PROCEEDINGS

of the

Twentieth Convention

of the

Association of Municipal Electricity Undertakings

of South Africa and Rhodesia.

(Founded 1915)

MUNICIPALITY OF

BLOEMFONTEIN

HELD AT

BLOEMFONTEIN

From Tuesday, May 14th, to Friday, May 17th.

1946

PRICE FIFTEEN SHILLINGS.

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INDEX OF PROCEEDINGS.

GENERAL.

PROCEEDINGS.

REPORTS.

INDEX TO ADVERTISERS.

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West Burger St., Bloemfontein.

Association of Municipal Electricity Undertakings of South African and Rhodesia

FOUNDED 1915

EXECUTIVE COUNCIL, 1946/7.

PRESIDENT:

G. J. Muller (Bloemfontein)

VICE-PRESIDENT:

C. Kinsman (Durban)

PAST PRESIDENTS:

I. J. Nicholas (Umtata)
H. A. Eastman (Cape Town)

COUNCILLOR MEMBERS:

Bloemfontein
Durban
Johannesburg (Alternate)
Cape Town (Alternate)

NOTE: The Town is elected and not individual Councillors.

OTHER MEMBERS:

D. J. Hugo (Pretoria)
J. C. Fraser (Johannesburg)
D. A. Bradley (Port Elizabeth)
J. C. Downey (Springs)

SECRETARY AND TREASURER:

A. T. Taylor, P.O. Box 7462, Johannesburg

REPRESENTATIVES:

World Power Conference (Local Committee)	H. A. Eastman, Cape Town.
S.A. Standards Institution	D. J. Hugo, Pretoria.
	J. C. Downey, Springs (Alternate).
Safety Precautions Committee	J. C. Downey, Springs.
	J. C. Fraser, Johannesburg (Alternate).
Electrical Wiremen's Registration Board	J. C. Fraser, Johannesburg.
Overhead Lines Regulations	J. C. Fraser, Johannesburg.
	G. J. Muller, Bloemfontein.

SUB-COMMITTEES:

Tables-Statistics Generally	G. J. Muller, Bloemfontein.
	C. Kinsman, Durban.
	J. C. Fraser, Johannesburg.
Freight Charges on Coal and Rural Undertakings	C. Kinsman, Durban.
	J. C. Fraser, Johannesburg.
	H. A. Eastman, Cape Town.
	A. Foden ,East London.
	D. A. Bradley, Port Elizabeth.

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. Tresise.
1927-29	J. M. Lambe, East London.	P. Adkins.
1929-31	R. Macauley, Bloemfontein.	E. Poole.
1931-32	L. L. Horrell, Pretoria.	E. Poole.
1932-34	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. L. L. Horrell, Jan., 1941.
1944-45	A. Rodwell, Johannesburg.	L. L. Horrell.
1945-46	J. S. Clinton, Salisbury. J. W. Phillips, Bulawayo.	L. L. Horrell to Nov., 1945. A. T. Taylor, Dec., 1945.

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. B. 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.

Councillors:	Alternate Councillors:	Engineers:
	1935-36:	G. H. Swingler, C. Town.
T. P. Gray, Johannesburg.	H. W. Dely, Pretoria.	J. H. Gyles, Durban.
J. McLean, Port Elizabeth		T. Millar, Harrismith.
		E. H. Behrens, P. E.
	1936-37:	G. H. Swingler, C. Town.
H. Middlebrook, Durban.	F. Morrell, Cape Town.	T. Jagger, Ladysmith.
T. P. Gray, Johannesburg.	J. McLean, Port Elizabeth	E. A. Behrens, P.E.
		G. M. Pirie, Bloemfontein
	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.
		G. M. Pirie, Bloemfontein
	1938-39:	D. J. Hugo, Pretoria.
E. Spilkin, Umtata.	G. C. Starkey, E. London.	J. S. Clinton, Salisbury.
W. James, Cape Town.	W. Fowkes, Cape Town.	A. Q. Harvey, Springs.
		G. M. Pirie, Bloemfontein
	1939-44:	D. J. Hugo, Pretoria.
E. Spilkin, Umtata.	G. C. Starkey, E. London.	C. Kinsman, Durban.
C. Olley, Salisbury.	W. Fowkes, Cape Town.	A. Q. Harvey, Springs.
		G. M. Pirie, Bloemfontein
		W. M. Powell, Bfn.
	1944-45:	D. J. Hugo, Pretoria.
H. H. Verity, J'burg.	H. E. Gearing, Cape Town	C. Kinsman, Durban.
C. Olley, Salisbury.	R. N. Thomas, Durban.	J. C. Fraser, J'burg.
		G. R. E. Wright, Benoni.
	1945-46:	D. T. Hugo, Pretoria.
J. Ohlsen, Bulawayo.	M. Jaffray, Salisbury.	C. Kinsman, Durban.
J. W. du Plessis, Bfn.	E. Boylan, M.P.C. J'burg	J. C. Fraser, J'burg.
		G. R. E. Wright, Benoni.

The Victoria Falls and Transvaal Power Co.,

LIMITED.

SUPPLIERS OF ELECTRICITY TO THE WITWATERSRAND GOLD MINING INDUSTRY, THE SOUTH AFRICAN RAILWAYS, RAND AIRPORT, NUMEROUS INDUSTRIES ON THE REEF AND IN VEREENIGING AND THE FOLLOWING MUNICIPALITIES.—

Alberton
Balfour
Bedfordview
Benoni
Boksburg
Brakpan
Edenvale
Elsburg
Germiston
Heidelberg
Kempton Park
Johannesburg (partial supply)
Klerksdorp
Krugersdorp
Nigel
Parys
Potchefstroom
Pretoria (partial supply)
Randfontein
Roodepoort-Maraisburg
Springs
Vereeniging
Livingstone (N. Rhodesia)

And a number of smaller Local Authorities

MAIN POWER STATIONS OPERATED BY THE COMPANY

	Electrical Generating Capacity.
Witbank (E.S.C.)	108,000 kW.
Klip (E.S.C.	424,000 ,,
Vaal (E.S.C.)	139,000 ,,
Rosherville	60,500 ,,
Brakpan	48,000 ,,
Simmerpan (Germiston)	40,000 ,,
Vereeniging	150,000 ,,
Victoria Falls (Hydro Electric)	2,000 ,,
	971,500 ,,

SALES OF ELECTRICITY AND COMPRESSED AIR APPROXIMATED TO 4,168,000,000 UNITS IN 1946.

Resident Director: BERNARD PRICE, O.B.E., D.Sc., M.I.C.E., M.I.E.E., etc.

General Manager: T. G. OTLEY, M.(S.A.)I.E.E., M.(S.A.)I.E.

Chief Engineer: V. PICKLES, M.I.E.E., M.(S.A.)I.E.E.

Chief Accountant: L. CROWTHER, A.S.A.A.

Local Secretary and Johannesburg Offices: CONSOLIDATED BUILDING, JOHANNESBURG.

Livingstone Offices: MAINWAY, LIVINGSTONE, NORTHERN RHODESIA.

London Office: 62, LONDON WALL, LONDON, E.C.2.

RULES AND CONSTITUTION.

ASSOCIATION OF

Municipal Electricity Undertakings

OF SOUTH AFRICA AND RHODESIA.

---

1. TITLE.

The name of the Association shall be "The Association of Municipal Electricity Undertakings of South Africa and Rhodesia."

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 Chairmen 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.

All Hon. Members and Members of the Association of Municipal Electrical Engineers shall ipso facto become Hon. Members and Engineer Members of the Association of Municipal Electricity Undertakings and existing Associate Members shall be eligible to transfer to the class of Associate.

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 Municipality 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 by the Council of the

Association. Any duly qualified assistants 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 the Victoria Falls and Transvaal Power Company or the Electricity Supply Commisison, who may be engaged in the public supply of electricity to municipalities.

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.

6. CONTRIBUTIONS.

Contributions shall become due and payable annually on the 1st day of September 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 Contributions. 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 necesary 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, and six other Members, two of whom may be Councillor Members.

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

Election of Council. Officers and Members of the Council (other than the Secretary & Treasurer) 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.

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 three shall constitute a quorum.

Convention. 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 & Treasurer shall present the Report and Balance Sheet of the Association for the immediate past period.

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 itself 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.

MEMBERS, DELEGATES AND VISITORS ATTENDING CONVENTION.

ENGINEERS AND COUNCILLORS:

BENONI.
Cr. A. A. Webb.
G. R. E. Wright.

BETHLEHEM.
K. M. Fisher.

BLOEMFONTEIN.
H.W. the Mayor J. G. Benade
G. J. Muller.
Cr. J. W. du Plessis.

BOKSBURG.
Cr. J. C. Jacobs.
E. L. Smith.

BRANDFORT.
D. V. S. Drëyer.

BULAWAYO.
Cr. Capt. J. Ohlson.
A. R. Sibson.

CAPE TOWN.
Cr. H. E. Gearing.
H. A. Eastman.

CRADOCK.
Cr. G. L. E. Venter.

DELMAS.
G. C. Delport.

DURBAN.
Cr. R. M. Thomas.
C. Kinsman.

EAST LONDON.
Cr. L. Laden.
A. Foden.

GEORGE.
Cr. G. O'Connell.
P. H. Newcombe.

GRAHAMSTOWN.
J. Iverach, E.E.

GWELO.
A. Hadfield.

HERCULES.
G. C. Theron.

JOHANNESBURG.
Cr. E. Boylan, M.P.C.
Cr. R. N. B. Smith.
J. C. Fraser.

KIMBERLEY.
Cr. H. Solomon.
C. R. Burton.

KINGWILLIAMSTOWN.
W. M. Andrew.

KLERKSDORP.
Cr. R. Campbell.
J. M. Gericke.

KROONSTAD.
Cr. A. N. Symons.
W. Rossler.

KRUGERSDORP.
Cr. J. W. Lotz.
W. Theron.

LADYSMITH (NATAL).
Cr. M. F. van Deventer.
F. Stevens.

LOUIS TRICHARDT.
R. R. Lyall.

MAFEKING.
Cr. K. C. Rowe.
G. E. H. Jones.

MIDDELBURG, C.P.
Cr. K. Glatthaar.
H. R. Bevington.

OUDTSHOORN.
C. H. E. Adams.

PAARL.
Cr. E. du Preez.

PIET RETIEF.
H. J. Relihan.
T. M. Mocke.

PIETERSBURG.
Cr. R. T. K. Baker.
L. B. Sparks.

PIETERMARITZBURG.
C. R. Halle.
Cr. Sax Young.

PORT ELIZABETH.
A. Schauder, J.P.
D. A. Bradley.

PRETORIA.
Cr. Major J. M. Preller.
P. C. Cowie.

RANDFONTEIN.
Cr. J. E. McKenzie.
W. Houreld.

ROODEPOORT—MARAISBURG.
Cr. D. A. Stumke.
H. Groom.

RUSTENBURG.
Cr. C. P. de Wit.
P. A. Meintjes.

SALISBURY.
Cr. M. Jaffray.
B. H. J. Tubb.

SPRINGS.
J. C. Downey.
Cr. A. V. Dyer.

SOMERSET EAST.
H. A. Prevost.

STANGER.
C. H. Dwyer.

STELLENBOSCH.
R. W. Ritson.

UITENHAGE.
A. Elliott.

UMTALI.
H. T. Turner.

UPINGTON.
Cr. J. J. du Toit.
H. M. S. Muller.

VEREENIGING.
Cr. J. C. Rice.
C. B. Foley.

VRYBURG.
P. C. Grandin.

WINBURG.
Cr. B. S. de Kok.
A. M. Ford.

WORCESTER.
H. J. Gripper.

OTHER MEMBERS.

J. S. Clinton, Johannesburg.
B. Marchand, Witbank.
J. W. Phillips, Bulawayo.

DELEGATES.

GOVERNMENT DEPARTMENTS.

Electricity Supply Commission: H. H. Jagger, Cape Town.
Electricity Control Board: C. Mullins.

DEPARTMENT OF LABOUR:

F. W. Joubert, Chief Inspector of Factories.
W. Lindeman, Inspector of Machinery, Bloemfontein.
C. Clutterbuck, Chairman, Electrical Wireman's Wiring Board.
P. L. Jupp, Public Works Department.

SOUTH AFRICAN RAILWAYS AND HARBOURS:

H. English, Electrical Engineer, Bloemfontein.
H. H. Gregorowski, System Manager, Bloemfontein.

OTHER REPRESENTATIVES:

F. W. Thatcher, The S.A. Electrical Review.
E. Jannasch, Vaal River Electrification Board.
A. Goldsmith, Witwatersrand University.
S. G. Redman, Merz and McLennan, Johannesburg.

REPRESENTATIVES AND VISITORS—ENGINEERING COMPANIES.

Babcock & Wilcox	K. M. Johnston, J. C. Callie.
Bellany & Lambie	L. W. Waywyn.
British General Electric Co., Ltd.	S. B. King, F. A. P. Perrow.
	S. G. Mortimer, J. S. Smyth.
English Electric Co., Ltd.	W. G. H. Jarvis, G. V. Jackson.
Endfield Cables, S.A. (Pty.), Ltd.	A. E. Torrance.
First Electrical Corporation of S.A., Ltd.	G. Dekanah.
Fraser & Chalmers, S.A., Ltd.	H. D. T. Harris.
Hubert Davies & Co., Ltd.	W. N. Powell.
International Combustion of S.A. (Pty.), Ltd.	G. R. Northard.
Metro Vick. Electrical Export Co., Ltd.	J. Monks.
Morris & Martin, Ltd. (P.E.)	J. A. England.
C. A. Parsons & Co. (S.A.), (Pty.), Ltd.	G. D. Gelling.
Reunert & Lenz, Ltd.	R. A. E. Denton.
Rice & Diethelm, Ltd.	R. E. Hughes.
Reyrolle & Co., Ltd.	J. G. Gibbons
C.A. Cable Makers Association	E. R. Smith.
The Brush S.A. (Pty.), Ltd.	J. White, J. S. van Velden.
Trevor Williams (Pty.), Ltd.	C. L. de Beer.
Wilson & Herd, Ltd.	C. B. Wilson.

LADIES:

Mrs. D. A. Bradley, Port Elizabeth.	Mrs. G. Muller, Bloemfontein.
Mrs. A. S. M. Eastman, Cape Town.	Mrs. A. A. Newcombe, George.
Mrs. F. M. Foley, Vereeniging.	Miss L. Newcombe, George.
Mrs. J. C. Fraser, Johannesburg.	Mrs. N. Ohlson, Bulawayo.
Mrs. Gladys G. Gearing, Cape Town.	Mrs. Percy Perrow, Bulawayo.
Mrs. H. M. Harris, Johannesburg.	Mrs. J. C. Rice, Vereeniging.
Mrs. H. Jagger, Cape Town.	Mrs. A. R. Sibson, Bulawayo.
Mrs. E. H. Jones, Mafeking.	Mrs. A. W. Torrance, Johannesburg.
Mrs. E. Muller, Upington.	Mrs. L. W. Waywyn, Johannesburg.

LIST OF MEMBERS AS AT 31st AUGUST, 1945.

HONORARY MEMBERS:

Van der Bijl (Doctor) J. H., Electricity Supply Commission.
Horrell, L. L., Johannesburg.
Poole, E., Durban.
Rodwell, A. T., Johannesburg.
Swingler, G. H., Cape Town.

COUNCIL MEMBERS:

Municipal Council of:—

Adelaide
Alice
Beaufort West
Benoni
Bethlehem
Blantyre
Bloemfontein
Boksburg
Brandfort
Bulawayo
Burgersdorp
Cape Town
Cradock
Durban
East London
Ermelo
Eshowe
Fort Beaufort
Fort Victoria
George
Graaff-Reinet
Grahamstown
Gwelo
Hercules
Johannesburg
Kimberley
Klerksdorp
Knysna
Kokstad
Kroonstad
Krugersdorp
Kuruman
Ladybrand
Ladysmith
Louis Trichardt
Mafeking
Matatiele
Middelburg (C.P.)
Middelburg (Tvl.)
Nelspruit
Nigel
N'dola
Oudtshorn
Paarl
Pietersburg
Pietermaritzburg
Piet Retief
Port Alfred
Port Elizabeth
Port Shepstone
Potgietersrust
Pretoria
Queenstown
Randfontein
Robertson
Roodepoort-Maraisburg
Rustenburg
Salisbury
Somerset East
Springs
Springfontein
Stanger
Stellenbosch
Uitenhage
Umtata
Upington
Umtali
Vereeniging
Victoria West
Vryburg
Walmer
Winburg
Windhoek
Worcester.

ENGINEER MEMBERS:

Adams, C. H.	Oudtshoorn.
Anderson, F.	Port Alfred.
Ashley, T. P.	Queenstown.
Baskerville, J. J.	Port Elizabeth.
Bevington, H. R.	Middelburg (C.P.)
Bickley, H.	Nigel.
Bradley, D. A.	Port Elizabeth.
Burton, C. R.	Kimberley.
Coppin, T. J.	Walmer.
Craig, J. S.	Burghersdorp.
Dwyer, C. H.	Stanger.
De Wet, D. P.	Springfontein.
Eastman, H. A.	Cape Town.
Elliott, A.	Uitenhage.
Fisher, K. M.	Bethlehem.
Foden, A.	East London.
Foley, C. B.	Vereeniging.
Ford, A. M.	Winburg.
Fraser, J. C.	Johannesburg.
Gericke, J. M.	Nelspruit.
Giles, P. A.	East London.
Gregor, C. E.	Alberton.
Gripper, H. J.	Worcester.
Groom, H. L.	Roodepoort
Grandin, P. C.	Vryburg.
Harvey, A. Q.	Springs.
Halle, C. R.	Pietermaritzburg.
Heasman, G. G.	Fort Victoria.
Houreld, W.	Randfontein
Hugo, D. J.	Pretoria
Inglis, J. I.	Ermelo.
Iverach, J.	Grahamstown.
Jones, G. E. H.	Mafeking.
Kinsman, C.	Durban.
Kruger, J. J.	Adelaide.
Lategan, J. F.	Brandfort.
Leishman, R.	Johannesburg.
Lotter, G. A.	Ladybrand.
Lyall, R. R.	Louis Trichard.
Mail, W. Mortimer	Kokstad.
Meintjes, P. A.	Rustenburg
Mocke, T. H.	Piet Retief.
Muller, G. J.	Bloemfontein.
Muller, H. M. S.	Upington.
Newcombe, P. H.	George.
Nicholas, I. J.	Umtata, Transkei.
Phillips, J. W.	Bulawayo.
Prevost, H. A.	Somerset East.
Relihan, H. J.	Paarl (C.P.)
Ritson, D. W.	Stellenbosch.
Rogers, J.	Fort Beaufort.
Ross, W. D.	Potchefstroom.
Rossler, A.	Cradock.
Rossler, W.	Kroonstad.

Rush, W.	Potgietersrust.
Sibson, A. R.	Bulawayo.
Smith, E. L.	Boksburg.
Sparks, L. B.	Pietersburg.
Stevens, F.	Ladysmith (Natal).
Theron, G. C.	Hercules.
Theron, W. C.	Klerkskdorp.
Tubb, B. H. J.	Salisbury.
Turner, H. T.	Umtali.
Vergottini, P. L.	Robertson.
Verryn, A. J.	Middelburg (Tvl.)
White, J. H.	N'dola.
Williams, V. E.	Windhoek.
Wilson, J.	Pretoria.
Wright, G. R. E.	Benoni.

ASSOCIATE MEMBERS:

Seller, W. J.	P.O. Box 15, Boksburg.
McDonald, F. G.	P.O. Box 399, Pietermaritzburg.

ASSOCIATES:

Behrens, E. A.	229 Vance Road, Durban.
Basherville, C. H.	P.O. Box 1094, Salisbury.
Coulthard, R. D.	Arcturus Road, Highlands, Sailsbury.
Castle, F.	P.O. Box 303, Cape Town.
Campbell, A. R.	P.O. Box 584, Johannesburg.
Clinton, J. S.	34 Wanderers Street, Johannesburg.
Dawson, C.	Electric Supply Com., Congella, Durban
Delport, G. C.	P.O. Box 6, Delmas.
Dobson, J. H. Dr.	P.O. Box 7764, Johannesburg.
Ewer, G. G. Col.	9th Floor, Surrey House, 39 Rissik Street, Johannesburg.
Gyles, J. H.	Gillett's, Natal.
Lloyd, R. K.	P.O. Box 786, Bulawayo.
Marchand, B.	P.O. Box 223, Witbank.
Milton, W. H.	P.O. Box 1091, Johannesburg.
Mercier, G.	P.O. Box 377, Salisbury.
Pentz, J. O.	P.O. Box 4560, Johannesburg.
Proctor, L. B. Major	98 Ernest Road, Kensington.
Powell, W. N.	P.O. Box 1386, Johannesburg.
Smith, M. M.	Paarl Road, Malmesbury.
Stewart, G. A.	P.O. Box 6672, Johannesburg.
Stewart, M. C. D.	
Syers, F. E.	P.O. Box 55, Gatooma, S. Rhodesia.
West, J. A.	Box 24, St. Michael's, Natal.

PROGRAMME OF THE TWENTIETH CONVENTION

of

The Association of

MUNICIPAL ELECTRICITY UNDERTAKINGS

(South Africa and Rhodesia)

14th to 17th MAY, 1946.

inclusive.

FOUNDED 1915.

(NOTE: All meetings will be held in the Clarendon Hall).

MONDAY, 13th MAY, 1946

10. 0 a.m.: Council Meeting, Committee Room, City Hall.

TUESDAY, 14th MAY, 1946

8.30 a.m.: Council Meeting.
9. 0 a.m.: Registration, Issue of Agenda, etc.
10. 0 a.m.: Official Opening of Conference by His Worship, the Mayor of Bloemfontein, Councillor J. G. Benade.
10.15 a.m.: Refreshments.
10.45 a.m.: Annual General Meeting. (Municipal delegates and visitors may attend, but only members are entitled to vote).
12.30 p.m.: Lunch interval.
2.30 p.m.: Continuation—Annual General Meeting.
3.45 p.m.: Refreshments.
4.15 p.m.: Continuation—Annual General Meeting.
5.30 p.m.: Sundowners at Mayor's Parlour as guests of City Council.
Evening: Free.

AGENDA.

1. Annual Report of Secretary and Treasurer.
2. Election of President.
3. Election of Officers.
4. Venue and provisional date of next meeting.
5. Presidential Address.
6. Reports of Sub-Committees.
   (i) A.M.E.U. Standards Sub-Committee.
   (ii) S.A. Standards Institute.
   (iii) Safety Precautions.
   (iv) Electrical Wireman's Registration Board.
   (v) Electricity Overhead Mains.
   (vi) Freight Charges on Coal.
   (vii) Registration of Electrical Wiring Contractors.
   (viii) World Power Conference.
7. Extension of A.M.E.U. activities.
8. Revision of tariff of subscriptions.
9. Earthing with special reference to overhead lines.
10. Appeal for funds: S.A. Standards Institute.
11. General.

RETIRING OFFICERS.

The following are the retiring officers:—

President: Resigned.

Vice-President: G. J. MULLER, Bloemfontein.

Past Presidents: I. J. NICHOLAS, Umtata; H. A. EASTMAN, Cape Town.

Councillor Members: J. W. DU PLESSIS, Bloemfontein; Capt. J. OHLSON, Bulawayo; M. JAFFRAY, Salisbury (Alternate); E. BOYLAN, M.P.C., Johannesburg (Alternate).

Other Members: J. C. FRASER, Johannesburg; D. J. HUGO, Pretoria; C. KINSMAN, Durban; G. R. E. WRIGHT, Benoni.

MEMBERS OF OTHER COMMITTEES.

1. S.A. Standards Institution: D. J. HUGO, G. R. E. WRIGHT.
2. World Power Conference (Local Committee): H. A. EASTMAN.
3. Electrical Wireman's Registration Board: J. C. FRASER.
4. Safety Precautions: J. C. FRASER.
5. Overhead Lines Regulations: J. C. FRASER. Alternate: G. J. MULLER.
6. Electrical Conductors Advisory Committee: C. KINSMAN. Alternate: R. LEISHMAN.
7. Electrical Generating and Distribution Advisory Committee: H. A. EASTMAN, D. J. HUGO.

WEDNESDAY, 15th MAY, 1946.

8.30 a.m.: Council Meeting.
9.30 a.m.: Council Reports.
Paper: "Bulk Supply"—G. R. E. Wright, Electrical Engineer, Benoni.
10.30 a.m.: Refreshments.
11. 0 a.m. Discussions.
12.30 p.m.: Lunch interval.
2.30 p.m.: Discussions.
3.30 p.m.:Visit to Power Station.
7.30 p.m.: Tour around Naval Hill, including visits to Broadcasting Station and Lamont-Hussey Observatory. (Subject to private transport facilities).

THURSDAY, 16th MAY, 1946.

8.30 a.m.: Council Meeting.
9.30 a.m.: Council Reports:
Paper: Superimposed Current Control over Distribution Network," by W. N. Powell.
10.30 a.m.: Refreshments.
11. 0 a.m.: Discussion.
11.30 a.m.: Leave for Mazelspoort Water Works and Pleasure Resort.
12.30 p.m.:Lunch at Mazelspoort as guests of City Council.
1.30 p.m.: Inspection of Waterworks and visit to Harvard Observatory.
8. 0 p.m.: Cinema Entertainment.

FRIDAY, 17th MAY, 1946.

8.30 a.m.: Council Meeting.
9.30 a.m.: Council Reports:
Damage to Properties caused by Spray Ponds—Contribution by A. R. Sibson, City Electrical Engineer, Bulawayo.
10.30 a.m.: Refreshments.
11. 0 a.m.: Discussion.
12.30 p.m.: Lunch interval.
2.30 p.m.: Discussions.
Business left over from previous days.
General.

Proceedings of the Twentieth Convention

OF

THE ASSOCIATION OF MUNICIPAL UNDERTAKINGS OF SOUTH AFRICA AND RHODESIA, OPENED IN THE CLARENDON HALL, BLOEMFONTEIN AT 10 A.M., ON TUESDAY, THE 14th MAY, 1946.

THE CHAIRMAN (Mr. J. W. Phillips, Bulawayo): My first duty is to introduce to you His Worship the Mayor of Bloemfontein, Councillor J. G. Benade, who has kindly consented to open the proceedings this morning.

HIS WORSHIP THE MAYOR OF BLOEMFONTEIN (Councillor J. G. Benade): Mr. Chairman, Ladies and Gentlemen, you find yourselves meeting to-day in the centre city of the centre province of the Union, a province on which the eyes of the whole world are fixed as a result of the richest gold strike on the globe. Not only has Odendaalsrust been placed on the map, but the whole Free State from Jagersfontein in the south to Vrede in the north. With all this development, Bloemfontein is becoming more and more important. It is not at all improbable that we, too, have a rich gold reef running somewhere in the neighbourhood. But, irrespective of this, Bloemfontein has a big part to play in the development of the Free State and South Africa as a whole. Bearing this in mind, I would ask you not to overlook Bloemfontein during your discussions. The city can play a big part in the plans you are laying for the future. When I say Bloemfontein is going to play an important part in the future development of South Africa, it is not just wishful thinking. It is not my opinion alone; I am supported by business men all over South Africa, and even overseas—not by just saying so, but by doing something about it. As we in business circles know, there is an enormous demand for business sites in Bloemfontein which shows that there is confidence in Bloemfontein. Prices, on account of the demand, are soaring to-day. Business men all over are enquiring, and they prove by the interest they are showing that they have a firm belief in the great future of our city. Not only business men, but industrial people, and not only on this continent, but overseas, are taking a great interest in our city. They have come from all over and they have got information and I know they are highly satisfied that they cannot make a mistake if they come to Bloemfontein for industrial purposes. Previously, we had to beg people — industrial people especially — to come to Bloemfontein and open up their factories here. To-day it is a different story. We can hardly cope with the demand. In the past, whenever an industrial firm wanted to come here, we could point out several industrial sites, and they could pick and choose. To-day it is different. They have to act and act quickly. To-day we have to put them up by auction, and we shall have to make provision for many, many more industrial sites in the near future. Fortunately, we are in a position that we can provide them with accommodation. A few days ago, we had a sale of residential erven here, and everybody was surprised to see at what prices these erven went. They were more than 100 per cent. above the prices fetched six months ago in the very same street, which also shows there is confidence in the future of Bloemfontein. You gentlemen are going to discuss matters here concerning electricity, and I hape you will bear in mind that Bloemfontein must be considered in the greater scheme. I now have pleasure in declaring the Convention open. (Applause.)

THE CHAIRMAN: Mr. Mayor, Ladies and Gentlemen, on behalf of the Association, I must sincerely thank you for your kind welcome to Bloemfontein, and I now call on Councillor Webb to reply on behalf of the members assembled here this morning.

COUNCILLOR A. A. WEBB (Benoni): Dames en Here, ek is bly dat die kongres in Bloemfontein byeen kom. Die aandag is vandag allerweë op Suid-Afrika gevestig en Bloemfontein is die sentrale stad van Suid-Afrika. Mag Bloemfonteiners nooit die

element van sekerheid wat hul optrede van die verlede gekenmerk het, prysgee nie.

THE CHAIRMAN: The next item is the election of President, but before we proceed with that, I would like to thank the Executive Council of this Association for the honour they did me in inviting me to preside at the opening of this Convention. As you are aware, I am no longer a municipal electrical engineer, and therefore had to resign as President, which I did on January 31st last. As I have no official standing as President — they wouldn't even let me wear the badge — I cannot give you a valedictory address, but I would just like to say a few words regarding the past year, and give some small account of my steward ship, as it were. It has been a very difficult year, partly owing to the change of secretaryship. You will remember that Mr. Horrell, at the last Convention, intimated he would not be able to carry on as Secretary together with his job at War Supplies. We found it rather difficult to find a successor, but about October we obtained the services of Mr. Taylor from the Electricity Department, Johannesburg, who has done sterling work in picking up the threads and carrying on as Secretary. The task of preparing the proceedings alone was an enormous job for a man who had not had experience of that kind before. We are very grateful to him for taking it on. I would, however, at this stage like to say a word regarding Mr. Horrell, as his services in the past are deserving of our special thanks and appreciation.. He was Secretary from early in 1941 until the end of last year. He is a Past President and an Honorary Member, and was Secretary for two years from 1920 to 1922. He has been connected with this association almost since the beginning, and I would like to record our sincere appreciation of his interest and his services. (Hear, hear.) I would also like to say we very much regret he was not able to come to this Convention to-day. I think it is probably the first Convention he has missed since he became a member. At the last Convention it was decided to double up on subscriptions, and I must say that the response has been excellent. Except for one or two of the smaller municipalities, we have had an excellent response, and I think the Secretary will probably tell you that our finances are in a much better condition. We had hoped the Proceedings would become self-supporting, but, owing to various circumstances, we have still made a loss, but not nearly as large as on previous occasions. I have said that the year has been difficult owing to the change of secretaryship, but it has really been a difficult period of two years owing to the rapid change of Presidents. First of all, we had Mr. Rodwell, who retired during his term of office, and Mr. Clinton resigned almost as soon as he was appointed, and then I resigned, resulting in Mr. Muller having to take over my duties since October. That has made everything very difficult during the past two years, but I sincerely hope the new President who will be elected this morning will be able to carry on for a full year, so that we can get back to normal, and I hope his year of office will be a flourishing one and one of considerable progress for this Association. (Hear, hear.) My next duty is to call for nominations for President.

MR. EASTMAN (Capetown): Mr. Chairman, Ladies and Gentlemen, I rise to propose as President of our Association for the ensuing year Mr. G. J. Muller, Vice-President for the past year, and City Electrical Engineer of Bloemfontein at the present time. For the reasons, Sir, that you have described, Mr. Muller is already a well-tried officer in a senior position in our Association. Because of the various resignations whach have taken place, and your resignation also, Mr. Muller has already been called upon to carry on a degree of responsibility which does not usually fall to Vice-Presidents, and it is with all the more confidence, therefore, that I submit his name to you for President for the ensuing year.

MR. KINSMAN (Durban): It is my pleasure to second the nomination of Mr. Muller as President for the ensuing year. It is customary for our Association to elect as President the Electrical Engineer of the city in which the Convention is held, but even if that were not the case, I think the Association would be considered fortunate in having as President Mr. Muller, who is well-tried and experienced and will prove a power on the job, and if it is the will of the Convention that his nomination be accepted, I wish him all success during the coming year. (Applause.)

G. J. MULLER, BLOEMFONTEIN
President 1946-47

MR.RITSAN (Stellenbosch): It is my privilege to support the motion, and I have much pleasure in doing so. On behalf of the members present, I sincerely trust Mr. Muller will have a successful year of office.

THE CHAIRMAN: Are there any other nominations? If not, I declare Mr. Muller duly elected President of this Association. His Worship the Mayor then invested Mr. Muller as President. (Applause.)

THE PRESIDENT: Ladies and Gentlemen, before addressing a few words to Mr. Phillips, I would just like this opportunity of thanking you for the honour you have done me in electing me as your President. I will come back to this subject, so I won't say any more on it at this stage. Mr. Phillips, the Association — and I speak on behalf of the Association now — are deeply indebted to you for taking this trouble of coming down from Rhodesia to preside at this meeting, because we would have been in rather a difficult position without your kindly help, and we appreciate it. I believe you are still an Associate, and we do hope you will not sever your connections with us entirely, and that you will honour us with your presence now and again .(Hear, hear.) Now I would like to ask the Secretary if there are any telegrams of greetings or apologies, to please read them.

THE SECRETARY: I have a telegram here from Mr. Frank Castle: "Deeply regret being unable to attend Conference. Best wishes for a successful Convention, and greetings to all members." Then I have a letter from Mr. Prevost: " I now find I shall be unable to attend the Bloemfontein Conference as planned and cancelled my reservations. It occurred to me that if the Conference were held in April it would be easier for engineers from the smaller centres to attend, as their plants are overloaded in winter." And a telegram from Mr. Horrell: "All best wishes for a successful and happy Conference. Sorry I couldn't attend."

THE PRESIDENT: Before asking for apologies from the Hall, I may say I have discussed the matter with one or two of the Executive, and as he has been a regular attendant for many, many years, the Conference might feel that we shoull address a letter to Mr. Castle sympathising with his ill-health, and wishing him the best. (Agreed.) Now I think there are several members who may, on behalf of their friends, wish to apologise for their absence.

MR POWELL: Mr. President, a few weeks ago I had the pleasure of having a short chat with Mr. Eric Dalton, Chief Engineer of the S.A. Railways, who is at present overseas, and he asked me to convey to this Conference his apologies for his absence, both as representing the S.A. Railways and also in his capacity as President of the Institution of Electrical Engineers.

THE PRESIDENT: I think there are still some messages of greetings.

MR. FRASER (Johannesburg): I have the honour to convey to you greetings from the President and members of the Institution of Certified Engineers of South Africa. They hope your term of office will be successful.

PRESIDENTIAL ADDRESS.

THE PRESIDENT: Ladies and Gentlemen, I have now come to the stage where I have to deliver my Presidential Address, and before going on to the formal form of the address, I would again like to convey to you my very sincere appreciation of the high honour you have conferred on me by electing me as President of your Association for the year 1946-47.
(Applause.)

I realise that circumstances played their part, but by reaffirming your decision to come to Bloemfontein, you have honoured me with your confidence, and I cannot express my appreciation in a better may than to set myself the task of living up to the high standard of service to the Association set by the array of distinguished men who have occupied this chair before me. I am aware of the magnitude of the task, but with your generous co-operation, I am also convinced that it will not be devoid of pleasure.

Bloemfontein has been very aptly called the City of Conferences, and most of the

Councillor delegates will probably be well acquainted with our city for that reason, but the last Conference of this Association to be held here takes us back to the year 1929, and coincided with an electrical exhibition in the Market Hall. One is reminded with regret of the passing of the time when electrical equipment of every description was freely available and orders keenly sought. To many undertakings they must indeed appear to have been the "Good old days," when it is remembered that the supply problem to-day keeps many engineers awake, wondering if the rise in load will win the race against overdue plant extension.

Much has, however, happened since those days. The world has passed through an economic cycle which reached its lowest level in the depression of 1930 to 1933 and its highest in the boom which followed. Out of the complacency of this prosperity emerged the rude shock of war, which in all its aspects must surely rank as the most terrible in human history. The crimes that have been committed against human decency, would make the world's annals of crime look merely silly. 1945 arrived, a war was lost and won and the struggle for the peace began. Even to-day, a year after armistice, the world is a seething mass of social and economic unrest and many must wonder if all this human suffering has been in vain.

But during these years of stress, human endeavour reached undreamt of heights, and history has been made which will be the basis of the economic and social structure of the world of future generations when the history of the war has receded to a memory in history books.

Radar was invented as a means of defence against aerial attack and has developed into an all seeing eye which penetrates the depths of the ocean, the darkness of night and fog and reaches out to the unknown worlds around us. Only recently we read that contact had been established with the moon. Do we need any imagination to visualise its possibilities?

Then followed flying bombs, based on jet propelled aircraft and internal conmbustion turbines, closely followed by rocket bombs, huge projections 43 feet long which travelled many miles above the earth with a speed far exceeding that of sound. Television also received attention, and only recently I noticed that the U.S.A. War Department had developed a radio controlled rocket bomb with a television transmitter in the head, which transmitted a continuous picture as the target was approached, thus ensuring pinpoint accuracy.

Instrument of destruction so far, but turned to peacetime use, what revolutionary changes can be wrought in our conception of travel by air, land and sea, coupled with the remarkable developments in the manufacture of synthetics, plastics and glass, we certainly look to an interesting if uncertain future.

And then as grand finale to the titanic struggle came the Atomic Bomb! By the successful splitting of the Uranium atom, a wave of energy, commensurate with the mighty forces of nature was released, which swept two cities from the face of the earth and stopped a war!

"Homo Sapiens" has been wise indeed and has wrested from nature the control of the mighty forces; but will he be wise enough to control his own passions? But "Hope springs eternal in the human breast" and as a body of men whose primary duty it is to render service, even if sometimes reluctantly used as tax collectors, we look forward to great developments, and a world more comfortable and interesting to live in.

With the materials developed, and the experience gained during the war, the electrical industry will be in a position to supply better appliances in greater variety to suit all requirements, and fluorescent lighting in curves, lines and globes will add cheer and brightness to our homes, offices and factories, as soon as the immediate effect of war in the form of labour, transport and control difficulties have disappeared. But from the point of view of the engineer the most interesting and vital factors will no doubt be the effect of the internal combustion turbine, and atomic energy on the future development of power, and a few remarks on these will therefore perhaps be excused.

In the jet propulsion unit as applied to aeroplanes, the object is to produce a stream of gas of large volume and high velocity in a backward direction, which drives the plane forward by reaction, hence its best performance is at high speeds and great altitudes. The turbine only serves to drive the compressor which in turn supplies high pressure air for the turbine, while the exhaust from the turbine provides the propulsive force. In this form the unit may have great possibilities for aerial transport engineers, but does not lend itself to the development of electric power. For this purpose a shaft for power take-off is required and for good efficiency the exhaust energy must be reduced to a minimum. Such units have been developed experimentally on the Continent and in America. The maximum capacity so far is about 10,000 K.W. and thermal efficiencies of the order of over 30% have been attained.

Improvements in both directions are anticipated in the near future, but even the figures for the modest sets of to-day exceed those for large steam stations. Coupled with rapid starting and the elimination of banking losses in boilers, and cooling water worries, it promises to be a strong competition for the honours so far monopolised by the Boiler-steam turbine combination.

Its reliability has, however, still to be proved, the cost factor is also still uncertain, and in our country the presence of coal and lack of natural liquid fuel will naturally militate against its general adoption, unless experiments with the use of powdered fuel prove successful.

On the other hand the limiting factors on the availability of steam plant such as the accumulation of mud and scale in condenser tubes and the sooting up and clinkering in boilers is eliminated, while auxiliary plant is simplified compared with steam, and wear and tear compared with reciprocating I.C. plant reduced.

Studied from all angles it remains a development of much immediate interest, and may yet prove the power plant of the future especially where cooling water is a problem.

On the subject of atomic power, with possibilities so vast, that one is involuntarily tempted into flights of fancy, and any remarks at this early stage must necessarily be made with the greatest diffidence. Opinions on the possibilities of the use of atomic power in everyday life, as reflected in news flashes in the daily press appear strangely divergent. Towards the end of last year the opinion was expressed in authoritative circles that it would take at least ten years before the stage would be reached when atomic energy from Uranium could be at all a serious competitor to other more familiar sources of energy for ordinary peacetime requirements. In January of this year a professor in America, expressed the opinion that atomic energy for the kitchen and other similar mundane uses could be available in six months, provided raw materials are available. One pound of commercial uranium sells at about £10 and contains 1/140 lb. of the 235 Isotope equal to about 10 tons of coal. But the efficiency of conversion by passing water into a "pile" of Uranium and graphite is only about 8%. The £10 worth of uranium is accordingly equivalent to less than a ton of coal which one buys here for 16/6. There is still, therefore, a substantial margin of cost in favour of coal. Even assuming unlimited raw materials were available and the cost per B.T.U. could be reduced to a fraction of that for coal, the portion of the cost per K.W.H. to the consumer attributable to fuel is relatively small, and it would appear that dreams of abundant atomic power for a song are not backed by the facts at this stage. Thinking along these lines, one can hardly imagine so dangerous a source of energy being put at the disposal of all and sundry while other forms of energy are still available.

Nothing I have said, however, can argue away the fact that 1 lb. of uranium 235 can release 11,400,000 K.W.H. of energy and this combination of small mass and stupendous energy may yet revolutionise life on our planet.

At the risk of wearying you with what you already know, I have only tried to pay tribute to the high lights in the developments of our time, by recording them in our proceedings.

We cannot, however, remain in the clouds while our everyday problems await attention.

Most undertakings urgently require plant, materials and men to cope with extensions for new urban layouts, industries, etc. Housing schemes on an unprecedented scale and a public starved for electrical appliances for six years, coupled with industrial development, is making the supply of electricity a major problem. Somewhat less urgent, but none the less real, are questions of administration of undertakings, control of marketing and installation of electrical appliances, control of load, tariffs, etc.

All these have to be faced by individual undertakings, but the main object of an Association such as ours is no doubt to live up to our national motto—"Ex unitate vires." This leads one to ask what is expected of this Association by engineer members and the Councils who pay the subscriptions and annually foot the bill for conferences.

The exchange of opinions on technical subjects in papers and discussions is dear to the heart of every engineer, but the Association's valuable service would be greatly enhanced if questions affecting undertakings or other practical matters such as will be discussed at this Conference could be dealt with and resolutions translated into action more expeditiously than is possible at present.

Councillors, as the representatives of the owners of the undertakings, are more interested in the financial advancement of their undertakings, and look to the association to promote this with all the means at its disposal, and require guidance on matters of general policy and the reaction of legislation on their undertakings.

To fill this role successfully the Association must

(a) maintain its identity as the recognised and authoritative representative of Electricity Undertakings in S.A. and the Rhodesias;

(b) provide facilities for its executive body, or its committees to meet, if possible, at least every quarter, with authority within defined limits to act on behalf of the Association.

There are unfortunately quite a few people who have the impression that a conference is a pleasant holiday, well earned or otherwise, with some business thrown in for goodwill! Perhaps we have ourselves to blame for such ideas, when we think of the years spent on such matters as standard regulations, registration of wiremen and hardy, even explosive, annuals such as relief of rates. One should not lose sight, however, of the scope of business which has to be considered in the space of a few days, after which the executive, like other members, scatter over Southern Africa for another year and further business must be laboriously conducted via the post.

That the Association should make its influence felt more definitely throughout the year, was never so clearly indicated as during the past year when a few of the smaller undertakings withdrew their membership rather than pay a few pounds more per year, in spite of what has been accomplished in the past under difficult conditions. This thought must also have been at the root of the suggestions of the past president at t he last conference, more particularly the institution of a regular journal and the control and examination of engineers in charge of undertakings, both of which would promote the idea of keeping the activities of the Association actively before both Councils and engineers throughout the year.

The thought has, however, occurred to me that with the very limited time available at a conference we may have given rather too much attention in papers and discussions to the technical side of undertakings to the detriment of other aspects. In the selection of papers for this conference an attempt has therefore been made to cater for technical as well as general interest, which with reports on divergent subjects should, it is hoped, be of assistance to Councillors as well as engineers.

Our ambition for our Society should, however, be to develop it into a driving force behind the destinies of its member

Undertakings until membership will be valued even by the smallest undertakings, as far beyond the paltry few pounds for membership. This happy state must, however, remain a pious dream as long as our activities as far as the average member is concerned, remain dormant during the year between conferences.

If the work of the Association is to be dealt with more effectively, the first essential is that the Executive should meet more frequently. Considered financially it may not, however, be possible to have more than two or three meetings during the year. As this would hardly suffice to deal with questions as they crop up, the only remedy seems to be to adopt a standing committee system with the members of any particular committee as far as possible reasonably close together.

The work could probably be conveniently grouped under the following committees:

Materials,
Technical,
Legal,
Staff

The materials Committee would strive to improve the availability of materials by standardising and co-ordinating requirements, and by seeking the co-operation of manufacturers and merchants. They could consider the possibilities of an Overseas Municipal buyer or agent whose duty it would be to expedite orders, look after the interests and make special enquiries on behalf of members. This committee could also be in charge of the control of materials and articles marketed, and reports of inferior or dangerous articles could be referred to them for further action.

The Technical Committee could in general keep members informed on new developments or technical literature of particular interests to Electricity Undertakings with suitable comments. More particularly they could be the body to which members could refer problems on which they feel that an expression of opinion would be valuable. Engineers of smaller undertakings who are not blessed with a staff of highly qualified assistants would perhaps more particularly value the exchange of views with colleagues who are in a position to put forward authoratitive views.

The Legal Committee would have as its primary duty the study of the effect on Electricity Undertakings, of any new or proposed legislation, and the drafting of recommendations or amendments. As an advisory body on legal question, regulations and even tariffs, they could render most valuable service.

The staff or perhaps better, Manpower Committee could study the question of staff from all angles. One could suggest such matters as the training of Artisan and engineering staff, examinations, conditions of employment, salary scales and status. They could place themselves in a position to give authoritative advice on all matters relating to staff engaged on electricity undertakings.

The conference will presently consider the reports of a number of sub-committees, all appointed for a specific purpose. Their work could also be subdivided among standing committees, so chosen that they can meet reasonably frequently, and with this advantage that any matter conveyed by their general mandate could be referred to them as it arises.

These suggestions are put forward with the sole desire to stimulate ideas on the more effective operation of our Association, and with a sincere appreciation of the good work done by past executives and their special committees.

In spite of the need to produce a surplus the basic idea of every Electricity Undertaking is to render service to the public and it seems to follow therefore that the Association of Electricity Undertakings should have as its watchword: "Service."

DISCUSSION ON PRESIDENTIAL ADDRESS.

MR. FRASER (Johannesburg): Mr. President, I rise on behalf of the Association to thank you for your stimulating address.

Although we naturally look forward with interest to new and improved methods of many years must pass before our existing

coal-steam stations are outmoded. Of atomic energy we, of the general mass, know very little, but it does seem probable that its use will be confined in the first instance to steam raising since, as the radio-active nature of uranium constitutes a menace to human life, elaborate precautions must be taken to ensure reliable shielding and safe handling.

The internal combustion turbine has great possibilities but, before is becomes a serious competitor of steam in this country, many difficulties will have to be overcome. For instance, consideration must be given to the present high capital costs due to the special materials required in its construction, and to the high ash content of South African coals.

Coming, however, to matters more closely related to the activities of the Association, it is indeed becoming increasingly important to utilize the time available for the Convention to the best advantage. It is the only occasion in each year when all members have the opportunity of meeting together, and I heartily agree that, at this Conference, less time should be given to the reading of papers on specialised or highly technical subjects and more to the consideration of matters intimately affecting Municipal electricity undertakings. If copies of technical papers were circulated to members about a month before hand, it should be sufficient simply to read a summary of the paper at the Conference, followed immediately by already prepared discussions.

A great difficulty with which this Association is faced is that its members are so widely scattered over so large an area. Nevertheless, the strength, progress and success of the Association as a whole depends entirely on the efforts of its individual member, and the fact that these are small in numbers calls for even greater exertion on the part of every individual. Members of smaller Municipalities can play their part along with those from larger undertakings, while the disadvantage of having to conduct so much of the activities through the medium of the post could be considerably alleviated by dealing promptly with matters as they arise.

The proposal that various standing committees should be established, each being allocated a definite sphere of activity, is good, but again the wide separation of members provides the stumbling block. For a committee to be effective it could not very well have less than three members, and the difficulty then is to find sufficient areas where towns are situated closely enough to permit members to meet conveniently and frequently. This is simple on the Witwatersrand, where the reef towns and Pretoria are all within easy striking distance of each other, and probably little difficulty would be experienced in the areas adjacent to Cape Town. However, if one active committee could be established in each Province, much good work could be accomplished.

The grouping of work as tentatively proposed in the address would give a good starting point for organisation if these committees are to be formed, but I would suggest that matters such as, say, the quality of commodities marketed, the conducting of examinations and so on, be left to bodies more suitably constituted and equipped for the purpose, in order to avoid unnesessary duplication of work.

The question of printing our own journal has again been raised. Unless a committee was established to handle such a journal, the responsibility of collecting material, editing and so forth would fall to our Secretary, who, under the present organisation could not be expected to cope with this additional work. As presently arranged, the South African Electrical Review is the official organ of this Association, but so far very little use seems to have been made of it. However, I agree that such an arrangement is not very satisfactory and would suggest that, as a try-out, a quarterly roneoed bulletin be published by the Association. As a suggestion, this bulletin should include reports from each of the committees referred to previously and from the Executive, together with sections dealing with items of interest, problems and answers, matters affecting Municipal undertakings, Municipal activities and general and technical articles. The success of such a venture will, of course, depend entirely on the members of this Association

whose contributions under any of the above sections, or any other, must be freely forthcoming, without the necessity for coercion on the part of those responsible for editing and producing the Bulletin.

It gives me great pleasure in proposing a vote of thanks to our President for his most instructive and illuminating address. (Applause.)

THE PRESIDENT: I thank you, Mr. Fraser. Gentlemen, the next item is the Annual Report, and I will ask the Secretary to read it.

Annual Report

To the President and Members of the Association.

Gentlemen.

I have the honour to submit the Annual Report together with the Balance Sheet for the financial year ended 31st August, 1945.

RHODESIAN CONVENTION.

Those members who were able to attend the 1945 Conference in Rhodesia will remember that it was a most successful and delightful affair. The papers read and the discussions that took place were of a very high standard. On the social side, both the Salisbury and Bulawayo Councils went out of their way to make the period spent in their respective cities most pleasant

It was most encouraging to see Council Members taking a much greater part in the discussions than they have done before and this bids well for the future.

1946 CONFERENCE.

It has been arranged to hold the next Convention in Bloemfontein and the date has now been definitely fixed from Tuesday the14th May to Friday the 17th.

FINANCIAL.

The balance sheet attached shows that the expenses during the financial year ended August 31st, 1945, exceeded the revenue by a considerable sum and that it was necessary to draw on the reserve funds to balance the accounts. The heavy expenditure was due to the cost of producing the 1944 Proceedings (this year the cost will be about the same), and the usual expenses of typing and reproducing reports, etc.

It was decided at the recent Conference that the subscriptions for Council Members should be raised by 100 per cent which extra revenue would cover the office and general expenses. It was also decided at the same time that the price of the Proceedings (other than those copies which are distributed free to all members) should be raised to 15/- per copy and that all firms who advertise in the journal should be asked to contribute £5 5s. 0d. instead of £3 3s. 0d. for their advertisement.

This appeal has been most gratifying for only four small towns have intimated they could not pay an increased amount. Although the accounts were sent out a few weeks ago practically all the other Councils have sent the increased amount, and Pretoria City Council made up their subscription to £21 0s. 0d. Also the firms who have supported us by advertising in the Proceedings in the past have agreed to raise their donation to £5 5s. 0d. These extra subscriptions and donations have placed the funds of the Association on a sound basis and so it will now be possible to advance in other directions and give Members a better service without financial embarrassment.

STATISTICS.

The Statistics of all Electricity Undertakings in the Union, Rhodesia and S.W. Africa for the year 1944-45 are again being compiled by the Secretary and in due course the returns will be forwarded to Cape Town to be incorporated by the Publishers in the Official South African Municipal Year Book.

SECRETARY AND TREASURER.

It is with regret that I asked the Council to relieve me of the Secretary and Treasureship duties of the Association, for having been connected with that body since its inauguration in 1915, one feels diffident in giving up the work. The Executive Council have, however, asked me to carry on the Secretarial duties in connection with the compilation of the Statistical Tables, which I am pleased to do.

I shall, therefore still be in communication with my many friends and hope to see them at future Conferences.

I hand over the main work to Mr. A. T. Taylor, the late chief clerk of the Johannesburg Electricity Department, at the end of the present month and wish him success in carrying on with the work.

I feel most grateful to the Council of seven years ago for electing me and for the Members as a whole for accepting me as an Honorary Life Member of the Association, an honour I assure you I deeply value.

PROCEEDINGS.

The President (Mr. J. W. Phillips) who kindly undertook the editing of the proceedings of the last Conference has notified the Secretary that the "matter" will be forwarded to Johannesburg within the next few days. The setting up of the type and printing will probably take the best part of four weeks and therefore it is likely the journal will be distributed early in the new year.

MEMBERS.

The following Members have been elected during the last year.

Honorary Members.

Rodwell, A. T.—Johannesburg.
Swingler, G. H.—Hermanus.

Council Members.

Brandfort,
Hercules,
Louis Trichardt,
Nelspruit,
Robertson.
Windhoek

Engineer Members.

Craig J. S., Electrical Engineer, Burghersdorp;

De Wet, D. P., Electrical Engineer, Springfontein;

Gericke, J. M., Electrical Engineer, Nelspruit;

Lyall, R. R., Electrical Engineer, Louis Trichardt;

Vergottini, P. L., Electrical Engineer, Robertson.

The membership is as follows:—

	1944	1945
Honorary Members	3	5
Council Members	66	71
Engineer Members	67	70
Associate Members	2	2
Associates	16	22
	154	170

I remain,

Mr. President and Gentlemen,

Yours faithfully,

L. L. HORRELL,

Secretary and Treasurer.

November 10th, 1945.

ASSOCIATION OF MUNICIPAL ELECTRICITY UNDERTAKINGS OF SOUTH AFRICA AND RHODESIA
REVENUE AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31st AUGUST, 1945.

	£ s. d.	£ s. d.	£ s. d.
AUDIT FEES		4 4 0	
PRINTING AND STATIONERY ...		24 14 6	
SECRETARY			
Salary	80 0 0		
Fees re statistical tables	10 0 0		
		90 0 0	
SECRETARIAL EXPENSES		72 11 5	
RENT		48 0 0	
BANK CHARGES		7 6 1	
INSURANCE—Presidential Badge		1 0 6	
DEPRECIATION—Fixtures and Fittings		1 4 0	
			249 0 6
I.M.E.A.			
Balance—1st September, 1944 ...		8 14 2	
Add Payments		3 19 3	
		12 13 5	
Less Subscriptions Paid		3 12 0	
			9 1 5
CONVENTION EXPENSES			
Reporting		87 9 0	
Honorariums		30 0 0	
Travelling Expenses, etc.		85 2 0	
Cost of Printing Proceedings ...		266 10 11	
		469 1 11	
Less Advertising	66 3 0		
Sales Proceedings	87 8 5		
		153 11 5	
			315 10 6
			£573 12 5

	£ s. d.	£ s. d.
SUBSCRIPTIONS	283 10 1	
STATISTICAL TABLES	20 0 0	
		303 10 1
INTEREST— UNITED BUILDING SOCIETY		
Fixed Deposit		3 0 0
INTEREST ACCRUED—UNION LOAN CERTIFICATES		13 15 9
BALANCE being excess of Expenditure over Revenue		253 6 7
		£573 12 5

BALANCE SHEET AS AT 31st AUGUST, 1945.

		£ s. d.		£ s. d.
SUBSCDIPTIONS IN ADVANCE ...		1 1 0	**INVESTMENTS—UNION LOAN CERTIFICATES**	
ACCUMULATED FUNDS		627 4 6	Cost	500 17 0
Balance—1st September, 1944 ...	880 11 1		**Add** Interest Accrued	26 10 6
Less Deficit for year	253 6 7			527 7 6
			PRESIDENTIAL BADGE	31 8 9
			SUBSCRIPTIONS UNPAID	17 17 0
			FIXTURES AND FITTINGS	
			Balance—1st September, 1944	12 4 0
			Less Depreciation	1 4 0
				11 0 0
			CASH	
			Standard Bank of S.A., Limited	40 12 3
		£628 5 6		£628 5 6

J. W. PHILLIPS, President.
L. L. HORRELL, Secretary.

We report that we have examined the above Balance Sheet with the Books and Vouchers of the Association for the year ended 31st August, 1945, 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 31st August, 1945, according to the best of our information the explanations given us and as shewn by the Books.

PRETORIA,
3rd November, 1945.

(Signed) WARREN & HOFMEYR,
Auditors.

ASSOCIATION OF MUNICIPAL ELECTRICITY UNDERTAKINGS.

Convention at Bloemfontein, 14th to 17th May, 1946.

Photo by: DANIE BRINK, Bloemfontein.

Back Row: A. Hadfield, G. C. Theron, Theo M. Mocke, P. C. Grandin, W. J. Gibbons, R. A. E. Denton; H. J. Gripper, F. Stevens, M. F. van Deventer, H. M. S. Muller, J. J. du Toit, E. du Preez, J. E. Mackenzie, W. M. C. Lindeman, A. M. Ford, F. W. Joubert, K. Glattaar, L. W. Walwyn, H. D. T. Harris, G. C. Delport, F. R. Smith.

2nd Row: J. M. Gericke, C. R. Hallé, G. D. Gelling, H. H. Jagger, P. H. Newcombe, F. A. P. Perrow, C. H. Adams, J. Iverach, H. R. Bevington, T. P. Ashley, G. E. H. Jones, D. W. Ritson, P. P. Jupp, D. A. Stumke, H. L. Groom, J. C. Downey, Nothard, W. M. Andrew, H. J. Relihan.

3rd Row: Reg. Smith, J. W. Lotz, W. Theron, A. V. Dyer, Leo Laden (Councillor), H. T. Turner, J. Monk, E. Boylan, K. C. Rowe, D. V. S. Dreyer, J. S. van Velden, P. Cowie, C. B. Foley, J. C. Rice, L. B. Sparks, A. A. Webb, B. Marchand, C. R. Burton.

4th Row: G. O'Connell (Mayor), J. C. Jacobs, W. G. H. Jarvis, G. V. Jackson, C. Poe Wit, P. A. Meintjies, A. R. Sibson, S. G. Redman, A. Foden, H. E. Gearing, J. M. Preller, D. A. Bradley, C. L. de Beer, A. E. Torraner, C. Mullins, E. H. Clutterbuck, C. Dekenan, C. H. Dwyer.

5th Row: J. S. Clinton, R. M. Thomas, C. E. Sax Young, H. Gregorowski, R. E. Hughes, E. L. Smith, Venter, J. C. Callie, K. M. Johnston B. H. J. Tubb, J. White, R. J. K. Baker, C. A. Law (Reporter), H. Solomon (Councillor), H. English, A. Golosmith, W. N. Powell.

6th Row: W. Hureld, Mrs. Muller, Mrs. J. C. Fraser, Morton Jaffray, G. R. E. Wright, H. A. Eastman, G. T. Muller, J. G. Benade (Mayor), J. W. Phillips, John Ohlson (Councillor), J. W. du Plessis (Councillor), C. Kinsman, J. C. Fraser, Mrs. H. A. Eastman, Mrs. D. A. Bradley, A. T. Taylor (Secretary).

THE PRESIDENT: Before discussing the Report, will somebody move that the Report be accepted as such?

MR. FRASER (Johannesburg): I move that the Report be accepted. Agreed.

THE PRESIDENT: I now declare the Report open for discussion. The Secretary will also give us a resume of the Balance Sheet, which I think can then be discussed with the Report.

THE SECRETARY: As the Balance Sheet was circulated to all Councillors and Engineer members some time ago, I do not propose to go into items in detail. The main position is this: at the end of the year ended 31st August, 1945, we had a deficit of £253 odd, and the position to-day is that after meeting all liabilities and allowing for forseen liabilities up to the present we will have a suppuls of round about £200. Which should cover our expenses up to the end of the financial year, 31st August, 1946.

THE PRESIDENT: The matter is open for discussion. If there is no discussion, I take it the meeting accepts the Report and the Balance Sheet for incorporation. Agreed.

VENUE OF NEXT CONVENTION.

THE PRESIDENT: The next item will be the selection of a venue for our next Convention. That follows rather differently from our programme, for rather obvious reasons, because it has been customary to elect as our Vice-President the Engineer whose Council invited us for the next Conference, so that this item is now taken rather in advance of the time given on the programme.

MR. KINSMAN (Durban): Gentlemen, I would like to extend an invitation to the Association to visit Durban for the 1947 Convention, and in support of that invitation, I would say that 1947 will mark the 50th anniversary of the Electricity Undertaking in Durban. The last occasion the Convention was held there was in 1937, so I now formally extend an invitation through you, Sir, to the Association to hold its next Convention in Durban. (Applause).

THE PRESIDENT: Are there any other proposals for a venue? Mr. Kinsman, on behalf of the Association, I must ask you to convey to your Council our very sincere thanks for the invitation, which we hope we will be able to make use of. I think the date is also relevant. Will Mr. Kinsman perhaps lead us in that respect?

MR. KINSMAN (Durban): Thank you, Mr. President. The date of the Convention is in the hands of this meeting, but, in order to give a lead, I would remind you that for several years now, it has been held approximately i n t he month of May, mainly, I think, because Councillor delegates have found September, or that portion of the year, was not entirely convenient, because of the impending municipal elections, which in the Union are held in October. So, in anticipation of the invitation being accepted, I discussed the matter with the Durban Publicity Officer, and he said, "For heaven's sake, don't make it June, July or August. The accommodation problem will not be easy even at other times of the year." Having regard to this factor, together with the fact that May is one of the most delightful months we have in Durban, I suggest to the Convention that it chooses May or thereabouts as the date of the Convention.

THE PRESIDENT: Is there any discussion on that point? Does the time suit everybody? It will be May of next year, then, in Durban.

CR. THOMAS (Durban): Mr. President, would you please allow me, as the Councillor member from Durban, to say that, having decided that Durban will be the place where the 21st Conference of the Association will be held, I am sure that the Council will be very gratified indeed at this decision having been made, and would wish me on their, behalf, to extend a very warm welcome to the Association for the Conference next year. As the City Engineer, Mr. Kinsman, has explained, it is the 50th Anniversary of the Municipal Electricity Undertaking, and I am quite sure that Council will feel that that occasion could not be marked in a more happy way than by being able to welcome the Conference to our City then. (Applause).

THE PRESIDENT: If there is no further discussion, we can proceed to the Election of Vice-President, and nominations are now invited for Vice-President.

MR. FRASER (Johannesburg): Mr. President, it gives me great pleasure to propose our friend Mr. Kinsman, City Electrical Engineer, Durban, as our Vice-President for the ensuing year. We are in a fortunate position to be able to nominate Mr. Kinsman to such a position and to have his guidance through the Association's 21st birthday year.

CR. BOYLAN (Johannesburg): Mr. President, I have much pleasure in seconding the nomination of Mr. Kinsman as Vice-President, but I am sorry he is going to make it the month of May. Had he made it the month of July, we would be able to back the winner. (Laughter).

MR. KINSMAN (Durban): We also had that in mind, but we wanted the members of the Association to go away from Durban with no regrets. (Laughter).

MR. PRESIDENT: Are there any further nominations? I take it there are no further nominations, and I declare Mr. Kinsman duly elected as Vice-President for the year 1946-47. (Applause).

Executive Council.

THE PRESIDENT: We can now proceed to the election of the other officers of the Executive. Two Past Presidents have to be elected, and I think we will have to call on Mr. Nicholas and Mr. Eastman as the only available Past Presidents. With your approval, then, they will remain on the Executive. Are you agreed? Agreed.

THE PRESIDENT: We now have to elect two Councillor Members and two alternates. In this connection I do not wish to sway the meeting in any way, but it has been customary to have as Councillor Members a member from the town or city where the Convention is being held, and one from where the Convention is going to be held, as a matter of smoothing out the work of the next Convention. Are there any nominations for Councillor Members? I should, perhaps, draw attention to this fact. We have, in the past, been inclined to elect individual Councillors, whereas it is actually the Councils that are nominated to the Executive, because it has been found that Councillors, in between the time of nomination and the next Convention, have either ceased to be Chairmen of their committees, or have ceased to be Councillors. It should be borne in mind, therefore, that the town is elected to the Executive, and it rests with the Council to nominate its own particular Councillor to represent it. Gentlemen, it has been suggested that, as a guide to the election of Councillor members, that we proceed to the election of the Engineer members. We require four Engineer members. Now, in that connection, I should say that, if you look on the page "Retiring Officers and Members of Other Committees," you will find that most of these bodies operate in Johannesburg or on the Reef, and one should, therefore, be guided by that, for the convenience of the operation of these bodies, in the selection of Engineer Members of the Executive. I think we will now call for nominations for the Engineer members, and then we will use that as a guide in selecting the Councillor members.

The following members were proposed and duly seconded to fill the four vacancies on the Executive Council.—

Mr. J. C. Fraser (Johannesburg).
Mr. D. J. Hugo (Pretoria).
Mr. P. A. Meintjies (Rustenburg).
Mr. D. A. Bradley (Port Elizabeth).
Mr. J. C. Downey (Springs).
Mr. A. Foden (East London).

MR. JONES (Mafeking): I should like to propose Mr. Wright, of Benoni.

MR. WRIGHT (Benoni): I thank Mr. Jones for his kind thought in nominating me, but I think it is only right and fair that I should offer an explanation in turning down the acceptance of tha nomination. This is probably my last appearance as a municipal electrical engineer. I have intimated to the members of the Executive Council, and a few intimate friends, that I intend going into business on my own account, and, whilst I still want to retain my membership as an Associate, it would

not be fair for me to accept a position on the Council for a matter of two or three months. I hope to be able to continue as an Associate Member, and perhaps it will be easier for me to attend conferences in future, because I won't have to get permission of any Committee, except my own Standing Committee—that is, myself. My expenses won't have to be passed by any Finance Committee, except by myself, and what I intend taking up I have been assured by everybody I have discussed the matter with will be far more remunerative than being the Electrical Engineer of the Town Council of Benoni. I am not given to saying a great deal, but I might perhaps tell you what I am going to take up, so you won't get any false impressions as to what I am going to do. The business I am going to take up does not lend itself to advertising; in fact it is a rule that no advertising should be done. But as I am not yet a member of the Stock Exchange, which I hope to be in a month's time, I can say now that I am going to take up stockbroking. Until then, I can do some advertising, and I should like to let you know that, provided the cash is forthcoming, I shall be only too delighted to accommodate you as far as any business is concerned. (Laughter).

THE PRESIDENT: Gentlemen, I think the Convention will feel that we are losing a strong man in Mr. Wright. He has served on many committees with distinction. We are very sorry to lose Mr. Wright. I don't know how he can possibly think that stockbroking would be more interesting than electrical engineering; I should say "remunerative," he did not say "interesting." We can only say we hope he will visit us now and again. (Hear, hear).

THE PRESIDENT: I think we can close nominations at this stage. As there are six nominations a ballot is necessary. Will somebody propose two scrutineers?

MR. BRADLEY (Port Elizabeth): I propose Mr. Powell and Mr. Jagger. Agreed.

THE PRESIDENT: We cannot complete the election of Councillor members, but, as I pointed out before, there are two Councillor members on the Executive and two alternates. Now, it has been customary, and it is rather necessary for the proper functioning of the machinery of the next Convention, that at least the town where the Convention is being held, and the town we are going to, have the other Councillor members. If you agree with me on that point, we can select two of our Councillor members and wait for the alternates until we get the ballot. We can then announce, with the approval of the meeting, that Bloemfontein and Durban are the two towns represented on the Executive. Agreed.

Apparently the Engineer members will not have an undue bearing on the selection of alternates for Councillor members and I can therefore now call for nominations for alternates for Councillor members on the Executive.

The following towns were nominated and seconded to fill the two vacancies as alternates on the Executive Council:—

East London.
Pretoria.
Johannesburg.
Cape Town.

Scrutineers: Mr. Eatsman and Mr. Kinsman.

THE PRESIDENT: I have much pleasure in announcing that the following Engineers have been elected members of the Executive Council: Mr. Fraser, Johannesburg; Mr. Hugo, Pretoria; Mr. Downey, Springs; and Mr. Bradley, Port Elizabeth. With that knowledge, if it helps you, you can now proceed to consider the matter of the alternate Councillor members—East London, Pretoria, Johannesburg and Cape Town.

We have just received a letter from Mr. Nicholas of Umtata (Past President). I think we can usefully occupy the time by asking the Secretary to read it.

THE SECRETARY: It reads: "I regret I will not be present at the 1946 Convention being held at Bloemfontein from the 14th May, 1946. We have come through the war years successfully, and this is the

first Convention to be held since the end of the war. But I have not had enough time to recover from the war, so I find I am unable to attend. I wish all present a happy reunion, much useful work done, and a successful function. I will be missing you all. Kind regards, I. J. Nicholas."

MR. PRESIDENT: Whilst on this subject may I mention that in reply to invitations sent to attend the Conference, I have received a number of apologies and good wishes for the success of the Conference which will be recorded in the proceedings, as these are not readily available at the moment.

Communicated:—

A. Rodwell, Past President.
Department of Commerce and Industries, Pretoria.
Provincial Administration of the Cape of Good Hope.
Secretary, Fuel Research Institute of South Africa, Pretoria.
Hon. Secretary, Fuel Sectional Committee, Johannesburg.
Controller of Building Materials, Johannesburg.
Dr. Schonland, President, South African Council for Scientific and Industrial Research, Pretoria.
Public Works Department, Pretoria.
Secretary, Provincial Administration, Natal.
Secretary, Provincial Administration, Transvaal.
Chairman, S.A. Standards Institution.
General Manager, Victoria Falls and Transvaal Power Company, Limited.
Secretary, Industrial Development Corporation of South Africa.
President, South African Institution of Engineers.
Municipality of Kokstad.
Municipality of Fort Beaufort.
Municipality of Middelburg, Transvaal.
Municipality of Nelspruit.
Municipality of Nigel.
Municipality of Ndola.
Municipality of Port Alfred.
Borough of Port Shepstone.
Town Electrical Engineer, Windhoek.
J. B. Home-Rigg, Manager, Allenwest, (S.A.), Ltd.
F. J. Head, Manager, Henley's (S.A.), Telegraph Works Co., Ltd.
African Cables, Limited.

The Convention adjourned for lunch.

On resuming.

THE PRESIDENT: I have much pleasure in declaring Bloemfontein and Durban as representatives of their respective Councils on the Executive Council, with Johannesburg and Cape Town as alternates. (Applause). We have completed the Executive, and can now proceed with the further business.

SUB-COMMITTEES: We have the S.A. Standards Institution, the World Power Conference, the Electrical Wireman's Registration Board, the Safety Precautions Committee, Overhead Lines Regulations, Electrical Conductors' Advisory Committee, and Electrical Generating and Distribution Advisory Committee.

The programme lists the members of the Association who are at present representing you on those Committees. Will somebody propose a member for the S.A. Standards Institution?

MR. WRIGHT: I would like to propose Mr. Hugo, Pretoria, who has been alternate to me for the past two years as the Association's representative on the S.A. Standards Institution, with Mr. Downey as alternate. Agreed.

THE PRESIDENT: Now, the World Power Conference.

MR. BRADLEY: I have pleasure in proposing Mr. Eatsman. Agreed.

THE PRESIDENT: The Electrical Wiremen's Registration Board. Mr. Fraser is the outgoing member.

MR. KINSMAN: I propose Mr. Fraser. Agreed.

THE PRESIDENT: Safety Precautions. Mr. Fraser is again the outgoing member.

MR. WRIGHT: Mr. Fraser only has been proposed. I don't know if it is a

mistake, but there have always been two on that Committee—Mr. Fraser and myself. I think it would be possible to continue with two. I would like to propose Mr. Downey.

MR. FRASER: I suggest that Mr. Downey be appointed, and I will act as alternate. Agreed.

THE PRESIDENT: Overhead Lines Regulations. Mr. Fraser and myself are the outgoing members. It was proposed that the outgoing members be re-elected. Agreed.

THE PRESIDENT: Electrical Conductors' Advisory Committee.

MR. SMITH (Cable Manufacturer's Association): May I ask whether it is right that the Electrical Conductors' Advisory Committee is still in existence. I have something to do with cables, and my opinion is that it is not in existence, and is not necessary now.

THE PRESIDENT: No report has been submitted from this Committee. I may say I think it rests with the meeting whether they continue their sub-committee or not.

MR. FRASER: I agree with Mr. Smith. It was a war measure, and I do not think the committee exists any longer.

MR. BRADLEY: I suggest the election of members takes place, and when the Secretary confirms that this Committee is no longer in existence, that it be wiped off the list of Committees.

THE PRESIDENT: Is that agreed? Agreed.

MR. BRADLEY: I nominate the same two gentlemen—Mr. Kinsman and Mr. Leishman. Agreed.

THE PRESIDENT: Now, the Electrical Generating and Distribution Advisory Committee.

MR. BRADLEY: I suggest the same remarks apply in this case.

THE PRESIDENT: Do you agree to that, that we nominate the same members pending the decision of the Committee. Agreed.

In connection with the above Sub-Committees the following letter has been received from the Controller of Building Materials:—

Dept. of Commerce and Industries,
Controller of Building Material,
Empire Building,
Cr. Market and Kruis Streets,
Johannesburg,
5th June, 1946.

The Secretary,
The Association of Municipal Electricity,
Undertakings of S.A. Rhodesia,
P.O. Box 7462,
Johannesburg.

Sir,

(a) Electricity Conductors,
Advisory Committee.
(b) Generation and Distribution,
Advisory Committee.

In acknowledgment of your letter dated 27th May, 1946, I beg to inform you that the above described Committees have now ceased to function.

Yours faithfully,

Controller of Building Materials.

REPORTS.

THE PRESIDENT: We now proceed with the Reports of the Sub-Committees. The first is the Standards Sub-Committee. Mr. Eastman has the floor.

MR. EASTMAN (Cape Town): It will be remembered that at the Salisbury Convention last year, the conference had put before it draft reports by regional sub-committees appointed previously at the Johannesburg Convention, on a wide variety of matters upon which it was thought some degree of standardisation might be decided. The Conference received those reports at Salisbury, but found some difficulty in understanding fully what their general import individually was, because some of them dealt with certain subjects from a rather different angle from others. I was therefore asked if I would co-ordinate those reports and submit them in a single document to the members of the Convention at this meeting.

SUMMARY OF REGIONAL REPORTS ON CO-ORDINATION AND STANDARDISATION OF MATTERS PERTAINING TO THE MANAGEMENT AND OPERATION OF MUNICIPAL ELECTRICITY SUPPLY UNDERTAKINGS.

At the Convention of the Association held in April, 1944, the following resolution was adopted:—

"It is resolved that the Executive Council of the Association appoints regional sub-committees of the A.M.E.U for Natal, the Cape Province, the Orange Free State, Transvaal and Rhodesia for the purpose of reporting on the matters arising from 1.20 to 1.27 of the Final Draft Agenda on a regional basis and that these reports be co-ordinated and acted upon by the A.M.E.U. Executive Council for the purpose of circulating a report to members of the Association in advance of the next Convention at which these matters will be placed on the agenda for discussion and action."

Effect was given to this resolution by questionnaires being submitted to Electricity Undertakings in each centre, the questionnaire being framed in such a way as to elicit expressions of opinion and suggestions in regard to the matters referred to in the resolution. The replies to these questionnaires in each case were then summarised in the form of a report and the reports of the various centres who had prepared them, namely, the Western and Eastern Cape Province, the Transvaal, the Orange Free State and Natal are now further summarised hereunder.

1.20—POOLING AND CO-ORDINATION OF EXPERIENCE.

It is generally felt that greater use should be made of the official organ of the Association, namely, the "South African Engineer and Electrical Review," to which journal it is suggested regular contributions should be submitted by permanent sub-committees appointed in designated areas by the Executive Council. These contributions should cover matters of particular interest to Municipal Electricity Undertakings such as, for example, administrative, financial, technical and legal information, and data relating to the organisation and running of those undertakings

Attention is drawn to the fact that the Incorporated Municipal Electrical Association of Great Britain publishes its own monthly journal — copies of which are obtained through the Secretary of the A.M.E.U. Its contents may be taken as an example of the kind of information that proves of interest and value to those in control of electricity undertakings comprising, as they do, notes on current municipal electrical affairs and activities, on operation and administrative experience, legislative measures, and in general a wide variety of matters which are of interest to the members of the Association in the conduct of electricity undertakings. Any procedure for publishing such information would necessitate the various undertakings sending properly edited contributions at regular intervals to the sub-committee referred to above, who would arrange to forward them to the Secretary.

It is also suggested that greater advantage be taken of the "Official Municipal Year Book," by including more information on administrative matters, such as policy in regard to payment in relief of rates, meter reading, collection of revenue, storekeeping, etc., and by including more detailed information regarding plant capacities and plant performance data, etc.

In addition to the above proposed facilities for the interchange of information and ideas in writing, a suggestion is made that one day of the Annual Convention be set aside for a general exchange of views or informal group discussions on subjects of common interest to members, and also that facilities be established for senior officials of Electricity Undertakings in the various regions, to meet periodically during the year and discuss developments or experiences taking place from time to time.

1.21—STANDARDISATION OF PLANT, EQUIPMENT AND SPARES.

It is considered that standardisation of generating plant and transformers is desirable only insofar as the capacity of

the units, voltage of generation and steam pressure are concerned — standardisation of the design of this type of plant is not favoured.

Attempts should be made to standardise requirements in order to reduce the range of items to be designed and manufactured, which in turn should tend to lower the prices or costs of other ancillary materials and equipment such, for example, as switchgear and metering equipment, which must necessarily be used before any scheme or installation is available for full use.

By standardisation as proposed above, it is not intended to suggest a slavish following of rigidly defined types of plant, since cases do arise where a particular job has to be specially "tailored." What is suggested is that the Association should support the establishing of schedules of recommended standards for equipment and spares on distribution network.

In support of this suggestion attention is drawn to the undermentioned important factors affecting standardisation in rapidly expanding electricity supply systems, viz:

(i) "Primary" and "Secondary" standard in High Tension voltages should be considered with a view to ensuring that networks which are sufficiently close geographically as to lead to ultimate interconnection even so far as 20/30 years ahead), are developed on parallel guiding principles.

(ii) Increasing fault currents resulting from the rapid growth of generator capacity on most systems are causing circuit breaks, particularly individual consumers Extra High Tension switchgear, to become obsolete with unusual rapidity due to their rupturing capacity becoming inadequate.

(iii) The standardisation of certain classes of plant should make for the securing of these at lower prices and of bringing about a reduction in the number of spare parts.

(iv) Standardisation should enable undertakings in cases of emergency to obtain spares at short notice from other undertakings, so avoiding delays in their manufacture and delivery possibly from distant places

In the interests of reliability, performance, safety in use and in overall economy, all plant, equipment and materials used in connection with the generation and distribution of electricity should conform to recognised standards of quality and design, such as those provided by the Standard Specifications issued by the British Standards Institution — many of which have already been adopted as South African Standards.

Another suggestion is that the proposed South African Standards Bureau should in due course interest itself in the matter as the natural body to prompt legislation making it obligatory for all plant and materials of the kind referred to above which are sold in the Union, to conform to the relevant British or South African Standards. With the object of preventing the sale and purchase of equipment of inferior quality to the prescribed minimum standard, legislation might be introduced to cover all appliances and wiring material used in electrical installations.

With regard to domestic equipment and appliances, such as plugs and sockets, fuses, fuseholders, switches, lampholders, hotplates, etc., it is generally agreed that standardisation in respect of physical dimensions as well as quality and design would be advantageous, both in the interests of the consumer and in checking the indiscriminate sale of inferior or unsuitable appliances.

In the case of hotplates and other heating appliances, it is thought that benefit would be obtained by standardising the ratings of elements on a few commonly used loads in the same way as has been done, for example, in standardising the incandescent lamp ratings at 40-watts, 60-watts, etc., so eliminating numerous intermediate loadings which do not serve any useful purpose.

1.22—STANDARDISATION OF VOLTAGES.

The only apparent advantage derivable

from the proposal to adopt the 400/230-volt system as a standard is that this has been standardised in Great Britain, and 230-volts is a standard voltage in America — from both of which countries most of the electrical appliances that will be imported in the immediate future may be expected to come. Accordingly all such imported appliances would be of a design which has been standardised for use in their country of origin. For that reason they may be expected to give more satisfactory service and prove more economical in use than articles made specially to suit a different voltage.

Most undertakings at present give supply at 380/220 3-phase 4-wire,, and it is considered that given a reasonable period of time, the necessary adjustments in connection with the changeover could be effected.

It is considered that if the proposed new standard of 400/230-volts is adopted it should, in the first instance, be applied only to new undertakings. Established undertakings operating at any other non-standard voltage should either be given Government assistance to effect the changeover within a fixed period, or be permitted to make the change only when circumstances dictate the necessity or permit the policy being carried out. It is suggested from another source that the older cities or larger municipalities should not be required to undertake the changeover in any given period, but that it should be done when opportunity and circumstances permit.

Information is divided on the question of standardising the 3-phase 4-wire system for house service connections. Some, including the larger undertakings, have standardised this arrangement for all domestic supplies where the total connected load exceeds 3,500-watt and, even if the load is less than 3,500-watts, in premises which consist of four or more living rooms. These Undertakings prefer this arrangement to that of the 2-phase or single-phase supplies, on the grounds that a better balance is obtainable between phases on the reticulation network, and prefer it also from the standpoint of greater reliability of supply to consumers, in that the cutting out of one or even two phases under fault conditions will still enable the consumer to receive at least a partial supply on the remaining two or one phases.

Some undertakings adopt the single-phase system for supplies to all consumers whose loading does not exceed 30-amps. per phase, but the majority of undertakings give supply on the 3-phase 4-wire system to all premises where such loading would be exceeded.

1.23—ELECTRICITY SUPPLY REGULATIONS.

It is considered desirable that as high a degree of uniformity in electricity supply regulations as possible should exist. At present it is impracticable to obtain absolute uniformity throughout the Union because of differences in Provincial legislation, but uniformity should at least be aimed at in respect of undertakings in each Province taken separately .

It is suggested that though local authorities may insist upon their own policy with regard to supply regulations as apart from regulations that cover the wiring of premises, a set of model Conditions of Supply could be framed under the auspices of the A.M.E.U. to be known as the A.M.E.U. Model Conditions of Electricity Supply in South Africa to be used as a guide for all undertakings.

Viewing the recently promulgated measures governing electricity supply on a national and not a provincial basis, e.g. the Standard Wiring Regulations, the Factories Act (1941), the Electrical Wiremen's and Contractor's Act (1939), the time seems to have arrived for pressing for a repeal of those sections of Provincial Ordinances which give rise to difficulties in applying the national measures.

As an example of what can be done in the way of bringing about uniformity or regulations, attention is drawn to the recent standardisation of regulations for the wiring of premises. It will be remembered that draft standard **supply** regulations were prepared by our Association at the same time as the draft wiring regulations and were submitted for consideration at the A.M.E.U. conference in Salisbury

in 1934. They were separated from the wiring regulations later only because it was felt that more delay might ensue in obtaining general approval to them than to the latter, and, as it happened, the method finally adopted in the publication of the standard **wiring** regulations was not readily applicable to standard **supply** regulations.

The draft standard **supply** regulations, however, as submitted to our Conference in 1934 with the draft standard **wiring** regulations, were based on the model supply regulations as first drafted by our Association in 1920 with amendments bringing them up-to-date in accordance with modern requirements, and they have in fact been adopted with very few amendments by at least one large Municipal Electricity Undertaking in the Cape Province.

1.24—FORMS OF ACCOUNTS AND FINANCIAL POLICY.

The standard forms of accounts which were drafted by our Association in 1922 and with minor amendments were later approved by the four Provinces of the Union for adoption by all Municipal Electrical undertakings continue to be used by the majority of undertakings and proves satisfactory. The accounts of the remaining undertakings are, however, based on the standard forms.

Although the standard forms of accounts provide for the keeping of accounts for:—

(i) renewals and obsolescence fund; and
(ii) reserve and betterment fund.

and the Chief Clerk in Charge of Local Government Audit, Cape Provincial Audit Office, when they were approved for general adoption, fully described the purposes of those funds and the need for establishing and maintaining them,* neither the Cape Provincial Administration nor any other governing body has laid down rules either for the compulsion or even the guidance of municipalities on the question as to what amounts should be set aside to those funds annually and at what minimum and maximum figures they should be maintained. As a result of this omission the amounts of the contributions to such funds have in many instances been determined mainly by the requirements of municipalities in meeting their annual commitments on general rating account.

In a few instances it appears to be a recognised practice to spend from revenue a limited amount annually on works of a capital nature, but apart from this and the adoption by others of the principle of allocating annually to "a renewals and absolescene fund" a specified sum based on the total capital expenditure, the majority have not consistently maintained any fixed policy in regard to these and other similar financial safeguards against over-capitalising their undertakings.

In this connection attention is drawn to the fact that recognition of the need for adequate financial reserves being established is given in section 9 of the Union of South Africa Electricity Act (Act No. 42 of 1922) wherein is specified the method in which the Electricity Supply Commission is required to deal with the matter.

It is also considered to be an important principle that the redemption periods of loans raised for the carrying out of works should correspond as closely as may be estimated to the useful lives of the assets to be purchased. No legislation exists in the Province governing this matter, but it is felt that the attention of the governing authorities might usefully be drawn to the importance of this principle in the case particularly of the various types of asset comprising the installation of new or the extension of existing electrical plant and equipment. Particulars of the periods for which undertakings in Great Britain are permitted by the Electricity Commissioners to raise loans for individual types of plant and equipment have already been presented to our Association, and it is suggested that these be submitted to the authorities concerned for their information and guidance when giving consideration to requests for the raising of loans for electricity works.

*Vide "Standard Electricity Accounts," by H. B. George. Published by Juta & Co., Ltd.—January, 1932.

1.25.—STANDARDISATION OF TARIFFS AND CHARGES FOR SUPPLIES OF ELECTRICITY.

A wide diversity of opinion exists on the question of standardisation of forms of tariffs for the supply of electricity. In general it is maintained that there is no need for such standardisation and that each undertaking should decide for itself the form or forms of tariff according to the circumstances prevailing in its area of supply. Doubtless the various methods of dealing with the question have been found to give satisfaction in the particular undertakings where they have been inaugurated, and it would appear that no degree of uniformity in these matters can be adopted until each undertaking has had an opportunity of closely studying the methods in use elsewhere and of deciding whether or not a change in its own method could be made with advantage. The present time—which is at the threshold of a new era of considerable development—is stated by one undertaking to be favourable for an attempt to be made to lay down a set of properly reasoned basic principles whereon to base a limited range of equitable traiffs if the applications of electricity are to enjoy free development on a national scale not inordinately penalising one class of consumer and favouring another.

There is considerable difference of opinion regarding the form of the two-part domestic tariff. It is generally agreed that this type of tariff must be designed to provide the necessary monthly income by the application of a fixed (service) charge based on the number of rooms, land and building valuation or kVA demand, etc., but opinion appears to be that the form of the tariff should be decided in accordance with local circumstances.

It is, however, generally agreed that for large supplies a measured "demand charge plus a unit charge is satisfactory, and that for smaller supplies a sliding scale or "block interval" rate is appropriate to business and small power consumers, and also that "off-peak" or "restricted hour" rates at a low rate conforming closely to the cost of the generation of electricity during off-peak periods, should be instituted in electricity undertakings.

General agreement is expressed also with the view that for supplies to consumers in areas outside the boundaries of the municipality, the tariff of charges should be those in force to consumers within the municipality with the addition of a surcharge calculated as a percentage on the tariff rate.

In the Cape Province it has been ruled that a tariff of charges which for the purpose of inducing consumers to pay their accounts promptly, provides for an increase in the charge to be made if the account is not paid within a specified period, is out of order. Accordingly, the prevailing practice is to quote "gross" and "nett" charges for supply—the "nett" figures being applicable only if the account is discharged within due date. The difference between the "gross" and the "nett" charges is in general of the order of 10%.

A considerable variation exists in the relations between the undertakings and prospective consumers on the question of making service connections. Some undertakings call upon the consumers to pay the whole cost of the service connections at actual cost, others provide the first 20 or 25 yards free of charge and the remainder at cost plus a percentage ranging from 5% to 25%, or as an alternative to paying cash for the cost of the additional work, the consumer is required to guarantee an annual revenue for a specified period by consumption of electricity equal to 20% of the additional cost.

1.26.—REGULATION OF PROFITS AND RATE RELIEF.

The greatest importance is placed upon the need for municipalities to decide upon the amount to be contributed to the relief of rates only after all of the financial safeguards mentioned under item 1.24 above have been adequately provided for.

The present day policy of many municipalities is to decide broadly upon the amount to be so contributed and to allocate the remainder, if there be any remainder, to reserve, renewals, betterment or other similar funds as may exist. It is not unusual to find that in some instances adequate provision is not made for safe-

guarding the financial stability of the undertaking or even to pay direct from revenue for works of a capital nature, but instead to allocate the whole gross surplus to the relief of rates after the deduction from the total revenue only of interest and redempion of loans.

In this connection attention is drawn to the fact that the Union of South African Electricity Act has embodied in it the principle that supplies of electricity shall be made available to consumers at the lowest possible price and that the price charged should exceed the cost of rendering that service by a small amount, if at all. The Act, however, does not itself control the conduct of municipally-owned electricity undertakings in this matter, though it would appear that it may do so by regulations promulgated under section 55 thereof whereunder the Governor-General may make regulations, inter alia,

"prescribing the duties and obligations of authorised undertakings and generally for the better carrying out of the objects and purposes of this Act . . . "

Particulars of the practice in vogue in Great Britain as prescribed under the Electricity (Supply) Act, 1926, are contained in the Proceedings of the 1937 Convention of our Association as follows:—

"The undertakings shall apply the nett surplus remaining in any year and the annual proceeds of the reserve funds when amounting to the prescribed limit:—

(a) in reduction of the charges for electricity; or

(b) in reduction of the capital monies borrowed for electricity puroposes; or

(c) with the consent of the Electricity Commissioners in payment of expenses chargeable to capital; or

(d) in aid of the local rates;

Provided that—

(i) the amount which may be applied in aid of the local rate in any year shall not exceed 1½% of the outstanding debt of the undertakings; and

(ii) after the 31st day of March, 1930, no sum shall be paid in aid of the local rates unless the reserve fund amounts to more than 1/20th of the aggregate capital expenditure on the undertaking."

These provisions were incorporated in that Act to check the financial expedients in operation when the Act was passed similar to those of some municipalities in South Africa at the present time.

In this connection attention is drawn also to a clause in a draft Ordinance relating to this subject published in the Cape Provincial Gazette on the 19th May, 1935, and set out in the Proceedings of the 1937 Convention of our Association reading:—

"(1) The Council of a Municipality operat- an electricity undertaking may apply a portion of the nett surplus revenue thereof in any financial year as a contribution in aid of the general landlord's rates.

"(2) No such contribution in aid of terms of sub-section (1) shall be made unless—

"(a) the Renewals and Obsolescence and the Reserve and Betterment Fund of the undertaking together amount to more than 1/20th of the total capital expenditure of the undertaking as appearing in the balance sheet thereof as at the close of the preceding calendar year; and

"(b) it is supported by a resolution of the Council passed by a majority of the total number of members of the whole Council.

"(3) The amount of any contribution in aid made in terms of this section shall be clearly and prominently set forth in the annual accounts of the undertaking laid before the Council, and in the certified statements or abstract thereof

available for inspection by ratepayers and other interested persons in terms of any law.

"(d) Where in the opinion of the Administrator the amount applied by any Council in terms of this section in any year is unwarranted or excessive, such Council shall be advised thereof, and the Administrator may direct that for a specified period thereafter no further contribution in aid shall be made without his prior approval in writing. Such approval may be given conditionally or unconditionally, and shall be in addition to the requirements of sub-sections (2) and (3)."

Consideration of this section of the Ordinance, however, was postponed upon representations made on behalf of the City of Cape Town.

Although, as stated above, provisions appear to exist in the Electricity Act for the promulgation by the Governor-General of regulations of this nature, it is recognised that this may be held to be a financial matter akin to regulations relating to the establishment and maintenance of renewals, betterment, etc., funds and that, therefore, it is a matter for consultation with each Provincial Administration. It is felt, however, that the matter is so important that in whatever way it should be dealt with the procedure to be adopted should be that it will bring about the enforcement of regulations on these questions as soon as possible

In this connection it is recalled that at the 1944 Convention it was resolved to ask the Government to establish a "Joint National Electric Power Board" whose functions would include the making of recommendations for the introduction of legislation on matters of this kind under the Electricity Act. It is suggested that the Government be pressed to inaugurate this body soon and alternatively if undue delay ensues in it doing so the matter be submitted to the Provincial Administration in the form of a resolution of this Association.

1.27.—GENERAL.

Attention is drawn to the desirability of bringing about uniformity in the requirements of the various Government bodies to whom statistical returns have to be rendered relating to the organisation or activities of electricity undertakings. It is also thought to be desirable, for the guidance of these undertakings, that clear-cut definitions be given of the various headings against which such information must be given, so that there can be no misunderstanding as to what should or should not be supplied.

It is generally felt that Municipal Electrical Engineers should be prepared to present a united front through the A.M.E.U. and work to achieve goals which are to the general and mutual benefit. To do this the Association must claim equal representation on some form of co-operative board such as the proposed National Electric Power Board representing all interests on the Supply Industry. Through such a board it will be practicable to undertake with good effect the foregoing items of co-ordination and standardisation which it is considered should lead to healthy electrical development in the Union and Rhodesia.

There is, therefore, little for me to do, Mr. President and gentlemen, except perhaps to draw attention to certain features of the summary. Under the heading of "Pooling and Co-ordination of Experience," the general concensus of opinion, you will remember, was that more use should be made of the technical press facilities which we have, so as to disseminate information among members, the press concerned being, of course, our official organ, the S.A. Electrical Review. But, besides that, there seemed to be a general desire, that at the Convention one day should be set aside for a general exchange of views or informal group discussions on subjects of a common interest to members, and, perhaps what is still more important, also that facilities be established for senior officials of electricity undertakings in the various regions, to meet periodically during the year, and discuss experiences and developments which are taking place from time to time. Under the heading of "Stand-

ardisation of Plant, Equipment and Spares," it is recorded that, in the interests of reliability in performance and safety in use and in overall economy, all plant and equipment and all materials used in the generation and distribution of electricity should conform to recognised standards of quality and design, such as those provided by the standards specifications already issued by the British Standards Institution, many of which, of course, have been adopted by the S.A. Standards Institution. It was also suggested, and there was remarkable unanimity of opinion on the matter, that the proposed S.A. Standards Bureau should in due course interest itself in the matter of standardisation of plant and equipment as the natural body to promote legislation making it obligatory for all electrical plant and materials sold in the Union, to conform to the relevant British or South African standards; and with the object of preventing the sale of equipment of inferior quality to the prescribed standard, it was suggested that legislation might be introduced to cover also all appliances and wiring used in electrical installations.

In regard to standardisation of voltages, it will be recalled that, in 1944, we learned that the Electricity Control Board had been approached by the South African Standards Institution to introduce a standard voltage in this country on the alternating current system of 400/230 volts, which, of course, departs from the present standard laid down by law under the Electricity Act of 380/220 volts three phase; and in the course of the enquiries which we made leading to the submission of these reports—enquiries made of all undertakings—it was found that most of us thought that, if there is any real desire to change to the 400/230 volt system of distribution, it cannot do a great amount of harm. It was in fact thought that there might be some advantage by our adopting it for single phase connected apparatus, 230 volt appliances, because in Great Britain and America, from which most of our appliances are imported, they had already standardised 230 volts, and would, therefore, produce more robust articles likely to give greater reliability and service for a standard they have worked to for many years, than the pressure of 220 volts single phase which is standardised in this country. If there was any advantage, it would be due to that.

But in England recently, it has been decided to standardise 240 volts single phase, 420 volts 3 phase. Now, I think the argument still holds good that 230 is, to all intents and purposes a standard. These companies have been making articles in America and England to 230 volts, and I see no reason why we should contemplate 240 volts, because it has now been adopted in some other place.

My object in drawing attention particularly to this point is that our representative on the S.A. Standards Institution may know our views. I think we should have the Convention's view on the matter for his guidance if the matter should be raised by that body.

Questions were also raised relating to the "Standardisation of Electricity Supply Regulations" and we felt it was desirable to have them standardised too. Every municipality has its own particular problems and difficulties, so one cannot expect absolute uniformity.

On the question of forms of keeping accounts of electricity undertakings, and financial policy, which involves also regulation of profits and rate relief, I think the Convention might be interested to know that these subjects recently formed the point of an enquiry in Cape Town early this year—an inquiry made by the Cape Provincial Administration into some of the administrative workings of the City Council. The Provincial Council Enquiry Commission went to a great deal of trouble to obtain information and took evidence on aspects of this subject. The Commission consisted of three Commissioners, but did not complete its work on account of the serious illness of one of them. The remaining two, however, wrote a note of the work done by it up to that time, and recommended that the Provincial Council should take steps to regulate contributions to the relief of rates by legislation governing that particular subject and laying down the maximum amounts which could be so contributed to the relief of rates. They also recommended that all undertakings should adopt the standard forms of accounts

already recommended by the Provincial Administrations in this country, but which have not yet been adopted in toto by all municipalities.

That, Mr. President, is a brief summary of these reports.

THE PRESIDENT: The very clear way you have put before us this resumé will help us to cover it quickly. But before we have a general discussion, I would like to point out something. I mentioned this morning about information through a journal. I did not infer this morning that it should necessarily be a journal divorced from the S.A. Electrical Review. The Review could be used for the same purpose, I want to make that clear. The report of the sub-committee is now open for discussion.

MR. GRIPPER (Worcester): Mr. President, in connection with the summarised report we have before us, I should like to refer first to the final item on the last page glossed over by Mr. Eastman, regarding the proposed National Electric Power Board. I think we discussed this at great length two years ago. Many members will remember the discussion at Johannesburg, and I, for one, would like to know if the Executive can give the meeting any further information on the steps taken in that direction, because I feel that if the Electricity Control Board is not going to take over many of these functions which we discussed two years back and again last year, then this National Joint Board is needed. For one thing, we, in many parts of the country are faced to-day with the prospect of rapid expansion in our rural undertakings, and we find some difficulty when faced with criticisms from our consumers in knowing where the court of appeal is. In the Worcester area, our rural consumers were told their scheme was not a financial success, and for it to be continued they must meet certain guarantees which were going to be called for. Well, to test the validity of that ruling on the part of the local authority, these consumers appealed to the Electricity Supply Commission for their proposals and an alternative scheme. It so happened that it worked out just the same, and they were going to be no better off on the whole. Some were going to suffer by going to the E.S.C. and some suffered by staying with us. Those who were going to suffer by staying with us were those we least wanted—the troublesome ones, or those who felt they should not be required to pay for the original connection. I feel there is a need for some authorised body to enter into such disputes and ensure that the outcome in the long run is beneficial to the consumer. This, I understand, should be the function of the Electricity Control Board.

While I am on this subject, Mr. President, I do not know whether it is in place, but I feel that a sub-committee of this Association should be appointed to deal with problems arising out of rural schemes and rural undertakings.

My next point is on the question of the journal you have mentioned. We understand that the S.A. Electrical Review is the official journal of this body and time and again I have looked in vain for those little contributions suggested two years ago. Now, at last in the latest issue of this journal we find a paragraph dealing with our own conference. It starts off by giving our title as the "A.M.E." Annual Conference, and then, after the preamble asks which of three games we want to play!! I submit that after the resolutions that have been passed, this year must see some change in that. We must have something we can turn to—it may be in the form of roneod sheets—which will give us useful information on what is going on round about us.

MR. MULLINS (Electricity Control Board): I think, Mr. President, that Mr. Gripper has got rather a wrong view. The Electricity Supply Commission is in a similar position to any municipality which has an area of supply. The object of a few of the municipalities is that which has taken possession of many South Africans—get rich quickly. In this respect they are charging to the outside areas town prices plus 25 per cent. That was an incentive to get started just over 20 years ago, but, with very few exceptions, that 25 per cent has never been altered. It does look wrong in a way. There is a profit in those outside areas which goes to the relief of rates. While some municipalities are sticking to

the Act in certain respects, others do not even comply with the spirit of the Act. If Mr. Gripper has an outside area attached to his municipality no one can step in there and supply. The municipalities as a whole should give further incentive to an abundant and cheap supply. Municipalities make a profit on areas outside the municipal boundaries. They certainly should not cause the least debit to the ratepayer, but at the same time, the outside man has no interest in the town, except going there to spend his money. If we want industries to develop, the only way is to give them a cheap and abundant supply of water and electricity. The Act cannot prevent, in its present form, monies being diverted to the relief of rates, but the control board can, to a certain extent, control the price of bulk supply of electric current.

MR. GRIPPER: It would appear that I have given an impression that there is a tendency on the part of my municipality to endeavour to bolster up its own undertaking with its rural scheme. On the contrary it is the other way about. This rural undertaking in Worcester is not run at any profit whatsoever, and has been supported by the municipal undertaking from 1936 until now, and it was only recently when an endeavour was made to come up level that the friction commenced. The crux of the whole trouble is with the initial financing of such a scheme. Under the Cape Ordinance we are not allowed to raise a municipal loan to develop the rural districts. The town has done its best and has developed the rural districts and run the scheme, but the capital has had to come from the farmers themselves, and that is where the main difficulty arises. You cannot get a scheme running smoothly when the consumers themselves have to provide the whole capital as they naturally adopt a dog-in-the manger attitude and say: "We paid for this and for equipment in the power station, and why should so-and-so get the benefit of it." One can understand that point of view, but it is hindering further development.

(MR. GRIPPER communicated: Having since read over the proceedings of our 1945 Convention which unfortunately were not available earlier. I am more convinced than ever that the parochial spirit shown in the letters submitted in Salisbury by the Orange Free State Municipal Association should be fought tooth and nail. The letters in fact add weight to the arguments advanced in favour of the formation of the National Board.

I should like also to urge our Executive to proceed with the amended proposal adopted at Salisbury concerning the circularisation of members regarding National Salary Scales so that the information may be made available to Municipal Councils in time to reach finality **before** the next Convention).

MR. EASTMAN (Cape Town): Just to answer Mr. Gripper's question on the proposed National Electrical Power Board. My information is, from correspondence that I have seen, that the Government, who had been approached on the question of the appointment of such a Board, has replied that in any case this could not be done except by Act of Parliament, and as the Board of Trade was, at the time correspondence took place, engaged in a survey of the electricity supply industry in South Africa, it was inopportune for the Government to consider a statement on the proposal.

MR. HALLE (Pietermaritzburg): Mr. President, you are talking about a national board. Well, we have a Municipal Public Transport Central Transportation Board and a National Road Transportation Board. which we wish we hadn't got. In electricity we have a monopoly, but in transport we have not, and we are cut to pieces by private enterpise not working to the same standard as ourselves, and I think transport is in a very bad way because of this; and here are the electrical people asking for a board, which may turn out just as troublesome. The point I want to make is that though we are a monopoly, we do not seem to be giving rural areas a fair deal. We have a supply of electricity, but when they want some in our rural areas, every municipality is battling away with complicated ways of making them pay for it. If there was a sub-committee on these questions and we could get down to some more commonsense way of developing the industry, it would be more to our benefit, and I would support Worcester on the establishment of

a sub-committee on the question of rural supplies. If we could only get information on what everybody is doing, it might help to standardise it a bit more.

MR. SIBSON (Bulawayo): Mr. President, this paper on standardisation is about the most important item on the Agenda before this Conference. I shall probably speak at some length on this, if you don't mind, as there are one or two things I particularly want to say. I remember urging in Johannesburg the value of standardisation, my reason then being that I felt that if the municipalities were going satisfactorily to meet the challenge of improved efficiency that centralisation is supposed to offer, they would have to look to it to improve their efficiency and their methods, and that something on the lines of standardised methods would be indicated, and that such a thing could be administered by this Association. I felt that this Association could develop a useful function indeed in bringing that about.

Now this report, or summary of regional reports, has advanced a number of proposals, and I am sorry I was not able to attend at Salisbury and discuss the same issue during its earlier stages; but I want to sound a note of warning now in respect of standardisation. I think one can go too far. While a considerable amount of standardisation is desirable, there is a danger that if we go too far, we shall find that Municipal Electricity Undertakings are becoming more and more a coherent whole in themselves, and less and less associated with their respective municipalities. I think we should guard against anything which tends to divorce an electricity undertaking from its parent body, the municipality which it serves. My reason for that is that any sort of organisation of any human activity is usually most efficient, and certainly most useful to the community, if it operates from the focal point of the community it serves, and I am one of those who opposes most strongly any suggestion that centralisation does in the long run bring efficiency, because I think usually precisely the opposite takes place. I think, therefore, in considering this question of standardisation, we should lay down a basis as to what we consider are the really fundamental things that we should standardise, which could then act as bases for comparison between one undertaking and another, and in that respect we get the advantage which local autonomy alone can give, of measuring one against another, of seeing how efficiency has developed here and there, and enabling that very healthy thing, competition, to flourish.

I would suggest some of the fundamental standards we should lay down. Firstly, on the financial side, the question of the relief of rates is something which is almost sickening to members of the Association. We have talked, to my knowledge, for about 15 years on this subject, and we are still talking about it, and still nothing very concrete has been done, although Mr. Eastman has told us there is a commission sitting on the subject in Cape Town. The question of this contribution to the relief of rates should be based, not on the principle that it is a bad thing to subsidise one section of the municipality by another, but on ordinary basic business principles, and I think one of the best ways of avoiding unwise contributions to another department is to ensure that a considerable payment is made annually into some fund associated with the undertaking itself. I would suggest, for example, that every undertaking should have a reserve fund, but not in the sense that is is put away and locked up, and quite unusable, because we know that once money like that is in the hands of the Treasury it has a habit of getting out of reach. But there should be a fund from which monies are taken for capital works, and that fund should be contributed to to the extent of, say, 8.5 per cent annually of the non-loan capital invested in the undertaking. Alternatively, for those undertakings that have not had an opportunity of doing that in the past, there should be a contribution of, say, 5 per cent of the annual revenue until the other figure becomes the greater one, and then use that. My reason for tackling it from this point of view, and not suggesting we should have a fixed figure laid down for everybody, and that there should be no contribution to the relief of rates till it amounted to that figure, is that I feel that an electrical undertaking should be a part of the community it serves, and there will arise occasions when it might be in the interest of the community for certain modifications to be made. Visualise a town which exists

purely as an educational centre, and a pleasant place for retired people to live, but can never be an industrial centre and can only hope to grow and attract population by making itself more beautiful. In a place like that there is something to be said for subsidising, say, the Parks Department, a department which is going to benefit the community and improve the status of the town and develop its population. On the other hand, where you have a town so geographcially situated that it can only develop industrially, there is a case where, if anything, the reverse should be done, in order that the community as a whole can benefit.

What I am really trying to drive at is that if we over-standardise in all directions there will be a tendency for the Electricity Department of any town to become divorced from the town and become part of an imponderable body of other undertakings which are standardised on the same lines, thereby sacrificing the principal advantage of autonomous control.

On the question of the standard form of accounts, this, I understand, has been used in the Cape—I do not know about anywhere else—but I would suggest that certainly as far as the returns in our annual statistics are concerned, there is room for improvement. Here is a place where full standardisation will benefit by enabling us to compare undertakings more accurately than is possible to-day. At present I find it almost impossible to draw any satisfactory conclusions from the figures submitted. They are very ambiguous and different people have different interpretations; and the whole thing becomes of very little value. First of all, I think in financial returns we should have generation and distribution capital expenditures shewn separately, instead of lumped together. The two things are quite distinct—some undertakings have only one—and any attempt to compare a bulk supply undertaking with one which is a complete entity is impossible, because one cannot see how much expenditure has taken place in generation and distribution.

Again I think there should be provision for clear indication of how much capital has been obtained by raising of loans, and how much contributed from revenue. That does not appear and it makes it impossible to compare capital and interest charges with the total loan expenditure of the undertaking.

Then you have capital costs per kilowatt in a column. I think that should be only in respect of generating plant expenditure, and the distribution cost shewn separately as per KVA of transformer capacity.

Another figure of very little value is the lbs. of coal per unit sold. A calculation is required involving the column of B.Th.U's. per lb. of coal, and sometimes that column has not been filled in. I think we should scrap the former and provide for thermal efficiency on units generated and sent out.

Another point is the number of consumers. That is an ambiguous column, headed "Power and Lighting Consumers." I think it is more logical to have something like: Consumers using less than 50,000 units annually; Consumers using between 50,000 and 1,000,000 units annually; Consumers using between 1,000,000 and 10,000,000 units annually; and Consumers using over 10,000,000 units annually.

Where there is more than one generating station, the necessary details should be given to enable a comparison to be made.

Figures of distribution losses would also be most useful in comparing undertakings.

Another thing which is most desirable is standardisation of statistical returns. At the moment we have returns to the end of March, June and December, from a variey of different undertakings. It would be very nice if that could be standardised and we could agree on the same financial year. I do not know what hope there is of that.

I notice in this report a tendency to confuse reserve funds with renewals and obsolescence funds. They should not be spoken of in the same breath. Renewal and obsolescence funds are only necesary where the loan life exceeds the estimated plant life. After all, the replacement of plant before the end of its normal life will take place either because an accident or an

unexpected deterioration beyond the scope of maintenance has taken place, or because it has become practicable to replace the plant by something more efficient on financial grounds. The former can be covered by some sort of plant insurance fund, and the latter does not justify any contribution because it is supposed to be paying for itself. The reserve fund is quite different, as I indicated earlier. Its purpose is to try and increase the stability of undertakings by enabling loan borrowings to be reduced as far as possible. If some fixed sum is contributed annually as a charge against revenue, then lean years can always be approached with a good deal of equanimity.

There is also a reference in this report to the statistical returns required by other bodies. We get census boards and various Government bodies who want to know all about us on occasions, and ask their questions in a remarkable manner—some I find it impossible to understand. It seems to me that this proposed joint board we have spoken about could do a great deal to improve that position.

I would say again, as I said at Johannesburg two years ago, that this Association can provide a complete and better alternative to centralised control. It is admitted that waste should be avoided as far as possible, and that full knowledge on a comparative basis should be available of each undertaking's activities. This Association can fulfil this need by providing proper control of statistical returns and fostering critical comparisons. Indeed, it must do this if the misconception regarding the value of centralisation is to be combatted. At all costs, local autonomy of electricity supply, as of as many other public activities as possible, must be maintained if progress is to be made towards the general happiness of mankind. Local bodies deal with people and these are the only things that matter. Centralised bodies deal with pieces of paper.

THE PRESIDENT: There are a few matters that should be touched on. Mr. Sibson mentioned statistical tables, but really they are not our property to do with as we see fit; they are the property of the Municipal Year Book, and our Association has compiled them for the Municipal Year Book in past years. This Association would, Ithink, be competent in suggesting amendments, but whether they would be incorporated would depend on the financial implications of the year book, which is not ours. Then, with regard to relief of rates, I would just like to voice a personal view, not that of the Executive Council. We have really tackled this from a wrong angle. Perhaps it has been mentioned before that the Councils do need the revenue. That is exactly so. Whether they get it from electricity or another source, there is a certain amount of revenue required for the municipal activities as a whole, and if the councils or municipalities could get their rating powers improved they need not then make use of this hidden form of taxation. Strangely enough, the Provincial Councils, and the Government presumably, who are as well aware as we are that these profits are being appropriated, and in that way it forms a tax, have seen fit to refuse, and consistently refuse, any form of improved taxing powers, but have just shut their eyes to this indirect form of tax. The Councils, as a whole, I think, feel they would like to get at the town dweller and not the property owner alone, and for that reason they have cottoned on to electricity, because by law they are not entitled to do so with water. Mr. Sibson, and, I think, Mr. Gripper also, touched on rural undertakings. Mr. Gripper, I think, touched on the subject in the right way. The difficulty is to get some form of guarantee from outside people. It is quite impossible to undertake any rural scheme unless you can get some form of concerted undertaking from the possible consumers that this line will be used to a certain extent. Where they cannot co-operate, I do not see how you can possibly undertake the work. We have several schemes we are contemplating, and that is the real difficulty.

MR. ANDREW (Kingwilliamstown): Mr. President, I am in agreement with Mr. Sibson regarding this question of standardisation, but I find myself at a slight disadvantage because I did not receive the report which was circulated to the members. On the question of voltage standardisation, I have the impression that it has not been given enough thought, because while on the one hand we are talking about the British Standards Specifications, which are

being adopted by the South African Standards Institute, we are, on the other hand, excluding the result of an intensive review made in England on the question of voltage standardisation. They have recommended 240 volts. There must be some very sound reason for doing that, and in perusing the technical press on this subject, it is obvious that the question of economy has been the answer to the selection—an economy on the one hand of copper, as against the cost on the other hand of chaging to the voltages. I may be wrong in interpreting Mr. Eastman's summary, but I think it would be wrong at this stage to agree to a standardisation of 230 volts. I think that before we do that there is a lot more work to be done.

MR. EASTMAN: Mr. President, might I rise on a point of explanation. The document to which I referred, that is the report, summarised replies to questionnaires sent out in 1944, which was of course long before England began to consider a new standard voltage. But, according to the technical press, of which I have copies here, the major factor in England in deciding upon the 240 standard was the 200 volt group of consumers. I will read the paragraph from the "Electrical Times" of 21st February of this year:—

EXTRACT FROM "ELECTRICAL TIMES": FEBRUARY 21st, 1946.

Major Factor the 200 V Group.

The key to why 240 volts works out as the cheaper standard to adopt is to be found in the number of consumers now supplied at various pressures and the respective numbers that would have to be changed by 10 volts, or more than 10 volts, depending on the standard adopted. The major item in the total net cost of standardisation, £18.49 and £26.43 million for 240 and 230 volts respectively, is £14.46 million required to convert the 200 volts group of consumers in either case.

Tea interval.

On resuming,

CR. DU TOIT (Upington): Mr. President and Gentlemen, this subject of the appropriation of electrical funds to the relief of rates is a subject which has been, I understand, before the Association at its various conventions for many years. It appears one is up against the difficulty that in the large municipalities terrific sums of money are being used to square rates. When the municipality is stuck for money they run to electricity, and one is up against what I might call mispractice, because you are hitting the small man to pay the property rates that the land owner should carry. I think this body should go on hammering the municipalities not to do that sort of thing, until we break them down. We know that the big municipalities are appropriating large sums of money, and it is iniquitous to hit the small man, who has the right to use electricity in his house. One knows there are places, especially in these parts, where electricity cannot be supplied so cheaply because of coal freight and so on, but we are by this practice preventing the country getting the best benefit from electricity. I therefore consider we should go on hammering at this thing until we persuade the authorities to legislate on this subject. In the municipality I represent we had the same trouble. There were men who wanted to collar a couple of thousand out of the reserve fund, but they came up against solid opposition.

MR. STEVENS (Ladysmith): Mr. President. In the few remarks I am about to make, I do not want it thought that I do not appreciate the advantage of having a universal standard distributing voltage; far from it. At a previous Conference, I expressed my doubt whether 230 volts will become a universal standard, at any rate, throughout the British Empire and the United States, before there is an agitation for some other standard voltage. At the time I referred to an article which appeared in a B.E.A.M.A. Journal advocating the adoption of 240 volts, and now I would draw your attention to an article in last month's "Distribution of Electricity" headed "The 240 V. Distribution Standard," and another in "The Electrician" for March, headed "Voltage Standardisation." "Explanation by Commissioners—why 240 V. Decision was made.

In South Africa 220 volt has been extensively adopted and is recognised as the

standard. It can be applied satisfactorily to most 200 to 240 volt appliances. For these reasons I feel we should stick to 220 volts until there is a universal pressure acceptable to all.

CR. GEARING (Cape Town): Mr. President, I am not qualified to speak on the subject of electrical standards, but you have graciously allowed the discussion to go to other subjects, and I was very pleased to hear Mr. du Toit of Upington make his protest about this pernicious system of appropriating electricity profits for the relief of rates. I know you have listened to all the arguments, and know them all probably much better than I do. For the last seven or eight years I have voiced a protest in my own City Coenuil, but I feel, Sir, that this is a body—the only body in this country at the moment—that can do something practical towards a partial cessation of this pernicious practice, if not a complete one. I think a unanimous resolution from this Association, pointing out the ill effects of this policy would be of great advantage. My own City Council are grave sinners in this respect—we appropriate all the profits. Now, what is the object of endeavouring to increase our efficiency, to reduce the cost of generation and make more profit if that money is going to be used for the relief of rates. It is an entirely iniquitous principle to use a trading department such as this, of universal use to the community, as a taxing machine, and I think that if the Association could be unanimous on this point, and make strong representations to the Government as to the grave handicaps that all the undertakings are suffering from by this principle, we might get somewhere. But if we just talk year after year and voice some idle protest, I am afraid we shall not achieve anything. I would very much like to see your Executive frame a strong omnibus resolution to that effect.

THE PRESIDENT: At the last Convention, it was suggested that the Governmen be pressed to inaugurate this Joint National Power Board soon, and alternatively, if undue delay ensue in doing so, the matter be submitted to the Provincial Administrations in the form of a resolution of this Association. That was in connection with the relief of rates.

CR. BOYLAN (Johannesburg): Mr. President, I have listened most attentively to the criticism of taking the profits from Electricity Departments for the relief of rates. An electricity department, where it is controlled by the City Council, is part and parcel of the community. It is the same as water and rates. The difference between the profits and the loss to the consumer is so slight in the aggregate that you could not reduce one-fifth of a penny of the cost per unit to the consumer without showing a loss, and in our socialistic system it is controlled by the local authorities; it is, as previously mentioned, part and parcel, the same as transport or water, and surely the Council is entitled to make that small profit per unit. It is only fractional, because what difference would it make to the cost of electricity and to the generation and distribution of electricity. We make roughly £100,000 to £120,000 per year, because we sell millions of units. Where is the adjustment going to come between profit and loss. Naturally, a municipality running a power station requires a slight profit, because there are many other departments that are non-returnable—it is all expenditure. Your social services are non-productive and they are run at a loss. You cannot run transport except at a slight profit or loss. Take public health administration and native administration. If you did not get profits from trading concerns, your rates would rise a halfpenny or a penny to every consumer. I think a great hullabaloo is made about this. The rates in any progressive town must rise unless the trading concerns show a certain degree of profit.

THE PRESIDENT: I think this discussion on relief of rates really started with standardisation of accounts, and does not appear on the agenda as such. The Executive are considering how they can give further time to it. Friday is more or less a free time for discussion. But I do not think we can take more time on it without previous notice. Members have had no time to think about it before the discussion developed. Is there any discussion on the Standardisation Sub-Committee's report, except on this one point.

MR. EASTMAN: In reply to the general discussion I would like to explain on this

matter of the relief of rates, which is referred to in the report I have submitted to you, that there was a resolution at the last meeting of the Convention, to the effect that representations should be made to an authoritative body. At the instance of the Councillor representative of Kimberley the Convention agreed that representations should be made first to the United Municipal Executive, because that is the normal channel through which resolutions affecting the welfare of municipalities should be directed, and if we make no progress by so doing then the approach should be direct to the Administrators of the various Provinces. Correspondence has been received recently which indicates that the United Municipal Executive is beginning to shirk responsibility and desires to offload it on to another body, but, as the Chairman has ruled against further discussion of that matter, I mention the point so you may think it over prior to our discussion later.

Mr. Sibson has raised some important criticisms of the form in which our statistics are published, and the President has told us that in any case we are very largely in the hands of the publishers. On the other hand, it is only reasonable to expect that the publishers would be only too happy to publish something of better value to the readers than now, if they are only told in what form they should be published. I do not know whether the Association would consider forming a sub-committee to draft a new set of forms and statistics to greater assistance than those which exist, and in any case, based on statistics which every year we have to deliver to the Census Department. I think we can save a good deal of time and trouble in preparing statistics if we make them correspond in every degree with those of the Census Department. I have had some trouble with the Census Department because I did not understand, and I do not think they did, the ambiguity of some of their questions That has been straightened out. It may be that other members of the Association have had similar questions on allied subjects which might be of some value to any sub-committee you appoint to go into the matter.

I think it would be desirable for this conference to consider the question of appointing a sub-committee to deal with the aspect Mr. Sibson raised.

MR. FRASER (Johannesburg): I have much pleasure in supporting Mr. Eastman on the question of forming a sub-committee to go into the revision of our tables, but I would like to couple to that that the sub-committee should enquire into the statistics being supplied to private bodies or private individuals. I for one, when supplying statistics from the department, was under the impression that I was supplying them to the Association of Municipal Electricity Undertakings. I did not realise I was supplying the statistics to an individual who publishes the year book. I consider that we should go into the question of whether undertakings should not supply the information to this Association before it is supplied to anybody else.

A MEMBER: There is the question of the possible duplication of work. I can quite see this position arising, that we submit figures in compliance with the Government's requirements which would not fit in with the Association's blue book; and, on the other hand, the sub-committee might get out statistics for the benefit of all concerned, but it would not meet with the requirements of the Government, and we would have to start all over again, and get the statistics as required by the Government. As we all know, we are not blessed in Electricity Departments with staff, and we have to overload them with work. That is why we should consider whether the suggested revised information will definitely meet with the Government's requirements, before we put it in the blue book.

THE PRESIDENT: It has been suggested that we form a sub-committee to go into the matter of the tables generally, and the various points raised could be dealt with by the sub-committee. I think that was proposed by Mr. Eastman. Are you agreed on the formation of a sub-committee? (Agreed. Three members are suggested for the sub-committee to deal with statistical tables and all related matters. Will you nominate members.

A MEMBER: The President, Vice-President and Mr. Fraser. Agreed.

S.A. STANDARDS INSTITUTE.

THE PRESIDENT: The next item is the South African Standards Institute. Mr. Wright is the member of that body.

MR. WRIGHT (Benoni): Mr. President and Gentlemen, this S.A. Standards Institution holds regular monthly meetings, and it has a terrific lot of specifications for adaption to South African standards. This is the result of one year's work, and if anybody wants to know anything they can go through this file. It is a very august body consisting entirely of doctors and professors except Mr. Mullins, Mr. Joubert and Mr. Wright. You may think these three gentlemen are out of place on an august body like that, but they are not. These doctors and professors are only human beings really and these three men fit in quite well.

MR. HALLE: I would like to ask about the testing of meters.

MR. WRIGHT: The S.A. Standards Bureau, a totally different body to the S.A. Standards Institute, is going into this matter, on the application of the municipality of Pietermaritzburg for some information as to what plant should be put in for the testing of electric meters. That committee has met twice. I was asked to attend on behalf of this association; Mr. Hugo attended on behalf of the Pretoria Municipality, and there were four other gentlemen there representing the S.A. Institute of Electrical Engineers, and the Chairman, who is the director of the Bureau. Nothing much has been done yet, but I can tell you that the Chairman and Mr. Hugo contacted the Electricity Control Board, who, under the Electricity Act can pass legislation compelling the regular testing and checking up of electric meters and the degree of accuracy to which they should work, and it is contemplated that once the Bureau drafts this code of practice for electric meters, in which the minimum requirements of appliances and plant to carry out the necessary tests will be laid down, there will be minimum testing apparatus laid down for all classes of meters. At present I think the proposal is that all meters should be tested and removed from their installations at least once in six years. Once the regulations come into force, so many meters will be done the first year, and so many the second year, and so on, until the sixth year, when they must all be done every six years. I cannot tell you more, but it is going to hit small municipalities very hard, because up to now the practice has been to instal a meter and forget it. That is to cease, and it would be just as well for them to get busy on something like this, so that when the time comes to do it, it will not be too heavy a burden. I cannot tell you more than that. Only two meetings have taken place, but there is something in the air.

THE PRESIDENT: I might mention that a letter has been received from the S.A. Standards Institute, appealing for funds, but the Executive has had no chance to consider the matter. We will go into the matter at a later date—perhaps during this session. Mr. Fraser will now deal with the Safety Precautions Sub-Committee.

SAFETY PRECAUTIONS SUB-COMMITTEE.

MR. FRASER (Johannesburg): The Safety Precautions Sub-Committe is a committee which deals with the drafting of and amendments to the standard regulations. Last year very few meetings were held due to the fact that most of the members who are on that committee being away from Johannesburg, and others have been unable to sit owing to pressure of work. There is another reason for not having many meetings during the year, and that is that there is at present a controversy going on overseas in regard to fusible plugs and plastic wires, and the committee thought it would await the outcome of the discussion.

You will remember that at the last Convention I told you that we intended to set up regulations to deal with medical and industrial X-ray appliances. The Committee is now waiting for specimen regulations from other countries.

At a previous conference the question was raised as to the advisability or otherwise of prohibiting the installation of improvised earths for wireless sets. This has received the consideration of the committee who have agreed to incorporate the following regulation in the 2nd edition.

115-03
Earthing.

If any part of a mains operated wireless set is earthed, the earthing terminal shall be connected to the earth continuity conductor or an earth permitted in terms of Regulation 201-10.

Furthermore, against the numbers 115/03 and 201/14 in the Notes, the following should be inserted:—

"Attention of users of the Regulations is drawn to the requirements regarding the earthing of wireless sets, which apply both to any intention to earth the chassis of the set and to the special aerial earth terminal sometimes provided on these sets."

At the last Convention I reported on the result of a deputation which met the Municipal and County Engineers' Association in connection with asbestos water piping; this matter was referred to the committee to see whether they could give a code of practice. After discussion it was agreed that it was outside the scope of the committee.

One other matter, the committee has received from he Forestry Department a list of woods considered hard and non-combustible as far as they affect the regulations. This list is being considered and will, if passed, be incorporated in the specimen regulations. I now have pleasure in moving my report.

Report adopted.

The Convention adjourned to Wednesday, 15th May, 1946.

WEDNESDAY, 15th MAY, 1946.

On resuming at 9.30 a.m.

PROPOSED DUTY ON ELECTRICAL MACHINERY.

THE PRESIDENT: I will now ask the Secretary to read a letter received from the Johannesburg Chamber of Commerce, regarding a proposed 20 per cent protective duty on electrical machinery, on which it was felt the meeting should express its views. The Executive as such have felt that this 20 per cent. duty will make it exceedingly difficult and costly to buy imported electrical material, which, in any case, cannot be bought locally. Quite a few of us have plant on order amounting to half a million or a quarter of a million pounds, and 20 per cent, added to that, on material which cannot be purchased here in any case, seems to be rather a hit below the belt. I will ask the Secretary to read it.

THE SECRETARY: The letter reads as follows:—

The Secretary,

The Association of Municipal Electricity

Undertakings of South Africa & Rhodesia

C/o G. J. Muller, Esq.,
City Electrical Engineer,
P.O. Box 288,
BLOEMFONTEIN.

Dear Sir,

PROPOSED SUSPENDED DUTY ON ELECTRIC MOTORS, GENERATORS, AND TRANSFORMERS.

I am directed to enclose for your information a copy of a telegram which this Chamber has despatched to a number of Members of Parliament, on the recommendation of the Engineering Section of the Chamber.

Since the proposed suspended duty on the above machinery will directly affect your members, representing the Municipalities of the Union, the suggestion is made that you might place this matter before the conference of your Association which is meeting this week. The Chamber would earnestly recommend that your Association should take similar action and should urge Members of Parliament to oppose the proposal.

Yours faithfully,

H. S. MABIN,

Secretary.

13/5/46.

HOUSE ASSEMBLY, CAPE TOWN.

In connection with suggested provision for suspended duty of twenty percent on electric motors generators and transformers Chamber considers that vesting of power in Minister to apply such duty by Gazette notice is example of dangerous delegation of Parliaments authority particularly in view of far-reaching effects of huch duty on cost structure of industry and possibly on cost of electricity stop commerce given no opportunity to express its views before Board of Trade recommendation tabled stop respectfully urge you to oppose the suggestion vigorously.

13/5/46.

JOHANNESBURG

CHAMBER COMMERCE

P.O. Box 687, Johannesburg.

THE PRESIDENT: You have before you this communication from the Johannesburg Chamber of Commerce. There is a double side to that subject and it is necessary to some extent to protect South African industries; but the matter can be carried so far that it becomes a drag on development of the country. I would like to hear the views of the meeting on the subject.

MR. FODEN (East London): Mr. President, we should strongly oppose this because it does not need much imagination to see the widespread effect it would have. Field-Marshal Smuts told us not long ago that he hoped this country was not only going to develop secondary industries, but primary industries also. Should this 20 per cent. duty be imposed on heavy Electrical Generation Plant, it is obvious that this will adversely affect the tariffs of Electricity Undertakings, thereby affecting the cost of production of industry and finally affecting the programme outlined by Field-Marshall Smuts. I think we should do everything possible to get our local M.P.'s to oppose this most strongly.

COUNCILLOR GEARING (Cape Town): Mr. President, I hear your announcement with astonishment. It would seem to me that before we make up our minds to act strongly on this point, we should ask for further information. You gave a hint just now that there were two sides to the question and it may conceivably be that this proposed duty is only intended to apply in the range of South African production. Very obviously, if it goes further than that — if it is the case that the 20 per cent. is to be levied on 40,000 K.W. generators, and plant of that nature, I think we should take the strongest exception to it. That sort of thing is comic opera legislation, it is absurd, and there could be no possible justification for it. From the revenue point of view, it is equally absurd, because the amount of money it will produce is negligible from a national point of view. It can only result in the hampering of every electricity undertaking, and it will probably result in increased rates. In every respect it cannot possibly be of help in the country's development. Here we have the Government telling us that the greatest service the municipalities and industry and commerce can do to the country is to increase industrial activity, and make ourselves a producing nation, and the first and obvious essential is cheap power and electricity; and they start off, the first year after the war, with the idea of making generating plant 20 per cent. dearer than it has been before, on top of the already enhanced costs of prices we have to pay. All the plants we are buying to-day is going to cost 50 to 60 per cent. more than in 1938, and to put another 20 per cent. on that is absurd; and to leave it in the hands of an official is democracy gone mad. I am glad you mentioned that. This government by officials is becoming one of the prime evils of the day, and we must remember that bureaucracy is very close to autocracy, and we must oppose it in every shape and form. If this duty is to be imposed it should not be left to one or two officials. But we must be sure that that is what is intended. We must be sure whether it is going to be a duty on small motors and material which comes within the manufacturing fields of the Rand. We know that considerable development has taken place there, in the way of manufacturing electrical switch gear, if not the actual manufacture of generators and

motors, and it may be it is intended that it will affect only that particular field. I do not say it is good even then, but it will not affect our electrical undertakings as much as if they place a big duty on generating plant. That would be most fatal, and we should strongly oppose it in every possible form.

COUNCILLOR SMITH (Johannesburg): I do feel there are occasions when it is necessary to impose protective duty on certain classes of goods being imported into this country; but of course there are limits, and there are circumstances under which we have to be very careful. There seems to be of late a tendency—and from conversations I have had with Government departments of late there is going to be a further and stronger tendency — to impose protective duties and other forms of regulation to protect local industries. Now that is quite allright, and we don't mind that when it is absolutely necessary. But from hints which we have heard, it is evident that departments have in mind the protection of industries that are not able in any shape or form, or will not be able for many years, to provide the products required for this country; if that is the case, we must object to a protective duty or regulations being applied which may bring about a scarcity of essential commodities, which, of course, also include electrical goods. But my purpose in rising this morning is to protest against this form of government by regulation which is becoming so prevalent nowadays. This form of Fascist legislation has crept into our laws during the war particularly, although it did also apply before the war, but, of course, was strengthened by the fact that the Government were given great powers under the War Emergency Regulations. It would appear to me that there is a tendancy to transfer such powers which they had under the War Emergency Regulations to ordinary law, that is, to pass legislation and under such to leave practically everything to the Government to do by regulation. I think we at this Conference must make it quite clear that we protest most strongly against such form of legislation. It is really a dictatorship, and if we allow it to go on without any form of protest, it is going to rapidly develop into a dictatorship of commerce and of all activities in this country. We have had examples which do not apply to the subject we are discussing, but there is a tendency all along the line to interfere with commerce and trades unions, etc., under what is government by regulation. That is right enough under War Emergency Regulations in time of war, but my fear, Mr. President, is that they are going to take over the whole form of what they were able to do under the War Emergency Regulations, and keep it as part and parcel of peace time government of this country. We must protest at the Minister being able to publish notices in the Gazette. He must not be allowed to merely say: "This has to be done" and "That has to be done." I hope there will be no suggestion of this Conference beating about the bush. We should express ourselves strongly on a serious subject of this description.

COUNCILLOR DU TOIT (Upington): Mr. President, I believe we are going about this in the wrong way. There are no facts before the Conference. Unless we have the actual facts before the Conference we are going to get no-where. I propose we go into the real facts of the matter, and find out whether it is to protect South African industries. I do not think the Conference has sufficient information about it.

THE PRESIDENT: I think this is the problem before us. We have not quite sufficient information. This is a letter from the Johannesburg Chamber of Commerce, and they may have sufficient reasons for taking this strong action and putting it to a large number of Members of Parliament, but at the same time, I doubt whether we can get sufficient information in time to lay before this Convention. We should urge that nothing be done until we have had an opportunity to go into the matter properly. Commerce is more concerned with the passing of hurried legislation. They have not had an opportunity, and until they have had an opportunity of studying the matter, do not know how dangerous it can be to them. We realise what it can mean to us if it is what it appears to be. It may be a simple protetctive measure for plant which can be supplied from South African factories. In that respect we probably will not feel so strongly, but what is mentioned

in the telegram is motors, generators and transformers, in a broad sense. I think we should ask the Government through members of Parliament not to put this on the books until this Association, as representing all the municipal electricity undertakings of South Africa, have had an opportunity of studying the repercussions on the undertakings as such. With the views expressed, I think the Executive should know very clearly the exact views of this meeting. If it is a question of a tax on plant which cannot possibly be produced in this country, then nothing we can do should be left undone. I think we should have a resolution on these lines: that nothing be done until we have had an opportunity to study the matter on behalf of the South African municipal electricity undertakings, and then we have power to act with all the force at our disposal.

COUNCILLOR DRYER (Springs): I do not think the Conference needs any details this morning. It is a question of principle, and I think we should deal with it. It is an important principle, and I think we, as a Conference, should strongly protest against any special levy on electricity undertakings at this stage. I feel it is the thin edge of the wedge. If we allow this, there is no telling how far it will go. I think we should support the Johannesburg Chamber of Commerce against this iniquitous levy on imported goods that we have discussed this morning. I move that this Association strongly protest against this legislation being allowed to be put in force.

MR HALLE (Pietermaritzburg): This is what I want to say. This was brought up at Port Elizabeth, at the Transport Conference, that the Government wants to put a tax on bus body accessories. That Transport Conference condemned it, and said that South African manufacturers cannot meet the demand, and if they made any article they could sell it, because the demand is so great., It is against the public interest to bring in protective measures to stop the flow of goods to this country in its present state. I think that we should say that this Association is whole-heartedly behind the Chamber of Commerce and we should oppose this tax tooth and nail.

COUNCILLOR BOYLAN (Johannesburg):I rise to support the point made by my colleague from Springs. The Government's intention will affect not only electrical goods but other heavy machinery coming to this country. We all agree that where local industries can produce the goods, protection should be given them, but we are dealing with these major subjects, gasometers and other things, which cannot be manufactured at the present time in this country, and the Government is attempting by regulation, without reference to any organisation, to place an iniquitous tax on importations. We have made application for gasometers, which run into many thousands of pounds, and before the contracts could be settled we got an intimation from the department concerned that the importation will be subject to 20 per cent. ad valorem, irrespective of the cost. These things cannot be manufactured in this country for a number of years. I do not know whether they are going to protect the Van der Bijl organisations. We, representing the major industries have a right to protest until we can manufacture the goods in this country. But it is not extra taxation that is required, but the same as the farmers get — a subsidy. It means you have to make a 20 per cent. contribution, additional to the contract and the gasometer I have in mind would cost £28,000. That means we will have to wait perhaps two or three years before we can get it, and the same position will apply to your generators, which you will be compelled to get from overseas, whether you like it or not, if you are going to expand the electricity undertakings of this country. The Chamber of Commerce are no friends of mine; I am looking at it from the point of view of the expansion of the industry, and heavy material and motors which cannot be made in this country should not be subject to an additional tax, but something in the subsidy line. We are getting far too much of this Government by regulation, and will have more in the future unless we put our foot down. I would like all the people involved in this to protest that the time for acting by regulation must stop.

MR. MULLER (Upington): No uncertainty is expressed here, but I feel it it not for us hastily to decry what our

country has produced. After some six years of titanic effort we have produced what we have never expected to produce. You, Mr. President, have put it in a nutshell when you say there are articles we cannot produce, and if a surchage is made on these articles we will be at a great disadvantage. Many municipalities have placed orders which in respect of their size are very significant, and we may find ourselves in the unenviable position of having to go to the ratepayers to make up this surcharge. I am of the opinion that we should get a true understanding of the position before we take any decision and deal with such things as cannot be advantageously produced in this country.

MR. KINSMAN (Durban): I suggest that the views expressed be summed up in this way: "This Annual Convention of the Electricity Undertakings of South Africa and Rhodesia views with concern a report that the Government proposes to make provision for legislation imposing suspended protective duty on imported electrical machinery, and further protests against such duty being vested in the minister."

MR. SPARKS (Pietersburg): We have heard a lot said about the duty, but the majority of speakers have spoken about government by regulation, and I see nothing embodied in the resolution about that. It is a dangerous thing; you may wake up in the morning and find the whole economic system upset in one day, and I think that should be embodied in the resolution.

THE PRESIDENT: "That we object strongly to it being vested in the Minister" would cover that.

MR. KINSMAN: I think we can cover it in this way. As we understand it, the legislation empowers the Minister by regulation to enforce or suspend this duty. To the latter portion of this we can add "by regulation" if you like.

COUNCILLOR DE WIT (Rustenburg): I think we must go carefully and not dictate to the Government. No democratic government is going to allow itself to be dictated to by a single group of people.

THE PRESIDENT: I do not think it is such an unheard of step to protest against the power being vested in the Minister. The Minister is under the democratic power of Parliament, and the time has arrived when the emergency powers handed over by Parliament to the Government for specific purposes should be taken back by Parliament, and when legislation in a hurry should, I think, be a matter of the past. There are no circumstances now that warrant legislation being passed at double speed without investigating all its repercussions on the development of the country. I do not know whether Mr. de Wit has an opposition motion to this.

COUNCILLOR DE WIT. Mine is the same as the first part; but I do not agree with the last part, as far as the Minister is concerned.

MR. KINSMAN: This might mean Mr. De Wit.

> "This Annual Convention of the Association of Municipal Electricity Undertakings of South Africa and Rhodesia views with concern a report that the Government proposes to introduce legislation imposing a suspended protective duty on imported electrical machinery, and protests most strongly against such protective measures without consultation. It further protests against the proposal that the duty should be imposed by regulation rather than by statute."

I move that.

COUNCILLOR BOYLAN: I second the motion.

COUNCILLOR GEARING: I wonder whether we might not at this stage make our case stronger by not referring to how the duty should be imposed. Our concern is to stop the duty being imposed at all. It might look as if we said: "If it is imposed by statute and not by regulation, we are not opposed to it." I feel very strongly about this government by regulation, but, from the point of view of this particular body at this particular moment, I wonder whether it is desirable to make reference to it.

THE PRESIDENT: We have given threequarters of an hour to this subject, and unless there is a definite motion, I think we should at this stage vote on this one. It is the only one before the meeting and I feel we should vote on it.

On a show of hands the motion was declared carried unanimously.

SAFETY PRECAUTIONS COMMITTEE (Continued).

THE PRESIDENT: We can now carry on with the business of the meeting. We have still some work left over that we want to complete. We were rather rapid yesterday afternoon with the Safety Precautions Committee. Is there any member who wishes to say anything on that subject before going on to the next item?

MR. SMITH (Boksburg):

"I would like two points to be brought up for consideration. The standard wiring regulations allow for six lighting socket outlets on a circuit. It is my experience that when anyone wires a house and puts in six lighting sockets, it is his intention to use them for lighting, but when it changes hands the new owners take a socket as a socket, and use them for heating appliances. I suggest we do away with this regulation and allow only for socket outlets wired with heavier wire. I had an experience of a circuit burning out because it had been used for a small electric stove, a kettle and an iron.

Secondly, with regard to the wiring from the main building to outbuildings, I think that should be done by underground wiring. The overhead wires are always a source of danger."

THE PRESIDENT: The views expressed will be passed to the Safety Precautions Committee.

MR. GRIPPER: In relation to the last speaker's remarks, and generally in connection with the wiring regulations, I would like the meeting to know that I have left with the Secretary a number of copies of papers on the wiring regulations in relation to the standard regulations and they may be of interest. They were drawn up at a time when we were working under great difficulties in connection with wiring. In effect we are finding there is a need for a revision of the standard wiring regulations. I think that has been suggested and accepted.

ELECTRICAL WIREMEN'S REGISTRATION BOARD

MR. FRASER: Those of you who were at the last Convention will recollect that you appointed me as a member of the Wiremen's Registration Board. Though I was appointed in May, I did not take over my duties until January this year. Mr. Rodwell, our Past President, was in office under the Act until the end of last year, and we had to await a request from the Board before I could take up my seat. I would like at this juncture to place on record the Association's thanks to Mr. Rodwell, our Past President, for his valuable work in connection with this Board. He was your first representative on the Board, and I think he served two periods of three years each, and has put in a tremendous amount of work. I would like officially to mention that the Association records its thanks. I have asked the Chairman of the Board for a report for the full year, as it is obvious I could not report on the portion of the year I was not present. I am indebted for this report to Mr. Clutterbuck, the Chairman, who is present here to-day.

ELECTRICAL WIREMEN AND CONTRACTORS' ACT, 1939.

During the year 1945, although the work of the Board increased considerably particularly with respect to the number of applications for registration dealt with, the proceedings at the 12 meetings which were held were marked by unanimity regarding the decisions taken and the following figures show the progress made.

Applications Received:

	To From 31.12.44	1945	Total.
Johannesburg area ...	1352	213	1565
Pretoria area	307	50	357
Cape Town area	715	64	779
Natal area (including Durban)	564	79	643
Port Elizabeth area ...	248	15	263
East London area ...	125	11	136
Orange Free State area	145	9	154
Kimberley area	102	3	105
		444	4002

The number of applications made was 130 in excess of the previous year.

Number of applicants registered 218, making a total of 2,302.

Number of applications accepted for examination 179, making a total of 1077.

Number of applications refused 57, making a total of 457.

Number of applications not finally disposed of 1225.

It may be remarked that the last figure includes many applications from persons who have been accepted for examination but have not seen fit to enter.

Two written examinations were held attended by 332 candidates, approximately 30% passed both Sections and 20% failed both Sections. The remainder passed one Section only.

At the four practical examinations held 158 candidates presented themselves and 13 failed.

To date seven prosecutions for offences under the Act have been instituted all of which were successful and fines were inflicted.

In the few cases in which appeals against decisions of the Board have been lodged with the Minister, the Board's decisions have been upheld.

During the current year the Board has been inundated with applications for registration, and despite the fact that the frequency of its meetings has been increased there will be some delay in overtaking the accumulation of arrears.

The applications recently made are chiefly from

(a) Ex-volunteers.

(b) Men who have been released from war work principally at the coastal towns.

(c) Men who wish to commence business on their own account as electrical contractors

(d) Men who are anxious to leave the mines and obtain employment exclusively on the surface.

(e) Ex-apprentices.

One written and three practical examinations have already been held this year and the number of registrations has increased by approximately 150.

Numerous small towns have requested that their areas should be determined by the Minister in order that the prohibitive Sections of the Act may be enforced. This matter is being held in abeyance until the present rush of applications has been disposed of.

Some progress has been made toward giving effect to the proposal that the Registration of Electrical Contractors shall be placed under the control of the Board and it is understood that the subject will be discussed at this Convention.

I have much pleasure in moving the report.

A MEMBER: Will you kindly enlighten us as to what is the procedure to get an area determined.

MR. FRASER: In order to determine an area the procedure is to refer to the local

authority. You will remember that some time ago some big towns combined and went to the Administrator and got their areas determined. Such a procedure may have to be adopted as far as your area is concerned.

CR. DE WIT (Rustenburg): Don't you think it would be advisable to force the smaller municipalities to come into it. In Rustenburg we have any man doing electrical wiring. I think it is a dangerous thing, and the regulations should be enforced by law.

THE PRESIDENT: If an area feels it should be determined it can do so. But it may cause discontent in places where it is impossible to carry out the Act.

CR. DE WIT: It is a matter of safety, and it makes no difference whether it is a small town or Johannesburg. It applies just the same.

MR. ANDREW (Kingwilliamstown): With regard to an "area" as defined in the Act, I have to say that there was an application from Kingwilliamstown over six months ago, and we have not yet been gazetted as an "area."

MR. FRASER: I understand from the report that owing to the increased number of applications from individuals to be registered, it is impossible for the board to do more than it is doing at present.

MR. ANDREW: I may add that in the case of Kingwilliamstown we have been fortunate in keeping the wiring work confined to wiremen possessing the necessary qualifications. But the demand has been rather great and we may arrive at a state of affairs where it is difficult to bring the Act into force.

MR. CLUTTERBUCK (Chairman of the Board): I have not been able to hear the comments of some members, but I understand they were concerned with the determination of areas. I might say that several applications have been received from some of the smaller towns to have their areas determined, and these will receive consideration in due course, but for the reasons which follow, no action has been taken to date. In the first place it is desirable that the large number of applications awaiting attention should be disposed of in order that more certificated wiremen may be made available. In some areas difficulties have been experienced in the enforcement of the prohibitive sections of the Act owing to the apathy of the workmen themselves, many of whom have failed to apply for registration although they have had ample opportunity to do so. It has also been found that there is a general lack of knowledge of the requirements, particularly with respect to the classes of electrical work covered by the definition of "Wiring Work."

In these circumstances it must be admitted that it is undesirable to extend the scope of the Act until there is a reasonable prospect of enforcing its provisions so that the necessity of having to condone contraventions may be avoided.

Furthermore, all Municipal Electrical Engineers do not appreciate the implications of a determination under which it becomes an offence to permit an unregistered wireman to perform wiring work or to test an installation before it is connected to the source of supply.

MR. WRIGHT (Benoni): May I, as one of the officials who have to see that this Act is complied with in an area, sound a note of warning to people who want their area determined. There is no doubt that there is a tremendous shortage of registered wiremen. In Benoni we have five contractors and they have five registered wiremen amongst them. The earliest date any work can be undertaken by these five wiremen is five or six weeks after placing it with them. You can see the position that will occur. New houses go up and old houses want repairing, and wiring work can only be undertaken by registered wiremen. Although I agree it is a desirable state of affairs to attain, at the present moment it appears impossible of attainment. I can see anybody possessing a wireman's ticket, and I think you will all agree with me that while all electricians are wiremen, all wiremen are not electricians. These wiremen are going to stick out for higher pay, because there is a tremendous shortage of this type of artisan, and if these undeter-

mined areas are going to apply for registration, they are going to find themselves in the same position the registered areas find themselves in at the moment, where they have to condone work not performed by registered wiremen, and render themselves liable to prosecution under the Act.

There is another thing which affects us very considerably and that is the section of the Factories Act which says a supplier shall not supply current unless the iron roof of any building using electricity is earthed. That does not give you any discrimination. The Act says you shall not supply. You all know that you had 100 per cent of your consumers connected up at the time of the passing of the Act and at that time not one per cent had the roofs earthed, and we have got to cut off the 100 per cent and run the risk of being shot at dawn, or use our discrimination. I have recommended to my Council and they have agreed that any premises which fall vacant or are disconnected for non-payment of accounts will not be reconnected until the earthing of the roof has been done. Every month there are approximately 400 changes of tenancy; that is, 400 houses to be earthed, with five registered wiremen. I ask you, what is the position?

MR. ANDREW (Kingwilliamstown): I was interested to hear Mr. Wright's remarks regarding his procedure in being assured that roofs were earthed, but there is one point on which I might have misunderstood him. Does not the Factories Act compel him to supply wiremen?

A MEMBER: There is one point in regard to the shortage of wiremen. Mr. Wright has said that an electrician is a wireman, but a wireman is not an electrician. Would it be possible for a certificate to be granted to electricians to do wiring work. It would ease the position considerably if all apprentices who serve an apprenticeship as electricians could automatically, after their apprenticeship, to granted a wireman's certificate. I think it will be agreed that an electrician is a far more intelligent man than a wireman.

MR. FRASER: I do not want anybody to be under a misapprehension. The qualifications for a wireman's certificate are laid down in the Act, and any electrician who has those qualifications will get his ticket.

(Tea Interval).

On resuming,

THE PRESIDENT: We have received a telegram from the Rossler Brothers.

PORT SHEPSTONE.

To President AMEU Convention, Bloemfontein.

Regret inability attend Convention tragic passing of our mother wish success deliberations—Rossler Brothers.

We are called upon to pass a vote of condolence with our fellow members. A letter of condolence will be sent to them, and I ask you to rise for a moment as a mark of respect.

All members remained standing for a few moments.

THE PRESIDENT: Mr. Wright will now read his paper.

MR. WRIGHT: Mr. Chairman and Gentlemen, before starting with the reading of this paper, I may say that I did intend apologising for its shortness, but in view of the amount of work you have before you, I do not think that apology is called for. Any time this paper will take up will not be wasted by this Convention. You have plenty of work to go ahead with. Apparently the paper is going to cause quite a bit of discussion; from what I have been asked and told by members, it is a paper which is of considerable interest, and I hope that what I am about to read to you will be of some assistance to you, and I will do my best to give you suitable replies to any questions which are raised.

PAPER ON BULK SUPPLY

By G. R. E. WRIGHT

ELECTRICAL ENGINEER, BENONI.

Any paper on Bulk supply must necessarily concern two parties who must work in the closest co-operation with each other. The Bulk Supply Authority, on the one hand, who has to provide the supply which is delivered at one or more points to the consumer, or Distributing Authority, on the other hand, who receives the supply and distributes it.

The duty of the Bulk Supply Authority is to provide a supply of electricity as and when required by the consumer, and to make provision for the normal increase in load and any abnormal increases which the consumer may demand.

It is established, other conditions being equal, such as availability and cost of fuel and water (assuming coal fired stations) and load factor, that the average total costs of generation will decrease as the size of station and generating sets and output of electricity increases. It is to be expected that, with a large station, it will be practicable to advantageously generate and transmit supplies over considerable distances to the area of an authority operating on any considerably smaller scale.

In addition, the large station, by the wide diversity of its supplies, operates with a relatively high load factor, that is, there is a high utilisation factor of the plant installed, the generating costs of the large station will be further reduced enabling bulk supplies to be economically available to distributors in areas at increased distances from the generating station.

The authority to distribute a public utility commodity such as electricity supply, carries with it the obligation to provide (a) continuity of supply, (b) voltage regulation, (c) requirements of all new consumers and increases in the demands of existing consumers. In respect to (a), and, to same extent (b), there is some fundamental advantages in a distributing authority taking its supply from a station in or near to the area, but with modern transmission line construction, and, if it is an important supply, duplicate lines, and available facilities for voltage regulation, (a) and (b) can be regarded as provided for by the usual general terms of a bulk supply agreement. Conformity with (c) is generally more easily arranged with a large power station than with a small power station, the increases in plant from time to time to meet increasing demands do not, as a rule, represent so large a proportionate increase of the installed plant in the large station as in the case of a relatively small station, where, in most cases, it is necessary to add plant considerably in advance of its increasing requirements involving caiptal expenditure which for a time is not revenue-earning.

Generally speaking, a distributing authority may meet its obligations either by generating its own supply or purchasing it from a bulk supply authority and the decision to adopt one or other method is almost always a matter of the relative cost per unit of supply delivered in the area of the distributing authority.

If a distributing authority can purchase its requirements under terms which meet the authority's obligations more cheaply than by generating them in its own station, there can be little justification for incurring the capital expenditure involved by the latter with its annual charges for interest and redemption. It has, however, been argued, in the case of a relatively small distributing authority, that consideration must be given to the spending value to the town of a power station staff.

It will be obvious that conditions in some areas provide better facilities for economic bulk supply than in others. On the Witwatersrand, for instance, the relatively enormous demands of the mining and associated industries for electric power have necessitated the construction of a number of large stations, the Klip station being the largest in the southern hemisphere, and a network of E.H.T. overhead lines covering a wide area and extending well into the Orange Free State. Thus the power generation and transmission initially provided for the mining industries are in the main readily available over a large area for bulk supplies to authorized town distribut-

ing authorities, and, as the schedule shows, has, to a large extent, been taken advantage of. In addition to generating on a large scale with large generating sets and boilers, the Klip, Vaal and Witbank stations are supplied with coal varying from, say, 3/- to 4/6d. per 2,000 lbs. mined in the immediate vicinity of the stations and therefore incurring little or no railage charges. The cost of coal delivered to any authorized distributor in the Witwatersrand area for generating its own electricity would probably be double these figures, due mainly to railway freight charges. Nevertheless, it is of interest to note from published figures that the total generating costs of the Klerksdorp Municipality are 0.675d. per unit sold, and it is to be presumed that, notwithstanding duplicate 88 kV. lines of the Witwatersrand system extend to that town, apparently no more favourable terms have been offered to the Municipality for a bulk supply.

While coal deposits are distributed over wide areas of the Union, so far these have only been extensively worked in the Witbank area of the Transvaal and in the Dundee area of Natal. Compared with the Northern Transvaal coal, the supplies of Natal coal are limited, and Transvaal coal is being regularly railed over distances as far as Cape Town for use in power stations. When coal supplies involve these long hauls, the freight charges become the main item in the coal cost. It will be seen that the difference in the cost of coal to the large generating authorities and the smaller authorities in the Cape is relatively much less than in the Witwatersrand area, and one condition for low cost of generation by big power stations for large areas obtaining there, does not obtain in large areas of the Cape to anything like the same extent.

The electrification of the Natal main line, with a power station conveniently located in relation to the Natal collieries, brought into use duplicate 88 kV. transmission lines from Durban to Volksrust and, with the sub-stations installed for traction power supply, provided the nucleus of the Natal Central Undertaking and facilitated bulk supply to a number of Municipal distributors along and, for appreciable distances, on either side of the main line, in most cases superseding small generating plants.

Generally, with progressive electrification of the S.A.R. & H. main lines and possibly the ultimate electrification of the entire S.A.R. & H. system, with the exception of certain branch lines that can be economically worked with light steam or Diesel engine trains, with large power stations located to suit railway electrification, mining, industrial and agricultural and general development throughout the Union, the probabilities are that, with the exception of the four or five largest Municipalities, the majority of distributing authorities will find themselves, in the course of time, within the economic supply range of a large station of an authority prepared to offer bluk supply on advantageous terms.

It is the duty of the Bulk Supply Authority to make a supply available at a stipulated pressure and frequency, any variation usually being the subject of a penalty clause in the contract to supply. There are various methods of maintaining the pressure of supply, such as manual or automatic or load tap changing transformers, induction regulators, etc.

Metering.

It is customary for two sets of metering equipment to be installed, one by the supplier and the other by the consumer, the mean average being taken as the true consumption.

Maximum demand charges are arrived at in the same manner as the unit charges, the only difference being that the maximum demand charge may be based on a 15, 30, or 60 minute demand, either per month or per annum.

In the case of a supply being taken at more than one point from the Bulk Supply Authority's mains, it is advisable to enter into an agreement whereby the benefit of any diversity in maximum demand at the various points may be taken advantage of. For this purpose special recording maximum demand meters are necessary or a summation meter requiring pilot cable between the metering points.

In order to ensure continued accuracy in the main metering equipment it is neces-

sary to have half yearly check readings taken by means of portable rotary sub-standard meters, the period of checking should not be less than one full average week, the accuracy of the joint metering equipment being corrected to the accuracy of the sub-standard meter, which accuracy is applied to the monthly consumptions until the next test.

Responsibility.

In any agreement between supplier and consumer there must naturally be a dividing line where the responsibility of the one ends and the other begins, and in the case of a Bulk Supply this is usually at the consumers Bus-Bars at the point of supply. Nevertheless it can generally be accepted that the supplier will never refuse assistance or advice to the consumer, the supplier usually being a large undertaking with more facilities available than the consumer.

Continuity of Supply.

Continuity of Supply is a cardinal feature of modern Electricity supply and with this object continually in view, every effort to maintain supply is made by means of Ring Feeders, Automatic Reclosing Switches, adequate protective devices, etc., and inter-station signals and telephones.

Reasons for taking Bulk Supply.

The following comparative schedule gives some indication of the total costs per unit for Undertakings generating and distributing and for Undertakings purchasing in bulk and distributing.

May I here digress a little and say that I wholeheartedly endorse Past President Clinton's remarks in connection with the compilation of the tables contained in the Municipal Year Book. Let me make it clear, however, that I have no complaint against the editors; the complaint is against those Engineers who supply the information; it is only when one desires to make use of the tables for comparative purposes, that the large number of errors become apparent. In the end one tends to despair of using any of the figures available.

Therefore, in submitting the figures contained in the schedule no responsibility for their accuracy can be accepted.

The schedule has been drawn up with a view, as far as possible, of drawing a comparison between Undertakings selling approximately the same number of units. It has been endeavoured to avoid including present day Bulk Supply Undertakings, which originally had their own stations and which might still be loaded with the whole or part of the original Station Capital Costs.

Unfortunately, no comparison can be made between Generating Stations and Bulk Supply, beyond outputs of 30,000,000 units, as there as yet no Bulk Supply Undertakings above this total number of units.

In conclusion it would appear that from the Statistics available there is a general advantage in favour of taking a Bulk Supply.

Nevertheless, it would be extremely dangerous to assume that a Bulk Supply must of necessity be more advantageous than a Generating Station. Each individual Undertaking must naturally be considered separately and on its merits.

For the benefit of our Councillor friends present may I repeat a definition of an Engineer which I once heard: "An Engineer is a person who spends other people's money wisely."

Therefore, Councillors, if your Engineer recommends a Power Station in preference to a Bulk Supply, it is not that the Engineer wants an additional toy to play with, but his recommendation is based on sound economic reasons.

SCHEDULE OF UNITS SOLD AND TOTAL EXPENSES BETWEEN GENERATING AND BULK SUPPLY UDERTAKINGS UP TO 30,000,000 UNITS PER ANNUM.

TOWN.		UNITS SOLD.		TOTAL EXPENSES.	
Generating.	Bulk Supply.	Generating	Bulk Supply.	Generating	Bulk Supply
Bloemfontein	Benoni	29,594,000	23,222,000	0.964	0.703
Klerksdorp	Brakpan	9,264,000	10,706,000	0.675	0.922
Grahamstown	Stellenbosch	6,445,000	3,982,000	1.31	1.27
Aliwal North	Bethlehem	2,072,000	2,952,000	1.28	1.872
Cradock	Livingstone	1,488,000	1,725,000	2.30	2.22
Ermelo	Dundee	1,043,000	947.000	1.82	2.28
Ficksburg	Glencoe	879,000	799,000	2.01	1.86
Burghersdorp	Hermanus	636,000	949,000	2.59	2.70

Figures taken from Municipal Year Book, 1944/45.

THE PRESIDENT: I think you will agree with me that we owe Mr. Wright a hearty vote of thanks for this short but lucid paper. It is on a subject which we feel is becoming of increasing interest to a large number of the smaller municipalities. As the Commission's lines spread over a larger part of the Union this question crops up, and we thought it would be a good thing for the engineers, as well as the Councillor members, to have some knowledge of Bulk Supply. Mr. Wright, on behalf of the Association, many thanks. The subjects is now open for discussion.

MR. JONES (Mafeking): I should like to express my appreciation to Mr. Wright for this interesting and instructive paper. My Council is at present considering a supply by means of a long distance transmission line, and it would be of considerable interest and assistance if he could inform me:—

(a) In the usual bulk supply to the Reef towns and those further afield, such as Klerksdorp, Bethlehem, Stellenbosch, etc., what is the available short circuit capacity one has to take into account, and what changes are likely to take place in future.
(b) What is the record of outages on a double circuit supply to Reef towns? Can the author state the number per annum, the maximum duration of an outage, and the average duration.
(c) Are there any intentional outages due to need for line maintenance, etc.
(d) In view of the need to keep consumers' voltage between limits of plus or minus 5 per cent both for the sake of the practical limitations and the economics of supply, what are the limits of voltage variation of H.T. supply. Are difficulties experienced by towns other than the Reef, say, Klerksdorp, Bethlehem, etc.
(e) What are the frequency variations?
(f) Are there any fine limits set for protection of plant and equipment in a Reef supply or the remoter towns?

THE PRESIDENT: We are very pressed with our programme, and I think it will be as well for Mr. Wright to take a note of these points and reply to them in writing. That will give Mr. Wright an opportunity to correlate them in one reply.

Agreed.

Mr. Wright's replies to the questions put by Mr. Jones are as follows:—

Communicated.

(a) Short Circuit Capacity is dependant on numerous factors and can only be confirmed by the Generating Authority.
(b) For all practical purposes the number of outages on a double circuit supply to Reef towns is nil, the continuity of supply being 100%.
(c) On a double circuit supply the intentional outages are nil, all inspections and repairs being carried out at periods of low load.

(d) The limits of voltage variations should not exceed 10%. It is understood that voltage variations of 15% have been common in Klerksdorp.
(e) Frequency variations on the Reef are nil. It is understood that frequency variations up to 5% or 6% have been experienced at Klerksdorp.
(f) The Generating Authority fixes the limits of protection at a figure slightly lower than their own setting.

MR. HALLE (Pietermaritzburg): I am rather surprised to hear there is no bulk supply beyond 30 million units a year. We took 32 million units from the Commission last year, and we hope to take a lot more this year. I could help Mr. Wright if he wants information later. But the question I would like to ask is on the subject of metering. It says. "In the case of a supply being taken at more than one point from the Bulk Supply Authorities' mains, it is advisable to enter into an agreement whereby the benefit of any diversity in maximum demand at the various points may be taken advantage of. For this purpose special recording maximum demand meters are necessary or a summation meter requiring pilot cable between the metering points." I can imagine that over short distances, but has that been done over six miles, which we have. I cannot see the possibility of a summation meter over that distance.

MR. STEVENS (Ladysmith): As an Engineer in charge of an undertaking that takes a bulk supply from the Electricity Supply Commission, I, like many others in the same position, am particularly interested in Mr. Wright's paper.

Referring to the fourth paragraph on page 2 I was surprised to learn that supplies of Natal coal were limited compared with other sources of coal in the Union, for it was only recently I was studying a geological map of the Garden Province which showed where minerals could be found and the impression I got was that there was almost limitless supplies of coal in Natal, particularly in the North West.

Regarding periodic testing of meters I am of the opinion that annual tests are sufficient. At Ladysmith we have Kw. Hr. meters on each of our three main feeder panels and while the aggregate of the readings line up with the Commission's meter it is felt that there is nothing to fear.

MR. GRIPPER (Worcester): I would like to make a few comments and add my appreciation of Mr. Wright's paper. He raised the question of the Tables; and I think this is an opportunity to mention that it is the possibility of a misunderstanding either by the contributor or the reader that causes these tables to be less useful than they might be. The tables do not make it clear whether or not the undertaking has included revenue and expenditure on departmental trading, and in some municipalities quite a considerable amount of the revenue is from sources other than the supply of electricity. Given that this can be separated, it is still a little difficult to follow the tables when capital expended on distribution, generation and special charges, are not shown separately. These are points which I think could be considered with advantage by the sub-committee formed to deal with these tables, and finally, I suggest that this committee takes into account the point, as in our own case and maybe others, where we generate and purchase and do not know which table to fill in. There are two difinite sections of the table — Purchasing bulk supply, and Generating. If you have your own generators you are expected to put your name on the generating table. But it may be that you need only a standby Set. To-day we in Worcester generate most of our load but we are dependent on one line for our purchased supply and we have a fair degree of continuity, but that line comes off a ring which is opened on occasions and it depends which side my friend Mr. Relihan is on whether we suffer or not.

MR. SIBSON (Bulawayo): I would like to thank Mr. Wright for this paper, which is an important one, introducing a controversial matter which must be before the minds of many people today. There are one or two things I would like to comment on. Mr. Wright is dealing principally with Benoni, and the Benoni demands compared with the capacities of the stations that supply Benoni is a small proportion. I think we should be careful not to generalise too much about the advantages of bulk supply as

opposed to local generation. Certainly, I should say that where the demand of a particular local authority is a large proportion of the capacity of the supplying authority's plant, any advantages of bulk supply immediately fall away. There are cerain semi-political issues involved in this question. Where the demand of the consumer is small, as in the case of Benoni, in comparison with the network of the main authority, there is no difficulty at all about increases of load. Benoni can double its load tomorrow probably without embarrassing the supply authority; but the position is not the same where the consumer requires a very large proportion of the total capacity, and one can visualise quite considerable interference in the economic life of the country by any large supply authority not taking adequate steps, for one reason or another—usually justifiable—in providing increased demands to a consumer already fairly large. That is a point which Councillors particularly should bear in mind in the larger towns, because Mr. Wright has said in his paper that he visualises bulk supplies in the future embracing an increasing number of undertakings, even extending to some of the larger ones. So long as you control your own generating facilities, so long you can make provision for the future, and once you have handed that power to some other authority, provision for the future has also been handed over, and you may find yourselves being controlled, as far as future development is concerned, by this authority; and that I think no local authority should permit. I would just sound that note of warning. I would also say that the position in England is quite different from the position that appears to be growing up in this country. Until quite recently there has not been a single power station in England owned by the central authority. The central authorities confine themselves to supplying power in between the power stations. The power stations are owned by the local authorities or private companies, and it has been realised there is great danger in allowing the central authority to control supply. I would just like to criticise the schedule Mr. Wright has prepared. I know he has prepared himself for criticism by saying it is drawn from unsatisfactory tables, but here is a schedule, and it will stick in your minds long after you have forgotten the unsatisfactory nature of its origin. There are certain things which are not mentioned here. Taking the first one, Bloemfontein and Benoni, we are given figures of 0.964 for Bloemfontein and 0.703 for Benoni, but it is not pointed out that, amongst other things the distance from the coal supplies has a bearing on costs. In the comparison between Livingstone and Cradock, it is not mentioned that the former derives its supply from a Hydro-electric station, and cannot therefore be compared, without reservation, with the latter. I just mention these points to underline the fact that these figures may mean nothing at all. The intention is to show that bulk supply tends to be cheaper than local generation, but there are many other factors which have to be taken into account.

MR. EASTMAN: I wish to add my mead of thanks to Mr. Wright for his paper, but I do not propose to deal with matters in detail. They have been dealt with by others. But I wish to deal with two items in which there is some reference indirectly to the giving of supplies at large distances from the coalfields — way down in the Cape. Mention is made, for example of the use of large distances from the coalfields of Transvaal coal. The fact is that we cannot now get enough coal from Natal from which province we obtained our coal for many years, for the reason that the coal which we prefer to have is of a good coking qualities. The authorities have, therefore, ruled that we are not to have for ordinary combustion purposes the large quantity of good coking coal which we previously used, and so at least 100,000 tons of the 140,000 tons of coal which otherwise we would get from Natal is used for steel making by being changed into coke for the purpose; and the rest of the 140,000 tons, which otherwise we would get from Natal, we get from the Transvaal, together with a large quantity more.

The other point to which I wish to refer is the debate. Mr. Wright opens in the paragraph at the top of page three, through which we have a peep at major power policies. The phrase to which I refer is "the probabilities are that with the exception of the four or five larger municipalities, the majority of distributing

authorities will find themselves, in the course of time, within the economic supply range of a large station of an authority prepared to offer bulk supply on advantageous terms." In South Africa, the possibilities of major development of electricity supply are governed mainly by the existence of sufficiently large supplies of water, for condenser circulating purposes. There will always be a very large number of small isolated communities which will never get a bulk supply from anybody; they are too far apart. We have a large number of representatives of them at our meeting today. But where there are abundant supplies of water — and the areas in which large supplies of water exist are a small proportion of the whole country — there one can hope to see this policy put into effect. It is already in operation on a large scale in the Transvaal. Whether it will be possible here in Bloemfontein, with your gold productivity now beginning, will determine largely the growth of the City and its environs.

In the far South a sufficient water supply for large developments are restricted to the area extending between Cape Town and Port Elizabeth. That enormous area, within a hundred miles inland from the sea, is mostly a very fertile district capable of great expansion from the agricultural and manufacturing stand points, and is probably richer than any other part of S. Africa, except, maybe, the Eastern Transvaal. There I visualise the possibility of extensive developments of electricity, by the interconnection of existing power stations, and with an additional station at a point between Cape Town and Mossel Bay, the whole system being operated by a large central authority working in conjunction with the major municipalities in the districts served. Development of that area is now in fact handicapped mainly by reason of the fact that electricity is not available for development purposes on a large scale.

MR. KINSMAN (Durban): I do not want to take more time than necessary in dealing with Mr. Wright's paper, but it is a very valuable contribution, because there will be, with the extension of trunk transmission lines, more attention needed to be given by smaller municipalities, within economic range of the large bulk supply authorities, to these factors, which must be taken into account. But one point has not been touched on that is that the decision would not rest with the local authority concerned in the event of their wishing to increase the generating capacity by more than ten per cent. I think it is common to all provinces that application is made to the Administrator, who calls for a report from the Electricity Supply Commission, and having decided what is in the best interests of the local authority, authority is given for the extension of the plant, or negotiations to be entered into with the Electricity Supply Commission for a bulk supply. I think it is very timely that such a paper as Mr. Wright's has been presented, when that is more and more in the near future the problem that will be faced by the smaller municipalities. There are a number of factors that come into it, and on an historical point, I would mention the case of Durban. In 1921 and 1922, just about the time of industrial unrest, and before the days of the Industrial Conciliation Act, Durban found itself faced with a dispute between the employees and the Council. The employees set up a Board of control and attempted to run Durban for 48 hours. Plans were later drawn up by the Council for a new power station in the vicinity of the site now occupied by the E.S.C. at Congella. The railway authorities were vitally interested, owing to the projected extension of the Natal Main Line, and one of the arguments used by the South African Railways and Harbours management was that the supply of electricity on a national railway dare not be left in the hands of a local authority, subject as it was, and had recently been, to disputes between the employees and the Council. That was one of the arguments adduced in favour of taking a supply from somebody such as the E.S.C. After the different views had been exchanged, Durban entered into an agreement with the E. S. C., which led to the establishment of the Congella Power Station. Most of the points raised by Mr. Wright do not arise in that case, because it is in the City of Durban, and Durban purchases its supply at the front door of the Congella power station.

THE PRESIDENT: Mr. Fraser intimated that he had prepared a contribution,

but, in view of the passage of time, proposes to hand it in to the Secretary for incorporation in the Journal. Do you agree that any further contributions be handed in to the Secretary in writing? Agreed.

MR. FRASER — communicated: The author is to be congratulated on a paper which sets out very concisely the benefits to be found in taking bulk supply, and the conditions under which it is advantageous to the distributing authority. This paper, however, deals mainly with the subject from the point of view of the smaller municipal undertakings, and the following remarks review the position as seen by the larger municipality, which may have very sound economic and other reasons for preferring to retain and expand its own generating plant. As the author states, it is extremely dangerous to assume that a bulk supply must of necessity be more advantageous than a generating station.

While it is undoubtedly true that the thermal efficiency of generating plant increases with the size of units used, it must be borne in mind that the largest stations are not necessarily the most economical, and, as regards capital cost per Kw. installed, a stage is reached — in the region of 200,000 Kw. — where this figure increases in direct proportion to the capacity. A factor affecting generation in South Africa is that the size of sets which can be installed inland is limited by railway facilities, 33,000 Kw. apparently being the limit at present. This precludes the use of very large units with their slightly improved thermal and overall economic efficiencies. A survey of 56 generating plants in the U.S.A., made by the "Electrical World" in 1939, revealed that medium sized plants of the 50,000 to 100,000 Kw. group had the lowest power generation costs. Another rather interesting fact brought to light by this survey is that stations of the order of 100,000 Kw. required the lowest plant staffs per Kw. The fixed charges for very large stations are relatively slightly less than those for medium sizes, but this is offset by the increased production costs, so that the total energy cost varies but little between medium and very large sized stations.

Another factor which is of considerable importance, but which cannot readily be assessed on purely economic grounds, is the increased flexibility of operation resulting from having both the generating stations and the distribution department under a single administration. By avoiding duplication of such branches as accounting, stores and transport as well as technical and drawing offices, all of which can readily serve a generating station at the same time as a distribution department, more economical management and administration are likely to result. A single central workshop is able to do a large part of the work of both departments, except for normal routine — maintenance which is carried out by the station staff. If necessary it is possible to switch both staff and artisans from one department to the other in order to cope with new construction or alterations.

For most modern plants built up to the outbreak of war the generation costs were approximately equal to the fixed charges, although of course the ratio varied with station load factor, cost of coal and cost and availability of water. Even before the war capital costs were raising and it is not possible to compare directly the performance of the Orlando generating station with that of Klip, as the latter was tendered for towards the end of the depression and its capital costs are only £15 per Kw. as against £25 5s. 0d. for Orlando. With present-day costs of generating plant only the cheapest equipment would be justifiable in this part of South Africa, where coal is relatively cheap, as any economy in fuel consumption gained as the result of improved efficiency would be small in comparison with the capital charges involved. As a result of this tendency the ratio of the cost of transmitting power to the cost of trucking coal will increase, and any advantages accruing from the transmission of bulk supply from stations situated on a coal field will decrease. Whether this is only a passing phase after which prices will return to their pre-war level it is not possible to say.

For the large power supply authority possibly the ideal situation is that existing today in the Southern Transvaal, where three large undertakings are interconnected, and

are thus able to render assistance to each other in times of trouble, although normally there is comparatively little interchange of power. This state of affairs is both in the national interest as well as to the economic advantage of the parties concerned, and the smooth manner in which the agreements have operated augurs well for the future.

MR. DWYER (Stranger): I wish to associate myself with those members who had the opportunity of thanking Mr. Wright for his interesting, if short, paper on Bulk Supply, which I was hoping would produce a long and instructive discussion. It came as a geat disappointment therefore to me to find that so short a time could be devoted to it. thus making it necessary for further contributions to be communicated.

The few members who did speak on the subject were agreed that this question of bulk supply is a very important one today and it is likely to be even more important during these post-war years as High Tension Transmission lines from large Central Undertakings spread further and further afield. That there are numbers of urban supply is unquestionable and I would like local authorities today considering bulk to suggest that the Executive Committee arrange for a much more comprehensive paper on Bulk Supply to be read at the next Convention in Durban and that adequate time be set aside for full discussion.

For several years now Stranger have been concerned with the matter of Bulk Supply, and comparative costs of Crude oil, steam and Hydro-Electric Generation have been investigated. A 700 Kw. Hydro-Electric Scheme on the Umvoti River estimated to cost about £80,000 was recently approved, and it is proposed to supply a partial off-season load to certain sugar mills and a tea factory within a range of 3 to 4 miles. This will enable the full capacity of the station to be reached within a matter of 10 years or so by which time it is probable that the E.S.C. will be operating in close proximity to our area of supply.

I mention these facts to show that while we will be in a position to generate at a price more economical than bulk supply, we will nevertheless have again in a few years to consider the question of bulk supply to augment our Hydro Station.

Mr. Wright has confined his remarks to steam operated generation as an alternative to bulk supply and he has shown from figures taken from the Municipal Year Book that in several instances, even in the case of medium-sized Power Stations, that bulk supply costs have exceeded the steam costs. It must be apparent that some of the smaller stations who generate at least partially by Hydro-driven Sets, that their costs must compare favourably with bulk supply. Such cases could be analysed in detail in a comprehensive paper on bulk supply. To my mind large potential supplies of electrical energy are available on rivers such as the Tugela if the E.S.C. and the Irrigation Department would put their heads together.

The Year Book figures cannot be taken as an accurate guide and I would suggest that in any comparisons made in a comprehensive paper on "Bulk Supply" the figures of the various undertakings be confirmed by the Engineer of the Undertaking concerned, so that there can be no misunderstanding as to what is actually required.

THE PRESIDENT: We really want to combine items 4 and 9 — that is, the Overhead Lines report and this letter from the Inspector of Factories, which has a special reference to overhead lines. Mr. Fraser will lead off with the Overhead Lines report, and immediately after that the Secretary will read a letter received from the Inspector of Factories. After that we will provide an opportunity for discussion.

REPORT ON OVERHEAD LINES CODE OF PRACTICE.

MR. FRASER:

It will be noted that the title of this report has been altered from the original, which was "Overhead Lines Regulations." This is due to the fact that the Committee, appointed by the South African Institute of Electrical Engineers to handle this matter, was of the opinion that the time was not ripe to approach any Government body

with suggestions for the amendment of existing overhead line Regulations but that, nevertheless, it was necessary, particularly for smaller municipalities and other concerns who may erect overhead lines, to give some guidance in the form of a code of recommended practice. The name of the Committee was therefore changed to "The Overhead Lines Code of Practice Committee," and the following bodies are represented on it:—

The South African Institute of Electrical Engineers.

The South African Institute of Engineers

The Institution of Certificated Engineers.

The Electricity Supply Commission.

The Victoria Falls and Transvaal Power Company Limited.

The Association of Municipal Electricity Undertakings.

The Department of Posts and Telegraphs

The South African Railways and Harbours.

The Public Works Department.

The Transvaal Chamber of Mines.

Safety Precautions Committee.

Government Mining Engineer.

Chief Inspector of Factories.

Further decisions reached by this Committee were:—

1. That, although some measure of standardisation of design for overhead lines was desirable, this aspect was outside the terms of reference of this Committee, and was a subject that should be referred to the South African Standards Institution.

2. That, as the question of electrolysis was already receiving the attention of a specially appointed Committee, it would not come within the scope of this Committee.

In order to handle that matter most expeditiously, a Sub-Committee of four members was appointed to draw up a preliminary "Code of Practice," and the first draft was submitted to the main Committee at its meeting held in October, 1945. This draft, with certain recommendations for alterations, was referred back to the Drafting Sub-Committee to which, in order to enable it to cope more efficiently with its duties, a further three members were appointed. This Sub-Committee is at present meeting twice each month and is making steady progress.

The following brief outline shows the ground being covered and, incidently, gives an indication of the magnitude of the work to be done:—

General Requirements:

Standards to be observed:
Basic conditions of loading:
Wind,
Ice,
Maximum and minimum temperatures.
Protection against hazards:
Displaced conductors.
Prevention of danger,
Proximity to buildings.
Inductive interference:
Separation,
Danger,
Noise interference.
Parallel lines:
Independent structures,
Common structures.

Conductors:

Requirements:
Material (L.V. and H.V. lines and earth wires).
Minimum sizes (service connections, L.V. and H.V. lines, etc.).
Strength:
Wires,
Fatigue,
Joints.

Supports and Fittings:

Strength:
Collapsing of supports,
Overturning,
Longitudinal,
Broken conductors,
Insulators and Fittings.
Clearances:
Vertical:
H.V. lines above 6000 volts,
H.V. lines below 6000 volts,

L.V. lines,
Communication circuits,
Road or rail crossings.

Clearance to other lines.
Earthed wires,
Horizontal clearance.

Erection:
Crossings,
Earthing bows,
Lines parallel to recognized thoroughfares.
Special precautions,
Crossing electrified tracks,
Anti-climbing devices.

Stays:
Stranding,
Factor of safety,
Electrical protection,
Mechanical protection.

Earthing:

General:
Metalwork,
Earth wire,
Maximum impedance.

Procedure:

Form of application to Postmaster-General,
Form of application to National Road Board,
Form of application to Government Mining Engineer,

Form of application to Chief Inspector of Factories.

From this it will be seen that the suggestions put forward by members of this Association, with the exception of those concerned more with the standardisation of design and layout, are receiving attention.

J. C. FRASER,
A.M.I.E.E., M.I.Mech.E.,
General Manager,
Electricity Department,
Johannesburg.

THE PRESIDENT: Before we discuss the Report, I will ask the Secretary to read this letter.

Department of Labour,
Marshall Street,
Johannesburg,
13-3-1946.

Assistant Town Engineer (Electrical),
P.O. Box 217,
ROODEPOORT.

Dear Sir,

With reference to your letter A.1/8 dated 17th January, 1946, dealing with the earthing of the neutral, since poles are "accessible metalwork" which can become accidentally alive, earthing is necessary.

As the resistance of the pole to the general mass of earth is usually sufficiently high to permit the pole becoming alive in the event of a phase conductor making accidental contact with the cross-arm, an earth continuity conductor is necessary from pole to pole and connected to earth-electrodes as often as necessary.

Earthing the neutral, using metal "insulators" could serve the double purpose of neutral and earth continuity conductor.

Adequate precautions would have to be taken to prevent such a neutral breaking and to ensure that should a break occur, the supply must trip out.

Multiple earthing will be necessary to provide a resistance of not more than 1 Ohm (Standard Wiring Regulations).

If these precautions are taken I can see no reason why a multiple earthed neutral should not combine both functions, viz., neutral and earth continuity conductor.

Yours faithfully,

J. O. PENTZ,
Inspector of Factories,
Engineering.

THE PRESIDENT: We thought these matters were closely related and the matter is now open for discussion. You may discuss both the report of Mr. Fraser and this letter.

MR. SIBSON (Bulawayo): I have nothing to say on the report of the Overhead Lines Regulations Committee that can be of any value, but I would like to refer to the circular letter. That is a matter of considerable interest to us. I agree something of this sort is obviously necessary. We have

had two or three occasions where poles have become alive to earth, and I have measured up 180 volts from the pole to an earth point about six feet away from it. There is no doubt about the danger of having poles not connected in some positive way to an earthing point. Contact between the earth and a pole buried five or six feet in the ground is quite inadequate to provide any safeguard. I do agree that adequate precautions have to be taken to prevent the neutral breaking, but I do not know how you are going to ensure that the supply is tripped out if it breaks. I suppose something could be devised, but since most Low Tension supplies are controlled by fuses it would be most uneconomic; it would mean having automatic switches on each circuit. I have an alternative suggestion to make which might be considered by the Inspector of Factories, and that is that instead of having one neutral, you have two. You can visualise a 3-phase 4-wire circuit in which your 3 phases are arranged in the centre, one on the pole top and two on either side, and at the extremities of the cross-arm, and below, two neutrals each half the section of the phases. These would be connected to the cross-arm at the points of support. The likelihood of two neutrals breaking together is extremely remote. It would only occur in circumstances which would break the whole line. Where one neutral can be expected to suffer a casual break, I cannot imagine two breaking for no particular reason. Also it gives an additional advantage, in that those people who like earthbows can provide them, say 18 inches on either side of the cross-arm by connecting the two neutrals together, which would ensure blowing of the fuse in the event of a conductor falling to the ground. Cradling, too, where necessary, is made easy in the same way. There are several other advantages that will appear from having a double multiple-earthed neutral, but I suggest it is one way of meeting the difficulties of the Inspector of Factories.

MR. MULLER (Upington): I actually prepared a Paper for this Convention, dealing with Earth Leakage Protection, Railage on Coal and Municipal Security, but the Secretary rightly pointed out that the paper was too late for publication and that these subjects already appeared in our Agenda, hence I would have the opportunity of expressing my views at the Convention.

I must point out that there is no other organisation or body in the Country that can so rightly be called the "Guardian of Distribution and the Consumers" as the A.M.E.U. While there are Officials to inforce the Law, they have for many years, been too lenient. After many years, yon can still see an insignificant length of A.M.E. wire in the line wire to the Consumers' premises — not sufficient to clear the roof or owner's property line and this is constructed as sufficient protection to comply with legal requirements as affecting safety precautions for overhead connections.

The Law assumes certain conditions when certain safety measures are demanded, but in practice such conditions are not the rule. It can be taken for granted that these Officials will welcome any suggestions we can make from our collective experience over many years for some system that offers greater safety .

The earthing methods hitherto adopted have possibly averted many thousands of accidents to life and property, but these methods have also been the direct cause of alarming numbers of deaths. This refers to the earthing system as a whole.

Hitherto the most satisfactory method was the use of the town's water mains but with increasing use of concrete and asbestos cement pipes, some other method must be adopted that will provide a reliable earth continuity conductor. Of late the oft tried multiple earthing system is coming in use, but this is not satisfactory and can give rise to potential gradients that can be dangerous to life and especially to livestock.

As an instance of how multiple earthing is constructed in a certain town, I must explain that the normally insulated neutral is used, but in making service connections the free end of the neutral is wound around a cross-arm or pole forming multiple earthing as such after being connected to the neutral. Now it frequently happens in that town that lightning surges break down the insulation of the line side in the wiring in-

stallation and is contacted to the tubing. Their remedy is very simple. They merely change the leads on the roof, thereby bringing all switches on the return wire side. Imagine a correctly serviced three pin plug on a radiator with open element, which now becomes a lethal instrument.

Apart from this, the Consumer can make a physical contact with the supply at dangerous potential in many ways under certain conditions, with such use of multiple earthing.

Even with the use of water mains, there is no means of securing the earth wire in a manner that is not open to interference and in any case the correct method is to connect such wire to the municipal side of the water meter, thereby traversing the owners ground where the connection can be broken with a spade, or in many ways, with no one the wiser.

Engineers cannot for a moment contemplate an unearthed system yet the methods adopted for safety are too often the cause of accidents.

Is there an engineer present here who can say that he has not had the experience of a line wire resting on a metal cross-arm, where metal poles are used, and only discovered such fault when seen, or during night load when abnormal current was indicated on that line? If the multiple earthed system is considered, then there is no line of demarcation in its correct use and you still lack a safe earth continuity conductor that is visible at all times and subject to the same attention as any line conductor.

The Law requires that all steel poles shall be correctly bonded to earth, so why not have such bonding wire overhead where it is assured of effective continuity? Even with wooden poles, the metal cross-arms at least can be bonded.

For the past 30 years I have had actual practical experience of both systems — the old way with the neutral at the extreme top, but for the past 20 years I have favoured the split neutral and can give the assurance that it is far less dangerous for live line work than with the neutral on top.

Today, and especially with rural distribution, it is necessary to have a neutral conductor of at least equal cross section to any line conductor, so my suggestion is to convert the usual insulated split neutral—each conductor at least equal to a line conductor, into a system which makes the one conductor a multiple earthed conductor firmly clamped (without insulator) on the metal cross-arm which is 18 inches below any other conductors and longer than the other cross-arms. The conductor which is multiple earthed should preferably be the one on the off street side, that is, on the property side. This then still froms the perfect cradle over telegraph lines, crossings, etc., with bridge wires as usual, but with this difference, that all these bridge wires and the bridges on either side of each pole are metal bonded only on the insulated neutral conductor. Before bonding on the multiple earthed conductor a tiny aerial insulator is inserted in the bridge wire and hard up against the multiple earthed conductor. The chances that a fallen line conductor will land on this little insulator, are remote. Where many bridges are required at a cradle the position of the aerial insulators can be staggered. Alternatively one additional cradle wire or complete cradles can be made where required as long as the insulated neutral conductor is maintained as such and is only earthed at a few known points.

In making the overhead connections A.M.E. wire, which should rightly run from shackle to shackle and also for the neutral, is then joined with a short length of bare wire clearing the neutral cross-arm. It will then be seen that full protection is afforded against line conductors falling and also against all consumer's service wires falling. All of which must touch either the neutral or the multiple earthed conductor in falling when all "live" conductors will form a direct short circuit. Naturally the service connection neutral need not be considered, but there again, if it is not all insulated and breaks, then the end laying on the consumer's ground is at line potential.

If insulated, there is only the remote chance of contact by way of exposed point or end.

Finally the multiple earthed conductor is also brought in as a bare wire directly to the consumer's roof, and is bonded to all

metal roofs, and all parts of the installation, ect., that should be earthed in the usual way. It makes a somewhat clumsy arrangement of the overhead connections more so, but should not be considered in that light and also not in terms of additional cost, which is nominal. General Rate appropriates surplus Electrical Revenue — why not use some of this money to bring the distribution in safe order.

Mr. President and Gentlemen, I conclude with the earnest wish that some such method will be considered as standard practice finally to provide a correct low resistance earth continuity conductor, which is at all times visible and subject to the same attention as line conductors and is immune from unauthorised interference.

MR. STEVENS (Ladysmith): As a matter of interest, at Ladysmith we have had a multiple earthed neutral system in operation for years, though it is only since I went there about 8 years ago that it has been recognised as an earthed neutral system. To ensure that no part of the neutral can assume a potential above earth should it break, both ends are connected to a common earth system. Where this is not practicable, as in the case of short lines leading off the principal overhead mains, the neutral is insulated and a continuity earth wire run from pole to pole. An earth wire is being run from the multiple earthed mains neutral to the roof and installation earths of premises because of the advent of composition water mains, With this arrangement we have been able to ensure that the installation earths are within I Ohm.

Actual figures for one hundred installations taken at random are as follows:—

Resistance	Percent	Resistance	Percent
.1	4.75	.6	9.50
.2	14.30	.7	16.70
.3	3.80	.8	11.10
.4	40.00	.9	5.46
.5	9.50	1.0	1.59

MR. FODEN (East London): I am not going to discuss the technicalities of earths. Everybody present is conversant with the principle. For the benefit of those present I would, however, outline what we do in our low tension overhead reticulation system in East London.

We have the metal cross-arm secured to the steel pole. On this cross-arm we have three porcelain insulators and one that we term a cast-iron insulator, which is a casting shaped like a porcelain insulator, all mounted on the cross-arm, and this latter casting is secured thereto, the effect being that every pole is therefore earthed to the neutral. We ring our sub-stations right round and, as Distribution Engineers know there are breaking points on certain sections of the areas, but we do not have these breaking points on the neutral wire. We carry them right through the system so that it is continuous from sub-station to sub-station, which ensures a continuous neutral should a wire break between any pair of poles. In East London we find this method advantageous and have had very little trouble. We adopt the same cross section of wire on the neutral as on the phase wire. The majority of our overhead reticulation conductors are composed of 19/14's wire. I consider stranded wire of the above size desirable, should costs allow; the advantage being that should corrosion or any other cause bring about a break in any of the strands of 19/14s wire, this loose strand would then start curling around the remaining strands, and, in addition to retaining continuity, it would be noticed by the patrolman in the course of his duties when inspecting street lights, etc. Where a solid conductor is installed the disadvantage is, of course, that the wire would break due to perhaps a bump on the pole, or corrosion, when continuity would be entirely broken.

MR. TUBB (Salisbury): I would like to mention one factor that has occured to me and that is that where the earth wire is taken from pole to pole, and the clamp becomes loose, it causes a considerable amount of wireless interference. I have been with the Post Office Authorities, and we have traced it to a single pole, and on that being tightened the wireless interference has completely disappeared. I would like also to mention another point and that is that with the coming use of concrete poles, insistence must be observed that they are also earthed. Our friend men-

tioned the earthing of steel poles; but unfortunately, we have had a fatality caused by a concrete pole touching a line.

MR. SPARKS (Pietersburg): Sometime ago in England they made an experiment of not earthing the cross-arm on the wooden poles. We tried that five years before — not earthing any insulators, but just putting up a wooden pole, and we found it very successful. These poles have been struck by lightning occasionally and we noticed little splinters on the pole.

MR. F. W. JOUBERT (Chief Inspector of Factories): On the matter of earthing, some difficulties have been pointed out by a number of engineers in connection with the earthing of roofs, in accordance with the provisions of Reg. 76 (2). No particular method of earthing can be covered by regulation. This regulation requires that the earthing must be adequate.

Now I quite agree with Mr. Muller of Upington. There are very good points in his suggested method of earthing, as outlined in his paper, but this method cannot be included in the regulations framed under the Factories Act.

Another difficulty brought to my notice by electrical engineers, is in connection with the application of Reg. 76 (2) and where the responsibility of the supplier ends. It reads: "The supplier shall satisfy himself that all metal roofs of buildings in which electricity is to be used, are adequately earthed before supplying current." Mr. Wright mentioned the point of earthing metal roofs. It has been suggested by this Association that this regulation should include gutters and downpipes. This, I consider, is reasonable.

The difficulty I mentioned is, should the supplier do the earthing of the roofs or should this be done by the contractors at the expense of consumers? It is quite clear that the supplier is not supposed to do the earthing, but he must satisfy himself that metal roofs are adequately earthed, before current is supplied. If this regulation is not quite clear an amendment can be considered on the following lines: "Steps shall be taken by the supplier to satisfy himself that all metal roofs, gutters and downpipes are adequately earthed before current is supplied." There should be no difficulty to comply with this provision. The supplier is concerned with the wiring of a building and all the wiring must be inspected and tested by an inspector of the supplier, before current is supplied. It is a simple matter for the supplier, through his inspector, to satisfy himself that all roofs, gutters and downpipes are adequately earthed when the installation is inspected. The cost of the earthing is to be borne by the consumer, who is also responsible to maintain both the installation and earthing in good order. This is covered by regulation 70.

I have had some correspondence with the Association on the matter of earthing and I believe the Association has taken legal advice on the responsibility of the supplier, after current has been supplied. But I do not think that there is any difficulty here. The difficulty the Association has pointed out to me is, whether once the supplier has satisfied himself that a roof has been adequately earthed, whether the supplier will be held responsible if the earthing breaks down or is interfered with. I cannot see how the supplier can be held responsible under such circumstances. Metal roofs are often earthed in a very unsatisfactory manner. The earth wire is fastened to a peg in the ground or attached to a water pipe. In such cases this wire can easily be interfered with, but the supplier cannot be held responsible for such interference. There are other methods of earthing which cannot easily be interfered with.

Suggestions have been received with respect to the wording of Reg. 79. It is that "overhead service mains" be deleted and the term "overhead service conductors" be inserted. This will prevent confusion.

Another point in connection with which members of this Association have found some difficulty, is that Regulation 79 (2) requires that overhead conductors or lines between buildings shall "consist of insulated wire of a type approved by the Chief Inspector." I wish to point out that such conductors are to be used by the consumer. All the wiring in the building belongs to the consumer or he is responsible for its proper maintenance as the "user"

and if he wants certain conductors between buildings, it is for you as suppliers to point out to him, that such conductors must be approved insulated wires.

THE PRESIDENT: I think we can consider this as having been dealt with adequately, and we can go on to the next item after lunch.

The Convention adjourned.

On resuming.

MR. W. C. LINDEMANN: A great deal has been said about government by regulation this morning and so I might find myself out of place in the remarks I am about to make.

Government by regulation has its disadvantages, but it must be admitted that government by regulation in connection with the supervision of machinery has advantages, in that, every machinery regulation has been designed and based on a fatality.

I am whole heartedly in support of what Mr. Muller has said about the split neutral system. Here in the Free State there happen to be 3 kinds of distribution, namely 3-phase no earthed neutral, 3-phase 4-wire, neutral earthed and the 2 and 3 wire D.C. network.

It is interesting to note that in connection with the three-phase no earthed neutral and which has been operating for 33 years, there has not been a single fatality; but against that on the mechanical side of the same concern there have been seven fatalities. In connection with D.C. distribution, I cannot recollect any fatal electrocution having occured over the same period.

With regard to the 3-phase, 4-wire system neutral earthed there have been many fatalities in connection with the earthing conductors. Here I would like to say that if electrical undertakings deliberately earth their neutral points, they must necessarily take steps to protect that neutral; for the simple reason that by deliberately earthing the neutral, the public are unwitfingly placed in contact with the electrical system, which would not be tolerated under the government regulations or otherwise in connection with mechanical machinery which must be fenced or efficiently guarded

Therefore it is up to Electrical Undertakings, if they deliberately earth their neutral point, it is quite in order, for inspectors of factories to demand protection and secure public safety. It is also interesting to note that in this district the average electrocutions are about two per annum which is considered high. Our most recent case was of a little girl of four years coming into contact with a gutter pipe contacting an earth wire. Practically all our fatalities are in connection with the earthing conductors of the electrical undertaking.

The Chairman has limited my time. I have exceeded my five minutes. However I wish to say, that we are greatly indebted to Mr. Muller of Upington for ably dealing with the subject and in the manner in which he tried to emphasize the importance of it.

In conclusion, Mr. Chairman, if the Committee is desirous of any further information in connection with electrocutions relative to earthing, I shall be only too glad to submit a written contribution.

In my considered opinion, in adopting the split neutral system the earthing conductors are taken out of reach of the public thereby ensuring alround safety.

THE PRESIDENT: I think the Committee would very much appreciate that contribution. We can now proceed with the next item — Freight Charges on Coal Sub-Committee. Mr. Eastman has dealt with that.

FREIGHT CHARGES ON COAL SUB-COMMITTEE.

MR. EASTMAN: It will be remembered that at our last Convention, Messrs. Foden, Bradley and myself were appointed as a sub-committee to deal with the question of freight charges on coal, with a view, if possible, of trying to get a reduction in those freight charges. During the year, our role as a sub-committee has been largely in the nature of a body having a watching brief for the reason that soon after the conclu-

sion of our last convention, various bodies, the more important ones of which are the Associated Chambers of Industries and the Board of Trade and Industries, supported an agitation and an inquiry respectively into freight rates generally, including freight rates on coal. We felt, therefore, that rather than intervene in what we thought was a line of action, in which we would, as an Association, participate and benefit, our desires would be met without action on our part. There was thought to be every likelihood of that happening. The City Council, for example, was asked to attend a conference in Johannesburg convened by the Associated Chambers of Industries, to discuss this very matter of freight rates generally with the Minister of Railways. Cape Town's representative to that conference is here now and will tell us something of what transpired there. Then, later in the year, the Railway Administration altered quite a number of its freight rates, and early this year the City Council of Cape Town hoped that those alterations in freight rates would be applied to coal also. Doubtless you will have noticed that in the report of the Budget Speech by the Minister of Railways this year he said that notwithstanding the 10 per cent. surcharge imposed in October, 1944, alterations had been made in freight rates so that they are 7½ per cent. lower on the average than in 1925. But unfortunately, he did not alter those on coal. When that was realised, the Electricity Committee of the City Council made a recommendation to the Council, which I have not the slightest doubt they will accept, that now the Council goes forward with definite representations to the Administration that at least the 10 per cent. surcharge imposed in 1944 should be taken off the freight rate on coal. The Council knows also that the Board of Trade has made very extensive recommendations indeed to the Government for a complete revision of all railway freights. At our last discussion of this matter, Councillor Ferry, who initiated it, laid particular stress on the possibility of obtaining lower charges for coal at the coastal ports by the Administration adopting a rates policy and a shipping policy too, of allowing coal to be brought down from coastal ports such as Durban and Lourenco Marques by ship to Cape Town, whereby probably the freight charges, which are now nearly £1 a ton from the colliery to Cape Town, would be reduced probably to 15/-. I think our Association will be interested to know that in the Board of Trade's report, which has been tabled but has not been considered by Parliament and is not likely to be this session, the Board of Trade recommends specifically that the Government go carefully into the question of so utilising the resources open to it to bring coal down to Cape Town as to bring it down in the most economical way. But if that does not mean by sea, it does not mean anything at all. You will remember that in the discussion at Salisbury, Mr. Dalton, who represented the Railway Administration, in the course of our discussion said that on the coal which leaves Beaufort West for the south, the Railway Administration makes a loss from the traffic point of view. The Board of Trade's report states however that there is a need for the Railway Administration to establish an efficient costing system and recommends that be done. There is thus now a strong movement afoot to completely recast all railway rates. What its result will be no-one can say, so far as coal freights are concerned, but the City of Cape Town is, as I have said, now proposing to press the Government for a removal of that 10 per cent. surcharge, and I think it most likely that if the other coastal towns concerned, Port Elizabeth and East London, wish to be associated with those representations, those arrangements could be made.

THE PRESIDENT: I thank you, Mr. Eastman, for the work you have done on this subject.

CR. DE WIT (Upington): I think we would be glad if the representative from Cape Town would give us a few words on the subject.

COUNCILLOR GEARING (Cape Town) It is quite correct, as Mr. Eastman says, that I attended on behalf of the City of Cape Town a Conference of the Associated Chambers of Commerce which was held in Johannesburg, I think last October. Unfortunately, from the point of view of railway rates, which, of course, was only a part of their deliberations, it was entirely barren, due, I think, to the fact that they had chosen a bad time in so far as the

Minister, who was present, gave us a bit of a bombshell when he told us that the whole question of railway rates had been handed over to the Board of Trade and Industries and this body would be issuing its report in the course of a few weeks. The delegates to the Association, however, felt that strong measures should be taken, and briefly, despite an amendment which I move myself, they decided to appoint a deputation to wait upon the Prime Minister and ask him to appoint a judicial commission to go into the whole subject of railway rates. Well, as you mentioned, Mr. President and Gentlemen, after what the Minister told us, and the whole subject had been deliberated, the deputation to the Prime Minister did not eventuate. The Prime Minister refused to meet them at all. So, as far as that meeting was concerned, the results up to date have been entirely barren, but this whole question of railway rates in South Africa is almost as thorny a subject as the question that agitates us, the question of the allocation of profits to the relief of rates. It has been going on ever since Union, and I think will continue to do so. As far as Cape Town is concerned, it is quite correct my Council hoped to persuade the Minister — we intend to request the Government to remove this 10 per cent. Most of you probably know — those delegates from the coast know — the cost of coal is in the neighbourhood of 26/5 per ton and 75 per cent. of that is railage. This is a very big figure, so much so that it represents 25 per cent. of the cost of generation, which is .8d., so that the cost of coal amounts to .2d., or 25 per cent. There is one small point however, I would like to make. It does not only concern Cape Town, Durban or East London, but it concerns the immediate hinterland behind those ports, because they are, many of them, purchasing their current from us; and as was envisaged in Mr. Wright's paper, those municipalities which do so, will probably increase in the future, so this question is really almost a national one. But it does, undoubtedly, affect us at the coast more than it does those in the middle of the country. But there is one fundamental point, I think we should first seriously consider, and that is to put our own house in order first, because the thing that will be said is the point Mr. Eastman mentioned at the last Congress, and that is the obvious answer of the Government to a request for a reduction in rates is "What are you going to do with it? Are you going to hand it to the consumer or use it to relieve rates. If the latter, why should we worry?" This is a pretty formidable question for us to answer. I do not know whether you wish to put forward anything in the form of a resolution, but it is handicapped at the moment by the fact that any resolutions made at the moment — we shall probably be fobbed off or told to wait until the Government has had time to deliberate on the report which I think is a very voluminous one, from the Board of Trade and Industries. That is quite as big a matter as the question of railway rates, which no ordinary man has been able to understand. This idea of making the traffic that can stand it pay high rates of freight, irrespective for what purpose those goods may be required, seems the only principle — make the man pay who can pay, provided he has not too much political influence. I do not think there is anything more I can add to the discussion, except to say that we in Cape Town are naturally very desirous of seeing a substantial reduction in the railway rate on coal at the earliest moment.

MR. FODEN (East London): I have no questions to ask, but I think it would be desirable for the benefit of members to hear my comments on the subject of Freight Charges on Coal that I sent to Mr. Eastman.

One point I wish to make is, that the Union Government is out to encourage industry and coal is an essential commodity to the majority of industries, particularly the generation of electricity in the larger industrial centres in the Union. As the Government hopes to establish industries it is essential that cheap electric power is available. The comments I sent to Mr. Eastman were as follows:—

"That this Association should make representations to the Government Departments concerned:

1. "That coal is an essential commodity to practically all industries, particu-

larly the generation of electricity at the large industrial centres of the Union.

2. "As the Government hopes to develop secondary industries it is imperative that cheap power is available. High freightage on coal militates against this.

3. "The farming community in areas remote from the large capital stations will not enjoy cheap electric power facilities as long as heavy transport charges on coal obtain. By reducing transport charges cheaper generation of electricity would occur. Savings in this direction would help to offset the high cost of interlinking central power stations. That this interlinking is desirable cannot be gainsaid and the reasons are obvious to all members of the Association. When the interlinking of power stations takes place then the farming community may realise their ambition, i.e., cheap and abundant electric power."

Councillor Gearing of Cape Town anticipated the point I was going to make, namely, "What would be done with the money if the Government did take this 10 per cent surcharge off Railway freights? I think it would be desirable if this Association were successful at a later date in getting the necessary legislation to limit the amounts paid into the Municipal General Rate Funds, from the profits of Electricity Undertakings, because the Government would not, in my opinion, look kindly on allowing for instance £4,000 rebate and that amount being paid into the General Fund for the purpose of say, building a park or some other amenity.

I concur with Councillor Gearing that Railway Freight Charges represent 75 per cent. of the total cost of the coal delivered to coast ports. I give figures as far as East London is concerned. For the year 1945 the total costs were £48,118-0-0. The cost at the pit head was £12,279-0-0 but the Railway charges, to bring the coal to East London, were £35,839-0-0 which latter figure is approximately 75 per cent. of the total cost. Should we be able to have the 10 per cent. Surcharge eliminated on the above quoted figures it would mean a saving of £3,584-0-0.

Reverting to coal costs per unit generated the 10 per cent. reduction in Railway freightage would have reduced the East London costs for the year 1945 by .07 of one penny bringing the coal cost down from 0.26 to 0.19 pence per unit generated. This reduction is, of course, quite appreciable where millions of units generated are concerned.

THE PRESIDENT: Mr. Eastman did not mention Mr. Bradley's letter, because those points would be covered in the representations made. The matter is receiving the attention of the Government and it is difficult to see how far we can get with it at this stage.

MR. GRIPPER (Worcester): I should like to put forward a suggestion. Yesterday, I mentioned the desirability of forming a sub-committee for rural undertakings. Actually that was not proposed or passed, but it occurs to me that this Committee investigating the question of cost of coal and railage freights could also tackle rural problems. Surely that will give more power to their elbow and another string to their bow. Mr. Foden has referred to certain classes of the community that have political influence. Do not let us only say we require cheap coal for our towns, but for the development of rural areas too, and I think therefore that the sub-committee should deal with the rural undertakings as well.

THE PRESIDENT: Do you make a proposal in that direction?

MR. GRIPPER: Yes. I propose that a committee be formed to go into the question of coal or fuel rates, and coupled with it, rural electrification.

MR. DREYER: I second that.

CR. DE WET (Upington): I move that it be left in the hands of the Executive to form a committee. It should be left to the Executive to select a committee for themselves.

CR. JACOBS (Boksburg): I second that.

COUNCILLOR GEARING: Speaking to the amendment I would like to suggest that you adopt Mr. Gripper's proposal, that you set up a special sub-committee to deal with this matter. It is a vital matter which requires a great deal of study and the collection of a great amount of information, and it requires a meticulous study of this document, which is a brief study of the Board of Trade and Industries Report on the coal question. So, with all respect to the Executive, I submit they have quite enough hay on their forks, and it would be difficult for them to deal with the subject adequately.

THE PRESIDENT: I agree with you, Councillor Gearing.

COUNCILLOR DREYER (Springs): I think the members should be from those areas most affected by these tariffs and I suggest Cape Town, East London and Port Elizabeth.

THE PRESIDENT: We will take the amendment first, that this question of the coal freights, coupled with rural electrification, be left in the hands of the Executive.

On a show of hands the amendment was declared lost.

THE PRESIDENT: Now we take Mr. Gripper's proposal that a sub-committee be formed to deal with the matter of coal freights and it be coupled with rural electrification.

On a show of hands the motion was declared carried.

THE PRESIDENT: Mr. Dreyer, your proposal will now be in order.

COUNCILLOR DREYER (Springs): I move that the members of the sub-committee should consist of members from Cape Town, Port Elizabeth and East London.

A MEMBER: I move there be five members — one from the Cape, one from the Free State, one from the Transvaal, one from Natal, and one from Rhodesia.

THE PRESIDENT: Coal rates to Rhodesia will not be applicable. Does the Conference agree with dividing the representatives between the four provinces.

MR ANDREW (Kingwilliamstown): It seems evident from the discussions on this subject that the greatest interest is shown where the rail charges are greater, and those people who are vitally interested are south of the Orange River, roughly, in the Cape Province, and I would support Mr. Dreyer's motion, that if a sub-committee were formed of members within the Cape, as he suggested, Cape Town, Port Elizabeth and East London, they would have a greater leverage and a better case to present than if it was spread over the four provinces.

THE PRESIDENT: Do you agree on the principle of the four provinces, making it a four provinces committee?

On a show of hands the proposal was declared lost.

CR. DE WET. I propose the President, the Vice-President, Mr. Fraser, Mr. Eastman, Mr. Foden, Mr. Bradley and Mr. Gearing.

COUNCILLOR GEARING: I shall be happy if you will withdraw my name.

THE PRESIDENT: Mr. Kinsman, Mr. Fraser, Mr. Eastman, Mr. Foden and Mr. Bradley.

Agreed.

MR. BRADLEY: Mr. President and Gentlemen, as a member of the past committee on this matter, I cannot say more than has been said by Mr. Foden and Mr. Eastman. But in my letter to Mr. Eastman I pointed out my outlook on the development of the hinterland by the supply of electric power from the larger generation stations, for instance, the Eastern Province from Port Elizabeth, is that it would be better and more beneficially attained if the Government would set aside sufficient capital — free of interest charges and repayable over a period of years — to enable the necessary reticulation of areas now specifically undertaking large produce outputs, whether it be in the form of agricultural or food supplies. Such a policy

would enable large producing areas within say 80 miles of Port Elizabeth to be provided with adequate electric power. I only mention this, so those members who are concerned with electrification can think that over in the coming years and probably next year we will be able to do something about it.

THE PRESIDENT: Mr. Eastman has a further subject — the World Power Conference.

WORLD POWER CONFERENCE.

MR. EASTMAN: I am pleased to be able to report that the World Power Conference Organisation, whose activities unavoidably lapsed during the war now ended, is being resuscitated.

In the early days of the war arrangements were made for the headquarters of the Organisation to be moved from London to Arnhem in Holland so that at least some of its work could be proceeded with in a neutral country. Circumstances, however, soon brought to nought this means of continuing its work.

The objects of the organisations, which has held three Conferences in addition to largely attended sectional meetings in various parts of the World, are similar generally to those of our Association of Municipal Electricity Undertakings, in consequence of which our Association has been represented on a South African National Committee of the Organisation for many years.

The Central Organisation has now been re-established in London in full working order ready to take up its activities in arranging for conferences of Engineers, technical experts, fuel experts and authorities on scientific and industrial research as well as dealing with technical education and the financial and economic aspects of industry internationally.

Our Association for many years past until 1939 made an annual donation of £10 to the Central Office Maintenance Fund, and as your representative on the Organisation I have been asked to submit to the Association at this Conference that it should resume its previous annual donations.

Agreed.

The Convention adjourned to Thursday, 16th May, 1946.

THURSDAY, 16th MAY, 1946.

The Convention resumed at 9.30 a.m.

SUBSCRIPTIONS.

THE PRESIDENT: At the last Convention, the matter of subscriptions was dealt with for the new year, and the new year only. We have now to fix our subscriptions for the coming year.

MR. FRASER: As explained by our President, last year you gave the Executive power to double subscriptions for one year. This year we have to do the same thing, or something equivalent, and I have got out a scale, which, more or less, as far as I can see, will probably bring in the same revenue as the double subscriptions. I want to point out that last year we had a loss of £253 which had to be made up from the Reserve Fund. This year we are just breaking square, as far as I can understand.

The doubling of subscriptions appears to have alleviated the financial difficulties with which the Association was faced. However, the scales are not equitable, for a municipality with an output of say 300 millions units is only expected to pay as much as one with an output of 11 million. On the other hand, owing to the comparatively large number of small municipalities in relation to the bigger ones, it is not possible to introduce a true sliding scale without demanding either an exorbitantly large contribution from the bigger undertakings or an absurdly small one from the smaller undertakings.

The following approximate figures have been taken from the statistics prepared for the 1944-1945 Municipal Year Book:—

Units sold x 10^6	0.5	0.5-1	1-10	10-50	50-100	100-200	200-300	Over 300
Number of Municipalities	18	10	33	8	2	0	1	3

At the present double rates of subscription, it is found that the sixty-one municipalities have an output of less than 10 million units per annum, subscribe about £416, while the remaining fourteen municipalities, of which three have outputs of over 300 million units, subscribe only approximately £147.

It is considered that the doubled rate of subscription as at present fixed is not excessive for the smaller undertakings, i.e., those sending out up to 10 million units per annum, while a higher rate could easily be afforded by larger undertakings.

The following proposal is therefore submitted for consideration:—

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	,,

This scale would result in a total revenue of approximately £416 (unchanged from the sixty-one smaller municipalities and £212 from the fourteen larger. The increase in the case of the larger municipalities is not very considerable because of the smaller number involved, but the individual municipalities would be paying subscriptions more in keeping with their size. Further, the proposed scale makes better provision for the growth of undertakings.

One may ask why we should have a revision of this. As I explained last year, we ran at a loss. All these resolutions and various sub-committees you have recommended during this session all involve secretarial duties, and we feel that the Association should at least be in a financial position to meet some of the requests of the members. Furthermore, I have noticed that the Association for the Parks and Estates, and the Association of City Treasurers have all put up their subscriptions. I have not the figures, but I think the Parks and Estates in Johannesburg — perhaps my Councillors can substantiate it — are paying somewhere in the neighbourhood of £15 or £18 a year. I think this Association, if it is to do any good at all, should be in a financial position to meet some of the calls made on it by members. I have much pleasure in moving this proposed scale.

CR. DU TOIT (Upington): I second the motion.

MR. MULLER (Upington): I think the discrepancy below the million mark is rather sharp, and we should take all below a quarter million at a fixed fee of 3 guineas. There are several municipalities between a quarter and half a million, with a fee of 4 guineas. There are a good many falling below a quarter million; and many between 40,000 and 100,000 units per annum, and I think it would be very wise if a minimum fee of 3 guineas can be considered. And also if we find ourselves in a position that we have to double it like last year, we could decide that the maximum fee under a million is not doubled, whatever we do above a quarter million.

MR. FRSER: I have not the figures for a quarter million, but there are 18 municipalities below half a million.

MR. WRIGHT. No doubt these smaller municipalities do face a real difficulty, but I think they lose sight of a very important fact which they should point out to their Councils. The proceedings cost fifteen shillings and they get two of them free, so actually they are only paying 30/- a year subscription. Under the proposed scheme it is 4 guineas, which means £2 10s. subscription a year, and I think the smaller municipalities can afford that.

COUNCILLOR BOYLAN (Johannesburg): On behalf of the City Council of Johannesburg, I may say we are willing to make the necessary representations, and I think the tariff is very small, even to the smaller municipalities, and more particularly to the larger municipalities. They have their representatives coming to these congresses; resolutions are being passed, and so on, and naturally the Secretary, particularly must be paid. You have one of the largest organisations in South Africa and you cannot afford to pay a full-time secretary. It is a disgrace to the Union of South Africa that you have to come cap in hand for an increase in the contributions. The benefits are not for the individuals, but the whole of the municipalities of South Africa. I think they should pay the largest percentage of the running of this organisation. They get the benefits of everything; they expect the recommendations to be put before the governing bodies, and I do not think it is too much to ask the delegates to go to their respective councils and press for favourable consideration. I think the larger municipalities are not paying enough. Costs have gone up and will still go up, and this organisation should have its financial difficulties overcome. We should have a full-time secretary and pay him a reasonable wage, and the costs should be borne by the municipalities.

COUNCILLOR ..... This is the first time I have had the opportunity of attending a conference like this. I do not pretend I can understand what the gentlemen are talking about when they talk about superimposed current, but from what I have seen, I realise very fully how important this body is to every municipality in South Africa. My own view is that the Executive should put up a letter to the municipalities and ask them in the near future to contribute such sum as they can see their way clear to, to build up a reserve fund, with which we can go on. The last speaker said this association should have a full-time secretary. He is perfectly right, and the Executive will do very well if it approaches the municipalities and asks them whether the smaller municipalities are not prepared to pay say 30 to 40 guineas and the larger 50 guineas, to build up a fund so that this important work can be carried on.

THE PRESIDENT: I have a personal view on this matter, and that is that we can only make out of this Association what we are prepared to pay. No organisation can exist without funds. If the funds are low, their work will be of a low standard, because you cannot finance it. Now I think complaints about fees are a little far fetched. Only yesterday when our interests were threatened this Association was asked to protest. The Chamber of Commerce would also protest, of course, but the Government might view the protests from the Chamber of Commerce as a sectional interest they are not prepared to consider. But when they get protests from a body representing the electrical undertakings throughout the Union, and through the electricity undertakings, the consumers in every town throughout the Union, it must have a different effect upon them. Supposing by our representations — and we will do everything we can — we can avoid this 20 per cent. protective duty, would not four guineas be swallowed up very nicely. A sum of £50,000 is not very much in the way of an extension. Supposing a small undertaking finds itself hard put to for cash, but would like to support the Association, surely they can save a pound in other directions. If they cannot make ends meet, and must save on something, there are other things which could be saved on with greater benefit to South Africa, than this Association.

COUNCILLOR SCHAUDER (Port Elizabeth): Although I have been a Councillor for a quarter of a century, this is the first time I have attended an Electricity Conference, and I intended to speak on a general topic at a later stage. This matter of the annual subscription has come forward whether it should be 3 guineas or 4 guineas. First of all, I want to support the gentleman from Johannesburg, and say that any reasonable fee you charge we shall support 100 per cent. But I want to go one further, and ask your engineers whether the time has not arrived when you should put your thinking caps on and ask whether you are carrying on as you should, as electrical engineers and experts. I am astonished that you should be so poor and poverty stricken. Electricity is the most profitable business in the Union. I want to ask you whether the time has not arrived

when you should not drop the title "engineer" and call yourselves "consultant" and "expert." I wonder whether you are not developing any inferiority complex and allowing yourselves to be run by people who get the money and you do the work. I want to make a genuine and sincere appeal whether you as a body should not be the consultants of the South African municipalities. If a South African municipality wants advice they bring somebody from overseas. Why should you not give the advice and receive the monetary benefits, rather than the man from overseas. The few pounds you ask for is nothing compared to what some of our experts take away from us.

MR. MULLER (Upington): I hope I haven't been misunderstood by this meeting, but I probably know more about these tiny municipalities than the great majority present. I just want to tell Mr. Fraser that if there are only 18 in this category, we stand to lose 18 guineas; and if we can bring back some of the municipalities who have gone from the fold, we would actually be rendering a greater service than losing a few guineas.

THE PRESIDENT: The smaller municipalities used to pay two guineas and it was raised to four guineas That is before the meeting. Will somebody move an amendment that the smaller municipalities be assessed at three guineas.

MR. MULLER (Upington): I move that municipalities below a quarter million be assessed at three guineas, instead of four guineas as proposed by Mr. Fraser.

THE PRESIDENT: There is no seconder. I will now put the scale proposed by Mr. Fraser.

Mr. Fraser's motion was carried unanimously.

MR. NEWCOMBE (George): There are some smaller municipalities which have not joined up, but the engineers would like to. Could not you make a small fee for them, not depend on the output.

THE PRESIDENT: Two guineas is the tariff for engineer members.

USE OF PROFITS FOR RELIEF OF RATES.

THE PRESIDENT: We promised the meeting that we would discuss relief of rates today. We have a motion before us; it is a year old. Mr. Eastman will be dealing with this subject. I would point out that time is precious. We would like to have new views, but we have already discussed the matter, and I would ask members to confine themselves to five minutes each, so that each member has a chance to say something.

MR. EASTMAN: It has come rather as a surprise, I think, to the Executive Council as well as to me, that there should be a debate on this matter at all. It has arisen through the fact that I have submitted, in response to the request made to me at the last convention, a summary of the reports on this and other matters which were submitted then, and which were fully discussed at that time. They were so fully discussed indeed that clear cut resolutions were taken on a number of matters, including this one, and those resolutions still stand. In 1944, a resolution was passed that the Government be asked to establish a Joint National Electricity Power Board, whose functions would include the making of recommendations for the introduction of legislation on this kind. Section 53 of the Electricity Act provides for the Governor-General to make regulations regulating the conduct of electricity undertakings, without excluding municipal electricity undertakings from the provisions. We thought that if the Joint Electricity Power Board consisted of members of bodies like ourselves interested in the supply of electricity we would be able to advise the Government better than persons in the public service, who had no experience in electricity supply matters.

That was one of the principal objects underlying the proposed inaugration of the board, and it was suggested that if undue delay ensue in doing so, this matter of relief of rates be submitted to the provincial Administrations in the forms of a resolution of this Association. That was in 1944. In 1945, after the views of City Electrical Engineers and of City and Town

Treasurers had been submitted to the meeting and debated. We resolved:—

"Before making a recommendation to the Joint National Power Board for the introduction of legislation to control the financial arrangements of municipalities in relation to their electricity undertakings steps be taken to make representations to the United Municipal Executive, and to urge that the whole structure of municipal budgets be examined with a view to charging the whole of the costs of spending departments to the general rates and to the health rate with a fixed contribution thereto — the amount of which to be determined as a contribution from the electricity undertakings subject to adequate financial safeguards being introduced in the undertaking itself."

This resolution was passed in full recognition with the principle — which was agreed to by City Treasurers in their personal capacities. That relief of rates should not be made on a scale which would be to the financial detriment of the electricity undertakings, but that after its financial stability has been adequately safeguarded, it is for the Council itself to determine what it will do with the remainder of the profits.

A letter has now been received from the United Municipal Executive, which indicates that the body proposes to pass the buck on to the Treasurers' Association. The Treasurers whom I have individually consulted in this matter agreed in their personal capacities that the financial stability of the undertaking is important and should be attended to first. But we know that the Treasurers have the obligation of finding the money somehow. This was debated fully at our last meeting in Salisbury also, so that nothing remains to be said about that aspect now. Accordingly, it is clear from our previous resolutions that we should now carry on exactly with what we contemplated doing before. Because the United Municipal Executive have indicated that it itself does not wish to take the initiative in future steps, it seems to me that our Association should now go ahead with the resolution already adopted, without further debate on the principles. Let us go to the Administrator and say "Your Honour," these are our views, and we hope you will pass legislation for the guidance of the municipalities in this matter, in the same way as has been done in other countries, where the municipal electricity undertakings are regarded as being a national asset owned by the municipalities themselves. (Applause).

MR. DE WIT (Rustenberg): I move on the lines Mr. Eastman has mentioned, that we keep on hammering at the authorities on the lines recommended at Salisbury and other places, and that we submit it to the various Administrators.

MR. SIBSON (Bulawayo): In seconding the resolution I think I made myself responsible for the little waste of time on this subject the other day, and I think I may say that the resolutions at Salisbury entirely agreed with my own views. Had I been aware of them, I would not have spoken at all, but I had not had a chance of reading them, and I did not have a chance of attending the Salisbury Convention. I entirely endorse Mr. Eastman's view that we carry on with the resolution already decided on and take no further resolutions at this Convention.

COUNCILLOR SCHAUDER (Port Elizabeth): I do not know what you have already discussed, but I may say I am 100 per cent. with the resolution read out, that the financial stability of the undertaking is of the first importance. But I think the approach to the Administrators is wrong; they will not move one inch. You will get nothing from the Provincial Administrations. You must make a recommendation to Escom, and if they do nothing, you must go to the Government. I believe that fair and legitimate profits from the electricity undertaking should be contributed to the relief of rates, but the stability of the undertaking should first be assured.

COUNCILLOR BOYLAN: I do not think this recommendation should come before this conference at all. I am speaking as a City Councillor of Johannesburg. Municipal administration is municipal house-keeping, and you cannot get away

from that. There are certain amenities in municipalities which have to be provided for the ratepayers. When I speak of ratepayers, I speak not of owners of property, but the residents of each particular town or village. These amenities should be controlled by the municipality and include light, water, power, transport, parks public health and social services. All these come under the administration of the municipality and all those costs must be paid by the municipality, and it is not the ratepayer who should pay for that, it is the general community. The municipalities are justified in establishing those necessary amenities through trading and the generation of electricity for it is bought by those people at a very reasonable rate, and it is only one of the trading concerns of the municipality. Funds have got to be raised for open spaces, playing grounds, swimming baths and public health and social amenities have to be provided. If they do not establish those through trading concerns, those amenities would not be provided, unless there is an extraordinary rate placed upon the stand holders.

THE PRESIDENT: I would point out that the motion is not opposed to the appropriating of the profits. It is only a question of financial stability. It has happened in certain undertakings that to the detriment of the undertaking they have taken all profits. All the Association was concerned about was that before appropriating funds they should first of all take care of the financial stability of the undertaking.

COUNCILLOR VENTER (Cradock): I would appeal to the gentlemen to be less theoretical and more realistic and to view the matter from a practical angle. Year after year Congress meets but Councillors come and Councillors go, so that there are few Councillors here today who have continuity of service in this capacity and are thoroughly acquainted with the subject. On the other hand, members of the Executive have been selected by a majority vote true to the principles of democracy. They were selected for their experience, ability and integrity; they are thoroughly conversant with this particular subject. They are in a position to collect such further evidence as they may require by collecting data from various Municipalities or going to the Provincial Council or Escom, etc. In the circumstances I move that the matter be referred to the Executive with power to act, as I feel that they can and will get somewhere.

COUNCILLOR SCHAUDER: I second that.

Unanimously agreed that it be referred to the Executive.

(Tea interval.)

ASSOCIATION OF MUNICIPAL ELECTRICITY UNDERTAKINGS

SUPERIMPOSED CURRENT CONTROL OVER DISTRIBUTION NETWORK.

By William N. Powell.

Introduction.

This paper endeavours to place before the members of the Association an introduction to the methods developed during recent years which enable a supply authority to control, or switch on or off at will, from a central point, apparatus connected to its system, by means of signals or impulses impressed on the supply network; that is, methods of control without recourse to pilot wires or supply cables between the control point and the apparatus being controlled.

It is felt that there may be a number of members, especially newcomers to the supply industry, and members from the smaller undertakings, who have, as yet, not had the opportunity of reading or hearing a description of this relatively new branch of electrical engineering.

It is also hoped that older members, and Councillor members, may find in this paper something of interest, as well as an easily assimilated introduction to a most interesting field of application of a branch of electrical engineering usually associated with communication engineering.

The matter is not now, nor is the paper presented to you as an expert's treatise on the subject, but simply as a past municipal electrical engineer's contribution to the Association from his store of knowledge and accumulated experience, obtained during many years of association with the Electricity Supply Industry and its many problems.

General.

It is only natural that electrical engineers, with their inventive and creative instincts, should almost from the inception of electricity supply, have been attracted by the possibility of using the cables of their supply systems to serve more than one purpose by carrying more than one class or system of current at the same time, and it was, therefore, early in the century that thoughts were turned to the possibility of controlling such consuming devices as street lights, two-rate meters and the like from a central point, by means of signals or impulses superimposed on the normal supply current carried by the distribution network, so avoiding the expense and difficulties associated with a complicated cable system, which, up to that time, was the only known alternative to switching street lights on or off by hand, or by means of time switches.

Two possible methods immediately suggested themselves, the use of a superimposed current having a different frequency from that of the supply frequency, or the superimposing of a direct current on an A.C. supply, or vice versa; the street lights or other apparatus to be controlled being provided with relays designed to respond to the frequency of the superimposed ripple current, as it is now called, or the impulse of a direct current.

Both methods have been successfully developed in practice, and, today, have a very wide field of application.

Historical.

The real pioneers of superimposed current control appear to have been two engineers, Messrs. Brown and Routin who conceived the idea of connecting a 100 cycle alternating current between line and earth of a two-wire supply system.

This was followed four years later by an effort on the part of two Frenchmen, Rennux and Turpin, to effect carrier current control by injecting a 50 kilo-cycle feed into a supply network at Bordeaux.

This, unfortunately, met with little success, due to the high frequency currents suffering from reflection and attenuation in the network resulting in considerable varia-

tion in voltage in various parts of the system.

Among the most outstanding of pioneers were Messrs. Duddell, Hancock, Dykes and Oliver who, in 1910, initiated experiments in ripple control, Mr. A. H. Dykes following up his experiments with a paper before the Institution of Electrical Engineers, London, describing a system in which a high frequency alternator was connected in series with an outgoing feeder, and which, when run up, superimposed a 200 cycle signal at a voltage equal to approximately 5 per cent. of the main supply voltage.

It was found that this arrangement worked quite satisfactorily on small supply networks but, where several different controls were required, necessitating several frequencies in order to make relays sufficiently selective frequencies very wide apart had to be chosen thereby introducing practical difficulties.

By 1926 after a number of engineers had worked patiently and carried out many experiments, successful ripple control installations were in operation on the Continent.

The progress of ripple control now became rapid, especially from 1928 onwards, the most notable development occurring when the Paris Electricity Supply Undertaking, with a maximum demand of something like 1,000,000 kilowatts, took the bold step of deciding to instal ripple control throughout their entire system.

Along with the development of the ripple control method, systems using a direct current, giving superimposed impulses, had also been successfully developed, and a method of utilising a D.C. signal between a network and earth was described by Reeves in 1917. Today systems using either ripple or D.C. impulse control are in successful operation in many parts of the world.

Whereas in the early days the principal object of superimposed current control was to effectively switch street lights on and off, the systems have today been developed to control many other services, as will be described later on in this paper.

Advantages of Superimposed Current Control.

All engineers will agree that, subject to economic and practical advantages, to be able to control certain engineering activities from a central point is a marked step in the progress of engineering.

Therefore as has already been stated, electricity supply engineers were early attracted by the possibility of being able to control certain classes of apparatus connected to their mains, from a central point.

Their attention was first drawn to the possibility of controlling street lighting, since to be able to control street lighting from a central point was not only a question of cost, but also one of convenience.

In the earlier developed countries, electric street lighting, in most instances, took the form of converted gas-lamp standards, each electric lamp being separately connected to the passing underground low tension distribution mains, with the result that each lamp had to be switched on separately every night by a "lamplighter" in exactly the same way as had been the practice with the gas lamps. This same "lamplighter", as he was called, had also the next morning to go his rounds and switch each lamp off.

The electrical engineers responsible for these undertakings were, and still are, in a great many instances, faced with the problem of continuing with this system, or of either digging up miles of roads to lay street lighting cables, or, as has been done in many undertakings, of fitting time switches to each lamp standard.

Cables were expensive in first cost, as was also the cost of laying coupled with the inconvenience caused.

The old mechanical time switches were good and served their purpose but had the disadvantage that they required regular attention for periodical resetting and rewinding.

The electrically wound switches fitted with astronomical dials which followed were, of course, an improvement on the mechanical type in that reduced attention

was required but at increased capital cost.

One of the chief disadvantages of the switch, as we all know, is that it cannot take account of variable climatic conditions.

At a later stage light sensitive cells became available but these have never become popular, principally no doubt as a result of the low limits of illumination at which they are required to work.

It is readily understood therefore, that these engineers eagerly saw in superimposed current control a solution of their difficulties.

They also realised that if superimposed current control could be introduced to their system it would mean that not only would they be able to control existing street lighting from one point, but that in the new areas they were developing from time to time they would be able to discontinue the need for laying special street lighting cables.

This problem which confronted, and still confronts, many overseas engineers is, fortunately, not so marked in South Africa where, in most towns street lighting is supplied by means of relatively inexpensive overhead lines and is, in most cases, already controlled from one or more control centres through the medium of pilot wires with or without some form of cascade control.

In the Union it would, therefore, be simply a question of considering the relative costs coupled with the greater reliability of superimposed current control and a reduction in the number of unsightly wires in our streets.

The ability of being able to control individual items of apparatus, from a central point naturally caused engineers to consider the possibility of exploiting this method with a view to controlling apparatus, other than street lighting, by using different frequencies or impulse signals impressed on their mains which could be made to operate relays attached to the apparatus being controlled suitably designed to respond to these signals.

The application which was most in the minds of supply engineers was the possibility of controlling classes of load for which an off-peak tariff could be offered. In most cases this meant, of course, that such units could only be supplied at the running costs of production, other units bearing the fixed charges and that the consuming apparatus would not be used on peak, so causing an increase in the undertakings maximum demand with a resultant increase in the overall cost of production.

Engineers first considered the advantages of controlling a two-rate meter following this with the idea of controlling the load itself. This was especially the case when Supply Authorities were purchasing energy on a two-part tariff.

The Engineers argued that if they could sell cheap units "off-peak" they could improve their load factors and so cheapen their costs of production, but they did not want those "off-peak" loads coming "on-peak" so necessitating installing more plant or paying more for their supply because of an increased maximum demand.

Now every progressive Supply Engineer wished to develop water heating and space heating loads, but in most cases recognised that the development of this type of load could not be effected unless electricity were made competitive by offering a tariff at a ½d., or under, flat rate per unit.

The question which, naturally, presented itself in the minds of the engineers was, could energy be supplied for these loads at prices like ¼d. and ½d. per unit. without incurring loss; the answer was that it could, provided the cost of production did not exceed the flat rate tariff nor cause an increase in the overheads of the undertaking. This meant, of course, that such units could only be supplied provided they were covered by the running cost of production only, other units bearing fixed cost and that such consumers would not cause an increase in the maximum demand of the undertaking and so cause an increase in the overall cost of production.

It was recognised that water heating, space heating and certain types of power

load, such as pumping, could be switched off for short periods over the peak-load period of the power station if the duration of the interruption of supply was short.

Therefore if a control system could be so arranged that the engineer could control consumers' loads by pushing a button, thereby controlling the peak demand on the station, a very few hours of interruption of supply per annum would suffice to render these loads entirely off-peak, and so prevent the necessity of putting extra plant into service, or, in the case of undertakings receiving bulk supply, keeping down the maximum demand.

As far as the consumer was concerned, such an interruption on perhaps a dozen occasions in a year would pass entirely unnoticed and would not materially affect his consumption, since the proceeds of peak interruption was one of flattening the peaks rather than cutting this off, and, anway, if the consumer were told that he could have low priced current if he would consent to an interruption to the supply of his water heater of a few hours per annum, it could be safely assumed that there would be no consumer who would refuse.

Here, then, was one of the most outstanding and advantageous developments in the field of electricity supply engineering — a means of controlling, within limits, the demands of consumers who had been given a tariff to encourage them to use electricity off-peak.

Today there are many other services to which superimposed current control can be effectively and economically used, and it naturally follows that once the main control equipment has been provided the more services which it can be put, the lower the unit cost per service.

The list given below will enable members to form some idea of the range of uses to which superimposed current control can today be effectively put, many of which were so successfully used in Great Britain during the war, and it should be clear that one could go on indefinitely suggesting services of this sort, but the merit of superimposed current control does not rest on its advantages for any individual services but on the fact that it can provide **all** these if a suitable control equipment is laid down:

List of some of the Services for which Superimposed Current Control may be used.

(1) Street Lighting.
(2) Water Heating — Restricted Tariff Services.
(3) Space Heating — Restricted Tariff Services.
(4) Industrial — Restricted Tariff Services.
(5) Control of Shop Window Lighting.
(6) Volunteer Fireman Call Service.
(7) Volunteer Wardens Call Service.
(8) Air Raid Syrens.
(9) Remote Operation of Switchgear.
(10) Staff Location.

A Supply Undertaking can today regard its distribution network as a giant telegraph system, and the advent of the superimposed current control opens up a limitless field of control to their profit and convenience.

Today many Undertakings overseas, on both sides of the Atlantic, are using superimposed current control for one purpose or another and are finding the methods simple and low in maintenance costs, and there is no reason but to picture a future in which all supply undertakings, regardless of size, will be using their distribution network for controlling street lighting, maximum demand, network switching and many other services.

The following brief description of carrying out the methods of superimposed current control are considered sufficient to stimulate your interest in this relatively new technique and members interested are recommended to search for more detailed information in the articles referred to at the end of this paper.

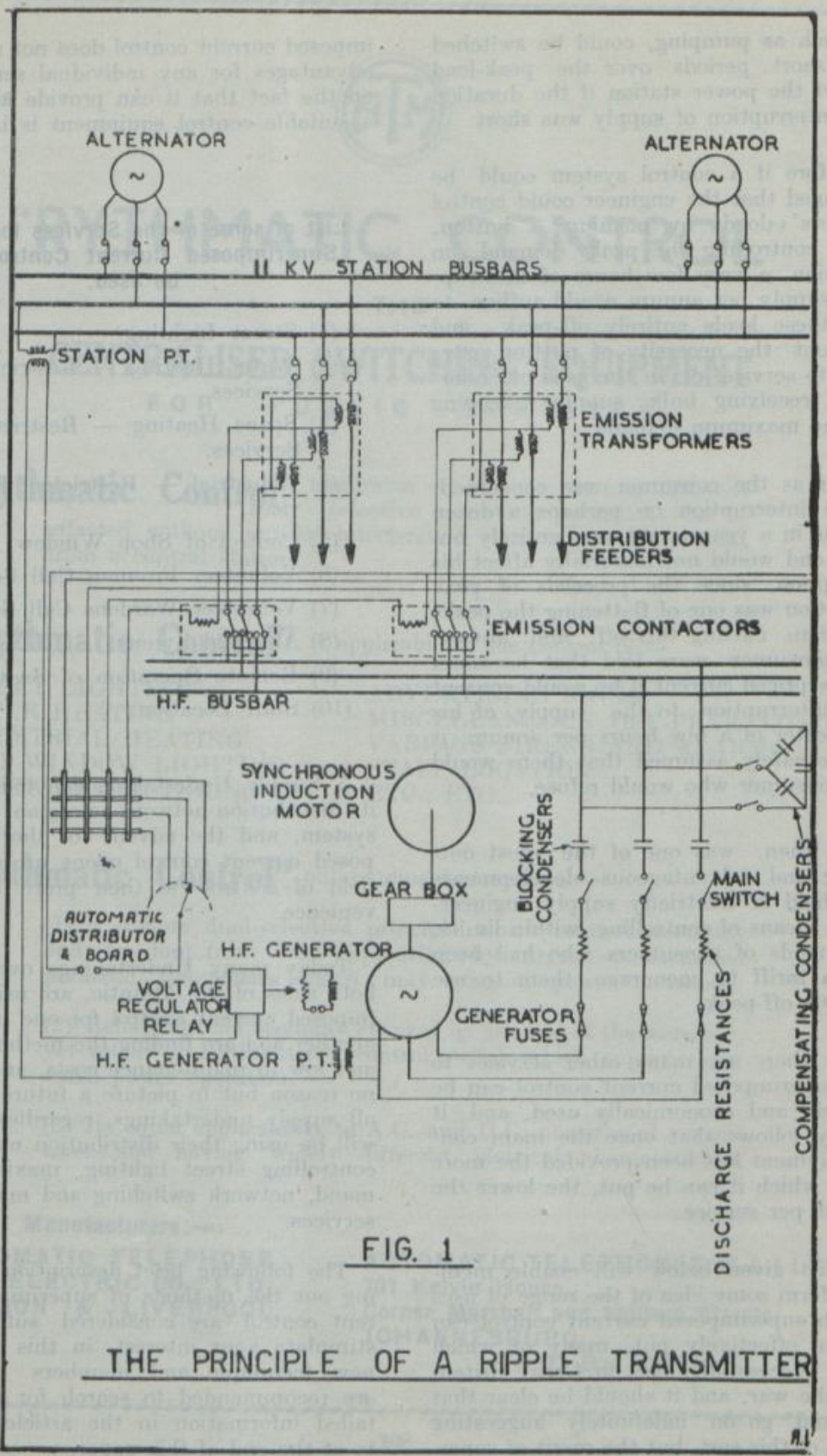

FIG. 1

THE PRINCIPLE OF A RIPPLE TRANSMITTER

The Principle of the Ripple Method of Control.

The ripple method of control is a method in which currents of a suitable frequency are injected or imposed on a supply authorities distribution system, usually on the high voltages system at the generating station or bulk supply point. Alternatively, they can be injected at distribution centres where these are small in number.

The ripple currents are generated by a ripple generator or transmitter, the latter being the usual term employed, designed to be capable of transmitting frequencies differing in periodicity.

The frequency of the superimposed currents is usually within the voice frequency range, the ripple transmitter being designed to be capable of giving a set of different frequencies equal in number to the required number of control signals. For example, in the case of street lighting there could be one frequency of say 400 cycles per second for switching the lights on and one of perhaps 460 for switching the lights off.

The control of the lights would be effected by means of a relay fitted in the lamp standard designed to respond to 400 cycles for switching on and to 460 for switching off.

It will be clearly appreciated that the provision of a generator designed to give a variable range of frequency will permit of a range of controls equal to the number of different frequencies for which the transmitter is designed.

Centralised ripple transmitters or generators are therefore usually designed to be capable of transmitting several signals differing in frequency from each other so that relays designed to respond to the different signals may be fitted to the services to be controlled, it being clearly understood that these signals are transmitted over the cables and apparatus already forming part of the normal distribution network, so removing the necessity of having to provide special cables for the same purpose.

In one well-tried system of ripple control the ripple transmitter consists of a 3-phase ripple alternator driven by either a D.C. motor or a synchronous motor, the different signal frequencies being obtained by varying the speed of the motor in the case of the D.C. motor, or by means of a sliding pinion gear box with the A.C. motor. With the A.C. motor form of transmitter the motor speed is constant, the different signal frequencies being obtained by changing the gear ratio between the motor and the alternator by means of the sliding pinion.

The change in frequency may be regulated either manually or electrically.

In order to inject the signals from the generator into the distribution system, a transformer is provided which may be either designed for connecting in parallel across the station busbars or for placing in series with the outgoing feeders from the Power Station or Sub-station.

In the first case only one transformer is required, in the latter it is usual to provide one for each outgoing feeder.

Now although the first method has been used in certain circumstances, it is usually impracticable, due to impedence of the station plant (alternators, transformers, etc.), being so low to the voice frequency currents as to absorb almost all the power generated by the transmitter, thus leaving little to be usefully applied to the system.

With the series system however the relatively low impedence path of the station plant is used as a return for the signal currents so being in their way an advantage for the successful operation of the method

It also enables the feeders to be connected separately to the generator, thus permitting of individual control and also by injecting in rotation into the different feeders enables the rating of the generators to be reduced.

Figure 1 illustrates the general principle of ripple transmitters.

The series transformer may be likened to 3-phase current transformers, the primary windings being fed from the ripple alterna-

tor and the secondary winding being connected in series with the outgoing feeders.

In order to prevent the 50 cycle current from flowing back into the ripple generator, suitably designed blocking condensers are connected between the generator and the Emission Transformers.

The compensating condensers shown are used to correct the Power Factor of the ripple.

As the emission transformers are in series with the feeders, these would act as reactors if special arrangements were not made to prevent this. Such effect is avoided by short-circuiting the primary winding of each transformer by a contactor, as shown, at all times except during the few seconds when the transformer is injecting the ripple signal.

As has already been mentioned, the operation of the superimposed current on the apparatus to be controlled is effected through a relay suitably designed to respond to the superimposed signal and which is fitted to the controlled apparatus.

One widely used type of receiving relay used on ripple control installations is known as the "vibrating reed relay."

In this form of relay the relay circuit is connected between phase and neutral and comprises a condenser and an electric magnet whose characteristics are such that in combination they resonate at ripple frequency but block the passage of 50 cycle currents.

The electro-magnet has two armatures each of which is like a small turing fork which is tuned mechanically so that it will vibrate only at a frequency corresponding to the electrical frequency of one of the two ripples which the relay is tuned to receive.

For example in connection with the switching on and off of street lighting one tuning fork or "reed" would be tuned to receive the "on" frequency of 400 cycles per second and the second "reed" to the "off" frequency of 460 cycles per second.

When the "on" signal is received the "on" reed would commence to vibrate and in so doing operate a small ratchet wheel which, through meter gearing, is connected to a mercury switch.

The reverse operation would occur when the "off" frequency is received.

It has been estimated that there are more ripple relays of the "vibrating reed" type today than all other types of ripple relays added together and quadrupled, and that experience of these relays over ten years show that failures in operation seldom exceed one in 100,000

Ripple control transmitters can be designed to provide six, ten or more different signal frequencies, it being remembered that a pair of frequencies are required for an ON — OFF service.

The ripple system is simple to understand and it is claimed that low maintenance and satisfactory reliability result in practice.

The operation of a ripple installation is effected from a control board upon which are mounted all the necessary push-buttons, pilot-lights, indicators, etc.

D.C. Bias System.

The D.C. Bias system is a system em ploying a direct current, the signals taking the form of timed impulses.

The method claims to combine simplicity of equipment with low initial and running costs.

The method employs a low voltage direct current bias applied to the net work for the operation of polarised relays.

The bias is derived from a 6 volt storage battery, which, at the moment of switching On or Off, the apparatus, it is arranged to control, is connected in series between the star point of the sub-station transformers and the neutral conductor.

This connection is established by means of contactors which are operated either

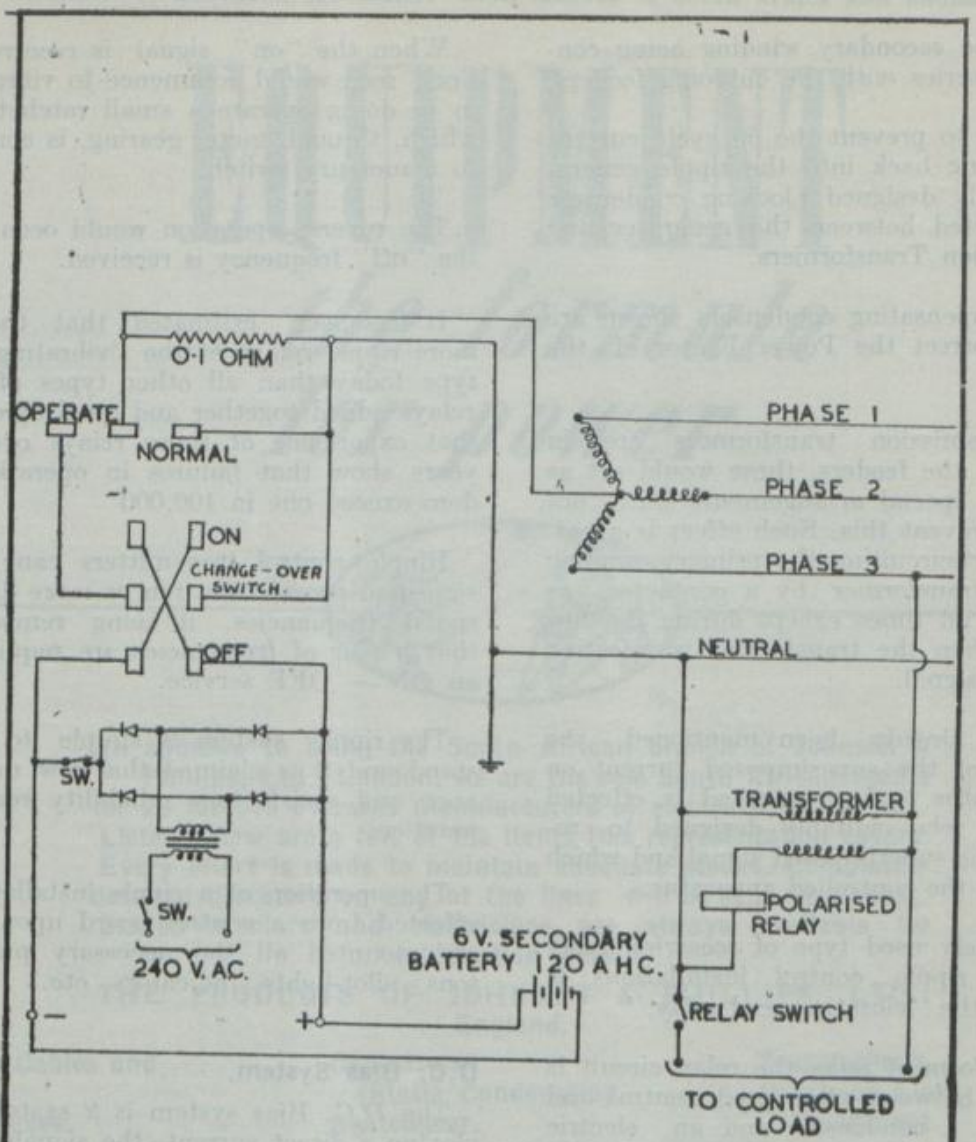

FIG. 2

ELEMENTARY DIAGRAM OF D.C. BIAS CONTROL CIRCUIT

locally from a sub-station control panel or by remote control from some central point.

The contactors are shunted by a resistance of .1 ohm to obviate the open circuit which would otherwise occur during the few milli-seconds of transit period of the contactors.

The circuit arrangement is shown schematically in the elementary circuit diagram Fig. 2.

In order to send a switching signal, the biasing battery is connected to the network for a period of two seconds.

When no signal is being sent, the star point of the sub-station transformers is connected directly to the neutral conductor.

It should be appreciated that it is possible to apply either a positive or a negative bias to the network, and by the use of a **polarised** relay at the far end, this method may be used for the two operations of switching lamps on and off.

To enable this to be done, two double pole contactors are used, connected to form the equivalent of a double pole changeover switch, as shown in the diagram.

The biasing battery is an ordinary 6 volt car type battery and is kept charged by a small trickle charger of the metal rectifier type.

From Figure 2 it will be seen that the control relay consists of a transformer and a polarised relay.

The transformer is of special design with the two windings connected in parallel across the mains, and the relay coil inserted in series with one of these windings. By making the primary inductance of the transformer equal to the mutual inductance, the amount of alternating current in the secondary winding and consequently in the relay coil in series with it, is reduced to a minimum.

However, as the secondary is connected across the mains, there is nothing to impede the flow of the biasing direct current.

The polarised relay is of standard design and is latched magnetically in its operated or released conditions.

The operation of the method is briefly as follows:—

Referring to Figure 2, the 0.1 ohm resistance is normally short circuited. On depressing the ON button, the double pole contactor operates to connect the biasing battery to the signalling contactors with the appropriate polarity for an ON signal. The signalling contactor then operates to remove the short circuit from the resistance and connect the biased battery to the network.

In this case the positive pole of the battery is connected to the star point of the sub-station transformers and the negative pole to the neutral conductor.

This applies a bias to all loads connected between phase and neutral but, of course, has no effect on any phase to phase load.

The bias also has no effect on normal apparatus connected between phase and neutral and can be detected only by the polarised relays in the lamp columns. These relays receive their 25 milliampers of direct current during the 2 seconds for which the bias persists and close their contactor to switch the lamps or other apparatus ON.

On the release of the push buttons, normal conditions are restored.

To switch the lights or other apparatus off, a similar sequence of operation is initiated by depressing the OFF button, save that the opposite double pole contactor closes, this connecting the battery with the positive pole to the neutral and the negative to the star point. In consequence, the polarised relay operates in the reverse direction, thus switching the lamps off.

From an examination of this method it should be obvious that it is necessary, in order to apply it to a complete network, to instal impulse sending equipment in every sub-station.

The equipment is, however, very simple and inexpensive, and where central control is required this may be carried out by providing pilot wires between the main station and the sub-stations.

Where networks are operated with interconnected sub-stations, it may be thought that certain difficulties may arise, but this is not the case.

Within the area served by the sub-station any number of control relays may be installed.

As previously pointed out, the current taken by the relay during operation is about 25 milliampers, and the relays are said to work satisfactorily even with a low D.C. bias as three to four volts.

As in the case of ripple control, the scope of this system can also be widened to include the control of half night lighting, water and space heating loads, sirens, etc. Actually a total of thirteen separate controls is normally provided by this system.

As has already been described, two distinct and separate signals can easily be obtained by single impulse from such an arrangement, one being sent out when the battery is connected with its positive terminal connected to the star-point of the transformer and its negative terminal connected to the neutral, and a different signal obtained when these conditions are reversed and the negative terminal connected to the star point.

Thus a simple method of sending an ON and OFF signal is obtained by using polarised receiving relays and this has been used for the control of half night lighting.

A simple ON and OFF service however is not all that is required for street lighting control. Some lights must be left on all night, while others are required to be switched off at midnight.

Thus, although one short positive pulse can be used to switch on all lights, two different pulses are necessary to switch off, in order to differentiate between the half night and all night lighting.

This is achieved by using a short negative pulse (2 seconds duration) for the half night switching off service while a longer negative pulse (12 seconds duration) switches off the all night lights, the relays controlling these being fitted with a delay action.

By using this delay action, three distinctly separate signals are obtained with the simplest arrangement of polarised relays.

Additional services however are required which must neither interfere with nor complicate the simple polarised relays principle adapted for street lighting control.

It will be understood that once street lighting has been switched on by a positive pulse, any number of positive pulses can be sent until midnight without affecting the street lamp relays.

If at midnight a negative pulse is transmitted to switch off the half night lamps, any number of negative pulses can be sent until dusk the next day.

In short, provided impulses are "poled" to agree with street lighting conditions, they can be sent as often as required during the twenty-four hours.

Accordingly, each of the remaining services is selected by means of two impulses (either positive or negative) time spaced by a distinct interval of 10, 15, 20, 25 and so on up to 55 seconds, each service using a different time interval.

To ensure that the multi-service receivers are responsive, whatever the polarity of the impulse, they are fitted with a non-polarised receiving relay which, when the first of two impulses is received, starts a small synchronous clock type motor driving a contact arm (for one revolution only), over twelve contacts at a speed of 1 r.p.m.

A similar motor at the control station has also started to make one revolution at the same instant, and, as the moving arm of this motor passes over the contact for the service selected, the second impulse is transmitted.

All receiving units will be passing over their similar contacts at this instant and those which have their operating relay wired to this control will be selected.

Whether a second impulse is sent or not during the revolution, all receivers reset themselves ready to make a future operation.

High Frequency Superimposed Current.

A paper or superimposed current control would not be complete without some reference to the use of high frequency current. Systems using frequencies from 100 to 150 kilocycles per second are used primarily for currents that are required to be localised, whereas voice frequency currents are used where the currents are not required to be localised.

In other words where a system of control is required in which current must be confined to a given circuit, such as a transmission line, as is sometimes required in the case of some systems of protection, then in order that such current shall not be capable of passing through the terminal transformer, high frequencies, as mentioned above, are employed to which the terminal apparatus offers a high impedence. When, however, it is desired that the superimposed current shall distribute themselves over an electrical network in order to broadcast the services for which they are intended, voice frequency currents capable of being passed through the transformer are used.

In some systems of control high frequency currents are injected in the circuits to act as carrier-currents being arranged to act as a carrier for another signal such as voice frequency impulses. Whereas voice frequency currents are usually provided by means of an alternator high frequency currents are generated by thermionic valves

Conclusion and Acknowledgements.

It is felt that the foregoing brief descriptions are sufficient for the purpose of this paper. Considerably more detailed information of these control methods should shortly become available now that the war is over and usage and experience of the various systems for war purposes will be awaited with interest.

The author wishes to thank the Association for its invitation to present the paper and to Messrs. Standard Telephones & Cables Ltd., Messrs. Metropolitan Vickers Co. and Messrs. A. Reyrolle & Co., for information received, and permission to publish information relative to this subject.

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THE PRESIDENT: Thank you very much, Mr. Powell. This is a subject which has interested me personally since 1937, and I think it has interested others. We have so far dealt with non-technical subjects, and I hope the engineers will enjoy themselves tomorrow morning when we get on to this more technical subject.

Councillor Gearing is leaving to-night, and has a word to say.

COUNCILLOR GEARING: I will not keep you a moment, but unfortunately ,I am compelled to leave for Cape Town tomorrow, so I will be unable to attend the discussions tomorrow. I cannot leave this happy gathering, without expressing to you, Mr. President, and through you, to the Mayor and Council of your City, on behalf of my Council, and my wife and myself, our thanks for the hospitality and entertainment extended to us. We have thoroughly enjoyed our stay in your city. Bloemfontein is a delightful place with a beautiful climate. It is a well-laid out city with fine buildings and charming people; and as might be said of the beautiful lady, Bloemfontein appears to have everything. I would like also to say how much I have enjoyed renewing my acquaintance with many of you, and I hope I will be fortunate enough to be again among you as a delegate to this very harmonious gathering.

THE PRESIDENT: I thank you very much, and I will certainly convey your wishes to my Council.

The Convention adjourned to Friday, 17th May, 1946.

FRIDAY, 17th MAY, 1946.

AUDITORS.

THE PRESIDENT: The first item is the appointment of auditors.

MR. EASTMAN: I have pleasure in proposing the re-election of the auditors for the year that has just ended, Messrs. Warren and Hofmeyr, of Pretoria.

MR. FRASER: I second that.

Agreed.

MEETINGS OF EXECUTIVE COUNCIL.

THE PRESIDENT: The other matter, which we have already discussed previously, is the necessity of the Executive to meet more frequently.

MR. KINSMAN: Your Executive has been meeting this week every morning at half past eight, and in spite of delaying the Convention a quarter of an hour this morning, we have been unable to deal with all the items requiring attention. We do not know what the attitude of the various Councils will be to leave and travelling expenses. Your Executive have undertaken to investigate that position, but we felt our hands would be strengthened if we were able to obtain from the Convention a resolution on these lines—that is was desirable that the Executive should meet at least twice each year between the Annual Conventions. I think something on those lines should be proposed, and I propose that.

MR. WRIGHT: I second that proposition. Agreed.

THE PRESIDENT: I think we had better proceed with the discussion on Mr. Powell's paper, and see how we get on before tea. Mr. Powell's paper on Superimposed Control is now open for discussion.

MR. BRADLEY (Port Elizabeth): I think our indebtedness to Mr. Powell for bringing before us this very useful contribution cannot be over-emphasised. Mr. Powell has laid down most of the points concerning it that I may have brought forward, because in Port Elizabeth we use the D.C. Bias System. We find it most economical and we have had no trouble with it to date. It was purchased in 1942 to be used for air-raid siren alarms and so on, but its uses are manifold; they are detailed in Mr. Powell's paper. We use it for street lighting only at the moment, but of course I hope in the next year to do something about using it for hot water heaters and shop window lighting control and for

a staff call system for instance, you will appreciate how useful it would be for the man on the switchboard to press a button and contact the Mains Engineer or any other key man required urgently. Its functions are really wonderful, and I strongly advise all municipal engineers to give this their very serious consideration, because its effects are so useful, that it cannot be ignored. I find that in using it on street lighting I save up to 30 per cent. capital expenditure on cables with street lighting extensions. Operating experience has so far been good, although it is necessary to carry out a definite routine maintenance programme, which point is often overlooked on the older method of cascade control.

We use, in Port Elizabeth (the 6,600 volt network as the primary impulse carrier, this is accomplished by injecting into the generator star point a 12 volt D.C. impulse in the same way as the impulse is injected into the low tension network. The signal is collected at L.T. injection points by means of a 3 phase star connected choke on the H.T. mains and a relay in circuit between the star point and earth. This relay then operates the L.T. biasing panel. Thus the L.T. panel is what might be termed a "follower" of the master H.T. panel. We also operate some panels via pilot and telephone wires where these exist for inter-substation communication.

One point which might cause misgiving to some engineer is that the system has a multiple earth. I have a paper here that was read at the meeting of the Port Elizabeth Engineering Society in connection with the D.C. Bias control and I would be happy indeed to pass on a copy of this paper or discuss it with anybody interested. I am not advertising for any firm, but it is a wonderful thing to municipal engineers that I think everyone should pay particular attention to this paper. It is one of the best papers we have had for some years. I will not digress further. I know time is short and others may want to ask questions. But I think Mr. Powell is due our sincere thanks for bringing this to our notice.

MR. ANDREW (Kingwilliamstown): I am interested to know whether there would be any disturbance on the control or tuned relays when gas discharge lamps are used on the system, irrespective whether the D.C. bias or frequency control system was being used. Perhaps Mr. Powell or Mr. Bradley can clear up that point. In connection with the relays inserted at the point of control to receive the signal I would like to know whether any trouble has been experienced or whether undue maintenance is required where they may be disturbed by temperature or dust conditions. If so, are these "teething" troubles being overcome. If adjustable features are incorporated for the relay settings, one is apt to get trouble from inexperienced maintenance operators.

MR. SIBSON (Bulawayo): I do not want to discuss the details of ripple control, or the various types of control, but there are one or two remarks made by Mr. Powell in his paper that I should like to comment on. Mr. Powell appears to have little confidence in light-sensitive cells for street lighting control. I know one type which is a great success; we have operated it for years and it is very satisfactory indeed. The photo-electric cell requires to be renewed about every five years, but provided that is done, it is very satisfactory. It has one drawback; with strong lightning the lights have a tendency to go out, and the relay therefore should be short-circuited during thunderstorms.

An important advantage occurred to me that is not mentioned by Mr. Powell in relation to a central control of such things as water heating, and that is the facility of dealing with emergencies which arise in power stations. I can imagine nothing more useful than, at will, without inconvenience to the consumer, being able to trip out two or three thousand kilowatts of load. It is an extraordinary asset. On the other hand the tendency to flatten out one's load curve by these sort of controls will bring about one possible danger. It is customary in the maintenance of a power station to rely on the early hours of the morning when loads are lighter, to do odd jobs on the steam ranges and so on. If we proceed on the lines of flattening the curves entirely there may be no time to undertake these repairs. Then engineers will proceed

to argue that they must have more plant to enable them to lay up part of the plant when it requires overhaul, and some of the arguments in favour of low rates will disappear. That is something we should bear in mind.

MR. FODEN (East London): I endorse Mr. Bradley's remarks to the effect that I consider Mr. Powell's paper a valuable contribution to our records. The Author of the paper is probably not aware of the system of control we have for street lighting in East London where certain innovations were brought about during the war. Further, I endorse Mr. Sibson's remarks that light sensitive cells have given satisfaction. In East London we use only one light sensitive cell as a Master Controller and this in turn controls the relays on the cascade system throughout the City, and it has been found to be quite satisfactory. Where a system such as that installed in East London is not in operation I quite appreciate the advantages of the Super-imposed Current Control either by D.C. Bias or Ripple Method of Control.

I would like to ask the Author if he knows of any trouble experienced with either the D.C. Bias or the Ripple Control where such systems are used for the operation of two-rate meters. No doubt both the above-mentioned systems are satisfactory when no interruption or supply occurs, but should a failure of supply at a local sub-station occur, I am of the opinion that the whole series of operations of the two methods of control are upset, and I would like to ask Mr. Powell if he can give the assurance that should you have an interruption of supply at the local sub-station the sequence of the operation of the two methods of control is not upset in any way. Briefly I would like to know, in view of the foregoing, if either of the two systems can be safely adopted for the control of two-rate meters?

MR. SMITH (Boksburg): I would endorse the remarks of the last speaker that this paper emphasises the effect on street lighting. I think there is a relay on each street light. I would like to know the metering of such consumption. We know we always like to have that information, as it is part of the trading departments. In regard to the D.C. control, it is from the low-tension sub-station that the relays are associated with our lighting. I would like to know how it is we arrive at the consumption for that street lighting — how it is metered

MR. GRIPPER: I would like to ask whether it is intended that we should reply to these questions by written contributions. I had hoped to make a contribution, but time is short. If replies to the discussions are contemplated, I would like to know what the time limit would be.

THE PRESIDENT: It is hardly fair to expect a man to reply to all immediately. It is usual to get him to reply through the proceedings. Your contribution would, therefore, be welcome, if you can make it very short now, and more extensive in the proceedings.

MR. GRIPPER: Mr. Powell has mentioned South African practice of street lighting using pilot wires with or without some form of cascade control. I hope to describe on some future occasion how we have provided control of street lighting and peak loads with a cascade system of control without pilot wires. On the subject of peak load control, Mr. Powell speaks of interruptions in supply for a few hours per annum. With our daily peaks it may be preferable and less misleading to refer to an hour or two per day. Regarding the total number of signals required, I would like to ask Mr. Powell how the ripple control is spread in the case of peak loads particularly, and whether any of these systems, particularly the ripple type, are designed to spread the incidence of the return of the load. We do not want it all going on or off at the same time, and you may have 13 or 14 different signals, but each of those might require to be multiplied considerably to avoid this difficulty. Finally I would like to know whether the D.C. bias control can be applied to a system which has the low tension paralleled throughout in a solid network. With all the sub-stations linked on the low tension side, it would appear that you cannot control from individual sub-stations. Mr. Bradley mentioned that the D.C. Bias system almost amounts to multiple earthing, and I would like to ask him whether he has had any experience of electrolytic troubles.

MR. STEVENS (Ladysmith): I would associate myself with the former speaker's words of praise. As a matter of interest, a system installed at Memphis in the United States used a frequency of 2980 cycles and they experienced considerable trouble where condensers had been installed for power factor correction. The difficulty was overcome by putting in forms of traps. I just mention this as a matter of interest. I do not think such frequencies are adopted any longer for ripple control system.

MR. FRASER: The address to which we have been listening deals with a scheme which was envisaged many years ago but which had to wait the advance of electrical engineering science and skill for its large-scale fulfilment. In 1910 an injected signal of 5 per cent. of the distribution voltage was necessary and frequencies wide apart had to be chosen whereas, with some of the most modern equipment, the sensitivity of ripple relays seems to be of the order of 0.25 per cent. of the consumer's voltage. Although signal frequencies differing by 20 cycle steps are in common use, modern relays may respond to frequencies differing by not more than 0.5 per cent. from the signal frequency.

Originally the development of superimposed current control was directed almost exclusively to street lighting, but to-day its application to load control and two- and three-rate metering equipment is of equal if not greater importance. The desirability of improving load factor by encouraging off-peak loads has been fully realised, but to derive the maximum benefit to both consumer and supply authority from this type of load, means must be provided to enable it to be switched off during peak periods. In New Zealand a very large electric water heating load has been developed, 136,681 water heaters being in use in 1942 with a total connected load of 120,510 Kk. For some of the larger undertakings units sold for this purpose alone amounted to 50 per cent of the total. Attractive tariffs are offered and, as a natural outcome, off-peak control is being rapidly installed, largely of the D.C. bias type.

For the smaller undertakings, where simplicity and low initial cost are of primary importance and where the number of circuits to be controlled is generally low, the D.C. bias system appears to be ideal. For the larger networks, however, a great deal of pilot cable would be necessary to bring about central control, as the biasing equipment can only be introduced at the sub-station on low tension feeders, and therefore some form of alternating current control seems preferable.

The technical difficulties in the design of satisfactory ripple control equipment appear numerous. The signal strength at the receiver is influenced by three factors, namely (i) the strength of the injected signal, (ii) drain into adjoining networks, and (iii) the system characteristics, particularly the size and location of current limiting reactors and power factor correction condensers. Fortunately, in the case of the average municipal undertaking, power factor correction is seldom necessary due to the large domestic load and considerable cable capacity. Where condensers are in use it may be desirable to shunt them with an inductive reactance, the circuit resonating within the band of signal frequencies in use. Another unforseen difficulty which has been encountered is that of voltage distortion due to mercury-arc rectifiers, sufficient to cause occasional relay operation; when once the source of this disturbing voltage has been located, suitable filters provide a sure remedy. The distribution of signal strength throughout the system is a further unpredictable factor due to the shunting effect of distributed capacity and the possibility of resonance between transformer reactance and cable capacity, or between generator reactance and the total distributed system capacity.

There seems to be two distinct schools of thought regarding the desirability and feasibility of using parallel instead of series injection. The system which is most widely employed and which was developed in Europe uses series injection into each feeder in turn, as described in the author's paper. The comparatively high signal strength of 5 to 7 volts is obtained by the use of a small high frequency alternator. The reliability claimed and achieved in operation is truly remarkable and reflects great credit on the manufacturers of the equipment.

A more recent type, originating in Great Britain, makes use of the much simpler method of parallel injection. In view of the shunting effect of the generating plant, a new and more sensitive type of receiving relay was devised which operates on about 0.5 volt at the ripple frequency. It is claimed that this system is applicable to extensive networks without resorting to excessively large high frequency generators, and has been successfully used on a system covering an area with a radius of approximately 10 miles.

The relays used are extremely ingenious in design, consisting of tuned metal reeds carrying "bouncer" contacts which normally short-circuit thermal elements. When a signal of the correct frequency is received the "bouncer" contacts open and, after a short time delay, the thermal element operates a snap-action switch in an evacuated glass envelope. A second reed, tuned to a different frequency, is arranged to operate the switch in the reverse direction, thus providing reliable on-off control which is not affected by failure of supply or transient frequencies. An incidental advantage obtained with this type of relay is that due to inherent slight differences in the time delays of individual elements, the load being controlled is not all switched on or off simultaneously, but over a short period of time.

Should ripple control ever become widely used on interconnected systems, or in undertakings obtaining bulk supply from a common source, the possibility of interference between the various networks would have to be guarded against, as it is virtually impossible to prevent the export of ripple energy. A very neat solution to this difficulty lies in using the type of relay just described with three elements instead of two, the third element being tuned to a "code" or "gate" frequency. The thermal switch of this element is of the self-resetting type and normally shorts out the two control relays. When it receives the ripple signal to which it is tuned it opens its contacts for a short period, during which time the control relays can be operated. At no other time can these elements be affected by any superimposed ripple or transient frequency. The total number of switching operations which can be controlled using this scheme is the product of the number of base frequencies and the number of control frequencies associated with each base.

During the war superimposed current control was in great demand for numerous purposes connected chiefly with Air Raid Precaution work. Happily this use has now fallen away and we must share the author's interest in awaiting details of improvements which are sure to have been made during the war years.

MR. SCHEFNER (Automatic Telephones):

The author has presented very successfully an introduction to a comparatively new technique which, with its many applications and advantages, has far-reaching possibilities, and which has resulted from, and still calls for, close co-operation between light current and heavy current engineers.

From casual considerations, control by means of currents super-imposed over distribution networks would appear to be of easy solution, and one might ask why its development did not reach the stages of commercial application earlier. Some of the difficulties are evident from the author's historical survey, and it is felt that a brief consideration of the problems to be solved and conditions to be satisfied, in the choice of such a system, will be of interest. The problems fall naturally under four main headings:—

(a) Power distribution networks which are the medium over which the control current is propagated.

(b) The control current and the factors which determine its frequency.

(c) The method of injecting the control current.

(d) Reception of the control current.

(a) **Distribution Networks:**

Although certain main principles are followed in all networks, wide divergencies in size and arrangements exist. From a control point of view these divergencies have a

greater significance to the superimposed current than to the normal supply current. Variety in the methods of high tension circuits, i.e. radial or loop feeders, also differing types of load, domestic or industrial, affect the control problem as well as other features such as ratio of minimum to maximum load, type of conductors, area of supply, etc.

(b) **Choice of control current:**

The control current must be capable of fulfilling the following requirements:—

(1) It will traverse the complete electrical distribution system. Both A.C. and D.C. areas must be accommodated.

(2) It is distinctive from the normal supply current, and also from the various parasitic and transient currents experienced on distribution systems. It will be appreciated that the latter requirement is most essential.

(3) It can be made to select different switches.

(4) It will not interfere with other equipment connected to the system.

(5) It is economical to generate and apply.

In deciding the most suitable audiofrequency to be used, the limitations are controlled on the low side by load absorption—the nearer to the 50 cycle supply frequency the greater the energy absorbed by the normal load. On the high frequency side the choice is limited by attenuation in the distribution system—the higher the frequency, the steeper the voltage gradient. The degree of absorption is also controlled by the characteristics of the 50 cycle load—highly inductive loads, such as motors, will absorb less current of the higher frequency ranges, while capacitance loads such as power factor correction condensers absorb more current of the higher frequency range. Frequency bands subject to harmonic and other parasitic frequencies must also be avoided, and the mechanical and electrical limitations of the reception device must also limit the choice of frequency to some extent.

(c) **Injection of control current:**

In applying the control current to the network, two main considerations are involved. Firstly, this should be done in a manner that ensures minimum expenditure of control power. Secondly, there should be no adverse effect on the operation of the normal 50 cycles plant and the operation of the ripple control equipment should be simple and straightforward.

The "Series" and "Parallel" methods of injection together with certain advantages and disadvantages have been outlined in Mr. Powell's paper. Against the disadvantages of high voice-frequency power absorption by low impedance of station plant, in the "Parallel" method, might be mentioned the following advantages:—

(1) Simplicity of application—Connection through a standard type of H.T. switch is a simple and standard procedure.

(2) Automatic adaption to the switching conditions of any network—whether feeds are changed from one to another, or high tension "rings" are closed, alternators run up or shut down, etc., the control current will always feed the connected circuits.

(3) Simultaneous operation over the whole of the network is provided.

(4) The time taken to complete each remote switching operation is a minimum.

Although the "series" method of injection effects a saving in audio-frequency power and consequently in size of generating plant, the cost of injection equipment may exceed the cost of the larger generator required for "parallel" injection, where a large number of feeders is involved. Sequential injection into the different feeders also extends the operating time and involves more complicated control equipment. Finally, series injection also imposes restrictions on the switching of feeders e.g. closing a H.T. "ring" effects a short circuit on the control current and so loses the control potential. Simultaneous injection into both affected feeders is necessary to build up opposing voltages under such conditions. This involves a large ripple current alternator. However, the advantage of the lower impedance return path in this method is enhanced by load growth, since this impedance is further reduced by the introduction of additional feeders.

It is therefore evident that each proposed new installation would require individual consideration with a view to deciding upon the method of injection best suited to it.

(d) **Reception of control currents:**

Essential features of the reception equipment are high sensitivity, immunity from possible false operation and robustness of construction. The main problem is to differentiate between the control currents and the surges, harmonics, transients and parasitic voltages and currents which exist on networks.

All these problems, some of which apply generally and others to particular power networks have, however, been overcome and, as pointed out by Mr. Powell, systems of control by super-imposed currents are now being used very successfully in practice.

Rythmatic Control.

A system known as "Rythmatic Concrol," has recently been developed and is interesting both from the points of view of technique and economy.

It is of the ripple current type employing voice frequencies of the order of 300 to 3,000 cycles per sec. but is unique in that it operates on a dual selective principle namely frequency and rhythm. The output of a generator supplying audio-frequency current at a particular frequency is interrupted at a low repetition rate thus producing audio-frequency current impulses. By utilising several audio-frequencies which are interrupted at different periodicities a multiplicity of separate switching operations is obtained, each of these being controlled by one of several different trains of current impulses, termed "rhythms," at one of the several different frequencies available. These trains of current impulses therefore differ both as regards the duration of each individual current impulse and the frequency employed. In practice one nominal frequency is interrupted at six different "rhythms" and up to four different frequencies can be used, these being obtained by driving in tandem, four alternators mounted on a common bed-plate. A total of twenty-four different selective switching operations is thus provided.

At the receiving end, the switching operation is performed by a "Rythmatic" control switch which employs two types of filter, one electrical, the other being mechanical. The electrical filter accepts a particular audio-frequency and rejects the 230 volt 50 cycle potential. The mechanical filter which selects the relevant impulse repetition rate consists of a specially designed galvanometer or polarised type of relap whose armature is caused to swing at a definite beat or rhythm under the control of a spring The audio-frequency which is accepted by the electrical filter is rectified and applied to the relay. If the repetition rate of the impulses correspond to the natural frequency of the armature and spring combination, the armature swing

gradually increases, until, after a specified number of impulses, it attains sufficient amplitude to close the contact and operate an associated mechanically locking switch which controls the street light or other device. Relays of various "rhythms" are employed to correspond to the corresponding impulses or rhythms of control current injected.

This dual selective principle on which this type of control switch operates renders it immune from shock excitation by surges or sustained parasitic frequencies. For any form of external interference to be effective, it would be necessary, not only for the correct frequency to be apparent but, the correct rhythm also and for this rhythm to be sustained for the required number of impulses.

The relays are extremely sensitive with the result that parallel injection of the control currents and similar audio-frequency generators may be employed.

The mechanics of the "Rhythmatic" control switch offer no restriction to the choice of frequency as is the case with relays embodying the vibrating reed principle. This means that a free choice is available, enabling the considerations of economics, network and operation conditions to be suited to an unfettered degree.

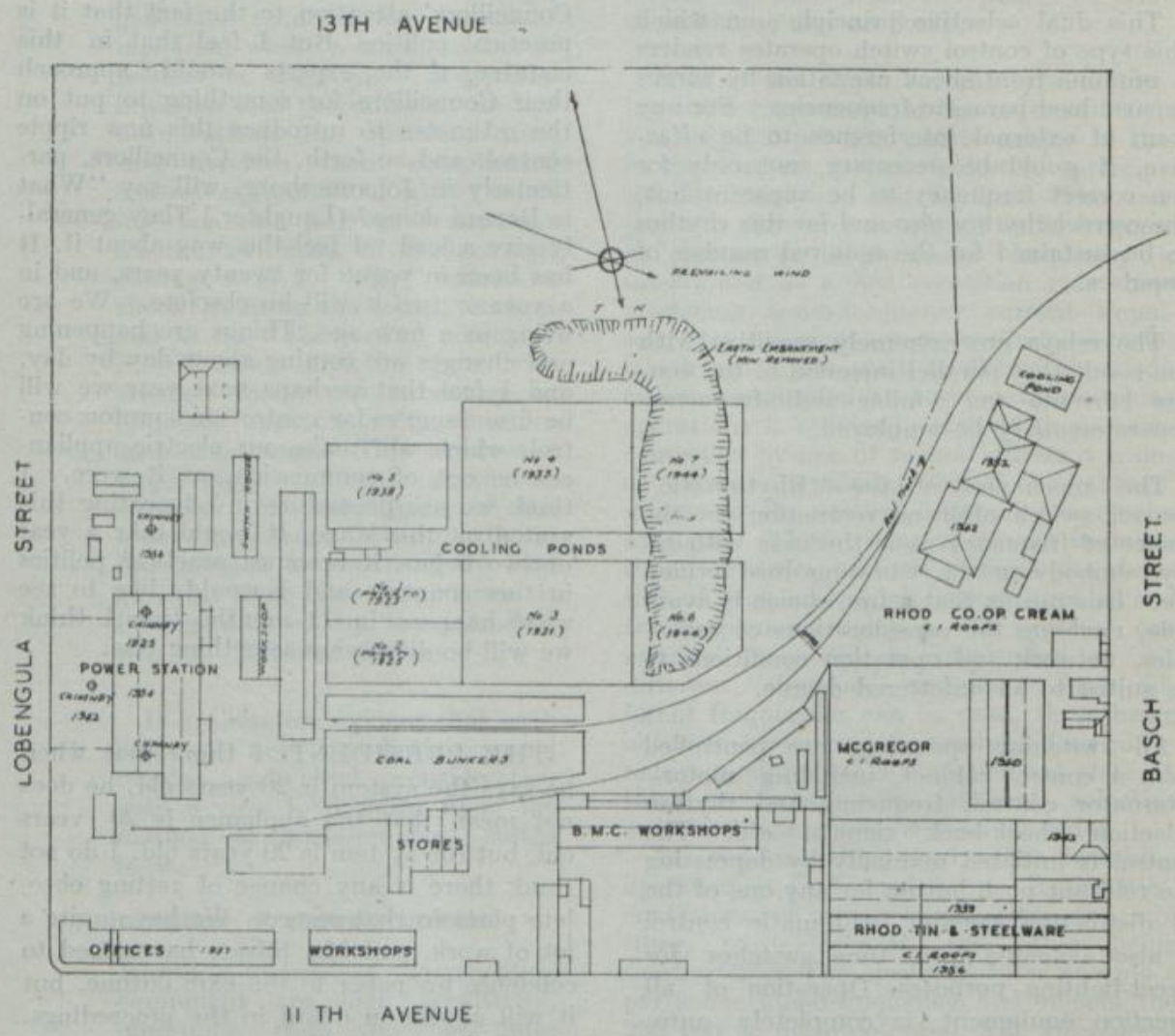
All switching operations are controlled from a control cabinet, including motor-alternator control, frequency and rhythm selection, check-back signals, etc. The control is initiated manually by depressing the relevant push-button for any one of the 24 distinctive signals. Automatic control is also available from time switches for street-lighting purposes. Operation of all injection equipment is completely automatic, every item being controlled from the push button associated with the particular signal to be transmitted. In addition manual control is provided, and provision for remote over pilot wires may alsc be made.

Numerous installations employing this technique are functioning with full satisfaction in Great Britain.

COUNCILLOR WEBB: I thought S. Africa had finished with controls. (Laughter.) This is evidently a new type of control that is good for society. I would definitely like to congratulate Mr. Powell on the valuable paper put before you. Undoubtedly, as far as the engineers are concorned, he has made it clear as a crystal, but as far as the Councillors are concerned, it is as clear as mud. But he has drawn the Councillors' attention to the fact that it is practical politics. But I feel that in this country, if the experts would approach their Councillors for something to put on the estimates to introduce this new ripple control, and so forth, the Councillors, particularly in Johannesburg, will say "What is Benoni doing? (Laughter.) They generally give a lead. I feel this way about it. It has been in vogue for twenty years, and in a year or two it will be obsolete. We are living in a new age. Things are happening and changes are coming about day by day, and I feel that perhaps next year we will be discussing radar control and proton control, which will make our electric appliances be out of commission, as it were. I think we are premature in advocating this system at this stage. It would take a year or two before it becomes practical politics in this country, and I would like to see what happens in 12 months time.I think we will be discussing something else.

THE PRESIDENT: I think that when he says the system is 20 years old, he does not mean that the appliance is 20 years old, but the system is 20 years old. I do not think there is any chance of getting obsolete plant in that respect. We have quite a lot of work, and Mr. Sibson has agreed to condense his paper to the bare outline, but it will appear in detail in the proceedings. So that members can at least ask questions or comment on it, we felt that he should give a resume of his paper.

MR SIBSON: I shall try to give you in a few moments a broad outline of this paper. You have got copies and those of you who read it will not lose much by the full paper not being read out.


13TH AVENUE
LOBENGULA STREET
BASCH STREET
PREVAILING WIND
EARTH EMBANKMENT (NOW REMOVED)
COOLING POND
No 5 (1938)
No 4 (1935)
No 7 (1944)
COOLING PONDS
No 3 (1921)
No 6 (1940)
POWER STATION
CHIMNEY 1925
CHIMNEY 1934
CHIMNEY 1942
WORKSHOP
COAL BUNKERS
STORES
B.M.C. WORKSHOPS
OFFICES
WORKSHOPS
RHOD CO-OP CREAM
4 ROOMS
MCGREGOR
4 ROOMS
1940
1942
1939
RHOD TIN & STEELWARE
4 ROOMS
1936
11TH AVENUE

SPRAY PONDS AS A FACTOR IN THE CORROSION OF GALVANISED IRON ROOFS.

By A. R. Sibson, Bulawayo

The Electricity Department at Bulawayo has recently been involved in a High Court case arising out of claims of damages made by three neighbouring owners of industrial properties. The claims alleged that water containing salts in solution was blown over their properties from the Power Station Cooling Ponds, and that these salts were of a corrosive character causing considerable damage to their galvanised iron roofs, and it was stated that in some cases roofs which had been replaced only five years previously had suffered to such an extent that it was now necessary to replace them again.

These claims were repudiated by the Council since it was known that the Cooling Pond water contained principally sodium bicarbonate and had a pH value of such an order that corrosion of galvanised iron was extremely unlikely if not impossible.

It is felt that the Association might be interested in the various details of this case, particularly in the considerable research that was done on behalf of the Council in justifying the position it took up. It is possible that in the future other engineers may be involved in similar complaints and the facts are, therefore, set down for general information.

Figure 1 is a plan showing the general layout of the Power Station and the adjoining properties. From this it will be seen that there is a total of seven Cooling Ponds of total area 93,500 sq. feet. These ponds handle normally 1.3 million gallons per hour of circulating water. Ponds 1 and 2 are equiped with Yarway helical sprayers; Ponds 3, 4, 6 and 7 are equipped with Yarway involute sprayers; Pond 5 is equipped with Harrison's conical sprayers.

The three plaintiffs were the Rhodesian Co-operative Creameries (1936) Ltd., F. McGregor Ltd., and Rhodesian Tin and Steelware Manufacturers Ltd., but the actual Court proceedings related only to the first plaintiff, it being the intention of the other two to await the findings of the first case before proceeding.

It will be noted that the direction of the prevailing wind is such that there would be a tendency for spray to be blown over the plaintiffs' premises, and the nearest of their buildings to the spray ponds is approximately 180 ft. from the nearest pond wall.

The history of the Bulawayo Undertaking has already been given in a previous paper to the Association, and it will be recalled that the first Power Station to be erected was put into operation in 1897. A considerable amount of intensive research was done into early records of past history when the Station was owner by a private company, and it was found that a Cooling Pond was installed about 1906 on the site of what are now Ponds 1 and 2, and that, in fact, the walls of the original pond are those which still exist surrounding the two ponds in question. In those early days there were no other buildings in the vicinity, and when it was originally put down the Power Station was some distance from the Town area proper. The Creameries' predecessors' establishment dates from 1921, and the other plaintiffs' much later and all are, in fact, accommodated in what was once a portion of the original grant made by the B.S.A. Company to the Bulawayo Waterworks for the purpose of water supply and power generation.

There was no doubt, therefore, that a prescriptive right existed to operate the Power Station in that area, and the claims that were made were based on what was alleged to be negligence on the part of the Council in permitting wind-blown spray to reach the premises of the plaintiffs. Particularly it was agreed that the removal of the earth embankment shown on Figure 1, which was necessary when Ponds 6 and 7 were installed in 1944, had considerably aggravated the nuisance and that the Council should take steps to erect some form of

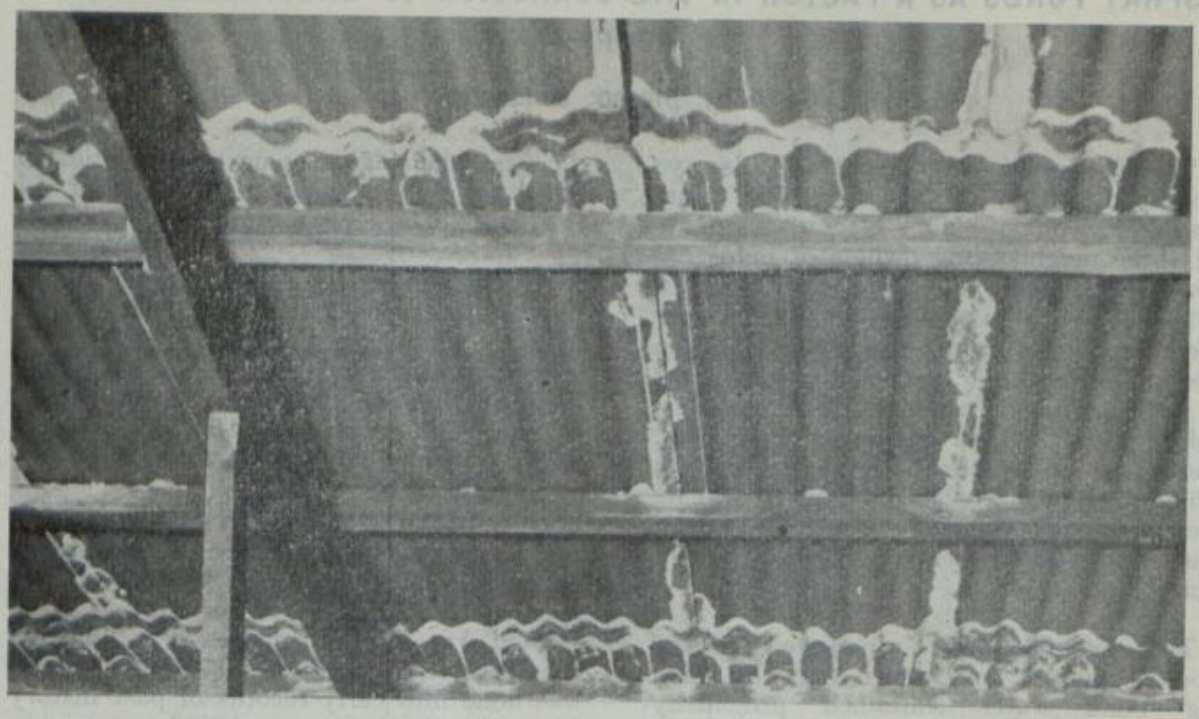


Figure 2.

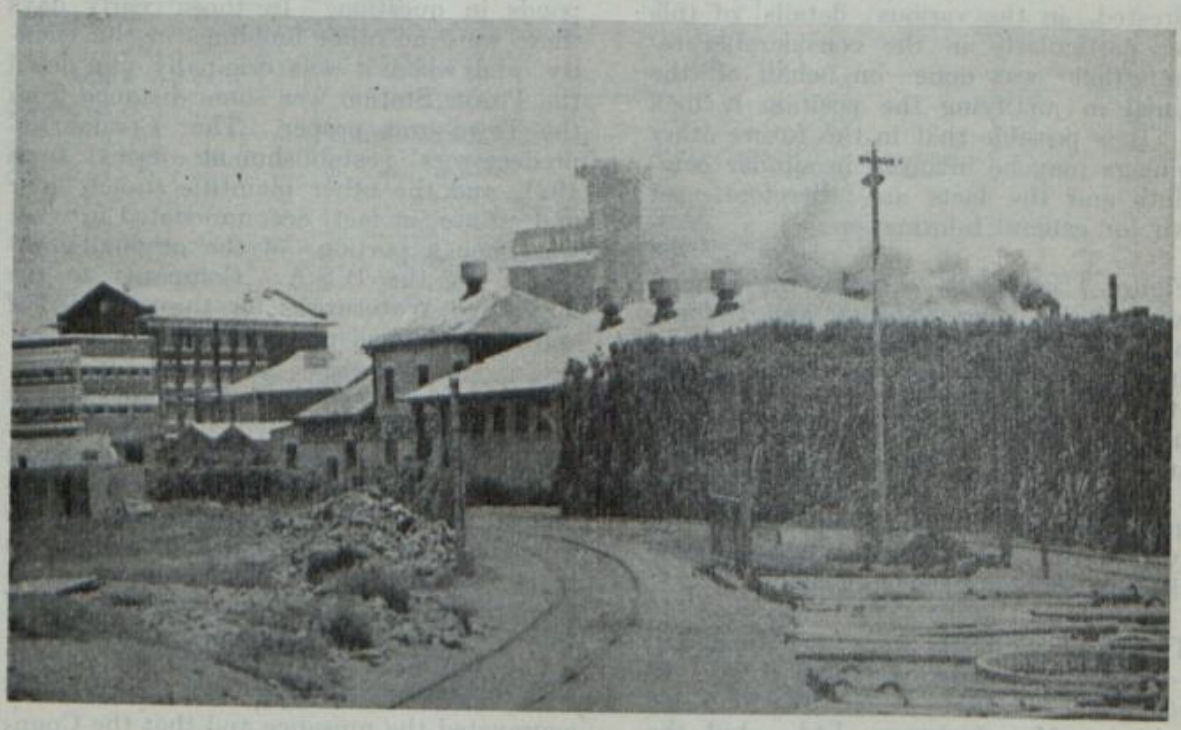


Figure 3.

barrier to keep wind-blown spray within their own premises.

It will be interesting at this stage to consider the nature of the damage to roofs which it was alleged the spray had caused. Appearances from the outside gave little or no indication of any corrosion, in fact the roofs were no different from the general mass of unpainted galvanised iron roofs of similar age throughout the town. The damage was only obvious when a close inspection inside the building was made, and this consisted of corrosion of the iron at joints and laps on the underside of the roof.

Figure 2 is a photograph showing a typical section of the roof. An outstanding feature was the presence of considerable amounts of a whitish deposit which was found at nearly every point where two sheets of galvanised iron met and overlapped, and it was naturally assumed that this deposit was either a product of or an active instigator of the corrosion. In many of the older roofs the iron was completely eaten through at the joints.

From the outset confusion existed due to the resemblance between the white deposit containing salts from the Cooling Ponds and a similar white deposit containing products of corrosion, the latter being found by us in many places remote from the Cooling Ponds and the former being found in many iron buildings, some of great age and close to the sprays, without any signs of corrosion.

The analyses of the deposits taken from the plaintiff's roofs showed very clearly that considerable sulphation was taking place and the low pH values of aqueous extracts indicated the presence of dissolved sulphur dioxide. Tests giving these results were taken by us soon after the claims were made, and formed the basis of our repudiation of them. The fact that the plaintiffs themselves had boiler plant equipped with very low chimneys (one of them being several feet below the level of the top of the roof), led us to the conclusion that the sulphurous gases from this source were probably a major factor in bringing about the damage.

When it was clear that the plaintiffs intended to proceed seriously with the case, the Council engaged Mr. O. Lazar of Johannesburg as a Chemical Consultant, and at the same time the Johannesburg Municipality very generously offered the services of Mr. McLachlan, one of their chemists with a wide experience of municipal problems.

It is not my intention to encroach to any extent upon the considerable research work carried out by these gentlemen. In several cases experiments, breaking new ground in chemical investigations, were done, and I have no doubt that at some future date Mr. Lazar may contemplate publishing the details of this investigation and informative work. Broadly, their analyses showed that deposits scraped from the roofs in the vicinity of the corrosive attack contained considerable quantities of sulphate iron, and in each case the aqueous extract gave a definitely acid reaction. The quantity of sulphate present was far in excess of that present in the Cooling Pond waters, which were found to consist of sodium bi-carbonate with small quantities of sodium sulphate and still smaller quantities of sodium chloride. No appreciable carbonate iron was found in the roof deposits.

A characteristic experiment with sheets of galvanised iron subjected to a variety of probable conditions in the Laboratory showed conclusively that continuous corrosion only occurred in the presence of sulphor dioxide. The Cooling Pond waters merely hastened the normal creation of a protective film of zinc carbonate which prevented further attack. This is, of course, precisely the same action as takes place over longer periods, owing to contact with the ordinary atmosphere, producing a condition usually sought after by builders prior to the application of paint.

The reason for the concentration of the attack at the lap joints of the galvanised iron can be given with a fair degree of certainty.

Water running down the outside of the roofs will tend to collect as droplets at the lower edge of each sheet of iron. On evapo-

ration, any salts in solution washed from the outer surface, will crystallise out on the under side of the edge of the sheet and will be protected, therefore, from surface washings of rain or dew. Whenever the surface of the roofs is wet, however, water with more salts in solution will be absorbed into the crystalline deposits which will tend to spread upwards on the underside. The deposit will remain wet for a longer period than the outer surface of the iron, so that the absorption of sulphur dioxide will take place to a greater extent there, and the sulphurous attack will be far greater.

This attack will produce hygroscopic substances which will remain in the space between sheets secure from the surface washings and accelerate the corrosion process on account of the presence of moisture capable of absorbing sulphur dioxide.

I have referred to the existence of low smokestacks on the premises of the Rhodesia Creameries. These can be seen clearly from the photograph, Figure 3. The premises of the other two plaintiffs are to the right of the buildings seen in this photograph, and it is interesting to note that the condition of their roofs in nowhere as serious as in the case of the Creameries. In fact, there is very little sign of any corrosion at all, though there is a fair amount of the white deposit present at the lap joints of the roof. Chemical analyses of these deposits show that sulphation has also taken place there, but at a less rapid rate. There are no smokestacks associated with these other two premises, and their greater distance from the creamery stacks will probably account for the lesser rate of deterioration. It is thought that the complaints made by these two plaintiffs were based on the assumption that the presence of a visible white deposit was an indication of corrosion taking place.

In spite, however, of the technical evidence which shows overwhelmingly that the actual corrosion is caused by sulphur dioxide, there is no doubt that the rate at which it has proceeded in the case of the Creameries is such that the layman can be forgiven for assuming that Cooling Pond spray had something to do with it, especially as on occasions spray can be seen and felt coming over to the property. Further, there are many other places where low smokestacks cause sulphur dioxide to be dissipated in the close proximity of galvanised iron roofs, and where nothing like the same damage has taken place.

One of the factors, too, that impelled the plaintiffs to take action, as was subsequently discovered, was the impression that large quantities of sodium chloride were put into the Power Station Cooling Ponds. This idea arose as a result of the frequent calling for tenders, by the Council, for salt for use in the Zoolite softening plant. From the point of view of the subsequent legal proceedings, it is extremely unfortunate that the plaintiffs did not first obtain reliable and accurate information about what was, in fact, taking place and what was the nature of the deposits and the corrosive process.

One of the most significant features on the plaintiffs's premises was the appearance of the underside of an open verandah roof in close proximity to their boilers. The construction of this verandah was such that direct wind-blown spray could not have reached the under surface, which was nevertheless heavily mottled all over with white specks suggesting that on frequent occasions moisture condensed on the underside and absorbed sulphur dioxide from the atmosphere, thereby attacking the zinc. Further, very considerable damage, of the character previously discussed, was found on portions of the roof more remote from the Cooling Ponds and much lower than those that intervened between them and the Ponds, and on to which it was improbable that much direct-blown spray could fall.

In our inspection of other buildings in other parts of the town we found an exactly similar corrosive effect taking place at a place where live steam was being exhausted, and where at the same time smoke was constantly present. This led us to the conclusion that the presence of sulphur dioxide, together with a higher than usual degree of atmosphere humidity, would explain the rapid corrosion that was complained of.

Now, in this respect it is possible and, in fact, probable that the Cooling Ponds did contribute towards the state of affairs

that is evident from inspection of the plaintiffs' roofs. Approximately 7 million gallons of water is evaporated monthly by the existing Spray Ponds and this is bound to have some effect on the atmospheric humidities in the near vicinity. This is, however, a totally different issue from that upon which the claim for damages was based, and different not only technically but from a legal point of view as well. Whereas it is possible that the Council could be held responsible for a state of affairs which it is within the bounds of practical engineering to abate, obviously it cannot be held responsible for conditions which are inherently inseparable from the activities carried on, particularly since such activities had been maintained for such a long period before the plaintiffs themselves commenced operations. In any case, the Creameries themselves also contributed very considerably to the conditions of humidity due to the process steam used inside the factory, and the constant and continuous washing of floors.

In all circumstances it was clear that the greatest individual item of negligence was on the part of the plaintiffs themselves in operating with such low smokestacks and not taking the elementary precaution of painting their roofs so as to avoid as much as possible, any damage arising from their own activities and from the many other hazards that existed in the industrial area.

The particular nature of the attack suggests, incidentally, that at least one coat of paint should be applied, before erection, to the portions of the sheets which will overlap. Suitable preparations are available which eliminate the customary postponement of roof painting for a few months for purposes of "weathering."

In the course of the investigation conducted by Messrs. Lazar and McLachlan they visited a number of South African Power Stations to ascertain whether anything of a similar character could be found elsewhere. The results were almost entirely negative. Though it was frequently found that white deposits of salts from Cooling Pond spray found their way on to galvanised iron roofs, in no case had marked corrosion taken place, except where sulphurous products were also freely available from low smokestacks or railway lines.

I should like to take this opportunity of thanking the Electrical Engineers of these towns and the V.F.P. officials for their assistance and co-operation in this very interesting research.

Summarising all the ascertained data the following are the broad facts that appear:—

1. In the near vicinity of Spray Cooling Ponds with water containing primarily, sodium bi-carbonate, a deposit can be expected on roofs. It will reach the roofs mainly as dry wind blown particles from the evaporation of drops thrown into the air by the sprays. Rain and dew will wash these salts down the roof surface and some will recrystallise between the laps of the galvanised iron. This deposit is innocuous and, in fact, tends to protect the roofs from any attack by sulphur dioxide.

2. If a sufficient quantity of sulphur dioxide is available to neutralise the alkalinity of the foregoing deposits, attack on galvanised iron might take place in the presence of water. In this event deposits would be formed which would be likely to be of a hygroscopic nature, thereby retaining moisture in a progressive corrosion cycle.

3. By far the greatest contribution that Spray Cooling Ponds can make to the danger of sulphurous attack is the increased local humidity due to the evaporation of large masses of water. This rises the dew point and results in condensation on cold metallic surfaces far more frequently and heavily than would be the case if such Cooling Ponds were not present. It would also increase the absorption of water from the atmosphere by hygroscopic substances.

4. The sulphur dioxide responsible for the corrosion is not likely to originate from a few isolated smokestacks elevated to heights of the order of 100 ft., if the points attacked are much lower down.

5. Sulphur dioxide and water are essential factors in this roof corrosion. In the present case the former come largely from

the plaintiff's own smokestack; the latter was derived partly from the atmosphere in the normal way, partly from the industrial operations within the plaintiff's premises and partly as a result of increased local humidities due to the presence of a large Cooling Pond.

6. Since the evaporation of water is the whole function of Spray Cooling Ponds and the use of such ponds is normal modern practice in the majority of inland Power Stations, the development of higher humidities in their vicinity is a normal hazard which anyone affected should take steps to guard against. There is no way in which the user of the ponds can abate this humidity.

7. Direct wind-blown spray, while contributing water, brings also the protective sodium bi-carbonate. In any case the water so contributed could only reach neighbouring premises on windy days in a finely divided state and has never been seen in sufficient quantity to cause visible wetting of roofs.

8. It is thought that the bulk of the damage is done in the hours of daybreak when the dew point is reached and the plaintiff's boilers are being started up for the day, there being less likelihood of appreciable wind at this time.

9. The use of buildings with unpainted galvanised iron roofs in the vicinity of low smokestacks where the humidities are high must result in rapid deterioration of such roofs.

The High Court proceedings in this issue did not reach finality. After the first few days it was evident that many weeks would be occupied in hearing evidence, cross-examinations and final arguments. The Plaintiffs, therefore, approached the Council with the suggestion that the case might be settled out of Court,, and after some discussion this was agreed to and duly settled.

In view of the highly complicated nature of the technical evidence and the difficulty of the layman in appreciating all the finer points, together with the very expensive legal proceedings that lay ahead, the Council agreed to terms of settlement which, at first sight, might suggest, at least to some extent, an admission of liability, though, in fact, a withdrawal of the damages claim was the important condition which was included. Unfortunately, the technical issues as laid out above could not, of course, be discussed with the other side prior to the reaching of settlement, and the erection of a barrier on the lee-ward side of the Cooling Ponds to trap wind-blown spray was agreed to by the Council — for while we knew that such a barrier could have no value in limiting the corrosive attack, the plaintiffs at that stage did not. To have held out against the provision of this comparatively cheap erection would have jeopardised the desirable cessation of lengthly and costly proceedings, which was, in our view, not in the public interest.

Settlement was made easier by virtue of the fact that we are, at the moment constructing a Cooling Tower which is expected to be in operation before the end of the current year. This is the first of a series of Towers that will ultimately replace existing spray ponds, the site having become too congested for any further expansion of spray cooling equipment.

I trust these few notes may have been of interest to members of the Association, and I have to express my thanks to the Bulawayo City Council for permistion to make this contribution.

Appendix.

1. Analysis of Cooling Pond Water.

Percentage of Total Solids.

Silica SiO_2	6.0
Ferric Oxide Fe_2O_3	0.1
Alumina Al_2O_3	0.4
Ammonium Chloride NH_4Cl ...	0.4
Sodium Chloride NaCl	7.2
Sodium Sulphate Na_2SO_4	26.5
Sodium Bi-carbonate (as Na_2CO_3	57.8
Calcium Carbonate $CaCO_3$	1.6
Total:	100.0

pH value 8.1 — 8.6

2. Analysis of Creamery Roof Deposit.
Percentage of Total Solids.

Total Water	13.63
Carbon	6.92
Insoluble matter	15.23
Acid Soluble Silica SiO_2	0.78
Ferrous and Ferric Oxide	2.08
Alumina Al_2O_3	1.30
Zinc Oxide ZnO	0.29
Zinc Carbonate $ZnCO_3$	2.59
Zinc Sulphate $ZnSO_4$	25.80
Calcium Sulphate $CaSO_4$	5.41
Magnesium Sulphate $MgSO_4$ ...	1.59
Sodium Sulphate Na_2SO_4 ...	21.01
Sodium Chloride NaCl	3.31
Total:	99.94

pH value of aqueous extract: 6.4

3. Estimate of SO_2 content in atmosphere.
In parts SO_2 per million parts air.

(a) Near Power Station ...	up to .0085
(b) Between Cooling Ponds 6 and 7, West end ...	up to .0181
(c) At Creameries	up to .0568

Figures at (b) and (c) probably less than actual, due to wind-blown alkaline particles neutralising SO_2

THE PRESIDENT: We are indebted to you, Mr. Sibson. Is there anybody ready with questions or remarks on this subject?

MR. ANDREW (Kingwilliamstown): The paper by Mr. Sibson is of interest to all Municipalities operating spray ponds within the municipal built-up area. While we have not as yet experienced any trouble or had any complaints such as referred to in the paper, we do feel conscious of what may possibly happen. In a recent technical publication, I was interested to observe that the pH value of rain water varied between wide limits with samples taken under identical conditions. This variation shows that the atmosphere had been cleaned of impurities. For example, a sample taken when rain started revealed that there were 6.48 parts per 100,000 which included sulphite of lime, organic matter, chloride of calcium and chloride of ammonia. A second sample some hours later revealed that the concentration had been reduced to 1.74 parts. This clearly shows that the atmosphere has been cleaned of soluble impurities, and obviously these impurities were deposited on buildings, etc., and I feel that it would be a most difficult thing to prove that corrosion of roofs was due to any one specific cause.

MR. W. C. LINDEMANN: I have listened attentively to Mr. Sibson's paper and the type of corrosion mentioned by him can be found on galvanised wire fences. Should the galvanizing be slightly damaged a galvanic battery action is set up and electrolytic corrosion takes place.

The conditions given in the paper, in my opinion were ideal for accelerating corrosion especially when there was a boiler house nearby thus bringing about heat, moisture and all the necessities for bringing about galvanic action which would spread faster than it would under ordinary atmospheric conditions.

Listening to Mr. Sibson's remarks it occurred to me that there were ideal conditions for corrosion apart from the effects of the spray pond and I feel that the case could have been easily defended on the grounds that ideal conditions existed outside the spray pond for rapid corrosion which could be reproduced physically in any laboratory.

MR. RITSON: Mr. President, there is an item of importance which I wish to bring to the notice of the members. No doubt there are many members of the Municipal Employees' Association present and the position may be that their local Secretary is in the, say, Town Engineer's Department, and the member may rarely see the "Situations Vacant" notices.

In Municipal Affairs Special Edition No. 208 of 1946, page 5, there is an advertisement for "Assistant Town Engineer and Head of Electricity Department."

This may possibly be my last meeting, and I know thetre are others present who are close to retiring age. Will our Councils advertise for the Electrical Engineer's

job in the same way as I have mentioned? I visualise, that if it is done, our meetings will be only attended by Councillors, Town Engineers, Assistant Town Engineers, members of the Electricity Supply Commission and representatives of certain firms. I brought this matter up Mr. President in case other members had not seen the notice.

MR. GRIPPER: Following Mr. Ritson's remarks, I also took note of this particular matter, and intended to bring it up at this Conference. Where the "Head of the Electricity Department" is to be Assistant Town Engineer, his biggest consumer may be his boss, and I move that this Conference expresses in the most suitable manner possible its concern over this type of appointment. I think we should take it further than merely commenting on it, and I therefore move, as a seconder, that this meeting expresses its surprise and disapproval of the type of appointment in which Engineer members of this Association are forced to act in positions subservient to members of our brother associations.

MR. KINSMAN: I wonder whether the meeting would be prepared to refer that to the Executive, with a view to proper action being taken.

MR. ANDREWS: I second that.

COUNCILLOR BOYLAN: You have to be very careful in your deliberations, and I think the Executive should take into consideration that some of the Engineers who are appointed have got Electrical Engineers' certificates. There could be no objection to men of that type as members of the Association, but I think strong exception should be taken when Town Clerks are in charge of the Electricity Departments.

THE PRESIDENT: I think that has been sufficiently ventilated. The next question deals with Electrical Wiring Contractors.

REGISTRATION OF ELECTRICAL WIRING CONTRACTORS.

(Mr. J. C. Fraser, Johannesburg).

Preamble.

1. The question of the registration of Wiring Contractors was discussed at the 1944 Convention of the A.M.E.U., when a motion was adopted that the Electrical Wiremen's Registration Board be asked to investigate the posibility of amending the Act in order to obviate the many difficulties arising in the registration of Contractors.

2. As a result of the above, a letter was sent to the Board by the Secretary of the A.M.E. during June, 1944.

3. The Board then sent out a question naire to various Municipalities and to the Secretary of the A.M.E.U., who sent copies to Engineer Members. The replies received by the Secretary were analysed and collated, and a report was drawn up making proposals under each heading, and was sent to all Engineer Members of the A.M.E.U.

4. The report was discussed at the A.M.E.U. Convention of 1945, where it was agred that, as certain of the proposals were of a controversial nature, members should be requested to submit their comments to the Secretary of the A.M.E.U., in an effort to reach a greater degree of unanimity before sending the report to the Board.

5. Comments on the report have been submitted by Cape Town, Oudtshorn, Boksburg, Bloemfontein, Hercules, Pietermaritzburg, East London, Benoni, Roodepoort-Maraisburg, Middelburg, C.P., and Port Elizabeth. Below is an analysis of these comments, together with a discussions on the points raised, and suggested proposals. This should be read in conjunction with the report referred to in paragraph 3, and dated 2nd May, 1945.

Question 1 — Definition of Contracting Work.

Analysis of Comments.

Proposal (a).

Section (1) — Generally agreed.

Section (2) — The majority agreed, two disagreed and two alternative suggestions have been made, viz.:—

(i) The wattage limit of appliances sold by non-contractors should be lowered to 500 watts to exclude irons.

(ii) No apparatus in excess of 110 volts should be sold by non-contractors.

Discussion:

(a) Points raised in favour of proposal (a) (2).

(i) It tends to ensure marketing of rereliable equipment.

(ii) It will compensate contractors for increased burdens imposed by proposed new regulations.

(iii) It lines up with the Drug Act and sale of Poisons by Chemists.

(b) Points raised against proposal (a) (2).

(i) The marketing of appliances cannot be regarded as contracting work.

(ii) It will do nothing or little to ensure the marketing of reliable appliances, the only way of doing this being by the establishment of a Standards Bureau.

(iii) It would tend to create price rings, combines, cartels, etc.

(iv) Many persons or firms at present selling appliances would have to take out contractors' licences, which in most cases would be either impossible or pointless since they do not engage in contracting work.

(v) The proposal would introduce difficulty in applying the regulations.

(c) The following should also be borne in mind:—

(i) The proposal includes "fittings and materials associated with wiring work," i.e., insulated wire, conduit, plugs, sockets, switches, ceiling roses, etc., so that manufacturers' selling agents would also have to take out contractors' licences.

(ii) Contractors would have to provide store rooms, show rooms, sales staff, etc., in order to market appliances.

(iii) The proposal might result in trade being shifted from one section of the community, which includes many firms of high repute, to another section which may not desire it or may not be able to handle it. (Contractors may at present sell appliances.)

Thus, considering all the above points, it seems that the question of marketing appliances is in fact outside the scope of the Act.

Proposal (b).

General agreement, with the exception of the following two comments:—

(i) There shall be only one grade of contractor, and where it is necesary for contractors to carry out H.T. work, special permission would be granted by the local authorities from time to time.

(ii) Contractors should be segregated into "Domestic" and "Industrial" according to the type of work in which they engage.

(iii) One asks why the non-standard voltage of 750 was chosen as the dividing line.

Discussion.

(i) In some areas a great deal of H.T. industrial work is carried out by contractors, so that in these areas at least the registration of qualified H.T. contractors would seem essential.

(ii) As regards the use of the terms "Domestic" and "Industrial," these will have to be very carefully defined if confusion is to be avoided. The distinction is not as simple as L.T. and H.T. In any case, if a contractor is competent to carry out L.T. wiring installations, should he not be competent to carry out any L.T. wiring installation?

(iii) 750 volts was chosen in order to allow for possible future changes in the definition of medium pressure.

Amended Proposal.

(a) The definition be extended to include company, firm or association of persons.

(b) Contractors be segregated into "Low and Medium Pressure" and "High Pressure" contractors, the line of demarcation being 750 volts.

Question 2 — Personal Qualifications of Contractors and their Employees, including the case where applicant is a firm or company.

Analysis of Comments.

The majority agree with the original proposals, but two authorities have expressed the opinion that it is unnecesary for any of the principals to be registered wiremen or qualified electrical engineers. Two have pointed out that in respect of proposal (c), it is unnecessary to have a qualified electrical engineer in **continuous attendance** on H.T. installations, and that it is sufficient for the electrical engineer to be in continuous responsibility. A further comment is to the effect that "principal" should be defined.

Discussion.

The idea behind specifying that one of the principals be qualified is to ensure that there is a qualified person who is in a position to "issue instructions affecting the technical aspects of materials or installation work." This phrase appeared in proposal (b) but should apply to both (a) and (b). An employee delegated with such responsibility would not in fact be able to be held responsible since his instructions could easily be over-ruled by a principal of the firm. In order that this proposal shall have its full force, it is suggested that the words "active and present principal" shoud be used.

As regards having a qualified engineer in continuous attendance on H.T. installations, the impracticability of this is recognised.

As regards defining "principal," there does not appear to be any ambiguity in the term, but if it is considered to be necessary, it could be defined as "any proprietor, partner or director."

Amended Proposal.

If proposal (b) under question 1 is adopted, then:—

(a) For low and medium pressure contractors, at least one active and present Principal shall be a licensed low pressure wireman.

(b) For high pressure contractors, at least one active and present Principal shall be a qualified electrical engineer. If both high and low pressure work is undertaken, then such Principal shall be licensed for both classes of work or two Principals shall hold these qualifications between them.

(c) No Principal not so qualified shall give or cause to be given any instructins affecting the technical aspects of materials or installation work.

(d) **Employees.** For high pressure installations, the work must be carried out by or under constant supervision of a qualified electrician. Where such work falls under the definition of wiring according to the Act, such electrician shall be a licensed wireman. In addition, a qualified electrical engineer shall bear constant responsibility for the work.

Low pressure wiremen are adequately covered by the existing Act.

Note: A qualified electrical engineer shall be the holder of a Government Certificate of Competency, a Degree in Electrical Engineering, or be a Chartered Electrical Engineer.

Question 3 — Procedure to be adopted with respect to applications for registration.

Analysis of Comments.

The majority agree with the original proposal but one favours licensing by the Board so that contractors would then be free to operate in any area. Another suggestion that a Press advertisement is unnecessary and that the posting of a notice outside the premises, as in the case of a general dealer, would be sufficient.

Discussion.

The majority opinion is in favour of the authority issuing licences, since the contractors work will be connected to the authorities network.

If conditions of registration are made uniform throughout the country, then there can be no objection to contractors from one area operating in another. By securing the Board's approval, it will be possible to check on contractors who, having been refused registration in one area, become or apply to become registered in another. As regards the Press notice, this is more far reaching than a notice posted outside the premises. It must be remembered that a general dealer's business concerns only his immediate neighbourhood, whereas an electrical contractor operates over a considerable area.

Proposal. — unchanged, viz:—

(a) That applicant shall,

(1) give notice in a prescribed form in the daily Press of his intention to apply for registration so that objections may be heard;

(2) make application on a prescribeo form to the Local Authority.

(b) The Local Authority, with the approval of the Board, shall issue licences.

Question 4 — Conditions under which existing contractors should be registered.

Question 5 — Issue of provisional certificates of registration, valid for a limited period pending adjustment to new conditions.

These questions being closely allied, were dealt with jointly.

Analysis of Comments.

There is general agreement with the original proposal. Two replies have not agreed to proposal (b) but have advanced no reasons. One suggests that existing approved contractors be granted final registration, but new applicants be granted a provisional certificate say of twelve months.

Proposal — unchanged, viz:—

(a) That existing contractors be granted registration subject to their comply-

ing with new conditions within a period of twelve months from the gazetting of these conditions.

(b) If it is agreed that, under Question 1, the segregation into high and low pressure contractors be adopted (when re-adjustment period of two or three years shall be granted) and/or under Question 6, registration is to be renewable annually, then provisional licences should be granted to existing contractors.

Question 6 — Whether Certificates should be permanent, subject to compliance with the Act, or renewable annually.

Analysis of Comments.

Original proposal agreed to by all.

Proposal — unchanged, viz:—

That certificates should be renewable annually.

Question 7 — Fees suggested for registration or renewal of certificates.

Analysis of Comments.

The majority agreed with the original proposal, but one suggests that as this matter closely concerns the local authorities, the views of Councillor members would be valuable. Another suggests that fees should be in pounds and not guineas, and another that the registration fee should be £1.1.0

Discussion.

The revenue derived from fees would cover cost of printing licences, application forms and record forms, administrative costs, etc.

Proposal — unchanged, viz:—

Registration fee: £2.2.0
Renewal fee: £1.1.0 per annum

Question 8 — Power to suspend, cancel or refuse the renewal of a certificate, and the grounds on which such action may be taken.

Analysis of Comments.

All agreed with the original proposal

Discussion.

There is general agreement that the registering authority shall have the powers referred to in the question and that the grounds on which these powers may be enforced are adequately covered in the Act. (Sections 21, 22, 23 and 24).

Proposal — unchanged, viz:—

That the relevant clauses of the existing Act be adopted with the reservation that alterations or additions, which may become desirable in the light of other amendments to the Act, be considered before the final draft is accepted.

Question 9 — Collaboration between Board and suppliers in dealing with applications for registration.

Analysis of Comments.

There is general agreement with the proposal made under this question, which is in line with that made under Question 3, but one suggests that the registration be obtained from the Board first and then application made to the local authority.

Proposal — unchanged, viz:—

Renewal contractors shall make application for registration for/ to the Local Authority, who shall decide whether registration or renewal shall be granted, withheld or cancelled. Before notifying the applicant of a decision, this should be submitted for the approval of the Board, whose opinion would rule.

Question 10 — Specific requirements with respect to premises.

Analysis of Comments.

The majority agreed with the original proposal, but one considers the proposals unnecessary for low pressure contractors and offers the opinion that such regulations will materially add to the cost of installations. (This applies also to Question 11). These regulations shall not, therefore, be made compulsory but should be left to the discretion of the local authority. A further comment is that the premises approved by one authority must be satisfactory to another in order that a contractor registered in one area may carry out work in another.

Discussion.

The requirements laid down in the proposals are on very broad lines and all detail is left to the local authority. Owing to the nature of wiring work, it is appreciated that elaborate premises are not required, but the needs of apprentices must be catered for and it is essential that a contractor should have a fixed headquarters. It is difficult to see how these requirements can add appreciably to the cost of installations, since the bare minimum requirements for reasonable work have been proposed.

As regards contractors from one town carrying out work in another, if these proposals are given effect, registration of contractors will be on a national basis.

Proposal — unchanged, viz:—

Workshops must:—

(a) be provided with adequate storage facilities and be sufficiently spacious to allow workmen complete freedom at their work;

(b) be suitably illuminated;

(c) be provided with a telephone;

(d) be provided with a signboard clearly visible from the street.

Question 11 — Specific requirements with respect to equipment.

Analysis of Comments.

There is general agreement with the original proposal except for remarks re increased cost of low tension installations discussed under Question 10.

Proposal — unchanged, viz:—

(a) In general, contractors shall possess or have unlimited access to any hand or machine tools which, in the opinion of the Local Authority, are necessary for attaining a high standard in such work as, for example, busbar erection.

(b) **Tools.** These shall include work bench, fitter's and pipe vices; conduit bending equipment, pipe cutter and reamers, stocks and dies, taps and wrench, blow-lamp, solder pot and ladle, soldering irons, hammers, chisels, pliers, spanners, wrenches, brace and drills, screwdrivers, wire gauge, spirit level, rule and tape measure; flexible steel fish tape.

(c) **Instruments.** Multi-range ammeter and voltmeter, 500 volt megger, earth-ohmeter.

(d) If high tension work is undertaken, contractors shall in addition to the above possess a 2,500 volt megger and either possess or have access to a 6,600/110 volt potential transformer and a phase indicator for work which necessitates phasing out.

Question 12 — Contractors' responsibilities regarding the inspection and testing of completed installations.

Analysis of Comments.

There is general agreement with the original proposal, but one suggests that in addition, contractors should notify the authority of date of commencement of work, as this is the only way that a check can be kept on qualifications of wiremen employed and quality of work.

Discussion.

This proposal is additional to such obligations as are laid down in clause 19 (1) of the Act. The main function of the Supplier's Inspector is to ensure that an installation complies with the regulations (not necessarily with the best practice), and may safely be connected to the Suppliers' mains. This test does not relieve the contractor of any responsibility. Details to be complied with in giving notice of commencement and completion of works are usually dealt with in the Supplier's own By-Laws.

Proposal — unchanged, viz:—

The contractor must inspect and test out every installation to ensure that it will meet the requirements of the regulations and the Supplier's Inspector, and every facility shall be afforded to the inspection made later by the latter.

Question 13 — The desirability or otherwise of limiting the scope of the work which a contractor may undertake, by a suitable endorsement on his certificate.

Analysis of Comment.

The majority agree with the original proposal, but one suggests that certificates should be endorsed for small or any work, and one disagrees for reasons set forth in the discussion.

Discussion.

The only point put forward in favour of repairs for gain to electric appliances being limited to registered contractors is that this would prevent shoddy and unsound repairs. Against this the following points have been raised:—

(i) It will be a difficult provision to enforce.

(ii) Many firms will be compelled to become registered as wiring contractors, who are not in fact in that line of business.

(iii) It is questionable whether it will do much to prevent shoddy and unsound repairs.

Actually the repair of electric appliances is not very closely related to wiring contracting. To take an extreme case, must radio sets be repaired by a wiring contractor? There are many firms all over the country who run large and well equipped workshops for repair work, but who have no desire to become wiring contractors.

The proper way to ensure sound repairs will be to legislate that repairs must be carried out only by or under supervision of a qualified electrician. If this seems to be outside the scope of this Act, could not steps be taken to get such a regulation framed under, say, the Factories Act?

As regards endorsing certificates for small or any work, one obvious difficulty lies in defining the boundary of "small" work. Should not a low pressure contractor be capable of carrying out any low pressure installation?

Amended Proposal.

Certificates should be endorsed for Low and Medium Pressure or High Pressure work or both, if proposal (b) under question 1 be adopted.

Question 14 — Penalties in the case of:—

(a) **Unregistered persons who carry out contracting work.**

(b) **Persons who employ an unregistered contractor.**

Analysis of Comments.

There is general agreement with the original proposal but two do not agree that (b) should be penalised.

Discussion.

It is not considered reasonable to discriminate between the two parties in a common felony. This does not mean that (b) must always be prosecuted. In fact only in exceptional cases would this be resorted to, but it is advantageous to be in position to do so, should the necessity arise.

Proposal — unchanged, viz:—

(a) and/or (b), on conviction, shall be liable to a fine not exceeding £50 and/or imprisonment with or without hard labour not exceeding three months and, in the case of a continuing further offence, to a fine of £5 and/or imprisonment with or without hard labour for a period of seven days in respect of each day on which such offence continues.

In order to facilitate the discussion on this matter at the forthcoming A.M.E.U. Conference and to expedite the arrival at decisions, I shall appreciate it if you will give the above proposals careful consideration in advance.

ELECTRICAL CONTRACTORS' LICENCES.

Since then, we have had a letter from the Council of Reef Municipalities — Johannesburg, Benoni, Brakpan, Germiston, Boksburg, Krugersdorp, Nigel, Roodepoort-Maraisburg and Springs. That letter has drawn our attention to a matter brought in front of them dealing with electrical contractors' licences, and the honorary secretary has asked if we would give them advice. This is a letter which was addressed to the Honorary Secretary of the Association of City and Town Council Engineers:—

In reply to your letter of the 12th instant I have to advise that, as a result of a questionnaire from the Electrical Wiremen's Registration Board, the whole question of the registration of electrical wiring contractors is already being considered by the Association of Municipal Electrical Undertakings, with a view to arriving at a common basis for such registration and submitting recommendations in connection with possible amendments to the Electrical Wiremen and Contractors Act of 1939.

This Act was primarily designed to safeguard the public and Supply Authorities by ensuring that wiremen and contractors are properly qualified to execute electrical wiring work. In terms of section 18 of the Act, the majority, if not all, of the Reef towns have now been declared "determined areas," i.e., only licensed wiremen are permitted to practice therein. It follows logically, therefore, in order to place the whole matter on as sound a footing as possible, that suppliers should take advantage of section 21 of the Act, and make provision for the registration of electrical wiring contractors.

If this is done by all the Reef municipalities, preferably on a common basis with particular reference to the application of clauses (I) and (II) of sub-section (b) of section 21, then, in all probability, there would be no objection to such registered contractors undertaking work in nearby towns. In such circumstances, however, it would not be reasonable to permit a contractor from one town to carry on a major part of his contracting work in another, unless he established a suitable workshop with approved equipment in that other town. Further, it should not be possible for a contractor, having failed to obtain registration in one town, to proceed to another and secure a licence.

As you will appreciate, the Johannesburg City Council cannot grant registration to contractors whose premises are situated outside its area of jurisdiction, since it is not competent for its officials to inspect such premises.

I am sending copies of this correspondence to the Secretary of the Association of Municipal Electrical Undertakings and shall advise you of any further development.

Yours faithfully,

J. C. FRASER,

General Manager.

This was referred to us for guidance. The position is that in Johannesburg and similar determined areas, a contractor must fulfil certain requirements in accordance with the Act before getting a contractor's licence, and in Johannesburg the Electrical Engineer of Johannesburg has no authority to go outside his own municipality, and therefore, he can only give contractors licences to those who practice inside his own municipality. The other municipalities must decide what steps they are going to take, but it is a hardship on those municipalities who have no licensed electrical contractors, firstly, and secondly, that the licence of any other municipality is not recognised inside the Johannesburg municipality. This is one of the points which comes under the various questions given out in our circular letter to you, and will probably come up for discussion this morning.

THE PRESIDENT: Is there any discussion on these points of view

MR. FODEN (East London): Mr. Fraser has had my comments in writing on this particular subject, and generally I agree with everything except that on page 4 of Mr. Fraser's report, under the heading "Amended Proposal (d)" in the footnote it states:—

> "A qualified Electrical Engineer shall be the holder of a Government Certificate of Competency, a Degree in Electrical Engineering or be a Chartered Electrical Engineer."

The competency of the holder of a Government Certificate of Competency or a Chartered Electrical Engineer I do not dispute for one moment.

Dealing with the qualificatinon "Degree in Electrical Engineering" it is quite con-

ceivable that a B.Sc. (Eng.), at the age of 21 to 25 can come forward for an Electrical Contractor's Licence, and if granted he would then be in charge of an electrical contracting concern, and have very little practical electrical wiring experience, and as supply authorities we would look to him to see that good work was being carried out. Government and Local Regulations require that only Certificated Wiremen are allowed to carry out electrical installations, but the supply authorities look to the Management of the electrical contracting concern to see that the work is carried out correctly in all respects, and if the Manager of a firm is a man with no practical experience he could not satisfactorily supervise or give his opinion on the work carried out by his employees, and therefore I think the definition of a "Qualified Electrical Engineer" in so far as a "Degree in Electrical Engineering" is concerned should be amended to read a "Degree in Electrical Engineering and 5 years practical experience."

Five years of practical experience is required by the Overseas Institutions, and the Union Government also requires 5 years' practical experience for its "Certificate of Competency." Practical experience is necessary before one gets a Union Government or overseas qualification, and I think it is very important that everyone coming forward for a Contractor's Licence should have practical experience of electrical wiring, because human life is at stake.

I therefore move that the definition of "Qualified Electrical Engineer" contained in the paragraph headed **"Note"** be amended to read "Degree in Electrical Engineering and 5 years' practical experience."

THE PRESIDENT: Mr. Foden has moved that where a qualified electrical engineer, amongst others, is an engineer with a degree, it shall be a degree with five years' practical experience.

MR. GRIPPER: I will second it, but is it not to be dealt with as part and parcel of the report. Are we accepting the report as it stands with minor amendments. The position is not quite clear. I second that, but I have other suggestions to make.

THE PRESIDENT: We will deal with them as they crop up. I think, Mr. Foden, we can deal with that just now, when we get to that particular item. No. 1 is "Definition of Contracting Work." Are there any comments?

MR WRIGHT: I think it would be better if we accept the principle first, that we request the Act to be amended so that registration of contractors is governed in the same way as registration of wiremen. That is the main point we are up against. At present power is given to certain areas to create their own licences, and I think the fact we are up against is that nobody can issue a licence to anybody trading outside their own area in the country. Until we get reciprocity we shall get nowhere. There is certain work which cannot be done by local contractors, and you must allow outsiders who are competent to come in and do it.

MR. FRASER: The result of the report, as I explained, is due to a questionnaire as sent out by the Board, and I would suggest at this stage, as the Chairman of the Board is here, he may give us some enlightenment on the result of his questionnaire.

REGISTRATION OF ELECTRICAL CONTRACTORS.

MR. CLUTTERBUCK (Chairman Electrical Wiremen's Registration Board): At the outset I should like to make it clear that the Electrical Wiremen's Registration Board was not the prime mover in the request that the existing provisions of the Electrical Wiremen and Contractors' Act should be amended and amplified in order to ensure more definite and effective control over the registration of electrical contractors.

Soon after the establishment of this Board representations were made to it by electrical contractors through their trade organisations expressing the opinion that the subject had been dealt with far too superficially in the existing Act and requesting that amendments be made to provide for a uniform system of registration throughout the Union on the same lines as that which applies to electrical wiremen.

It was recommended that these amendments should include specific requirements with respect to the qualifications of contractors, their premises, and equipment, the Certificates to be issued by the Board and to be valid anywhere in the Union. These representations were supported by the Trade Unions concerned.

At your Convention in 1944 the subject was discussed at length and a resolution was passed asking the Board to explore the possibilities of introducing amending legislation on the lines indicated.

During 1944 I prepared a questionnaire enumerating certain matters which I considered should be dealt with in any such legislation and this was circulated to the Electrical Engineers of the larger centres. In due course replies were received and tabulated. These replies disclosed that there was a divergence of opinion regarding important features of the proposals and it was impossible to prepare a draft Bill for the 1945 Session of Parliament it was also intimated to me that in any case there were so many urgent war measures to be put forward that a Bill of this nature could not be accepted.

During 1945 I understand your Executive Council circulated a somewhat similar questionnaire to that referred to and a report on the subject was considered at your last Convention.

This report has since been amended in some respects and the latest proposals were placed before the Electrical Wiremen's Registration Board at its last meeting.

Following is an outline of the recommendations of the Board on each of the points raised. These are expressed briefly and if accepted will require some amplification before being embodied in a draft Bill.

Query No. 1.—Definition of Contracting Work.

Recommendations of Board:—

That the definition of a "Contractor" in the existing Act be retained.

Notes:—

In law a "person" included a firm, company or association of persons.

The Board does not favour two sections of any reference to the sale of electrical apparatus as this matter does not fall within the scope of the Act and the standardisation of such apparatus will probably be dealt with by the newly created Standards Bureau.

The Board does not favour two sections of contractors for the following reasons:—

(a) In order to improve the prospects of an amending Bill being accepted it should be as simple as possible and it is undesirable to introduce complications of a technical nature.

(b) The H.T side of an installation is generally controlled by the supplier and comparatively few contractors deal with H.T. installations, these are as a rule firms of repute whose work is of a good class.

(c) If considered necessary provision can be made for endorsement of certificates for any particular class of work.

Query No. 2.—Personal Qualifications of Contractors and their Employees.

Recommendations of Board:—

If in the case of a contracting firm or company neither of the principals are qualified wiremen, the person in charge of contracting work shall be a registered wireman and shall be delegated in writing to have full control of such work. A copy of the delegation shall be lodged with the Board.

Query No. 3.—Procedure to be adopted with respect to applications for registration.

Recommendations of Board:—

Applications to be made to the Board in the same manner as that prescribed for wiremen. All applications shall be submitted to the supplier concerned for his recommendation which will be acted upon unless there is a sound reason for doing otherwise.

Board may consult any other interested body at its discretion.

Notes:—

To render a registration certificate available throughout the Union it is necessary

that the procedure to be followed in obtaining registration and the requirements, should be uniform.

If registration remains in the hands of Municipal Authorities the existing position will remain practically unchanged. The interpretation of various requirements will undoubtedly vary in different- Municipalities and it is essential that all applications should be judged by the same established standard. Suitable forms would be prepared for suppliers reports. Once having been placed upon a National Register the contractor would be entirely under the control of the local authorities the same as a wireman.

Contractors and the Trade Unions support the above views.

Query No. 4.—Conditions under which existing Contractors should be registered.

Recommendation of Board:—

Existing contractors who already comply fully with the requirements of the Act to be automatically granted registration.

Existing contractors who do not comply with the Act to be granted provisional registration on the recommendation of the supplier for a limited period to enable them to comply.

All new applicants for registration after the Act is brought into force to comply fully within a specicied period.

Query No. 5—Issue of Provincial Certificates of Registration valid for a limited period pending adjustment to new conditions.

Covered by recommendation with respect to No. 4.

Query No. 6—Whether certificates should be permanent subject to compliance with the Act, or renewable annually.

Recommendation of Board:—

Certificates to be renewed annually.

Query No. 7—Fees payable for registration or renewal of certificates.

Recommendation of Board:—

To be fixed by Regulation in conformity with present Act. Fee £5 5s. 0d. per annum.

NOTE:— This fee is suggested by the contractors themselves and in the light of present-day conditions is not considered exorbitant.

Query No. 8—Power to suspend, cancel or refuse the renewal of a certificate and the grounds on which such action may be taken.

Recommendation of Board:—

That the relevant clauses of the existing Act (Nos. 21 to 24) be adopted suitably amended to conform with the new provisions.

Query No. 9—Collaboration between Board and Suppliers in dealing with applications for registration.

Dealt with under No. 3.

Query No. 10—Specific requirements with respect to "Premises."

Recommendation of Board:—

Premises: Shall not be part of any dwelling house and shall include a workshop properly lighted and suitably equipped for carrying out electrical contracting work.

Shall be sufficiently spacious to allow workmen complete freedom at their work and comply with the requirements of the Factories Act where applicable.

Shall be provided with adequate facilities for the storage of materials.

Query No. 11—Specific requirements with respect to "Equipment."

Recommendation of Board:—

Equipment shall consist of all necessary hand and bench tools together with approved testing instruments required to test efficiently any wiring work or installation.

Query No. 12—Contractors responsibilities regarding the inspection and testing of completed installations.

Recommendation of Board:—

That the existing procedure in each Municipality be continued.

Query No. 13—The desirability or otherwise of limiting the scope of the work which a contractor may undertake by a suitable endorsement of his certificate.

Recommendation of Board:—

No general limitation of scope but Board to have the power to suitably endorse a registration certificate at its discretion.

Query No. 14—Penalties in the case of:—

(a) unregistered persons who carry out contracting work;

(b) persons who employ an unregistered contractor.

Recommendation of Board:—

Contractors to be subject to the general conditions of Section 28 of the existing Act suitably amended.

No penalties for client.

Section 33 of the present Act also to be amended to extend the Governor-General's powers to make regulations if necessary to cover minor points not expressly provided for in the Bill.

In conclusion I should like to emphasize that the Board itself is not pressing for this amending legislation but is prepared to act as the medium through which representations may be conveyed to the Minister of Labour.

Owing to the large amount of post war and other legislation on the programme for present Parliamentary Session the proposed Bill was not considered to be of such a nature as to justify its inclusion.

The main argument used to secure the passage of the existing Act through Parliament was, that it was necessary to ensure the safety of the public, no such argument can be used in the present case.

I may add that the Labour Department has intimated that it is unlikely that any contentious legislation will be considered and unless the bodies interested can reach unanimity on the various points so that an amending Bill can be presented in the form of an agreed measure, it has very little hope of being placed before Parliament in the near future.

MR. EASTMAN: Mr. President and Gentlemen, we are very greatly indebted to Mr. Clutterbuck for his very able and clear exposition of the views of the Wiremen's Registration Board on this matter. The minutes of our last Convention state: "Did we not agree at the last Convention that regulations dealing with the registration of electrical wiring contractors should be put into the Act if it is reasonably practicable to do so? In Johannesburg the chairman of the board undertook to go into the matter." I think he has done so very well indeed. We are indeed very grateful to him for the vast amount of work he has done, and which has disposed of a large number of matters which are contained in the report which is before us. The recommendation by the Committee who proposed this report was that there should be two grades of electrical wiring contractors, one for high tension and one for low tension. I am glad to see that the Board's recommendation is against that. In Cape Town we have little call for high tension work to be done by contractors, mainly for the reason that the Council will not allow them to do it, as this in effect generally would be to allow him to connect up to high tension busbars in sub-stations. It would only be under very special circumstances that any contractor would be allowed to do such work, and I do not know of any single case where such permission has been granted. I would like, however, to refer to the question of the proposed fee of 5 guineas per annum. This figure, I understand, has been suggested by the contractors. The municipalities, however, might well have other views. They may consider that is too high. I think that even in a large centre like Cape Town 5 guineas will be regarded as too high a fee for the registration of electrical wiring contractors when hitherto the only fee they have paid is the original registration fee of 10/6. The figure might well be re-considered. I understand we have

already agreed generally to the principle of this matter of general registration being carried out if it is practicable. Accordingly, if this meeting feels that the proposals put up by the Chairman of the Board are practicable, then all we need do at this meeting is to resolve on the adoption of those recommendations, subject to such amendments as the Executive Council might consider desirable, and we can dispose of this matter once and for all, except that we cannot get it on the Statute Book, except with the assistance of the Board itself. I move accordingly.

MR. GRIPPER: May I second Mr. Eastman's proposal and heartily endorse his remarks concerning our appreciation of the work the Chairman of the Board. Mr. Clutterbuck, has put in. The first impressions I received when I went through the report was that our sub-Committee was inclined to forget the areas that have not yet been determined under the Act. In Worcester we had to take the bull by the horns and include some provision for the registration of contractors in our supply regulations. There are copies of these on the table for anybody interested — not with the idea of laying them down as something ideal, but with a request that any suggestions on this or any other matter would be welcomed indeed. May I read one small paragraph headed "Regulation 113, Enforcement of Regulations." "The foregoing Regulations Nos. 111 and 112 hereof shall come into force six months after the promulgation thereof and Regulation No. 112 shall remain in force only until such time as the provisions of Act No. 20 of 1939 are applied throughout the area supplied with electricity by the Council." In other words this is a regulation which gives us certain powers which fall away when our area is determined. With this matter being referred to a committee in the coming year, I would ask them to bear in mind particularly the small municipalities where the provisions of the Act have not yet been enforced. The voltage dividing line for contractors struck me as being unwise. From the point of view of safety precautions, we know that 200 volts can terminate a useful life as thoroughly as a higher voltage. If one man only is going to qualify for high tension work he will have a monopoly. If a man is given a contract to do high tension work he should do it under the supervision of the local authority. Under question 10 "Specific requirements with respect to premises," it is noted that when these proposals are given effect, the registration of contractors will be on a national basis. It appears that "national basis" at this stage means a basis the same as the registration of wiremen, which is not quite national yet. Then one point arising out of a newspaper report. In Port Elizabeth a woman received a fatal shock from a kettle, and it is reported in the Press that the magistrate said the defect in the kettle was probably due to the negligence of a named person, the managing director of a company dealing principally with radio apparatus. Apparently this particular firm did repair the kettle ten months before the accident. We are free to come to any conclusions we like on a report like that, and this question of the registration of contractors should do away with that sort of thing.

THE PRESIDENT: I should like to associate myself with the views expressed on behalf of the Executive. We feel that you have done a tremendous amount of work on our behalf to assist us. I wonder if you would let the Executive have a copy of your comments as soon as convenient.

MR. CLUTTERBUCK: Mr. Eastman raised the question of the fee. As I have already intimated the amount of the fee to be charged for the registration of a contractor would probably be fixed by regulation and a decision on this point need not delay the drafting of the Bill. Mr. Gripper raised the point of the determination of the area of Worcester, and for his information, I would say that Worcester will certainly be placed on the next list of the areas to be determined, and he will have the full benefit of legislation in this connection.

MR. BRADLEY: The name of Port Elizabeth has been mentioned in connection with the fatality. That was a really tragic case — something beyond my control or my help. I think it is in the newspaper article that the coroner and others interested came to the conclusion that something should be done to make known

the dangers of installations which have apparently not been tested since they were installed. This house is apparently 50 years' old, and the Electricity Department have not been there since the service was first put in. When we did visit the house after the accident had been reported, we found that the regulations had been contravened and so on, but we had no knowledge of any alterations to the wiring. There is a recommendation in the Coroner's remarks to the effect that an advertising campaign or something of that nature be broadcast throughout the Union to help to minimise these fatalities. I think there were three fatalities that month: one at Durban, one at Port Elizabeth and one at Johannesburg. The Johannesburg one was more mysterious than any one of the others. The question is how far should we go to advertise and broadcast so that people will have their installations inspected, knowing that such a measure will minimise fatalities. What would be the best agency to bring about such a request?

MR. HALLE: I am surprised. I thought we were back in Pietermaritzburg. We have a couple of inspectors testing installations. I have written over a hundred letters and where earth wires are found broken consumers are told they will be disconnected if it is not put right. But apart from that, on our electricity accounts, we always put "Broken earth wires are dangerous — Examine yours," and anything we wish to draw the consumers' attention to we stamp in red on the electricity accounts. I think it will get to them that way, and I advise you to advertise on those. But may I ask a question. If a man gets a licence in this country does it mean he is licensed for the whole of South Africa, or is there anything to say that he is operating in the area of Durban or Maritzburg or so on. Suppose we get a complaint about wiring in Pietermaritzburg and the consumer produces a letter from Polliacks, Johannesburg. They may not have done the work, but we have to follow the matter up and find out if the wireman was a registered contractor. If I write and complain to the Central Board they are not going to take away a Johannesburg contractor's licence because one of their men did something in Pietermaritzburg. I feel this should be like the wireman's licence, endorsed Maritzburg, and if he wants to operate in Durban he gets a further endorsement "Durban area." Then the second thing I want to ask is this. We pay particular attention to wiring work. We are very concerned with the subject of wiring installations, but nobody worries about the repair of the equipment connected to the wiring installations: I do not know whether I am wrong, but I believe any man with the time can collect kettles and refrigerators and repair them in his back yard. If he has a screwdriver, and a pair of pliers and a soldering iron, he can repair anything in his back room, which is an absolute death trap, and hand the appliances to the people and kill them off. I think that the repair of apparatus to be connected to an installation should come under some form of control.

MR. KINSMAN: I do not think there is any intention of taking away the licensing right of the local municipality. The Registration Board will not necessarily give a contractor the right to go from Durban to Maritzburg. He would have to be licensed by the Maritzburg Municipality. It is laid down in Durban that when a contractor puts in his completion notice, we provide on the back of the registration notice for the names and registration numbers of the wiremen. It might be possible for an unscrupulous firm to put in a fictitious name, but it is of considerable assistance when the inspectorate receives a completion notice from a licensed wiring contractor in respect of any new work or extensions to an existing installation. The completion form has on it the name or names of the registered wiremen employed, together with their numbers and that is checked up in the inspector's office with the register of the men who were in the employ of the particular firm. The man's name and his registered number are recorded in our records in the office, and I think we have been able to keep an effective check on abuse.

MR. SIBSON: I was about to speak on the very subject Mr. Halle spoke on: the question of the limitation of the area in which a registered contractor is permitted to operate. I have gathered so far —

particularly from Mr. Clutterbuck — that the proposal for uniformity of registration would bring about the position that a contractor registered in Johannesburg would be entitled, without any further requirements, to practise anywhere in South Africa. That was the impression I gained; and I felt that was not a very satisfactory state of affairs, particularly because of the very point Mr. Halle mentioned, that so many of the contractors fail to comply with local regulations in respect of intimating commencement of work, and if the local authority has no weapon to deal with that, the position is most unsatisfactory. It is quite possible, as Mr. Halle says, that somebody from another town will come along and fail to inform him that he is commencing work, and once the work is done, it is impossible to deal with the situation; and further, he will have no power to prevent that contractor doing the same thing again. If it is a breach of the bye-laws he should have the power to do something about having the man's licence cancelled. The necessity does exist of a local authority having power to deal with contractors who fail to comply with the regulations on so apparently minor a matter as the forwarding of notices.

MR. KINSMAN: I see Mr. Sibson's point about his own bye-laws, but the Act provides for a registration by the Board. If a man goes into an area and does improper things it is provided in the Act that his licence may be suspended for contraventions of the Act. The report of the Board will take due care of that and they can take action in regard to the suspension or cancellation of registration, and with that would fall away the right to trade under municipal licence.

C. H. DWYER (Stanger): Mr. Kinsman has partially answered one of the questions on which I wanted enlightenment — in Natal, electrical contractors are licensed under the Natal Licences Consolidation Ordinance, in terms of which advertising in the local Press each year is imperative. Now, it would seem that under the proposed new legislation contractors will be obliged to advertise twice each year, which to me appears to be unnecessary duplication. In addition to the cost of this advertising the contractor will have to pay two separate licence or registration fees, and it is going to hit contractors in the smaller centres extremely hard.

MR. KINSMAN: For licensing. There is no registration at the moment. They have to advertise in a paper in that particular area that it is their intention to apply for a licence. Under the new proposal, before a man can apply for a licence he has to satisfy the Board that he has the premises, tools and so on, and that he is suitable. He has to justify his registration. He will then go to the local licensing office or local Council, and the first thing he is asked is "Have you your national registration?" If he has, the ordinary procedure or local licensing will follow.

THE PRESIDENT: We have accepted this motion of Mr. Eastman. Perhaps Mr. Eastman can read it again.

MR. EASTMAN: My proposal is that we accept in principle the registration of electrical wiring contractors on a national scale by way of an amendment — presumably by way of amendment — to the Electrical Wiremen and Contractors Act, and that we adopt the recommendations read to us by Mr. Clutterbuck, the Chairman of the Electrical Wiremen's Registration Board, with such minor amendments as the Executive Council of this Association may, in consultation with him, consider desirable.

Agreed.

THE PRESIDENT: Is there any other matter you wish to bring to the notice of the Executive.

COUNCILLOR. LOTZ (Krugersdorp): May I raise one point that has occurred to me arising out of the memorandum which Mr. Clutterbuck has presented to the Executive — one which may be of interest to the Councillor members — and that is the desirability or otherwise of raising what may be obstacles in the way of a small man starting up as an electrical contractor. Mr. Eastman has referred to a fee of 5 guineas, and the memorandum by Mr. Clutterbuck makes reference to the premises which

would be required and the equipment which would be necessary. I think the Council's point of view would be rather sympathetic towards the small man, and they would not wish for any further obstacles to be placed in his way.

THE PRESIDENT: I think the safety of the public is the only criterion in this matter, but the Act makes provision for these matters, and no great difficulty will be placed in his way.

MR. WRIGHT: May I stress the point brought up by Mr. Halle, that the repair of apparatus should be given special consideration.

THE PRESIDENT: There is one small matter. We have had a letter from the S.A. Standard Institute, appealing for funds. The Executive have considered this matter, and have not come to any decision. We look upon it as not very pressing and we thought that, with the permission of the Convention, the matter could be left in the hands of the Executive to decide whether there should be a contribution, and if so, how much it should be.

MR. WRIGHT: I can tell you this, that the Institute felt they were in need of funds and the Chairman addressed a personal letter to some 200 bodies, but the response has been poor indeed. I do not think it has exceeded £30.

THE PRESIDENT: Do you feel it should be left to the Executive or would the meeting like to express a view.

Agreed that the matter be left to the Executive.

THE PRESIDENT: Now the Chief Inspector of Machinery, Mr. Joubert, has some amendments of the regulations which he wishes to put to the Convention.

MR. F. W. JOUBERT: We have had some difficulty in applying regulation 31 (7), which requires that a competent person be in charge of machinery, especially with respect to shiftsmen in the smaller power stations. The definition of "competent person" is "a person who has served an apprenticeship in an appropriate trade or who has had not less than five years' experience in working with machinery," etc. The engineers of the smaller power stations have pointed out to me and to inspectors, that it is difficult to comply with these provisions, when a new shiftsman is to be appointed. Being a small power station, the new shiftsman has not served an apprenticeship or had five years' experience. Thus the electrical engineer of a small station has difficulty in complying with the provisions of regulation 31 (7) read with the interpretation of "competent person."

The suggestion is that there should be a proviso to this regulation with special mention of shiftsman. A shiftsman may be a competent person, but the term has not been defined in the Act. The proposed amendment is: "Provided that a shiftsman, who has had suitable training and is able to read and write one of the official languages, need not have served an apprenticeship in an appropriate trade or have had five years' experience in the working of machinery, may attend machinery at a plant which it is necessary to work three or less shifts per day." This is the proposal, and I would suggest that this proposal be placed before your Executive who can contact me and point out any difficulty or suggest further amendments.

I have been approached by quite a number of engineers since the original regulation was promulgated, and also by Inspectors who pointed out the difficulty of applying this regulation, especially to small power stations. I have also been approached by the engineering unions, in connection with the definition of "competent person" and once I get the views of your Executive, I can meet a deputation of the A.E.U. who has communicated with me on the matter.

In regard to the question of earthing, Mr. Wright pointed out that quite a number of buildings are disconnected every month in the Benoni Municipality and reconnected again, and that the regulation asking for metal roofs to be earthed becomes rather a difficulty, in that the supplier must satisfy himself that this is the case. Mr. Wright also pointed out the scarcity of registered wiremen, but the earthing of roofs and the inspection thereof

does not require a registered wireman and electricians who are not registered can attend to these matters. I do not consider that the inspection of the earthing, when reconnection is made, is a difficulty but an advantage, because the earthing and installation can be put in proper order before current is again supplied.

Now, Mr. President, as a visitor to this Convention, I would like to thank your Executive and yourself for your kind invitation to this Convention, and I would also like to thank the Mayor and Councillors for their hospitality and entertainment. Another point is that I would like to thank the engineer members of the Association for their co-operation with inspectors of this department. There is no doubt that if there had not been co-operation there would have been more accidents, and we look at it from the accident, or safety point of view. I might say I have been through the figures of accidents which have occurred actually due to electricity for the last four or five years — that is mostly the war period — and we have had only about an average of 40 accidents per annum which were actually due to electricity — that means in private houses, to electricians, and wherever electric current is used. But although there were comparatively few accidents, the only tragedy is that roughly 50 per cent. of the accidents were fatal; and I am sure the co-operation between the inspectors of the Department and electrical engineers will continue, and this is bound to lower this figure to about 40 accidents per annum.

I would like to draw the attention of engineers of suppliers to section 31 (2) of the Act: "Local authorities must report electrical accidents in private houses to the inspector as soon as such accident has been reported to the local authority." I do not want to mention any names but we find sometimes that an inquest is held and we probably see something about it in the newspapers, and find that an electrical accident has taken place and was not reported by the suppliers. The municipality knows about the accidents in private houses. The Magistrate has no technical evidence from the inspectors' point of view; but he may get some evidence from the municipal employees. Under the Act we should know about these accidents, and we only get to know of them after the inquest has been held. That is not very satisfactory. Fortunately, not many of such cases have happened.

THE PRESIDENT: I think I can say that there is not a member here who does not approve the action you have taken in this matter. You have taken members into your confidence and we appreciate that. We feel that the inspector is there to consult us and not to prosecute us, and it shows a fine spirit between the inspectors and the various undertakings. I think your fine spirit will make it easier for the engineer members to grant you the further co-operation you have asked. I would ask Mr. Joubert, before we close this subject, to give his notes to the Secretary, so they can be considered. Are there any more points that members wish to raise.

MR. SIBSON: I wish to refer to the question of shiftsmen in small power stations. I appreciate the point brought forward by the small local authorities. Since it has been brought by them, presumably they are the only ones affected by it, and I would suggest that any relaxation such as Mr. Joubert proposes should be limited to undertakings of less than 1,000 K.W., or any figure it may be decided to recommend.

MR. JOUBERT: Talking about incompetent persons being in charge of small stations, there are suppliers of electricity with small power stations who put in charge of a plant that may cost £4,000 or £5,000 or more a shiftsman who gets £10 a month or less. We had quite a number of suppliers who did that. They do not realise that by having a man like that in charge he might cause damage to valuable machinery and stop the supply altogether. But I think municipalities are coming to realise that to get good service, shiftsmen must know something about the running of the plant, and therefore, if they want somebody in charge who knows something about the plant, they must pay a fairly decent salary.

THE PRESIDENT: If there is nothing else under this heading, we now go to general, and it is competent for any member to raise any subject under general.

PUBLIC UTILITY SERVICES.

MR. BRADLEY: Under this heading, I may mention that I am desirous of extending mains into rural areas, and I find I am up against a stone wall with the Roads Board.

MR. BRADLEY: The phrase Public Utility Service is used with certain reservations and is meant to include any service, viz., highways, telephonic communications, water and electricity, which is provided for the welfare of the nation. Whether the service is large or small it is desirable that it should be co-ordinated with its parallel services.

For example, it is desired to provide a supply of electricity to some remote area. Before any work is commenced it is necessary to obtain the approval of the Post-Master General and the appropriate Road's Authorities. The co-ordination of the electricity extensions and the telephone routes is usually amicably settled and agreed to. However, the Roads Authority, particularly the National Roads Board, will not usually be so easily persuader that the electricity service should be co-ordinated with the roads requirements. The Roads Board maintain that the requirements of the Advertising on Roads and Ribbon Development Act of 1940 adhered to, i.e., poles being higher than 6 feet are classed as "structures" under the Act and must be kept at least 300 feet from the road centre, even underground cables must not be laid in the road reserve.

It will be appreciated that each authority backed by an Act of Parliament will endeavour to press its rights to the detriment of others, particularly the owners of propety traversed by the services.

There is at present a Power Co-ordination Committee made up of Representatives of the Electricity Supply Commission, the Post Master General and the Railways Administration, who co-ordinate power and telephone schemes. By a parallel or extended Committee complete co-ordination between all Public Utilities could be achieved.

To this end a resoultion could be put to the Conference:

"That this Conference recommends the advisability of setting up of a Permanent Co-ordinating Committee consisting of Representatives of the Electricity Supply Commission, the Department of Posts and Telegraphs, the Railway Administration, the National Roads Board and the Association of Municipal Electricity Undertakings to co-ordinate all public services."

MR. ANDREW (Kingwilliamstown): The difficulties with the National Roads Board which Mr. Bradley has experienced have been felt on a smaller scale in Kingwilliamstown, and I would heartily second his proposal or an amendment to that proposal which would lead to the same objective. Namely, that while the investigating committee be composed as suggested, it would perhaps be more beneficial if codes of practice regarding underground and overhead line routes be drafted relative to each National Road specification. We were told by the National Roads Board that street lighting poles had to be 35 feet from the centre of the macadam section of the road, which was only 20 feet wide.

MR. JOUBERT: The National Roads Board requires that standards be not less than 300 feet from the centre of the road, which means that you must have a 600 ft. span for a high tension line. This was brought to my notice and I found that under the Act under which the National Roads Board made the regulations, that, notwithstanding this regulation of 300 feet from the centre of the road, provision is made to comply with the requirements under the Mines and Works Regulations, where the shortest possible spans for crossings is required. I contacted the Board through the Department, and asked to have a clause inserted to include the Factories Act which has a similar regulation, asking for short spans at crossings. The reply was that although it is not in their regulations, they are prepared to take into consideration the electrical regulations formed under the Factories Act.

THE PRESIDENT: We have a committee on the code of practice dealing with overhead lines. Would it not be best to take note of the suggestions and refer them to the sub-committe for their guidance?

A MEMBER: What would be the position in towns, where the National Road has not been proclaimed? I would like to ask that question.

A MEMBER: The National Roads Board has no power in the municipal area. If the road is in the municipal area you can plant your poles where you like.

MR. ANDREW (Kingwilliamstown): Perhaps I have not made myself clear, the municipal area consists of two sections namely, the surveyed erven and the remaining commonage. The National Roads Board has constructed all the roads in the commonage up to the last surveyed erf in the town. To illuminate the entrance to Kingwilliamstown, it would be necessary to plant poles alongside the National Road for a distance of 500 yards, but as I said the National Roads Board ruled that these poles must be 35 feet from the centre of a 20 ft. tarmac road. We were told that we could put up span lamps, but it is obvious that for a town of our size span lamp construction would be far too expensive.

MR. WALWYN: I would like to thank you very much indeed, Mr. President, for the invitation which brought me here, and I hope I have behaved myself sufficiently well to justify another. I have been some time away from professional life, and a fair time in business, and am therefore quite incompetent to express any opinion on the technical subjects discussed but, I do claim to know a little about business and perhaps while observing the five minute rule, I could amplify a little on the proposal to charge 20 per. cent duty on electrical equipment. I am obviously no friend of Mr. Boylan—he said so; because I am a member of the Johannesburg Chamber of Commerce — and still less a friend because I am a property owner in Johannesburg, and therefore not worthy of consideration. You may wonder why the Chamber of Commerce should seek to interest you in this matter; I think I can explain that. The Chamber of Commerce have taken the initative in this matter but, although they get a fair amount of publicity, they are really a body with very little power by reason of their comparatively small numbers. They recognise that you gentlemen, although your Association is also not large from the point of view of numbers, do influence an immense number of consumers, who are also voters; and I would like to suggest that you analyse this proposed duty into the additional cost of your extensions proposed during the ensuing year, I think you will be surprised at the total amount involved. What is more, tell that to the Government, tell it to Escom, but, above all, tell it to your consumers, and with a tactful suggestion, they may in turn like to tell it to their M.P.'s, I think if you take the trouble to do that, when you meet next year, your President will have the pleasure of announcing that the proposed duty was not only suspended, but with the words "sine die" added.

Power in conjunction with sound finance is, and must remain, the lifeblood of this developing country, so a supply of power at low cost; and sound finance will ensure its industrial future.

I have detected during this Convention a tendency for engineers, particularly municipal engineers, to get at loggerheads with Town Treasurers, and I submit that is a very bad mistake — rather co-operate. It is the Town Treasurer's duty to present figures to his Councillors, of revenue and expenditure, and I think in conjunction with your Town Treasurers you can submit to those same Councillors figures showing what they will lose by not granting you the extensions necessary. Sometimes you yourselves will be a little mistaken, and, if you co-operate with your Town Treasurer, you may find that the pet scheme you had in mind was not all sound. If you took it alone to the Council, it would be the Treasurer's duty to point that out, you and he might quarrel, and you might lose your case. If you co-operate, you would almost certainly present to your Councils sound schemes. I shall conclude with best wishes for a successful year of development and progress before you meet again twelve months hence.

MR. POWELL: I would like to refer to a small matter of the Association's activities. You will remember that in 1944 the Executive Council was empowered to set up a special Committee to deal with

the question of national salary scales. The Committee reported at Salisbury, and the report is now in the Proceedings. But you will aslo remember that the matter was referred, on a proposal of Mr. Gripper, to the Committee, to go into the question of whether the salary scales were suitable. I was Chairman of the Committee, and unfortunately, because of my untimely exit from the service, it had to be dropped. I just wanted to remind you that the story is incomplete.

MR. WHIGHT: This is probably my last Convention as an official, so I can say a little more now than if I had to go back and tell the Council what I said. I have been a member of the Association for 16 years and attended all the Conventions; and I must say the standard has risen progressively each year. Mr. Chairman, I would like to thank you for the very fine manner in which you have conducted the Convention, and arising out of that, I would like to express an opinion of engineers of small concerns over the past few years that, the time has arrived now when it is no longer necessary to appoint the President or Vice-President of the Association from one of the bigger towns where the Conventions are held. I think you realise there are only a few towns in the Union where it is possible to hold Conventions. I cannot be accused of seeking any glory, because I am stepping out, but it has been commented on, and I would like the Executive to know that it is generally felt that the time has come when the high honour and dignity of being President of this Association could well be shared by some of the competent and generally able members in the body of the hall — that is, by all and sundry who are members of the Association. For instance, it is through fortuitous circumstances that our present President is in the Chair; it was by virtue of the fact that he was an Electrical Engineer of Bloemfontein. He was not the engineer member for Bloemfontein at the last Convention; he was the engineer member of a much smaller municipality. But the fact that he was appointed Electrical Engineer of Bloemfontein has appointed him to be President at this Convention, which he has carried out very well. There is one other matter I would like to mention, and that is on the subject of salaries. Here again I cannot be accused of personal ambition, but I think it is hardly the right thing when you see advertisements in the paper, such as "Certificated Electrical Engineer: Salary £25 a month." Now, I know we have a schedule in the Proceedings, and it has been agreed as to what should be done; but this body is not a body of Electrical Engineers as such, but municipal undertakings, composed of Councillors and municipal electrical engineers; and until you have an association of municipal electrical engineers, or until the Institute of Electrical Engineers takes up something in this connection, it is going to be difficult. I understand that overseas, if a position is advertised which does not offer the correct salary, then the Association of Electrical Engineers puts an advertisement next to it, asking any of its members not to apply for this position, and if any do they are ostracised. Gentlemen, I have been continually asked for tips since I said what I was going to take up. I can give you a tip; get yourselves some Blyvoors. (Laughter.) May I in conclusion say that I wish you every success for the future.

COUNCILLOR SMITH (Johannesburg): Mr. President, I wish to take this opportunity as a Councillor visiting this Convention to thank the Mayor and Mayoress of Bloemfontein, and all officials, and all those connected with the very fine entertainment which has been given to us. I would also like to thank those who have been responsible for the organisation and conduct of this Convention, so ably led by yourself. Councillors, of course, come here rather timidly, not knowing what they are going to hear, and they have to have a lot of patience in sitting and listening to the technical stuff that is put over. But I can assure you that it has been an education. It has been the first opportunity I have had of attending a Convention of this description and I must say quite definitely that I am going away very much more enlightened than I was before. I feel that when matters crop up in the Council or in our Committee work in connection with matters which have been discussed here, I will benefit considerably by the experience I have gained, and all I have listened to here. I do not want to miss anybody when I thank all the officials and everybody concerned in connection with the very fine time we have

had, and also for the manner in which the proceedings have been conducted. I also want to touch on Bloemfontein itself. I believe it has a very successful outlook, and I wish to congratulate Bloemfontein and everyone concerned, and to wish them the best of luck for the future. As far as the organisation is concerned I would like to touch on a question on similar lines to the remarks by Mr. Schauder yesterday, and say that this organisation must definitely be strengthened; it must become stronger. The electrical profession must realise that they are very important people, I'm not underestimating their status. It is necessary that they should so build up their organisations, and particularly an organisation of this description, in such a way that they will be recognised as the experts and authorities in this Country on all matters which crop up. This will mean that they will have to be approached when advice is desired by the Government, municipalities, or anyone concerned. Is is not correct or fair for a municipality to depend entirely on its own engineer. He must have an authority such as your organisation to which he can turn when necessary, for advice and support on any matter and at anytime he so desires. I do not think the municipalities will object to putting up the extra finance to maintain such an authoritative organisation because it will be of much assistance to them. You must not be afraid to ask for what you want in this connection.

MR. FODEN: I have been asked by my Chairman to express on behalf of the Council of East London our thanks and appreciation for a pleasant week at Blomfontein and for entertaining the East London representatives. We have had a most enjoyable time.

MR. CLUTTERBUCK: Mr. President, may I endorse what has been said, and thank you on behalf of the Wiremen's Registration Board for inviting me to your Conference, and Mr. Mullins who represents the Elictricity Control Board, asks me to couple him with that.

THE PRESIDENT: It is with considerable diffidence that I get up to speak now. There are so many speakers who have said good things about us which we feel we do not entirely deserve, that I would not like to sort out anyone for thanking. I would thank you one and all for the nice things you have said about myself, my city and my councillors, and I will convey your wishes and your congratulations to them. I am sure they have been very happy to have you here. Whatever success we have had at this Conference can only have been possible with the amount of tolerance shown by the members; a conference is only what its members make it. The members have responded beautifully to the discussions right through; there has never been a moment we have waited for anything; in fact, I have been accused of using the hammer too frequently. That is a good thing; it shows there is interest, and it is a pleasure to me to see that so much interest is shown. There is one other matter I may refer to. Mr. Wright is probably attending his last Conference. Mr. Wright has been a member of this Association for many years. He has been a live member of this Association, and it is with considerable regret that we wish him good-bye. He retains his associate membership, and we would like to see him occasionally.

I think there are a few things I cannot overlook. I must mention the Executive of the previous year, who helped me through the difficult time when I took over after the half year, with things slightly disturbed, and it is only that those members have assisted me in every possible way that I have been able to achieve anything. The Executive have been a great support to me, and one and all I must thank them. I also thank all the municipal departments that have ably co-operated with me; and last, but not least, my small staff who have worked very hard, and I wish to record my thanks to them.

The proceedings then terminated.