wees.

Dit het my besonder getref, mnr. die President — ek weet nie wat die bedoeling was nie — toe ek daar by die swembad by die Fontaine kom en ek sien daar twee pragtige, statige swane, toe het ek gevoel, die een is moontlik die simbolisering van Pretoria moontlik — die statige stad, „the stately city” — en, aan die ander kant, Johannesburg. Toe sien ek ook daar so 'n lelike eendjie wat nou nie so mooi soos die ander twee is nie — I thought that was the ugly duckling — en ek was bekommerd en het gewonder of dit nou 'n simbolisering is van my stad, wat die derde stad is in Transvaal — Germiston. Ek het my darem getroos met die gedagte, mnr. die President, dat „Germiston” in daardie dammetjie in goeie geselskap verkeer.

En so het ek ook hier gevoel — ek het gevoel dat ons Raadslede hier in goeie geselskap verkeer. Ek dink ek spreek die dank uit namens al my kollegas vir die aangename verblyf in Pretoria. Dankie. (Applous).

PRESIDENT: Hartlik dank, Raadslid Boneschans.

RAADSLID F. J. C. CASTELYN (Bloemfontein): Mnr. die President, Dames en Here, ek wil graag aansluit by wat my kollega gesê het, maar ek wil verskoning maak: U weet, een van die

kwalifikasies wat 'n Raadslid moet hê, is om te praat; ons praat, dit is die eerste en die laaste ding — jy moet praat.

Ek wil die vorige spreker regtig gelukwens met sy mooi vergelykings, met alles wat hy genoem het. Ek het probeer aantekene van daar dan nie iets oorbly vir my ook om te sê nie, maar hy het werklikwaar tot die ganse ingesluit!

Mnr. die President, laat my dan toe om u net te verseker dat ons 'n heerlike tyd in Pretoria gehad het. Ons is besonder dank verskuldig aan Sy Edele die Burge-meester en sy medeledes vir hierdie pragtige manier waarop hulle ons trakteeer het. Die Stadsaal is opgemaak — die oggend toe ek hier inkom, het ek nie seker gewet waar ek nou is nie — in die Landbou-tentoonstelling daar in Bloemfontein nie (en ons is bekend vir blomme) of waar ek is nie; alles was nou net soos dit moes wees.

Wat my besonder getref het was die wyse waarop u administratiewe staf dinge hanteer het. Ek dink dit is die naaste aan perfeksie wat ek nog gesien het. As ons die middag laat van die Kongres af gaan, dan lyk dit my daardie seuns en dogters begin nou eers werk. Die oggend voor ek opstaan, hier is my notule en alles klaar. Mnr. die President, ons wil u dank vir daardie mooi en bekwame manier waarop hierdie dinge gedoen is. Ons wil u gelukwens — dit is werklikwaar 'n prestasie.

In Bloemfontein het ons net soveel kongresse, indien nie meer nie, as Pretoria, maar ek kon 'n paar dingetjies hier leer. Ek dank u daarvoor. Wat ek geleer het, neem ek saam met my as 'n aangename herinnering van hierdie Konferensie in Pretoria. Mnr. die President, ek kan u verseker dit was werklikwaar van die allerbeste, vanaf die „cocktail party” tot daar by die ganse tot by die dans — orals waar ek gewees het, was net soos dit moes wees. Ons dank u baie hartlik daarvoor. Ons kan u verseker dat ons pragtige herinnerings saam met ons neem en ons al hierdie Kongres nie baie gou vergeet nie.

Tot siens dan tot in Salisberg — of hoe noem 'n mens die plek? — Salisbury! (Applous).

PRESIDENT: Hartlik dank, raadslid Castelyn.

Mr. Hallé has something to say on behalf of the ladies, I believe.

MR. C. R. HALLE (Pietermaritzburg): Mr. President, I have been asked to express the thanks of the ladies for the very fine entertainment and the happy time Pretoria has given them.

Now, of course, you know the idea of providing entertainment for the ladies is to stop them going shopping too much! Well, of course, some husbands are not too sure of that and some of us have left our wives behind, but at this Convention I have heard several opinions expressed that it is a pity that some of the wives did not leave their husbands behind! (Laughter).

Of course, the view on husbands is changing. In fact, it reminds me of the story of the Archbishop of Canterbury, who had to admonish a choirboy and he had him sent downstairs to the study and the old Archbishop thought that he would give him a lesson in humility. And he said, "My boy, do you realise that there is One above to whom even I am but a miserable worm?" The little chap said, "Yes, your wife!" (Laughter).

Well, of course, that has all changed because nowadays through the work of husbands, specially electrical husbands, who do all the housework through their electricity, the ladies have more time to enter into public life and naturally the cities are getting more beautiful. And so it is because of us — ahem! — modest people that the ladies have had the time to go around and see this beautiful city of Pretoria. They particularly enjoyed going over the Voortrekker Monument and the Fountains and I believe that the musical items at the Women's Club were much appreciated.

They particularly want to say how they enjoyed the dance, which, I believe, became radio-active due to the beautiful nicer types whom we saw on the floor. Altogether, in general, they want particularly to express thanks to the Mayoress and, of course, to Mrs. Hugo for the very kind attention and for all the hospitality and entertainment they have enjoyed. In

fact, I think that I can say that in the hearts of the ladies all over our country they will be marching to Pretoria with very happy memories of this wonderful Convention for many years to come.

Thank you very much indeed. (Applause).

PRESIDENT: Thank you, Mr. Hallé. There is now an opportunity for any other speakers.

MR. H. J. DE VILLIERS (Escom., Johannesburg): Mnr. die President, ek wil, namens Escom, net ons dank uitspreek dat ons geveza is om verteenwoordigers na hierdie Vereniging se verrigtinge te stuur. Ons het dit ten seerste geniet.

En aan u persoonlik, mnr. die President, wil ek noem dat Escom maar te bly sal wees om die liggaam te ontmoet wat u voorgestel het om nasionale probleme te bespreek. Baie dankie. (Applous).

MR. A. SOLOMON (Pretoria Technical College): I sincerely hope that you will not consider this an intrusion, as although not directly connected with any particular Municipal undertaking, we nevertheless do play a small part in the training and provision of some of your staff, namely, apprentices, as well as the provision of facilities for studying for any members of your staff who may desire them.

I would like to take this opportunity, Sir, of thanking you and your Association for the privilege offered my institution to be represented and from what I have seen and heard, both in and out of the Convention Hall, there can be no possible doubt that this has been an outstandingly successful Convention, both educationally and socially.

There has been a general tendency by industry to criticise the practical training given by Technical Colleges to students in their high or trade schools and that the remission granted apprentices in lieu of their training received, is out of all proportion.

Referring to the first aspect, I do not agree entirely with this, as it is not possible in any Technical College to give the lads such training, so that they would be suited for employment in every specific organisation, e.g. Municipalities, the Railways, Iscor, private firms and so on. What

the Technical Colleges endeavour to do, is to give the lad a general basic training, since, after all, the training is of a pre-apprenticeship nature. With regard to the second aspect, there are various committees investigating this.

Some parents, too, have their own opinions of Technical Colleges. For example, while interviewing a mother last year about why she wanted her son to take up a course at the Technical College, she said, "Die Prinsipaal van die primêre skool sê dat Jannie se Intelligensie Kwo-siënt of verstandskwo-siënt so laag is dat hy na die Tegnieë Kollege moet gaan!" (Laughter). (You see, we are also considered as an institution for sub-normals).

The attitude of the Technical College student has also been frequently criticised in that he thinks he knows too much because he comes from the Tech. This may certainly be the case here and there, but, although we are not responsible for the boys' psychological make-up, we often find that the journeyman who takes a dislike to an apprentice from the Tech., has invariably been one who has done very little or no technical study at all, and this man is constantly out to find fault with the apprentice, thus making the lad's life a misery and ultimately an unsuccessful apprentice.

In cases such as these, a great deal could be done by the Personnel Department or, in the smaller undertakings, by the senior staff concerned.

With regard to apprentices, I think everybody, without exception, is having some form of trouble when it comes to part-time technical classes — the reason naturally being that there are far too many outside attractions or, should I say, distractions, and that most of the apprentices seem to have quite a lot of pocket money to be able to go on the spree.

On the other hand, of course, there is also the question of home problems, which, to my mind, has a very great influence on the lad's general behaviour, particularly if he is of the sensitive type; for example, about three years ago, I made a survey of the behaviour of a certain group of students and found that in a class of 32 students of the Junior Certificate stand-

ard, 28 had come from broken homes, i.e., living with one parent only, where the other parent is either divorced or dead, mother working and, in some cases, father or mother drinking very excessively.

This must obviously have a bearing on any lad's behaviour and outlook on life and therefore the problem also becomes a sociological one.

The following average figures may be of interest with regard to apprentices attending part-time classes at the Pretoria Technical College over the last five years:

Total number of apprentices:

Approximately 2,250.

Approximately:

Approximately 400.

% who proceed beyond N.T.C. III stage (that is, the two years post-Matric. course) to the Advanced Technical Certificate are about 14% (but not all succeed).

The College also provides tuition for the first two years of the B.Sc. (Engineering) Course, which is done in collaboration with the Witwatersrand University, who accept our students for the last two years of the B.Sc. Course.

I have a few short figures here:—

1st year B.Sc.: Average about 8 to 10 students.

2nd year B.Sc.: Average about 7.

% Graduates: About 33½%.

It will, therefore, be evident, Mr. President, that the Technical Colleges do endeavour to provide facilities whereby lads may better themselves, if they so desire, provided, of course, that encouragement and opportunities are also afforded them by the employer.

Before I close, Sir, there is just a word of advice that I would like to give to employers of apprentices in the rural areas. From results observed in the National Examinations, it seems that a large number of apprentices in these areas fail the examination, and examiners generally are of the opinion that the lads are studying without supervision.

It would be advisable, therefore, wherever possible, to provide supervision and facilities, such as drawing boards, teesquares, etc., for these students who are studying by correspondence.

In conclusion, Sir, I would therefore once again like to thank you for this opportunity and to wish you a very successful term of office. Thank you. (Applause).

PRESIDENT: Thank you, Mr. Solomon. Are there any other speakers.

MR. J. CARSTAIRS (Caltex, Johannesburg): Mr. President, Ladies and Gentlemen, I see from the clock that this Convention should now be closed, so I shall be very brief.

As one of the commercial delegates attending this Convention, I have also been able to analyse it from the point of view of an Engineer and I would like to convey to Mr. Dunstan my personal appreciation, and that of many of my colleagues, no doubt, of the way in which he has tackled the problem of cutting red tape.

As a member of the armed forces during the war and also in peace-time, I was privileged to serve with the Royal Navy. In peace-time red tape was something which everyone abhorred, but when we got cracking during the war, I can assure you all that red tape was cut to a minimum.

I had the privilege of attending the Twenty-seventh Convention in Johannesburg two years ago, during which an appeal was made by Dr. Nicol, the Administrator of the Transvaal, to the members of the Association to endeavour to extend rural distribution. It has been most gratifying to listen to Mr. Dunstan's paper and to see what he has done in the way of circumventing red tape and getting the job done instead of talking. I feel that this is a very important step that has been taken by the Pretoria Municipality.

Frankly, I have been somewhat disappointed that we have not heard more from the E.S.C. on what they are doing in this direction. Tremendous quantities of power are used in this country, supplied by the E.S.C. (their development has been phenomenal) and they are still going ahead building large power stations. But I would be interested, merely as a member of the Muldersdrift and District Association, to know what is taking place in the proximity of Johannesburg in regard to rural distribution.

There is a very fertile valley stretching

from Tarlton to Northcliff, with hundreds of small farmers there who could produce a great deal more and assist toward bringing down the cost of household necessities. The ladies who are present today, probably know, tomatoes being 1/6d. to 2/- a lb., cabbages at 1/6d. and 1/9d. and potatoes at the controlled rate being somewhere round about 3½ lbs. for 1/-. These are items of vital interest to all of us and I feel that the time is not far distant when we should get down to basic principles again and decide whether the production of food, in which electricity has become such a wonderful factor, should be given a little more consideration than the large consumers of electrical energy. Normal population increase plus immigration may force us to do so.

In closing, I would like to convey my thanks to His Worship the Mayor, whose representative, Councillor Acton, is here, and also to you, Mr. President, and the members of the Association for the excellent way in which they have organised this Convention, I feel that this has been a most successful one and I trust that this Association will go forward in the future from strength to strength with these Conventions, which have proved so instructive to many of us. Thank you, Mr. President. (Applause).

PRESIDENT: Thank you very much. Are there any other speakers? Councillor Acton, would you like to say a few words?

COUNCILLOR C. E. ACTON (Pretoria): Mnr. die President, Dames en Here, namens my Raad wil ek graag die geleentheid te baat neem om van ons kant u hartlik te bedank vir u goedgunstigheids hier uitge-spreek aan die stad en Stadsraad van Pretoria. Ek sal toesien dat dit aan my Raad meegedeel word.

Mr. President, as your proceedings draw to a close, I am called upon, on behalf of the City Council of Pretoria, to express those commendations that inevitably flow from a Conference of the importance of this one. Before I do so, I reciprocate the unmeasured thanks so generously offered to my Council representing the city of Pretoria, but we are still indebted to you, definitely indebted to you. By your presence on this occasion, you have con-

tributed handsomely towards the fulfilment of our aspirations for the Centenary Year, already much embellished, I say, you have added lustre. Also, you have been high-lighted, I suggest, from the auspicious opening of this Convention almost until this very moment.

Let us be introspective, Mr. President, for a moment. Let us recall with pleasure the reality and objectiveness of the immediate Past President's valedictory address, the balanced brilliance of the President's address, an address, I say, which cannot but influence a grave national problem and might well, in substance, constitute the Electrical Engineers' Charter for greater recognition of stature and status, these men in whose hands, apart from the authorisation, I say, lies the destiny of millions of pounds of taxpayers' money for prudent investment.

Let us recall the down-to-earth, pugnacious factitude of our Mr. Dunstan's paper, the scintillating intrepidity of the address delivered by the Personal and Technical Assistant to the City Treasurer of Durban, the excellence of the innovation of the Engineers' Forum and our special indebtedness, on this occasion, to Mr. Downey, Electrical Engineer of Springs, for his service as Quiz Master — some of the highlights. I say the principal actors were thus involved.

May I say a little more about one of them? I refer, of course, to our own Mr. Hugo, your President. My Council is very proud indeed that this high honour should have fallen to him — very proud. It is a fine reward for a very fitting and appropriate personality.

I refer now, Mr. President, with emphasis to the responsive and co-operative gathering we have been privileged to have with us during the sittings and throughout this Conference — the Government representatives, the delegates, the manufacturing and commercial interests, consultants and others, all focussing and serving the best interests of electricity undertakings. All these elements have contributed to make this a memorable Convention. We are indeed grateful.

Perhaps, then, I could not end on a better note than to say, "Well done,

A.M.E.U. Your cause is meritorious."
(Applause).

PRESIDENT: Councillor Acton, Ladies and Gentlemen, sincere thanks to you, firstly, Councillor Acton, for your kind remarks and thank you all who have spoken this morning. You will appreciate, of course, that the staff of the Electricity Department have borne the brunt of the work of the Convention. I cannot now thank them individually, but I thank them one and all for their interest and the effort they have put into it.

I would also like to take the opportunity of thanking the Town Clerk, Mr. Henry Preiss, and his staff; they were responsible for most of the arrangements here in the City Hall. Grateful thanks also to the Director of Parks, Mr. Bruins-Lich, and his staff who were responsible for the decorations not only of this hall, but also of the Supper Room for the civic cocktail party.

I feel that I could not have achieved anything without the encouragement and moral support of my wife and I am deeply grateful to her. (Applause).

Finally, I thank members for their extreme courtesy to the Chair, which has certainly made a dreaded task very much easier.

And now comes the moment to which I have looked forward for twelve months. Now that it has arrived I am sorry and I formally close this Convention. Thank you. (Applause).

CONVENTION CLOSING AT 12.45 P.M.

SOCIAL FUNCTIONS.

After 29 annual conventions of the A.M.E.U. it is only natural that certain traditions will have become established. One of the more important of these requires that a very delicate balance shall be achieved between the social and professional activities at a convention.

One or two conscientious delegates have suggested that this tradition has been flouted, and that the social programme at the 29th Convention quite overshadowed the more serious pursuits.

This is, of course, entirely untrue, as

witnessed by the impressive record of the proceedings in the Conference Hall. In view of this misconception the Papers Sub-Committee has decided that it would be unwise similarly to record the social proceedings at length. The papers Sub-Committee further directed that the brief resumé of the Social Programme shall be devoid of superfluous adjectives which may create the wrong impression!

The first major social event was a Cocktail Party held in the buffet room of the City Hall, where delegates and their ladies were the guests of the Mayor and Mayoress of Pretoria.

On the following morning the ladies were taken to tea at the Fountains Valley Kiosk, and later on visited the Voortrekker Monument. That evening the Association had the pleasure of acting as hosts at a

cabaret dance held at the Waterkloof Country Club. It was with reluctance that the evening was brought to a close after the appointed closing time had been twice extended by popular demand.

On the Thursday morning which followed, the ladies were entertained by the Pretoria Women's Club. After lunch, delegates and their ladies had the choice of visiting either the South African Bureau of Standards, or Asea Electric S.A. (Pty.), Limited.

Thursday evening, the City Council of Pretoria were the hosts at a Braai and Swimming held at the Fountains Valley Swimming Pool. The setting was perfect for a function of this kind, and this final event was probably one of the most appreciated items on the social programme.

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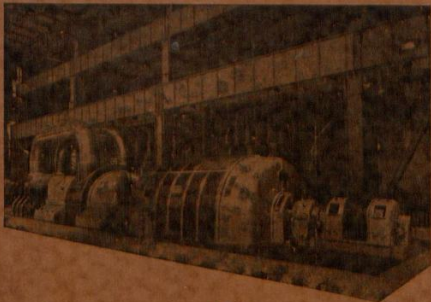


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