PROCEEDINGS

of the

Twenty-Fourth Convention

of the

Association of Municipal Electricity Undertakings

OF SOUTHERN AFRICA

(Founded 1915)

MUNICIPALITY OF

PIETERMARITZBURG

held at

PIETERMARITZBURG

From Tuesday, May 9th, to

Friday, May 12th,

1950

PRICE FIFTEEN SHILLINGS

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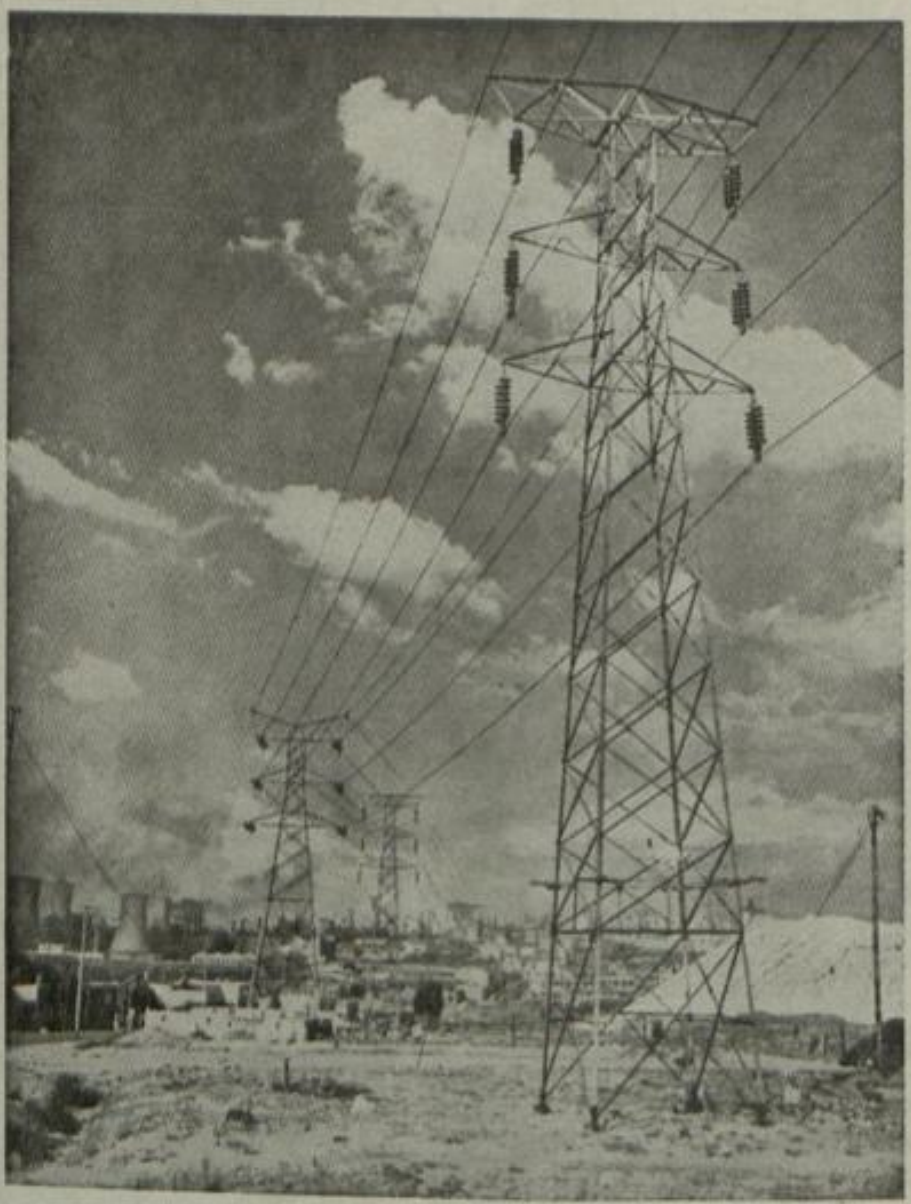

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ASSOCIATION OF MUNICIPAL ELECTRICITY UNDERTAKINGS OF SOUTHERN AFRICA

FOUNDED 1915

EXECUTIVE COUNCIL, 1950/51

President:

G. R. Hallé (Pietermaritzburg)

Vice-President:

J. C. Downey (Springs)

Past Presidents:

D. A. Bradley (Port Elizabeth)
A. Foden (East London)

Councillor Members:

Pietermaritzburg Springs Krugersdorp Durban
Bloemfontein Cape Town Bulawayo Johannesburg

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

Other Members:

G. J. Muller (Bloemfontein)
J. C. Fraser (Johannesburg)
A. R. Sibson (Bulawayo)
H. A. Eastman (Cape Town)
C. Kinsman (Durban)
J. L. van der Walt (Krugersdorp)

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	J. C. Downey (Springs) D. J. Hugo, Pretoria (Alternate)
Electrical Wiremen's Registration Board	J. C. Fraser, Johannesburg
Registration of Electrical Wiring Contractors	J. C. Fraser (Johannesburg)
C.I.G.R.E.	J. C. Fraser, Johannesburg A. Foden, East London (Alternate)

Sub-Committees:

Coal Supplies	H. A. Eastman, Cape Town (Convener) A. Foden, East London D. A. Bradley, Port Elizabeth G. J. Muller, Bloemfontein
S.A. Bureau of Standards, Safety Specifications and other Committees	J. C. Downey (Springs) D. J. Hugo, Pretoria (Alternate)
Safety Precautions	J. C. Downey (Springs) J. C. Fraser, Johannesburg (Alternate)
Improt Control	J. C. Fraser, Johannesburg D. J. Hugo, Pretoria J. C. Downey, Cape Town Alternates: H. A. Eastman, Cape Town C. Kinsman, Durban G. T. Muller, Bloemfontein

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
1931–33	L. L. Horrell, Pretoria	E. Poole
1933–34	L. F. Bickell, Port Elizabeth	F. A. P. Perrow
1934–35	A. R. Metelerkamp, Bulawayo	E. Poole
1935–36	G. G. Ewer, Pietermaritzburg	E. Poole
1936–37	A. Rodwell, Johannesburg	E. Poole
1937–38	J. H. Gyles, Durban	E. Poole
1938–39	H. A. Eastman, Cape Town	E. Poole
1939–44	I. J. Nicholas, Umtata	E. Poole until Dec., 1940
		L. L. Horrell, Jan., 1941
1944–45	A. Rodwell, Johannesburg	L. L. Horrell
1945–46	J. S. Clinton, Salisbury	L. L. Horrell to Nov., 1945
	J. W. Phillips, Bulawayo	A. T. Taylor, December, 1945
1946–47	G. J. Muller, Bloemfontein	A. T. Taylor
1947–48	C. Kinsman, Durban	A. T. Taylor
1948–49	A. Foden, East London	A. T. Taylor
1949–50	D. A. Bradley, Port Elizabeth	A. T. Taylor

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:
T. P. Gray, Johannesburg J. McLean, Port Elizabeth	1935–36: H. W. Dely, Pretoria	G. H. Swingler, Cape Town J. H. Gyles, Durban T. Millar, Harrismith E. H. Behrens, Port Elizabeth
H. Middlebrook, Durban T. P. Gray, Johannesburg	1936–37: F. Morrell, Cape Town J. McLean, Port Elizabeth	G. H. Swingler, Cape Town T. Jagger, Ladysmith E. A. Behrens, Port Elizabeth. G. M. Pirie, Bloemfontein
H. G. Capell, Durban W. James, Cape Town	1937–38: H. Middlebrook, Durban L. Hofmeyr, Stellenbosch	L. L. Horrell, Pretoria J. S. Clinton, Salisbury A. Q. Harvey, Springs G. M. Pirie, Bloemfontein
E. Spilkin, Umtata W. James, Cape Town	1938–39: G. C. Starkey, East London W. Fowkes, Cape Town	D. J. Hugo, Pretoria J. S. Clinton, Salisbury A. Q. Harvey, Springs G. M. Pirie, Bloemfontein
E. Spilkin, Umtata C. Olley, Salisbury	1939–44: G. C. Starkey, East London W. Fowkes, Cape Town	D. J. Hugo, Pretoria C. Kinsman, Durban A. Q. Harvey, Springs G. M. Pirie, Bloemfontein W. N. Powell, Bloemfontein
H. H. Verity, Johannesburg C. Olley, Salisbury	1944–45: H. E. Gearing, Cape Town R. M. Thomas, Durban	D. J. Hugo, Pretoria C. Kinsman, Durban J. C. Fraser, Johannesburg G. R. E. Wright, Benoni
J. Ohlsen, Bulawayo J. W. du Plessis, Bloemfontein	1945–46: M. Jaffray, Salisbury E. Boylan, M.P.C., Johannesburg	D. J. Hugo, Pretoria C. Kinsman, Durban J. C. Fraser, Johannesburg G. R. E. Wright, Benoni
P. J. C. du Plessis, M.P.C. (Bloemfontein) Major J. Raftery, J.P., M.P.C. (Durban)	1946–47: A. Immink, Johannesburg A. Z. Berman, Cape Town	D. J. Hugo, Pretoria J. C. Fraser, Johannesburg J. C. Downey, Springs D. A. Bradley, Port Elizabeth
Major J. Raftery, J.P., M.P.C. (Durban) E. H. Tiddy, East London	1947–48: J. M. Preller, Pretoria C. G. Thompson, Johannesburg	D. J. Hugo, Pretoria J. C. Fraser, Johannesburg J. C. Downey, Springs H. A. Eastman, Cape Town
E. H. Tiddy, East London J. C. K. Erasmus, J.P., Port Elizabeth	1948–49 C. G. Thompson, Johannesburg J. Johnston, Durban	D. J. Hugo, Pretoria J. C. Fraser, Johannesburg J. C. Downey, Springs H. A. Eastman, Cape Town
J. C. K. Erasmus, J.P., Port Elizabeth C. E. (Sax) Young, Pietermaritzburg	1949–50 W. F. du Plessis, Bloemfontein S. H. Millar, Bulawayo	J. C. Fraser, Johannesburg J. C. Downey, Springs H. A. Eastman, Cape Town G. J. Muller, Bloemfontein A. R. Sibson, Bulawayo J. L. van der Walt, Krugersdorp

RULES AND CONSTITUTION

ASSOCIATION OF

Municipal Electricity Undertakings

OF SOUTHERN AFRICA

---

1. TITLE

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

2. OBJECTS

The objects for which the Association is formed are:—

(a) To promote the interests of Municipal Electricity Undertakings.

(b) To bring Municipal Electrical Engineers and 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. After 1st June, 1947, one only duly qualified assistant in an undertaking with sales of over 20,000,000 units per annum may also be admitted to this class on the recommendation of the Chief Electrical Engineer.

(d) **Associate Members.** The Member shall be a Technical Assistant engaged on the permanent staff of any Electricity Undertaking represented by its Councillor Member and/or Engineer Member.

(e) **Associates.** Any member resigning from the class of Engineer Member or Associate Member shall be entitled to apply for transfer to the class of Associate. An Associate may also be an Engineer in the employ of an Authorised Electricity Undertaker other than a Local Authority who is engaged in the supply of electricity to consumers in the area of jurisdiction of a Local Authority.

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 necessary for the objects of the Association.

Members of the Council. The Council shall consist of a President, Vice-President, two immediate Past-Presidents, all of whom shall be Engineer Menbers, six other Engineer Members and eight Councillor Members.

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

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

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

8. MEETINGS

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

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 and 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 THE CONVENT ON COUNCILLORS AND ENGINEERS

ADELAIDE
M. M. Smith

ALBERTON
Cr. N. Rosslee
C. E. Gregor

BARBERTON
P. C. Asselbergs

BENONI
Cr. N. C. Korsman
R. Tarran

BETHAL
K. N. Kirberger

BETHLEHEM
K. M. Fisher

BLOEMFONTEIN
Cr. W. F. du Plessis
G. J. Muller

BOKSBURG
Cr. F. A. Keuler
Cr. A. J. Law
E. L. Smith

BRANDFORT
D. v. S. Dreyer

BULAWAYO
A. R. Sibson

BRAKPAN
Cr. A. L. Des Fountain
P. L. Vergottini

BOTHAVILLE
Cr. J. H. van de Bergh
J. D. Hattingh

BRITS
T. de Wit

CAPE TOWN
Cr. J. Muller
H. A. Eastman
C. G. Downie

CRADOCK
A. Rossler

DELMAS
Cr. H. Samuel
G. C. Delport

DURBAN
Cr. G. Hayward
C. Kinsman

EAST LONDON
A. Foden

ESHOWE
H. Fohren

EDENVALE
J. J. Baskerville

FICKSBURG
Cr. J. H. Greeff
G. Aalbers

GEORGE
P. H. Newcombe

GRAHAMSTOWN
J. Iverach

GREYTOWN
J. S. Craig

GWELO
A. W. K. Hadfield

GRAAFF-REINET
Cr. J. H. Greeff
V. E. O. Barratt

HEIDELBERG
Cr. F. W. Robertson
J. F. Lategan

JOHANNESBURG
Cr. C. F. Beckett
Cr. C. G. Thompson
J. C. Fraser

KLERKSDORP
J. M. Gericke

KOKSTAD
W. G. Thackwray

KROONSTAD
W. Rossler

KRUGERSDORP
Cr. E. B. Neill
J. L. van derWalt

LADYSMITH
Cr. F. O. Rapson
Frank Stevens

MAFEKING
Cr. W. R. G. Fair
G. E. H. Jones

MATATIELE
Cr. C. H. W. Gray
L. J. Roberts

MIDDELBURG (C.P.)
E. P. W. Hall

NEWCASTLE
Cr. D. R. Hugh
B. W. Cowley

NIGEL
Cr. D. F. J. MacRae
B. T. Janas

OUDTSHOORN
C. H. Adams

PIETERSBURG
Cr. R. J. K. Baker
J. I. Inglis

PIETERMARITZBURG
Cr. C. E. K. Young
C. R. Halle
F. G. McDonald

PORT ELIZABETH
Cr. J. C. K. Erasmus, J.P.
D. A. Bradley

PORT SHEPSTONE
K. W. J. Halliday

POTCHEFSTROOM
Cr. H. Holtzhausen
Cr. M. Singer
T. Kramer

POTGIETERSRUST
L. Roode

PRETORIA
Cr. C. W. Sinclair
D. J. Hugo

RANDFONTEIN
Cr. J. E. Mackenzie
J. R. Cherry

ROBERTSON
E. L. Buchanan

ROODEPOORT-MARAISBURG
Cr. M. C. B. Steinmann
D. D. Brown

RUSTENBURG
Cr. J. A. Linde
P. A. Meintjes

SALISBURY
Cr. H. B. Auld

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

STANGER
C. H. Dwyer

STELLENBOSCH
Cr. G. Blake
D. W. Ritson

THEUNISSEN

P. D. Kruyt-Hoogendyk

UITENHAGE
J. A. Mathews

UMTALI
H. T. Turner

VENTERSDORP
H. Bähr

VENTERSPOST
Cr. P. J. Rietsma
L. Dreyer

VEREENIGING
A. F. Turnbull

VREDE
Cr. Dr. G. T. du Plessis
G. E. Mossop

VRYBURG
Cr. W. J. Herbst
P. C. Grandin

VRYHEID
W. Rush

WINDHOEK
V. E. Williams

WORCESTER
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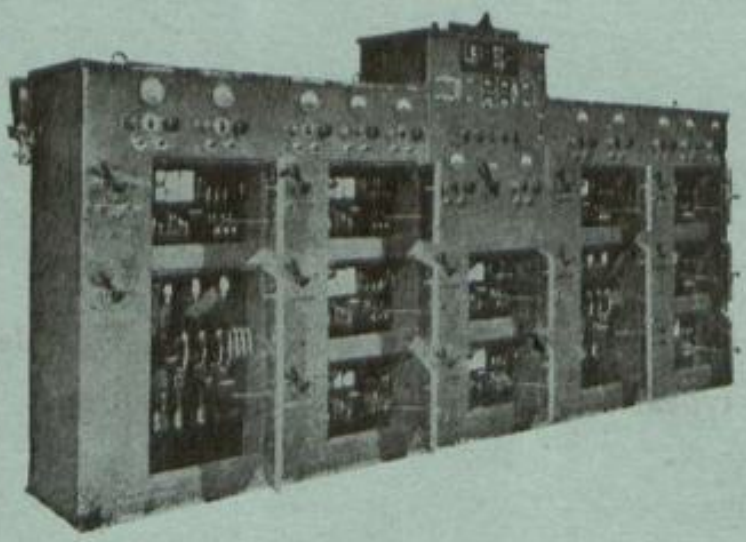

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H. C. Schwartz, Divisional Engineer, G.P.O. Pietermaritzburg.
J. J. de Haas, Public Works Department, Pretoria.
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R. N. F. Smit, Inspector of Factories, Durban.
C. Mullins, Electricity Control Board, Pretoria.

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J. McLennan, Natal Provincial Administration.
H. Howell, Principal Pietermaritzburg Technical College.
David Davies, Pietermaritzburg Chamber of Commerce.
Q. R. Nothard, S.A. Institution of Engineers.
A. P. Burger, Legal Assistant to Town Council of Springs.

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Rodwell, A. T., "Miranda", Oxford Road, Parktown, Johannesburg.
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Venterspost, Tvl., Municipality, P.O. Box 19.

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Windhoek, S.W.A., Municipality, P.O. Box 59.
Willowmore, C.P., Municipality, P.O. Box 15.
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Zastron, O.F.S., Municipality, P.O. Box 20.

ENGINEER MEMBERS

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Adams, C. H., Municipal Electrical Engineer, P.O. Box 132, Oudtshoorn, C.P.
Anderson, F., Municipal Electrical Engineer, Port Alfred, C.P.
Ashley, T. P., Municipal Electrical Engineer, P.O. Box 113, Queenstown, C.P.
Asselbergs, P. C., Town Electrical Engineer, P.O. Box 33, Barberton, Transvaal.
Baskerville, J. J. Acting Town Electrical Engineer, P.O. Box 25, Edenvale, Tvl.
Bahr, H., Municipal Electrical and Waterworks Engineer, P.O. Box 15, Ventersdorp, Tvl.
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Barlow, K. B., Town Electrical Engineer, P.O. Box 109, Livingstone, N.R.
Bradley, D. A., City Electrical Engineer, P.O. Box 369, Port Elizabeth, C.P.
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Burton, C. R., City Electrical Engineer, Kimberley.
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Cherry, J. R., Municipal Electrical Engineer, P.O. Box 139, Randfontein, Tvl.
Cowley, B. W., Borough Electrical Engineer, P.O. Box 21, Newcastle, Natal.
Craig, J. S., Borough Electrical Engineer, P.O. Box 71, Greytown, Natal.
Delport, G. C., Municipal Electrical Engineer, P.O. Box 6, Delmas, Tvl.
de Wet, D. P., Municipal Electrical Engineer, P.O. Box 15, Willowmore, C.P.
de Wit, T., Engineer-in-Charge, Municipality of Brits, P.O. Box 106, Brits, Tvl.
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Downie, C. G., Deputy City Electrical Engineer, P.O. Box 82, Cape Town, C.P.
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Dreyer, L., Municipal Electrical Engineer, P.O. Box 19, Venterspost, Tvl.
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du Toit, A. A., Municipal Electrical Engineer, P.O. Box 44, Ceres, C.P.
Eastman, H. A., City Electrical Engineer, P.O. Box 82, Cape Town, C.P.
Fainsinger, G. S., Municipal Electrical Engineer, P.O. Box 25, Mossel Bay, C.P.
Ferreira, N., Town and Electrical Engineer, Odendaalsrus, O.F.S.
Fisher, K. M., Municipal Electrical Engineer, P.O. Box 130, Bethlehem, O.F.S.
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ENGINEER MEMBERS—(Continued)

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Gregor, C. E., Town Engineer, P.O. Box 4, Alberton, Tvl.
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Hugo, D. J., City Electrical Engineer, P.O. Box 423, Pretoria, Tvl.
Inglis, J. I., Town Electrical and Water Engineer, P.O. Box 111, Pietersburg, Tvl.
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Kane, R. W., Assistant General Manager, Electricity Department, P.O. Box 699, Jo'burg.
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Lotter, G. A., Town Engineer, P.O. Box 48, Ermelo, Tvl.
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Newcombe, P. H., Municipal Electrical Engineer, P.O. Box 28, George, C.P.
Nicholas, I. J., Municipal Electrical Engineer, P.O. Box 57, Umtata, Transkei.
Prevost, H. A., Municipal Electrical Engineer, P.O. Box 21, Somerset East, C.P.
Redman, R. H., Assistant City Electrical Engineer, P.O. Box 591, Bulawayo.
Relihan, H. J., Municipal Electrical Engineer, P.O. Box 12, Paarl, C.P.
Reyeneke, G. M., Town Electrical Engineer, P.O. Box 10, Springfontein, O.F.S.
Ritson, D. W., Municipal Electrical Engineer, Stellenbosch, C.P.
Roberts, L. J., Municipal Electrical Engineer, P.O. Box 35, Matatiele, E. G.
Rogers, J., Municipal Electrical Engineer, P.O. Box 36, Fort Beaufort, C.P.
Roode, L., Town and Electrical Engineer, P.O. Box 34, Potgietersrust, Tvl.
Rossler, A., Municipal Electrical Engineer, P.O. Box 24, Cradock, C.P.
Rossler, W., Town Electrical Engineer, P.O. Box 302, Kroonstad, O.F.S.
Rush, W., Borough Engineer, P.O. Box 57, Vryheid, Natal.

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Sims, C. N., Municipal Electrical Engineer, P.O. Box 3, The Strand, C.P.
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Smith, M. M., Municipal Electrical Engineer, P.O. Box 38, Adelaide, C.P.
Stevens, F., Borough Electrical Engineer, P.O. Box 56, Ladysmith, Natal.
Tarran, R., Municipal Electrical Engineer, P.O. Box 45, Benoni, Tvl.
Thackwray, W. G., Town Electrical Engineer, P.O. Box 8, Kokstad, E.G.
Theron, W. C., Municipal Electrical Engineer, P.O. Box 37, Worcester, C.P.
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White, J. H., Municipal Electrical Engineer, P.O. Box 197, N'Dola, N.R.
Williams, V. E., Town Electrical Engineer, P.O. Box 59, Windhoek, S.W.A.
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Woolridge, W. E. L., Town Electrical Engineer, P.O. Box 24, Harding, Natal.

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Clinton, J. S., P.O. Box 4648, Johannesburg.
Coulthard, R. D., "Lyonsdown", World's View Road, P.O. Doonside, Natal.
Conradie, D. J. R., P.O. Box 18, Ficksburg, O.F.S.
Dawson, C., Electricity Supply Commission, P.O. Box 2408, Durban.
Ewer, Col. G. G., P.O. Box 1332, Durban.
Foley, C. B., 124 Fordyce Road, Walmer, C.P.
Gyles, J. H., P.O. Gilletts, Natal.
Harvey, A. Q., c/o A.E.G. Engineering, Ltd., P.O. Box 4554, Johannesburg.
Heasman, G. G., P.O. Box 77, Fort Victoria, S.R.
Houreld, W., 4 Monument Street, Krugersdorp.
Lloyd, R. K., Arusha, Tanganyika.
Mail, W. Mortimer, P.O. Box 164, Kokstad, E.G.
Marchand, B., P.O. Box 223, Witbank, Tvl.
Mercier, G., P.O. Box 377, Salisbury, S.R.
Milton, W. H., P.O. Box 1091, Johannesburg.
Mole, E. W., P.O. Box 428, Port Elizabeth.
Muller, H. M. S., Engineer, Kakamas, C.P.
Powell, W. N., P.O. Box 1386, Johannesburg.
Phillips, J. W., P.O. Box 592, Bulawayo, S.R.
Stewart, G. A., P.O. Box 6672, Johannesburg.
Theron, G. C., P.O. Box 1, Vanderbyl Park, Transvaal.
Tubb, B. H. T., P.O. Box 1699, Salisbury, S.R.
West, J. A., "Edgerton," P.O. Box 24, St. Michael's, South Coast, Natal.
Wright, G. R. E., P.O. Box 465, Benoni, Tvl.

AGENDA AND PROGRAMME

Twenty-Fourth Convention held in the City Hall, Pietermaritzburg from 9th to 12th May, 1950

AGENDA

1. Election of President.
2. Retiring President's Valedictory Address.
3. Presidential Address.
4. Annual Report of Secretary and Treasurer.
5. Venue of next Convention.
6. Election of Officers:
   (*a*) Vice-President
   (*b*) Executive Council.
   (*c*) Sub-Committees and Representatives.
7. Reports of Sub-Committees and Representatives:
   (i) World Power Conference.
   (ii) International Conference on large Electric Networks (C.I.G.R.E.).
   (iii) Electrical Wiremen's Registration Board.
   (iv) Registration of Electrical Contractors.
   (v) S.A. Bureau of Standards—Safety Codes and other Committees.
   (vi) S.A. Bureau of Standards—Meter Testing Code.
   (vii) S.A. Standards Institution.
   (viii) Safety Precautions Committee.
   (ix) Overhead Lines and Code of Practice.
   (x) Coal Supplies.
   (xi) Import Control.
8. Appointment of Auditors.
9. General.

RETIRING OFFICERS

President: D. A. BRADLEY, Port Elizabeth.

Vice-President: C. R. HALLE, Pietermaritzburg.

Past Presidents: C. KINSMAN, Durban; A. FODEN, East London.

Councillor Members: One representative each of Port Elizabeth and Pietermaritzburg.

Alternates: One representative each of Bloemfontein and Bulawayo.

Engineer Members: H. A. EASTMAN, Cape Town; G. J. MULLER, Bloemfontein; J. C. FRASER, Johannesburg; J. C. DOWNEY, Springs; A. R. SIBSON, Bulawayo; J. L. v.d. WALT, Krugersdorp.

MEMBERS OF SUB-COMMITTEES AND REPRESENTATIVES

Sub-Committees:

1. S.A. Standards Institution: J. C. DOWNEY. Alternate: D. J. HUGO.

2. S.A. Bureau of Standards, Safety Codes and other Committees: J. C. DOWNEY. Alternate: D. J. HUGO.

3. Meter Testing Code: J. C. DOWNEY. Alternate: D. J. HUGO.

4. Safety Precautions: J. C. DOWNEY. Alternate: J. C. Fraser.

5. Overhead Lines, Code of Practice: J. C. FRASER. Alternate: G. J. MULLER.

Representatives:

6. World Power Conference (Local Committee): H. A. EASTMAN.

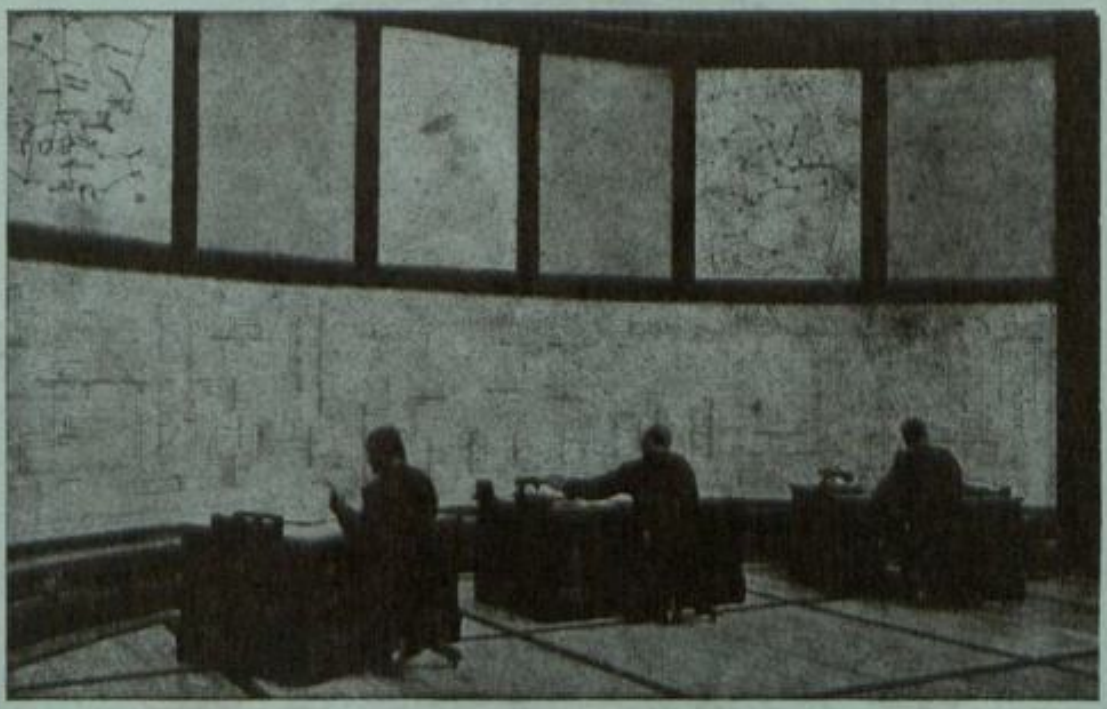
7. Electrical Wiremen's Registration Board: J. C. FRASER.

8. Registration of Electrical Wiring Contractors: J. C. FRASER.

9. Coal Supplies: H. A. EASTMAN (Convenor), A. FODEN, D. A. BRADLEY and G. J. MULLER.

10. International Conference on Large Electric Networks (C.I.G.R.E.): A. FODEN and D. J. HUGO.

Visual indication of vital information



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Distances over which the equipment will operate are practically without limit. Many different conditions may be controlled and indicated over a single pair of wires.

May we send you further information?

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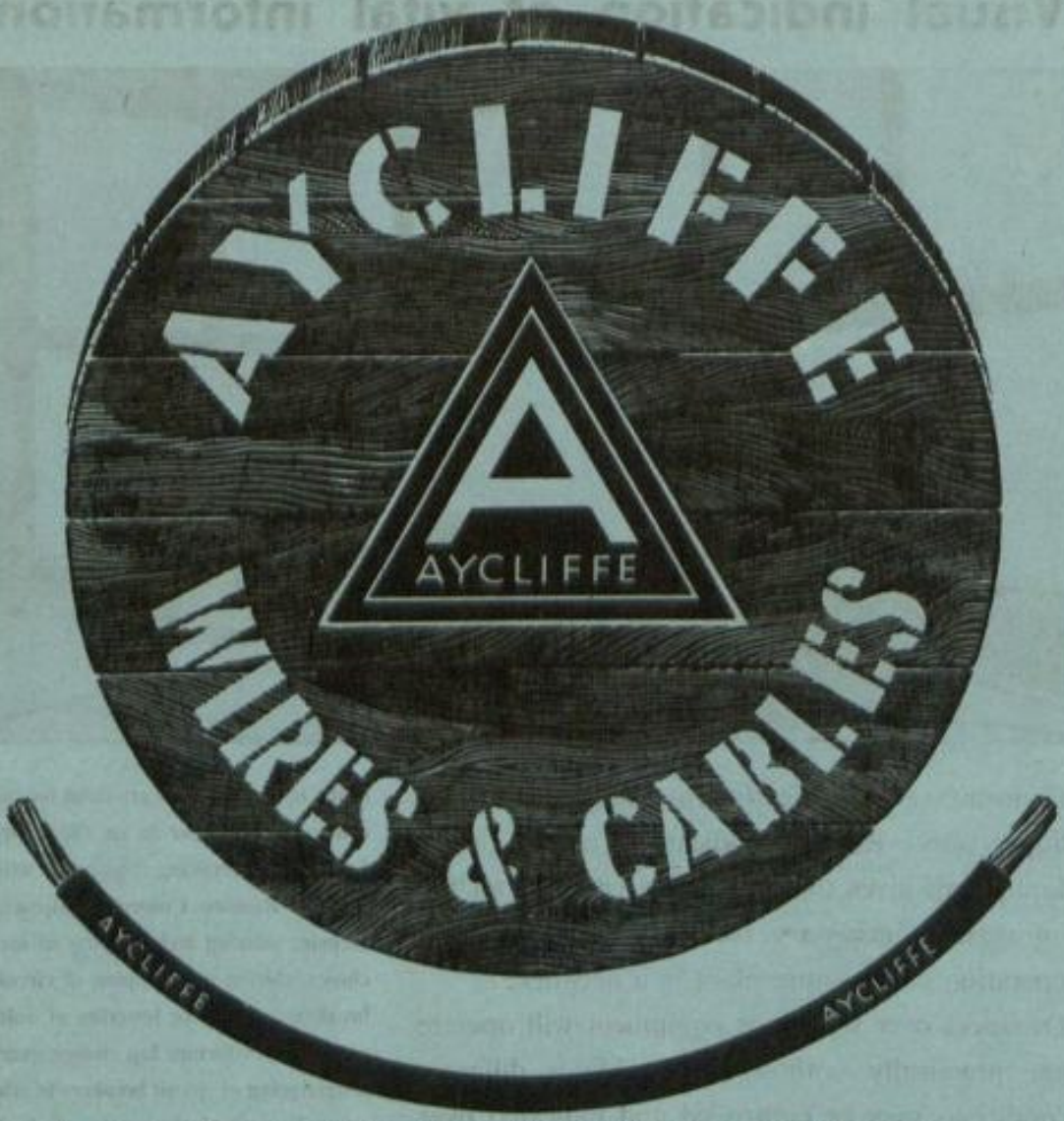

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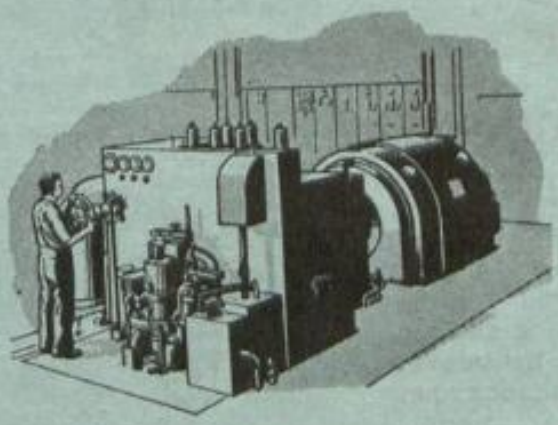

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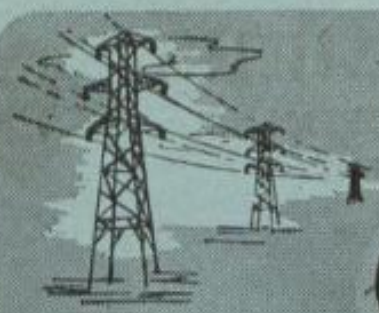
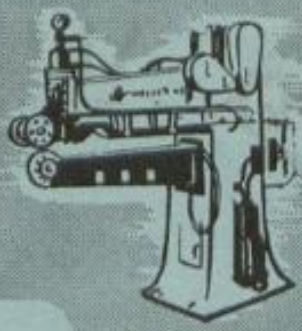


B.I. Callender's



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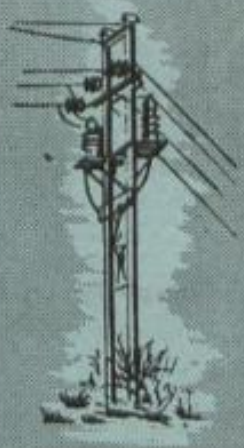

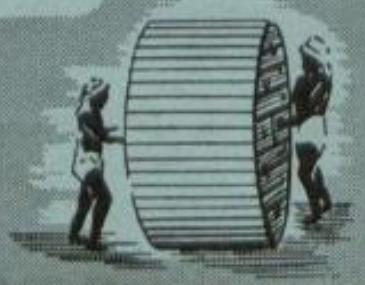

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11. Import Control: J. C. FRASER, D. J. HUGO and J. C. DOWNEY. Alternates: H. A. EASTMAN, C. KINSMAN, G. J. MULLER.

PROGRAMME

MONDAY, 8th May, 1950

(Supper Room)

9.00 a.m. Meeting of Executive Council in City Hall.

TUESDAY, 9th May, 1950

(Main Hall)

9.00 a.m. Registration, Issue of Papers, etc.

10.00 a.m. Official opening of Convention by His Worship the Mayor of Pietermaritzburg, Councillor G. C. Jolliffe.

10.30 a.m. to 11.00 a.m. Refreshment Interval.

11.00 a.m. Annual General Meeting (Visitors may attend but only members may vote).
Annual Report of Secretary and Treasurer.
Election of Officers, etc.

12.30 p.m. Adjourn for lunch.

2.30 p.m. Conference resumes.
Presidential Addresses. Report of Sub-Committees, etc.

3.30 p.m. Refreshment Interval.

4.00 p.m. Official photograph outside City Hall.

4.15 p.m. Bus Tour of City Parks ending at Bird Sanctuary.

WEDNESDAY, 10th May, 1950

(Supper Room)

8.30 a.m. Executive Council.

(Main Hall)

9.30 a.m. Convention resumes (business matters).

10.30 a.m. to 11.00 a.m. Refreshment Interval.

11.00 a.m. Paper by A. P. Burger, Legal Assistant to Town Council of Springs, "Aspects of the Law Relating to Electricity as it Affects Local Authorities".

12.30 p.m. Adjourn for Lunch.

2.30 p.m. Visit to Aluminium Co. of S.A. Ltd.

5.30 p.m. Civic Reception City Hall (Cocktail Party).

THURSDAY, 11th May, 1950

(Supper Room)

8.30 a.m. Executive Council.

(Main Hall)

9.30 a.m. Paper by P. C. Asselbergs, A.M.I.Cert.E., Town and Electrical Engineer, Barberton. "Automatic Protection of Diesel Power Plants" and discussion thereon.

10.30 a.m. to 11.00 a.m. Refreshment Interval.

11.00 a.m. to 12.30 p.m. Paper by F. G. McDonald, Assistant City Electrical Engineer, Pietermaritzburg. "The Engineer in the Office" and discussion thereon.

12.30 p.m. Visit to Rhodesia Cables Ltd. Luncheon Party and official opening of factory by Mr. Eric Louw, Minister of Economic Affairs, followed by tour of factory.

7.30 p.m. Cinema Party.

FRIDAY, 12th May, 1950

(Supper Room)

8.30 a.m. Executive Council.

(Main Hall)

9.30 a.m. Paper by G. C. Theron, Vanderbijl Park. "The Use of Cut-off Lanterns for Street Lighting" and discussion thereon.

10.30 a.m. to 11.00 a.m. Refreshment Interval.

11.00 a.m. Convention resumes — conclusion.

12.00 noon Convention closes if business completed.

2.00 p.m. Visit to Sir George Usher's farm, Nottingham Road.

LADIES' PROGRAMME

TUESDAY, 9th May, 1950

10.00 a.m. Official opening of Convention.

10.30 a.m. to 11.00 a.m. Refreshment Interval.

11.00 a.m. Annual General Meeting.

4.00 p.m. Official Photograph outside City Hall.

4.15 p.m. Bus tour of City Parks ending at Bird Sanctuary.

WEDNESDAY, 10th May, 1950

10.00 a.m. World's View and Hilton Road. Morning Tea at Country Club with Mayoress.

2.30 p.m. Visit to Nestle's (S.A.) Ltd. or Eddels or Aluminium Factory (Kindly put names down).

5.30 p.m. Civic Reception, City Hall (Cocktail Party).

THURSDAY, 11th May, 1950

10.00 a.m. Free morning.

12.30 p.m. Luncheon party and visit to Rhodesia Cables Ltd.

7.30 p.m. Cinema Party.

FRIDAY, 12th May, 1950

10.30 a.m. Morning Tea at City Hall and visit Native Beer Hall and Sobantu Village (Weaving School).

C. R. HALLÉ, PIETERMARITZBURG

President, 1950-1951

THE ASSOCIATION OF MUNICIPAL ELECTRICITY UNDERTAKINGS OF SOUTHERN AFRICA

Proceedings of the Twenty-Fourth Convention

The Twenty-Fourth Convention of the Association was opened in the City Hall, Pietermaritzburg, by His Worship the Mayor (Councillor G. C. Jolliffe) at 10 a.m. on Tuesday, 9th May, 1950.

Representatives of 64 Councils were present at the Convention, including 39 Councillor Members, 65 Engineer Members and Engineers representing Municipalities, 1 Honorary Member, 11 Associates, one of whom represented another organisation, 24 Delegates or Representatives from Government Departments, other Supply Authorities and Engineering Institutions, etc., 56 Trade Representatives, 62 Ladies, 10 other visitors, Press and officials (the latter figure was probably considerably higher, but as a number of visitors did not sign the Attendance Register, the exact number could not be ascertained) — a total of 263.

CIVIC WELCOME

PRESIDENT (Mr. D. A. Bradley, Port Elizabeth):

Ladies and Gentlemen: It is my privilege to say "Good morning" to you all and to welcome you here. To you, Mr. Mayor, we are grateful that you are able to be with us this morning and I now have great pleasure in asking you to officially open this, the 24th Convention of the Association of Municipal Electricity Undertakings.

HIS WORSHIP THE MAYOR OF PIETERMARITZBURG (Councillor G. C. Jolliffe):

Mr. President, Ladies and Gentlemen: I am very happy indeed, in my capacity of Mayor, to extend to you a hearty welcome to this beautiful City of Pietermaritzburg, and I appreciate the privilege conferred on me in being asked to open this 24th Convention.

I believe it is fifteen years since this Convention was held in our City and those of you who were present then will notice during your stay here the way in which the City has expanded.

Since 1935 when we last saw you, large areas of Europe have been destroyed, while we in South Africa have witnessed rapid progress and development, and we now rank among the highest in the world, per head of European population, in the generation and use of electricity. Pietermaritzburg is no exception to the rule. From 15 million units sold in 1935 we have risen to 50 million being sold this financial year.

Our beautiful city has not neglected opportunities for industrial, educational and commercial development and we can even boast a deficit of five figures on our bus services!

In 1935, 44 towns and centres were represented — to-day there are nearly 100 centres represented and more than 300 delegates.

I am specially pleased to address men whose livelihood is Municipal trading. Municipal trading undertakings are often criticised because they are sometimes run at a loss. Usually this simply means that they provide their towns with better services than they charge for.

Electricity Undertakings have given the lie to opponents of Municipal trading. They are efficient and deserve any surplus that their trading produces. They are often criticised because they produce profits, but all these profits are used to benefit the community, and Electricity Undertakings in this way have brought great benefits to South African towns and cities.

The present tendency is towards nationalization, but this is not always a good thing. Municipal Departments look after problems near to home — they help to make towns pleasant places to live in. Nationalized Undertakings lose touch with local problems — staff move about the country on promotion, and everything must be ironed out as it goes through the office of the headquarters which in South Africa would probably be in Pretoria or Johannesburg.

I hope the time will never come when Municipal Electricity Departments lose their separate identity.

I live at Clarendon — the suburb on the hill. I would recommend the delegates to this Conference to take a bus ride one evening to Clarendon to see the lights of our City. In the daytime Pietermaritzburg is a fine sight from the hill, but in the night it is indeed a fairyland — the work of the Electricity Department — that makes it something to remember, too.

Your President warned me that I must not speak too long this morning, otherwise he will switch on the red robot light behind me here — just to tell me in a polite way that it is time I shut up — so I shall take him at his word and not risk being "short circuited" by all the "live wires" I can see around me this morning.

Once again may I say how pleased we are to have you in our City and I hope that your Convention will prove a memorable and fruitful one and that all the delegates and their good ladies will enjoy being in Pietermaritzburg, as our guests, and will appreciate the functions and outings which my Council has been pleased to arrange for you.

I now have much pleasure in declaring this important Convention open, and I shall do so by asking Mr. President — just by way of getting my own back — to switch on the green light to indicate that you may now go right ahead.

Mr. D. A. BRADLEY, Port Elizabeth:

Mr. Mayor: Allow me, Sir, on behalf of the Association to thank you very sincerely for your very encouraging address and for sparing the time from your numerous duties to come here to open this Convention. We appreciate your kindness in doing so and we are encouraged by your remarks. We hope that Municipal Undertakings will not be nationalized and we will work to that end, but you have encouraged us in the way of putting forward another mode of operation that we can utilise, that is hire purchase trading. I don't know whether all Councils would agree, because it means money, and money is tight. May I just thank you again for your remarks and for coming along, and we shall delight, I am sure, in our stay in your wonderful and beautiful City. Thank you very much, Sir.

HONORARY MEMBERSHIP:

DR. J. H. DOBSON

It is my privilege to announce that the Executive Council of our Association has decided to confer the honour of Honorary Membership on Dr. J. H. Dobson, who was the Foundation President of this Association.

ELECTION OF PRESIDENT

Ladies and Gentlemen: I now call for nominations for the office of President of this Association for the coming year.

Councillor J. C. K. ERASMUS, J.P., Port Elizabeth:

I have great pleasure in proposing Mr. Hallé as President for the ensuing year and in doing so wish to congratulate Pietermaritzburg on providing the candidate for this position. Mr. Hallé is a Natal man with a Transvaal background. His grandfather was a very celebrated and renowned musician. I don't know whether Mr. Hallé is a musician, but he is certainly versatile. Apart from being the City Electrical Engineer, he is also the Transport Manager, and he holds another very important position which touches us, I suppose, more that the other two, and that is that he is the Chief Traffic Officer of this City. I don't want to canvas votes, but I must warn you that if you annoy him, by parking all over the place, you will find yourself in trouble.

Mr. A. FODEN, East London:

Mr. President, Ladies and Gentlemen: Councillor Erasmus has left me with very little to say with regard to the good points of, we hope, our incoming President. I have known Mr. Hallé for very many years and I can assure you that the activities of this Association will be quite safe in his hands, and I therefore have great pleasure in seconding the proposal of Councillor Erasmus.

Mr. D. A. BRADLEY, Port Elizabeth:

Are there any further nominations? Then it is my pleasure to declare Mr. Hallé our incoming President and I now have the privilege and pleasure of investing him with the collar of office.

Mr. C. R. HALLE, Pietermaritzburg:

Ladies and Gentlemen: I wish to thank you very heartily for the honour which you have conferred upon me. I have heard a few very nice things said about me but I think one of the most pleasing to remember is that in this Hall are a couple of men who were Railway apprentices with me and that boy appreciates the honour which you have conferred upon him to-day. We hope, finally, that with your help, we will make this a happy and successful Convention.

OBITUARY

My first duty, unfortunately, is to refer to an obituary which has occurred during the past year. Mr. C. H. Baskerville, late of Salisbury, an Associate of this body, has passed on, and out of respect for him I would ask you to stand for a minute.

APOLOGIES AND GREETINGS, ETC.

We have a number of greetings and apologies, which will be recorded in the Proceedings.

The following telegrams were received:

C. R. Burton, Kimberley:

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

A. M. Jacobs, Chairman, Electricity Supply Commission:

"Please convey to meeting my best wishes for successful and stimulating Convention and my congratulations to incoming President."

Arthur Rodwell, Honorary Member:

"Best wishes for successful Convention. Regret my inability to be present."

COMMUNICATED

Councils:

Aliwal North, Elliot, Gatooma, Harrismith, Kimberley, Paarl, Port Alfred, Somerset East, Upington, Ventersdorp, Zastron.

Associate:

B. T. H. Tubb, Salisbury.

Governments and Other Institutions, etc.:

Department of Commerce and Industries, Pretoria.

Dr. H. J. van Eck, Chairman, Industrial Development Corporation of South Africa Ltd.

V. Bosman, Chairman, Mark Sub-Committee, Johannesburg.

Charles H. Clutterbuck, Chief Inspector of Factories, Southern Rhodesia.

Engineering Firms:

V. H. Woods, General Manager, African Cables Ltd.

Rice and Diethelm Ltd.

G. S. Rogers (Pty.) Ltd.

PRESIDENT:

We intend trying to run to the programme as printed and I would be glad if each speaker would give his name and the name of the town he represents when he stands up to speak.

VENUE OF 1951 CONVENTION

The next business is to call for invitations for the venue of our 1951 Convention.

Councillor J. MULLER, Cape Town:

Mr. President: I represent the Electricity, Waterworks and Afforestation Committee of the Cape Town Council. A resolution, which I will read to you, was passed at the meeting of the Council, and I have great pleasure in passing it on to you because we have the Convention this year in this wonderful city, and from what His Worship the Mayor has said, it is only fitting that your next meeting should be in a city, if not better, equally as good. The resolution reads: "That an invitation be extended to the Association of Municipal Electricity Undertakings to hold its 1951 Convention in Cape Town at a date to be arranged." That was unanimously passed by Council and I hope that the Association will accept the invitation.

PRESIDENT:

I am certain I am voicing the feeling of this meeting when I say that we all thank you very much for the invitation because I think everybody loves to visit Cape Town, of course, next to Pietermaritzburg.

Now comes the question of the date, which I think is usually left to the hosts.

Mr. E. L. SMITH, Boksburg:

Mr. President: I would like to recommend for consideration that the Convention be held a month earlier. We have various estimates to be drawn up at this time of the year, which makes it difficult

for us to get away, and would therefore strongly recommend that the Convention be held a month earlier.

Mr. P. A. MEINTJIES, Rustenburg:

Mr. President: I would like to second our friend's proposal. In the smaller towns the Engineer is everything but a Father Confessor, and it is difficult for him to leave at this time of the year.

Mr. G. J. MULLER, Bloemfontein:

The Financial Year in the Free State commences on the 1st of April, which would make a month earlier impossible for Free State members and Councillors as they would not have had a meeting of their new Committees. It is just on the change of the Financial Year.

Councillor J. MULLER, Cape Town:

Mr. President: I think that it will be best to have it in May because you will find the accommodation in April very limited. If you could have it in May it will be better.

PRESIDENT:

Gentlemen, I think we must be guided in this by our hosts, and leave the date to be finalised by Cape Town.

Councillor G. BLAKE, Stellenbosch:

Die President: Ek wil graag die afgevaardigdes namens die Stellenbosche Raad uitnooi om Stellenbosch tydens die Konvensie in Kaapstad te besoek en ek is oortuig dat hulle die besoek sal geniet.

PRESIDENT:

My Afrikaans is a little weak because the Voortrekkers in this City rather neglected the Engineering Institutions. I think the Executive will take note of your invitation and it will not be lost sight of.

ELECTION OF VICE-PRESIDENT

The next item on the Agenda is the election of the Vice-President and I accordingly call for nominations for that office for the ensuing year.

Mr. J. C. FRASER, Johannesburg:

Mr. President: It has been the practice in the past to nominate as Vice-President the Electrical Engineer of the town from which you have accepted an invitation for the next Convention. On this occasion that practice will not be adhered to because the Electrical Engineer of the town who has issued the invitation will have retired by the date of the next Convention. After a full discussion in the Executive it has been decided to honour a smaller town by nominating the Electrical Engineer of a small town on this occasion. Mr. J. C. Downey, of Springs, has been on the Executive Council for some time and has done a considerable amount of work on behalf of the Association. In addition, he is the Chairman of the Rand Electrical Engineers, a body which has recently done a great deal of work to aid this Association. I therefore have much pleasure in proposing Mr. J. C. Downey as our incoming Vice-President.

Mr. J. L. VAN DER WALT, Krugersdorp:

I will be pleased to second Mr. Fraser's proposal.

PRESIDENT:

Are there any further nominations? As there are no further nominations, I have great pleasure in declaring Mr. J. C. Downey of Springs Vice-President, and I would ask him to come up to the table.

Mr. J. C. DOWNEY, Springs:

Mr. President, Mr. Mayor, Ladies and Gentlemen: Words fail me to express my appreciation for this honour. I can only say that I will continue to pull my weight, to do all I can in the interest of our Association and to assist the President in every way during the ensuing year.

PRESIDENT:

Those of us who have known Mr. Downey for all these years have no doubt that he will fulfil all his duties most splendidly. I think that that clears up the morning's part of the Agenda, and we will now adjourn for tea, which will be served in the Supper Room.

Conference resumed at 11.15 a.m.

PRESIDENT:

Ladies and Gentlemen: I am told that it has been very difficult for people at the back of the hall to hear and will therefore be obliged if all speakers would use the microphone.

The next item on the Agenda is the election of the Executive Council, but be-

fore dealing with that there is a proposed amendment to the Constitution regarding the election of Councillor Members.

AMENDMENT TO RULES AND CONSTITUTION

Mr. C. KINSMAN, Durban:

Mr. President and Gentlemen: At the present time the Constitution provides for a Council consisting of the President, Vice-President, two immediate Past Presidents, and eight other members, two of whom may be Councillor Members. It has been customary to appoint six Engineer Members and two Councillor Members. Your Executive has felt for a number of years that it has been considerably helped by Councillor Members who have brought to bear a vast experience of Municipal work. Therefore your Executive has discussed the increase in the membership of the Executive Council by extending the number of Councillor Members from two to eight. It may at first glance appear a somewhat large and unwieldy Executive, but we feel that that will not be so because Councillor Members when they see the Agenda for an Executive meeting may decide that the matters are all purely technical. To that end, I beg to move a suitable amendment to the Constitution and a word of explanation is due, at this stage, in regard to the method of election. The Engineer Member is elected in his personal capacity because the Engineer Member does continue, in general, for a number of years as the Electrical Engineer of a particular Municipality or of some other Municipality, but with the Councillors it is different. If we were to elect a Councillor Member in his personal capacity, by the date of the next Convention he might not be a member of the Electricity Committee of his Council. So, therefore, we propose, and we do not wish it in any sense to be a reflection on any particular Councillor, that the Constitution of the Association be amended in respect of Section 7, which deals with the Council, its constitution and election. I move that in place of the sub-section dealing with Members of the Council, the following be substituted:

"**Members of the Council:** The Council shall consist of a President, Vice-President, two Immediate Past Presidents, all of whom shall be Engineer Members, six other Engineer Members and eight Councillor Members."

The effect of that is to increase the Councillor membership from two to eight. Then the next sub-section affected is the election of Council. To give effect to what your Executive thinks would be in the best interests of the Association, I move the deletion of that particular sub-section and the substitution of this:

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

I formally move, Sir.

PRESIDENT: Does anyone second?

Mr. D. A. BRADLEY, Port Elizabeth:

Mr. President: I endorse all that has been said by Mr. Kinsman, and have great pleasure, in the interests of the Association generally, in seconding the amendment proposed by him concerning the number of members on the Executive Council.

PRESIDENT:

You have heard the amendment proposed and seconded. Is it your wish that this be approved?

Agreed.

ELECTION OF EXECUTIVE COUNCIL

PRESIDENT:

We can now proceed with the election of the Executive Council and I call for nominations for six Engineer members.

The following having been proposed and seconded were duly elected:

Mr. A. R. Sibson, Bulawayo.
Mr. C. Kinsman, Durban.
Mr. H. A. Eastman, Cape Town.
Mr. J. L. van der Walt, Krugersdorp.
Mr. J. C. Fraser, Johannesburg.
Mr. G. J. Muller, Bloemfontein.

PRESIDENT:

I hope it is fully understood that the Councillor Members from those centres are now automatically members of the Executive.

The position now is that Mr. Foden and Mr. Bradley as Past Presidents automatically become members of the Executive. That completes the Executive according to the Constitution.

Sub-Committees and Representatives:

We now come to the election of sub-committees and representatives. I would ask the Meeting if they are prepared to move that the election of sub-committees and representatives be left in the hands of the Executive. Is that agreed?

Agreed.

I will now ask the Secretary to read the Annual Report.

ANNUAL REPORT

To the President and Members of the Association.

Gentlemen: I have the honour and pleasure of submitting to you the Annual Report, together with the Revenue and Expenditure Account and Balance Sheet for the financial year ended 31st August, 1949.

Obituary:

I regret to have to record the passing on of Dr. J. H. van der Bijl, an Honorary Member of the Association, and an eminent and highly respected Engineer, not only in this country, but also overseas, and also of Mr. H. Bickley, late Town Engineer of Nigel, and an old member of the Association.

Twenty-Third Convention:

The Twenty-Third Convention of the Association was held in Port Elizabeth from Tuesday, the 17th, to Friday, the 20th May, 1949, inclusive. A total of 302 members, delegates and visitors attended the Convention, which may be recorded as a record and also goes to show the growth of the Association, the popularity of these Conventions, and in so far as this particular gathering is concerned, that it was an unqualified success.

It is opportune at this stage to express the appreciation and sincere thanks of the Members of the Association and all those who attended the Convention to His Worship the Mayor and Council of Port Elizabeth for the entertainment and facilities provided and to those officials who assisted in making our stay in Port Elizabeth so enjoyable, and last but not least to those Engineering Firms who so generously entertained the visitors and gave them the opportunity of visiting their works and factories.

Papers:

As the Proceedings of the Convention have already been in the hands of all members since about the end of September, wherein full details of the Papers are given, I think it will suffice to express our sincere thanks to Dr. J. H. Dobson for his most interesting address on "South Africa's Industrial Outlook during the Post-War Years of the Second Great World War, 1939-45," and Mr. H. J. Gripper for his paper on "Efficiency in Municipal Electricity Supply Undertakings," which, as some members put it, deserves congratulation on the considerable amount of time devoted by Mr. Gripper to the most thought-provoking and controversial subject read at a Convention for many years and, incidentally, gave scope for considerable discussion.

1950 Convention:

An invitation has been received from the City Council of Pietermaritzburg to hold the next Convention in Pietermaritzburg during the month of May, 1950, which was unanimously accepted at the Port Elizabeth Convention in May, 1949.

Membership:

The following members were elected during the year under review:

New Council Members

Heidelberg (Transvaal), Ventersdorp (Transvaal), Ceres (Cape Province), Theunissen (O.F.S.), The Strand (Cape Province), Ficksburg (O.F.S.), Bothaville (O.F.S.).

New Engineer Members

S. Dormehl-Smith, Town and Electrical Engineer, Eshowe; M. J. C. Kruger, Municipal Electrical Engineer, Butterworth; P. D. Kruyt-Hoogendijk, Town and Electrical Engineer, Theunissen; J. F. Lategan,

Front Row: L. to R.—R. Tarran (Benoni); Cr. N. C. Korsman (Benoni); . . . . . ; L. J. Roberts (Matatiele), Cr. C. H. W. Gray (Matatiele); J. M. Gencke (Klerksdorp); Cr. M. C. B. Steinman (Roodepoort-Maraisburg); D. D. Brown (Roodepoort-Maraisburg); J. Ritchie (Pretoria); Cr. J. Muller (Cape Town); Cr. A. J. Law (Boksburg); C. Kinaman (Durban); A. T. Taylor (Sec. and Treas., Johannesburg); Cr. D. R. Hugh (Newcastle); B. W. Cowley (Newcastle); G. Aalbers (Ficksburg).

Second Row: L. to R.—J. J. Baskerville (Edenvale); Mrs. C. R. McRae (Nigel); Mrs. B. T. Janas (Nigel); Mrs. C. Mullins (Howick); Cr. C. G. Thompson (Johannesburg); Mrs. C. R. Halle (Pietermaritzburg); Cr. E. B. Neill (Krugersdorp); J. L. van der Walt (Krugersdorp); A. R. Sibson (Bulawayo); Cr. L. P. Davies (Springs); J. C. Downey (Springs); C. R. Halle (President, Pietermaritzburg); D. A. Bradley (Port Elizabeth); H. A. Eastman (Cape Town); G. J. Muller (Bloemfontein); A. Foden (East London); Cr. J. C. Erasmus (Port Elizabeth); Cr. C. E. K. Young (Pietermaritzburg); J. C. Fraser (Johannesburg); Cr. G. Hayward (Durban); H. O. Smith (Pretoria); Col. G. G. Ewer (Durban); Mrs. J. C. Fraser (Johannesburg).

Third Row: L. to R.—A. F. Turnbull (Vereeniging); A. E. O'Dowd (Johannesburg); A. Rossler (Cradock); H. P. Alexander (Johannesburg); Mrs. H. P. Alexander (Johannesburg); Cr. J. H. Greef (Graaff-Reinet); Mrs. W. Fenwick (Johannesburg); V. E. O. Barratt (Graaff-Reinet); N. R. Yorke (Johannesburg); Mrs. E. V. Perrow (Johannesburg); Mrs J. S. Craig (Greytown); Mrs. H. A. Eastman (Cape Town); Mrs. E. L. Damant (Durban); Mrs. L. G. Axe (Johannesburg); Mrs. C. Kinsman (Durban); Mrs. M. C. B. Steinman (Roodepoort-Maraisburg); Mrs. H. Holtzhausen (Potchefstroom); Mrs. M. Singer (Potchefstroom); Mrs. C. E. Gregor (Alberton); Mrs. L. P. Davies (Springs); Mrs. J. C. Downey (Springs); Mrs. W. Mortimer-Mail (Kokstad); T. Kramer (Potchefstroom); Mrs. G. J. Muller (Bloemfontein); Mrs. E. L. Buchanan (Robertson); Mrs. A. Foden (East London); Mrs. J. A. Law (Boksburg); Mrs. F. Stevens (Ladysmith); Mrs. D. A. Bradley (Port Elizabeth); Miss E. J. Bradley (Port Elizabeth); Mrs. A. R. Campbell (Johannesburg); Mrs. C. G. Thompson (Johannesburg); Mrs A. Ravno (Colenso).

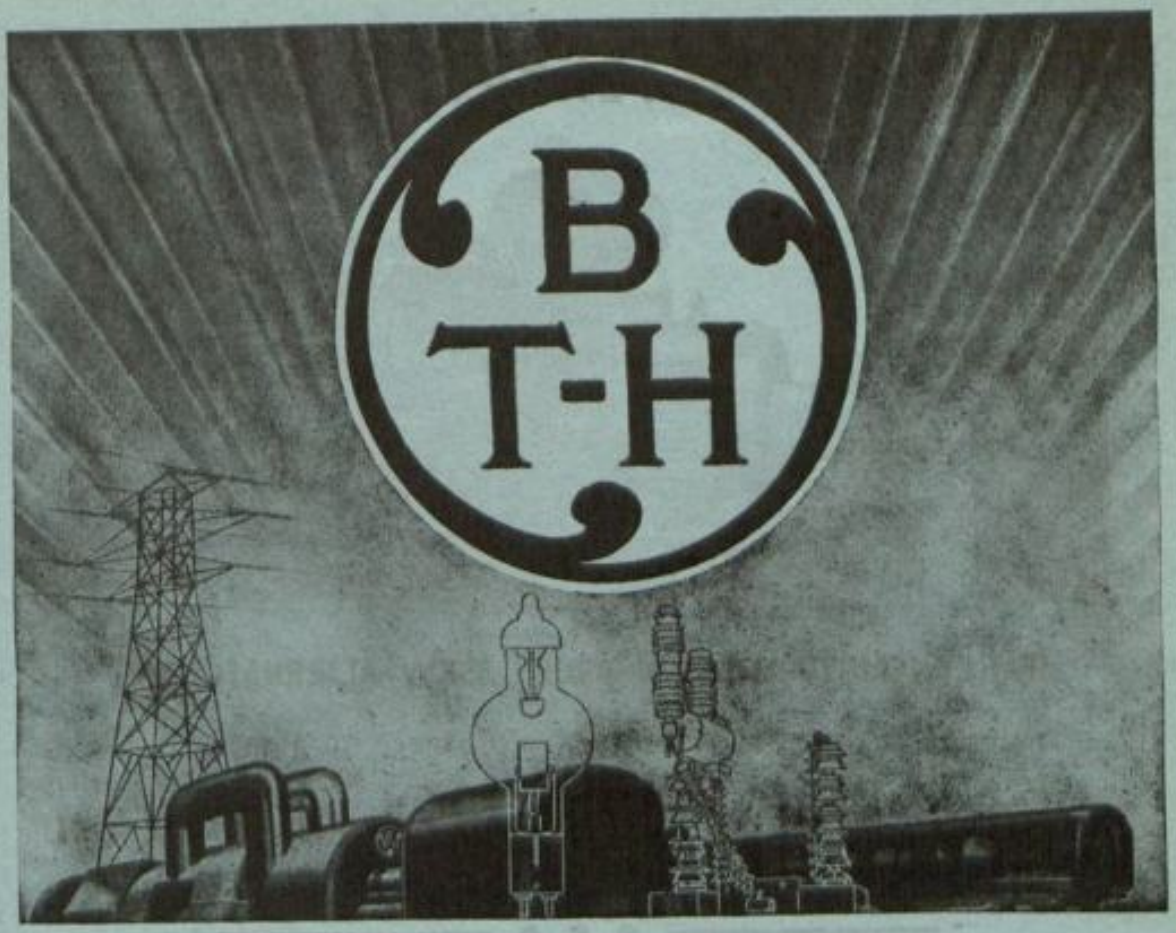
Fourth Row: L. to R.—S. G. Mortimer (Johannesburg); A. Rossler (Cradock); W. N. Stevens-Burt (Johannesburg); A. W. Allen (Cape Town); Mrs. J. H. Greef (Graaff-Reinet); A. C. Grant (Johannesburg); Mrs. A. C. Grant (Johannesburg); Cr. E. Traub (Worcester); Mrs. V. E. O. Barratt (Graaff-Reinet); Mrs. J. D. Hattingh (Bothaville); R. D. Coulthard (Doonside); Mrs. R. D. Coulthard (Doonside); P. L. Vergottini (Brakpan); D. W. Ritson (Stellenbosch); G. E. H. Jones (Mafeking); Cr. M. Singer (Potchefstroom); C. E. Gregor (Alberton); G. C. Theron (Vanderbijl Park); E. L. Smith (Boksburg); T. Kramer (Potchefstroom); P. D. Kruyt-Hoogendyk (Theunissen); E. L. Buchanan (Robertson); H. Fohren (Eshowe); R. N. F. Smit (Durban); S. G. Redman (Johannesburg); Mrs. G. Williams (Johannesburg); T. R. J. Bishop (Johannesburg); Dr. R. G. Edwards (Johannesburg); A. Ravno (Colenso).

Fifth Row: L. to R.—A. C. Tilley (Johannesburg); J. A. F. Mitchell (Pretoria); J. Russell (Johannesburg); G. Drewett (Johannesburg); W. Fenwick (Johannesburg); E. Poole (Durban); Mrs. W. Rossler (Kroonstad); Mrs. E. Poole (Durban); N. R. Yorke (Johannesburg); L. G. Axe (Johannesburg); E. V. Perrow (Johannesburg); F. P. W. Hall (Middelburg, C.P.); Cr. H. Holtzhausen (Potchefstroom); W. Mortimer-Mail (Kokstad); J. D. Hattingh (Bothaville); Cr. J. H. van der Bergh (Bothaville); H. Bahr (Ventersdorp); . . . . . ; P. A. Meintjes (Rustenburg); G. Phillips (Cape Town); C. B. Knobel (Durban); F. Stevens (Ladysmith); W. N. Randall (Vereeniging); Cr. F. O. Rapson (Ladysmith); G. Williams (Johannesburg).

Sixth Row: L. to R.—Cr. J. E. Mackenzie (Randfontein); J. R. Cherry (Randfontein); C. G. Watkins-Ball (Johannesburg); . . . . . ; C. G. Downie (Cape Town); P. C. Asselberg (Barberton); . . . . . ; K. N. Kirberger (Bethal); D. J. R. Conradie (Ficksburg); W. C. Theron (Worcester); L. Roode (Potgietersrust); W. Thackwary (Kokstad); C. H. Adams (Oudtshoorn); W. Rush (Vryheid); H. J. Maclean (Durban); M. M. Smith (Adelaide); Mrs. J. T. Williams (Pretoria); O. J. Alexander (Pretoria).

Seventh Row: L. to R.—D. G. Sutherland (Glasgow); P. H. Newcombe (George); J. England (Port Elizabeth); W. Rossler (Kroonstad); B. T. Janas (Nigel); Cr. D. J. F. MacRae (Nigel); D. v. S. Dreijer (Brandfort); E. L. Damant (Durban); C. Mullins (Howick); G. C. Delport (Delmas); Cr. H. Samuel (Delmas); . . . . . ; J. Iversch (Grahamstown); . . . . . ; J. T. Williams (Pretoria); Cr. F. A. Kealer (Boksburg); K. W. J. Halliday (Port Shepstone).

Eighth Row: L. to R.—J. F. Lategan (Heidelberg, Tvl.); J. S. Hastie (Glasgow); R. Scott-Williams (Johannesburg); . . . . . ; A. P. Burger (Springs); J. M. McGowan (Southern Rhodesia); J. S. Craig (Greytown); L. Dreyer (Venterspost); Cr. A. L. Des Fountain (Brakpan); Cr. P. J. Rietsma (Venterspost); Cr. W. J. Herbst (Vryburg); P. C. Grandin (Vryburg); W. H. Milton (Johannesburg); B. Marchand (Witbank); J. C. Royce (Johannesburg); W. Mayes (. . . . .); R. W. Barton (Welkom); J. A. Barnett (Johannesburg); F. G. MacDonald (Pietermaritzburg); W. M. Andrew (King William's Town); H. M. Witherspoon (Durban); E. Trotter (. . . . .).



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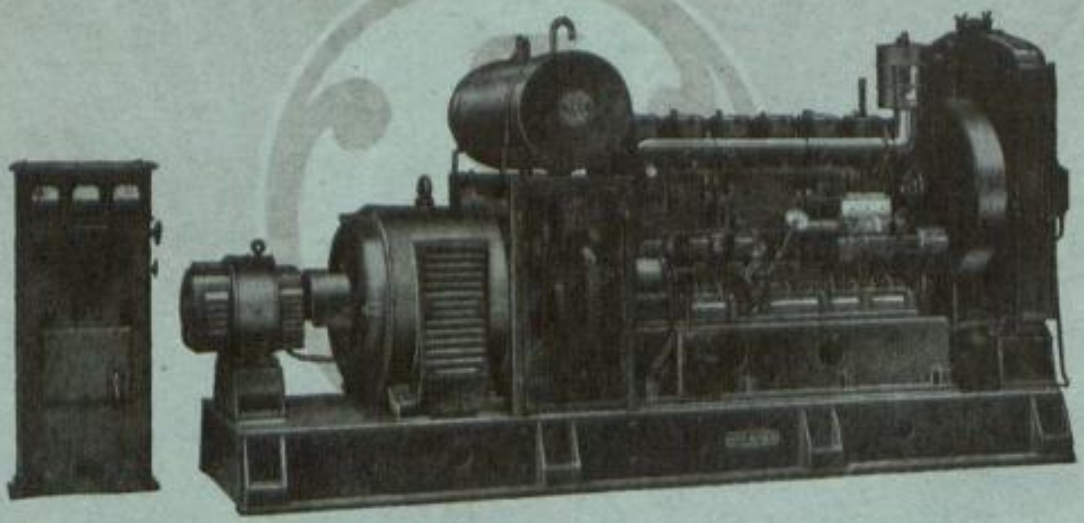

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145 KW	400/230 V	....	....	....	September 1950
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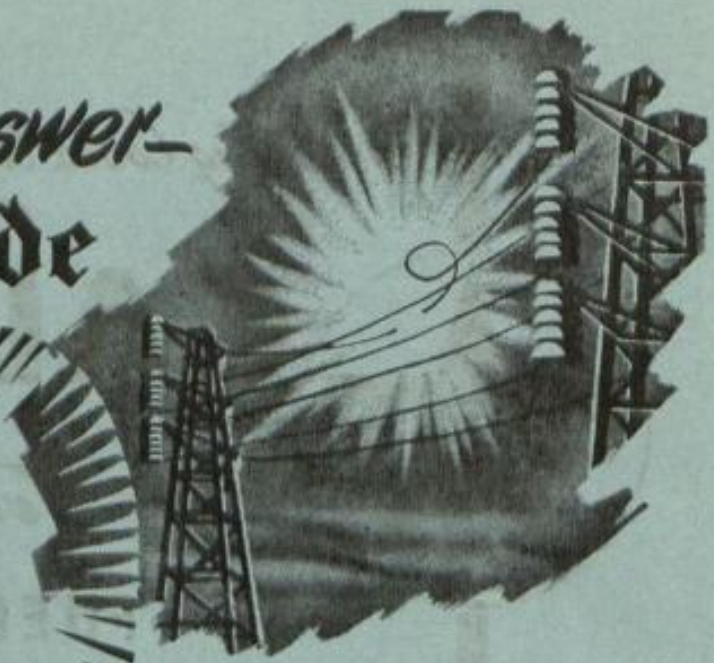

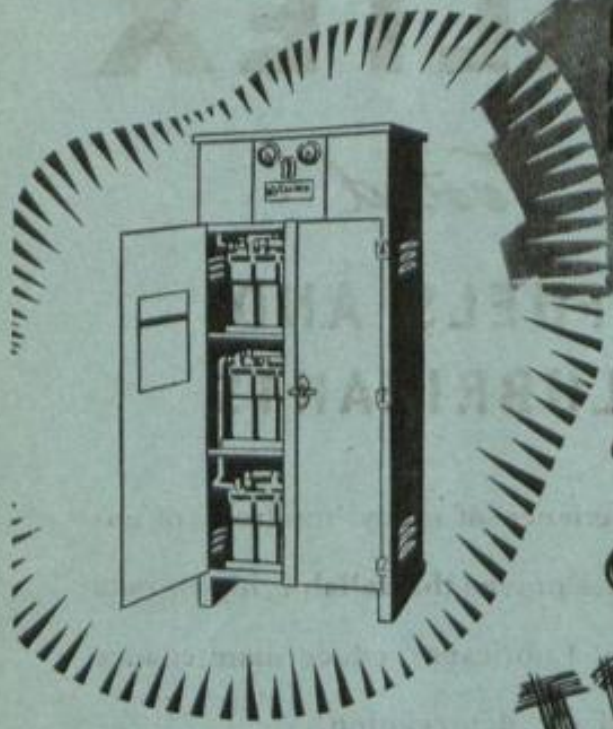

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Municipal Electrical Engineer, Heidelberg (Tvl.); A. A. du Toit, Municipal Electrical Engineer, Ceres; W. J. S. Lutsch, Municipal Electrical Engineer, Aliwal North; P. C. Asselbergs, Town Electrical Engineer, Barberton; K. W. J. Halliday, Municipal Electrical Engineer, Port Shepstone; M. N. Kirberger, Town Electrical Engineer, Louis Trichardt; J. D. Hattingh, Municipal Electrical Engineer, Bothaville; E. L. Buchanan, Municipal Electrical Engineer, Robertson; J. L. van der Walt, Town Electrical Engineer, Krugersdorp; D. D. Brown, Municipal Electrical Engineer, Roodepoort-Maraisburg; H. Bähr, Municipal Electrical and Waterworks Engineer, Ventersdorp; E. W. O. Mitchell, Municipal Electrical Engineer, Gatooma.

The comparative figures of membership for the years 1948 and 1949 are as follows:

	1948	1949
Council Members	89	96
Honorary Members ...	4	3
Engineer Members ...	86	95
Associate Members ...	—	—
Associates	29	29
		223

Appeal to Engineer Members:

Once again I must take this opportunity of strongly appealing to Engineer Members when changing their occupation or address to notify the Secretary of such change, so as to facilitate keeping in touch with them and keeping a record of members and finally to save unnecessary correspondence.

Financial:

It is pleasing to note from the Balance Sheet that income for the year exceeded expenditure by £334 13s. 0d. and from the Income and Expenditure Account that the Convention expenses, £91 5s. 0d., and the cost of printing the Proceedings, £376 2s. 6d., a total of £467 7s. 6d., has been met from the sale of Proceedings, £188 5s. 0d., and Advertisements, £280 1s. 0d. —£468 6s. 0d.

I wish to take this opportunity of thanking Advertisers and Council Members, on behalf of the Executive Council and Members, for the financial support and the continued keen interest shown in the Association's welfare.

In conclusion, my thanks is due to the President and Members of the Executive Council for the advice, assistance and courtesy at all times extended to me.

I Remain,
Mr. President and Gentlemen,
Yours faithfully,
A. T. TAYLOR,
Secretary and Treasurer.

PRESIDENT:

Thank you, Mr. Taylor. I want to thank you on behalf of the Association for a very fine comprehensive Report and I am very pleased to know that we are still solvent. Will someone propose the adoption of the Report.

Mr. H. A. EASTMAN, Cape Town:

I formally move that the Report be adopted.

Mr. A. FODEN, East London:

I second the motion.

The Report was duly adopted.

PRESIDENT:

I will call on the retiring President, Mr. Bradley, to deliver his Valedictory Address this morning instead of this afternoon.

VALEDICTORY ADDRESS

By

D. A. BRADLEY, M.I.Mech.E., A.M.I.E.E.,

City Electrical Engineer, Port Elizabeth.

Gentlemen: With the election this morning of our new President, Mr. Hallé, my year of office has closed, and I wish to place on record that I value the opportunity and privilege that has been mine to serve this Association. I will always look back with the happiest recollections of the concord and co-operation that has been shown towards me by every Member of this Association. I am especially indebted to the continued untiring services rendered by the Executive Council, Committee Representatives, and our Secretary and Treasurer. Their deliberations and "putting to work" of sound recommendations are proven in the continued success and progress which the Association can express after another year. Many problems, affecting all Undertakings, were considered and dealt with as expediently as possible, requiring patience,

ASSOCIATION OF MUNICIPAL ELECTRICITY UNDERTAKINGS OF SOUTHERN AFRICA

BALANCE SHEET, 31st AUGUST, 1949

Accumulated Funds			£1,654	4	0
Balance at 1st September, 1948 ...	£1,319	11 0			
Add Excess of Revenue over Expenditure for year ended 31st August, 1949	334	13 0			
Creditors			25	14	0
Subscriptions in Advance	9	9 0			
Proceedings in Advance	9	15 0			
Advertising in Advance	6	10 0			
			£1,679	18	0

D. A. BRADLEY, Chairman.
A. T. TAYLOR, Secretary.

Presidential Badge			£1	0	0
Nominal valuation.					
Furniture and Fittings			75	7	6
At Cost less Depreciation.					
Investments at Cost including Interest Accrued			1,280	5	3
636 Union Loan Certificates	£648	15 0			
United Building Society Fixed Deposit	631	10 3			
Debtors			7	7	0
Arrear Subscriptions.					
Cash			315	18	3
At Barclays Bank (D.C. and O.) ...	£312	2 9			
Cash on Hand	3	15 6			
			£1,679	18	0

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

We report that we have examined the above Balance Sheet with the books and vouchers of the Association for the year ended 31st August, 1949; that we have satisfied ourselves of the existence of the securities; and certify that, in our opinion, the above Balance Sheet is properly drawn up so as to exhibit a true and correct view of the state of affairs of the Association as at 31st August, 1949, according to the best of our information and the explanations given to us and as shown by the books of the Association.

SAVORY & COMPANY,
Incorporated Accountants,
Auditors.

Johannesburg,
29th September, 1949.

ASSOCIATION OF MUNICIPAL ELECTRICITY UNDERTAKINGS OF SOUTHERN AFRICA

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31st AUGUST, 1949

Audit Fees	£7 7 0	
Bank Charges	7 14 11	
Convention Expenses	91 5 0	
Insurance	2 1 0	
Printing and Stationery	31 15 3	
Postages, Telegrams, etc.	18 13 9	
Rent	48 0 0	
Secretarial Expenses	66 9 6	
Salaries	360 0 0	
Telephone	8 16 0	
Executive Committee Expenses	14 4 6	
Subscriptions Paid	12 11 7	
Donations—World Power Conference	10 0 0	
Depreciation	8 7 6	
		£687 6 0
Excess of Income over Expenditure for the year transferred to Accumulated Funds		334 13 0
		£1,021 19 0

Subscriptions			£874 13 0
Sale of Proceedings	£188 5 0		
Add **Advertisements in Proceedings**	280 1 0		
	£468 6 0		
Less **Printing of Proceedings**	376 2 6		
			92 3 6
Interest			54 10 0
Union Loan Certificates	36 11 0		
United Building Society—Fixed Society	17 19 0		
I.M.E.A. Journal			0 13 6
			£1,021 19 0

SAVORY AND COMPANY.

with careful thought and action, to attain the necessary beneficial results.

The Executive Council's mid-year meeting was held in Johannesburg on the 18th November last, when amongst many other matters dealt with, through the arrangements made by Mr. J. C. Fraser, we were favoured by the kind attendance at the afternoon session of Mr. C. L. F. Borckenhagen, the Director of Imports and Exports, to discuss with us the intricacies and operation of these important economic measures adopted by the Government. Undertakings generally were assisted considerably through the agreement reached, wherein a Standard Application Form was to be put into use which would detail the equipment, for what purpose required and a supporting statement given, so that the Controller could readily determine the degree of priority to assess.

A special Advisory Committee was set up by the Director on which three of our Executive Members, Messrs. Fraser, Downey and Hugo, were elected to serve and thus the interests of all Municipal Undertakings are suitably safeguarded. At the time of writing this Address, the stringent Import Control measures, compulsorily enforced by the Government in June, 1949, have been somewhat relaxed as a result of the country's partial economic recovery — an achievement coming earlier than most of us expected — but we are told that Import Control will be with us for some time to come, hence our Members will value the arrangements made by the Director which, no doubt, will expedite the delivery of essential equipment from overseas.

The exceptional expansion of Industry, particularly in the cities and towns, over the past five years, with the obvious increase in population, has brought with it the usual problems, not only in the provision of the essential Water Supply, but also in Electricity and Housing, with all the associated difficulties regarding the increase or enlargement of all public amenities, including Roads, Public Conveniences or Transport, and — a weighty problem these days — Traffic Flow and Control. These factors, noted particularly in the larger centres, lead me to touch upon the subject of Town Planning as it affects the Municipal Electrical Engineer.

The experience gained in World War II has been sufficient to warrant the "spreading" of industrial activities, rather than the concentration in a given, but comparatively small, area. We know that Mining must take place in the immediate location where the Mineral is found, but manufacturing processes can be undertaken almost anywhere, subject to the first essential, water, being available.

The Engineer in charge of an Electricity Supply Undertaking to-day is the Manager of an organisation, set up to control the receipt and safe distribution of large quantities of power, and to promote the sale and use of same for the joint benefit of the owners and the consumers.

The generation of electricity must take place where fuel, water and transport facilities are available but the transmission of Electricity or Power is readily possible over long distances, therefore satellite towns and large industrial areas, situated anywhere within the radius of, say, one hundred and fifty miles of any selected Power Station could have their needs met from this source.

The selected Power Station, I feel, would, if not at present, ultimately be one under the control of the Electricity Supply Commission as we can visualise conditions being such that, as existing Power Stations reach the end of their economic life, the Local Authorities concerned will turn to Escom where possible, and within a few years South Africa may be emulating in some measure the National Grid as pertains in Britain to-day.

It is on this assumption that some thought may be given to the Municipal Electrical Engineer and his relations to the Government, Provincial Administration, Townships Boards, Town Planners and Architects. We know that only too frequently a scheme, be it a dwelling or a township, is accepted and the work commenced when suddenly the matter of electricity supply is raised. After much discussion a compromise is the best that can be attained, but the "job" is not as good as might have been, and is probably more costly than would have been the case had the Electrical Engineer been consulted before the plans were finally adopted.

Liaison between the Electrical Engineer and the Planning Department can be useful mainly to effect economies in reticulation. A knowledge of what development is being planned in an area gives the Electrical Department a chance to plan its sub-station sites, cable sizes and reticulation generally in the most economical manner.

In detailed layouts, even economies in street lighting layout could be effected if Planner and Electrical Engineer got together in the earlier stages of the preparation of the plans.

From the aesthetic point of view the Electricity Department can make or mar a good layout. The reticulation of electricity by overhead lines is not always in keeping with the ideals of the Town Planner and the additional cost of cable reticulation may have to be faced, in order to assist in creating a more pleasing street appearance. Consideration of these, with other important factors, together with the co-operation of all concerned in Municipal and Public Works, are necessary to ensure that the various schemes embarked upon are not allowed to develop in "watertight" departments, but with an eye to the common weal rather than to the specific profits of the Department affected.

Mr. President, Ladies and Gentlemen, I thank you very sincerely for the excellent spirit of goodwill that has been directed towards me and enriched my period as the President of this Association; with full confidence I hand over this important position to Mr. Hallé in whose care our affairs are well entrusted and wish him a full measure of happiness and success during his term of office.

Mr. A. FODEN, East London:

Mr. President, Ladies and Gentlemen: Thank you, Mr. Bradley, for your most interesting address, touching as it does on the activities of this Association and the economic conditions of our country. During your period of office you have seen the membership of our Organisation grow as stated by our Secretary which indicates the interest our Councils are taking in this Organisation, being as it is, a representative body of Electricity Undertakings and not Electrical Engineers. You, Sir, touched upon a subject which is very important, namely, the liaison between Town Planning Authorities and the Electrical Engineer. This is most important as electricity will continue to play a major part in the lives and activities of the people. I would also plead for closer liaison between Architects and the Electrical Engineer, as often buildings are designed without the necessary provision for the incoming electricity supply.

Once again, Mr. Bradley, I thank you on behalf of the Association for all the work you have done during your year of office which redounds to your credit.

PRESIDENTIAL ADDRESS

By

C. R. HALLE, M.I.E.E., M.I.Cert.E., City Electrical Engineer and Transport Engineer, Pietermaritzburg.

I think we are ahead of the programme and I might as well carry on with the Presidential Address as that will give us much more time to devote to the Papers. I would like to make it clear from the outset that I tried to get out of this and I suggested to the Secretary that it was poor thanks for the honour you have conferred on me. He said I have got to conform to custom. I have decided to be brief. The Papers and other Addresses have not left me much to talk about and I also find that the scope is limited by the endurance power of the audience. I want to take your minds back to the pre-historic days when our ancestors were busy killing their food and their neighbours.

From the little we know about women we can deduce that it was they who introduced the first touches of stability that gave rise to the idea of "home" and it was there that man's first home-made articles were manufactured. The home was the first factory and it is fitting, and poetic justice, that after vast aeons of time we Electrical Engineers have the task of bringing the full-grown scientific factory technique back to the home. We certainly owe this debt to the first civilised sex. They, I am sure, must agree that electricity has played its part towards the emancipation of women by releasing them from the slavery and drudgery of the old-fashioned housework. If it is not too late, emancipated Woman may yet dissuade Man

from wholesale self-destruction and we may live to see the day when the hand that switches on the electric cradle really rules the world.

It is with such thoughts in mind that I wish to talk about the all-electric home in this country. Here we are blessed with a different domestic servant problem from overseas; the word blessed being open to various interpretations. Here, as in the rest of the world, "cheap" labour must eventually become a thing of the past, and more and more attention must be paid to the economics of mechanisation.

In a country where there are more motor cars than income tax payers there should be few citizens that cannot afford all-electric homes. There are in actual fact few citizens who feel they cannot afford servants. Now very few people calculate the total cost of keeping a servant including wages, food, clothing, quarters, light, and various perquisites that you discover too late to remedy. These actual costs must average between £80 and £100 per annum at to-day's prices and are probably rising sharply year by year. This means that most citizens after ten years' housekeeping have expended nearly £1,000 of their income on nothing but very indifferent service. People who keep two or three servants may have expended £2,000 or £3,000.

There are more and more people every year finding that it pays them to invest £300-£400 in electrical domestic equipment and do without a servant. They are finding out that the electrical home is not only the cleanest and the most convenient — it is also the cheapest to run.

To equip an all-electric home, on present standards for a family of ordinary size, will need:

Essentials:

Cooker	£60
Refrigerator	90
Washing Machine	45
Water Heater	30
Kettle	3
Iron	2
Vacuum Cleaner	30
Floor Polisher	25
	£285

Desirables:

Dishwasher	£40
Radiators	10
Mixing Machine	10
Sewing Machine	12
Toaster	2
Refuse Grinder	30
Lawn Mower	35
	£140

These lists disregard electric light and those household conveniences which have little to do with housekeeping, such as clocks, bells, radios, blankets, razors, fans, hair driers, towel rails, coffee percolators, cigarette lighters, etc. This is not a big capital outlay if it is offset against the cost of keeping a native servant.

Our problem as Electrical Engineers should be:

(a) to help citizens to raise the necessary capital, and

(b) to find more and more labour-saving devices for the home.

As regards (a) much more scope should be given to Electricity Undertakings in the financing of Hire Purchase Schemes. These are safe and profitable investments and very few failures are ever reported.

Among the lower income group electrical devices make it possible for young married couples both to go out and work and to save up for a family.

As regards (b) we are too slow in adopting new ideas. New devices overseas have grown whiskers before we see them out here. Corporations should be the leaders and have special showrooms demonstrating the latest devices: dishwashers, boot-polishers, refuse grinders, etc.

Lastly, we must not forget that the better education of our non-European population must evenutally curtail the number of Africans who are content to sweep floors and wash dishes. The migration of labour from homes to factories goes on everywhere. It would be better here if more of our domestic servants were employed in factories making vacuum cleaners, dishwashing machines, etc., for us to use.

With these remarks, having briefly covered the years between the Stone Age and the Electric Age, I think I have done my duty as President. I thank you for

the honour and now we may pass on to the other items of our Agenda and discuss in more detail some technical problems of 1950.

Mr. H. A. EASTMAN, Cape Town:

Mr. President, Ladies and Gentlemen: I feel that on your behalf I should express to our President our thanks for his address. As he himself has mentioned, the scope for an address of this nature is so wide that he must have found a great deal of difficulty in deciding how to confine his remarks to a subject or branch of our work which does not carry him into so far a distance that we lose the point of the speech in a large Paper. He has confined himself essentially to the service which electricity renders to the community and whilst it is improper I think to discuss the address, if it were proper to do so I have not the slightest doubt that the ladies would take a big part in the discussion. The keynote of the paper is service. Service to the community starts in the home. That has been our theme for many years but it has not been emphasised in a Presidential Address, I think, since we were constituted.

Because of the attention you have drawn to the service we are rendering with emphasis on service, we thank you heartily for your address.

PRESIDENT:

We are very happily in the position of being ahead of our programme and I think we can now adjourn until 2.30 this afternoon.

The Convention adjourned and resumed at 2.30 p.m.

WORLD POWER CONFERENCE

PRESIDENT:

I will now ask Mr. Eastman, the representative of the World Power Conference, to submit his Report.

Mr. H. A. EASTMAN, Cape Town:

Mr. President, Gentlemen: In submitting my Report as the Association's representative on the South African National Committee of the World Power Conference, it may be of interest to refer briefly to the work which has been done by this body hitherto.

The first World Power Conference was held in London in 1924, the theme of which was "Resources of the World in Power and Fuel and their use to the greatest possible advantage."

The second World Power Conference was held in Berlin in 1930 when the subject under consideration was "The Power Problem from every point of view."

The third World Power Conference was held in Washington, D.C., in 1936 to consider "The National Power Economy."

In addition, sectional meetings have been held from time to time in Basle, Barcelona, Vienna, The Hague, and other places to discuss particular branches of engineering work, such as "Water Power Development and Inland Navigation," "The Power Problem of large scale Industry and Land and Sea Transport," "Supply of Electricity for Agriculture, Household Purposes, Small Scale Industries, Public Lighting and Railways," etc.

The next sectional meeting will be held at New Delhi in India from the 10th to 15th January, 1951, the sessions of which will be followed by a 15-day study tour concluding with the closing session at Bangalore on the 1st February, 1951. The theme for this sectional meeting will be "The Utilization of Energy" under the following main sub-heads:

(1) Use of Electricity in Agriculture;

(2) Co-ordination of the Development of Industries and the Development of Power Resources.

The World Power Conference has also been responsible for the holding of three Congresses on International Commission on Large Dams.

The fourth meeting of the World Power Conference will be held in London from the 10th to the 15th July, 1950, with headquarters in the premises of the Institution of Civil Engineers, London. The theme of the Conference will be "World Energy Resources and the Production of Power." It is of particular interest to us to know that among the Papers to be presented are:

(1) Energy resources and the development in the Union of South Africa;

(2) Torbanites and Oil Shales; their occurrence and utilization in South Africa;

(3) Preparation of coals of high ash content;

(4) Production of power in the Union of South Africa.

Facilities will be made available for the discussion of all Papers at separate technical sessions, each devoted to particular branches of them of the Conference and arrangements will be made for delegates to take part in conducted tours in the United Kingdom which will include visits to the principal engineering works whose interests cover the subjects under discussion.

A full programme for the week of the Conference is being arranged for ladies accompanying the members of the fourth World Power Conference who will also be able to participate in all the post-conference study tours and in almost all the visits from London.

It is essential, so that the necessary arrangements may be made in good time for the accommodation of delegates and visitors, that they inform the Secretary of the South African National Committee of the World Conference of their intention.

In conclusion, it should be mentioned that the South African National Committee of the World Power Conference has been invited to be represented at the thirteenth session of the International Conference on large electric high tension systems (C.I.G.R.E.) to be held in Paris from the 29th June to 8th July, 1950.

A statement of accounts of the South African National Committee of the World Power Conference for the year ended 31st December, 1949, is appended to this Report.

PRESIDENT:

Thank you very much indeed, Mr. Eastman. I think we all know that you have done very valuable work in this connection.

The next item will be the Report of the International Conference on Large Electrical Systems.

C.I.G.R.E. — INTERNATIONAL CONFERENCE ON LARGE ELECTRICAL SYSTEMS

Mr. A. FODEN, East London:

Mr. President, Gentlemen: Briefly, the position in regard to the C.I.G.R.E. is that the Proceedings of the last Conference have been received by the Secretary and are available to Engineer Members on application.

The next Conference, the 13th Congress, is to be held in Paris from the 29th June to the 8th July, 1950, and this Association, as a member, has been invited to attend or send delegates.

The object of the Conference will be to study all the technical problems concerning generation, transformation and operation of high tension networks. One hundred and forty-two Papers will be discussed. The languages will be English and French and the organization will be such that anyone speaking one of the two languages will fully profit by the work of the Congress.

The Conference was founded in 1921. It is a first-class international centre for the exchange of electrotechnical documents and information, where the best specialists on large generating stations and high tension lines meet regularly whether they be manufacturers of material, builders of lines, power distributors or government engineers. It is not only the oldest of all international electrotechnical organisations (except the International Electrotechnical Commission) but it is also by far the largest, having 1,450 permanent and 2,000 corresponding members all over the world.

Thanks to the Conference, all electrical engineers are able to obtain, every two years, the very latest information on progress realised throughout the world on all questions relating to the construction and operation of high tension lines, on experiments made, practices applied in operation, apparatus used in service, etc.

The last Conference held in 1948 met together 1,144 attendants who came from 40 different countries and from the five continents.

PRESIDENT:

Thank you, Mr. Foden, for keeping us in touch with these international affairs. When our finances permit it, I hope that our Association will elect a delegate to one of these Conferences. We now come to the

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SOUTH AFRICAN NATIONAL COMMITTEE—WORLD POWER CONFERENCE

RECEIPTS AND PAYMENTS ACCOUNT FOR THE YEAR ENDED 31st DECEMBER, 1949

PAYMENTS		RECEIPTS		
To Payment made to World Power Conference—Central Office (London) Maintenance Fund in respect of the year 1949	£50 0 0	By **Subscriptions Received**		£44 4 0
,, Exchange on £50	0 5 0	Electricity Supply Commission	£10 0 0	
,, Statistical Yearbooks 1-4	45 5 5	South African Railways and Harbours	10 0 0	
,, Exchange on £45.5.5	0 4 7	Association of Municipal Electricity Undertakings of Southern Africa	10 0 0	
		Associated Scientific and Technical Societies of South Africa	5 0 0	
		Department of Mines	5 0 0	
		S.A. Institute of Engineers	2 2 0	
		S.A. Institute of Electrical Engineers	2 2 0	
		,, Advertisement in Publication of the Transactions of the Fuel Economy Conference		20 0 0
		,, Sale of Publications		16 13 9
		,, Balance being excess of Payments over Receipts		14 17 3
	£95 15 0			£95 15 0
,, Excess of Payments over Receipts, 1949	£14 17 3	,, Balance brought forward from 1948		£110 7 10
,, Balance as at 31st December, 1949	95 10 7			
	£110 7 10			£110 7 10

JOHANNESBURG,
2nd March, 1950.

G. R. D. HARDING,
Secretary.

ELECTRICAL WIREMEN'S REGISTRATION BOARD

Mr. J. C. FRASER, Johannesburg:

Mr. President and Gentlemen: I have the pleasure in presenting a brief review of the Wiremen's Registration Board's activities for the year 1949.

1. Personnel of the Board

Messrs. Clutterbuck and Gosse, both of whom were foundation members, retired from the Board at the end of 1948.

The Department of Labour appointed Mr. P. Sommerville in Mr. Clutterbuck's place as an administrative representative in terms of Section 3 (1) (b) of the Act, and Mr. H. R. Townsend succeeded Mr. Gosse. Mr. J. L. Greet resigned during the year and his place was filled by Mr. D. W. Harvey.

The following personnel now constitute the members of the Board as at 1st January, 1950:

Mr. H. O. Smith, Chief Inspector of Factories (Chairman).

Mr. P. Sommerville (representative of the Labour Department on Administrative Matters).

Mr. J. C. Fraser (The Association of Municipal Electricity Undertakings of South Africa and Rhodesia).

Mr. H. R. Townsend (The National Federation of Building Trade Employers of South Africa; The Federated Chamber of Industries; The Electrical Engineering and Allied Industries Association).

Mr. J. Calder (The South African Electrical Workers' Association).

Mr. D. W. Harvey (The Amalgamated Engineering Union; The Building Workers' Industrial Union; The Western Province Building, Electrical and Allied Trades Union).

2. Meetings of the Board

During the year under review the Board held 15 ordinary meetings and one special meeting.

3. Applications for registration as Wiremen

During the year 1949, 572 Wiremen were registered which is an increase of 154 over the previous year. This now brings the total number of Wiremen registered by the Board to 4,143.

Out of 569 applications received for registration, 503 or 88·5% were accepted for examination; 27 were granted exemption from the examination, and 39 or 6·9% were refused registration for various reasons. This is the lowest figure in any one year for refusals since the inception of the Board.

4. Examinations

In order to reduce the back log of candidates carried forward annually and generally to speed up the registration of applicants, the Board increased the frequency of holding examinations, 3 written and 9 practical examinations being conducted during the year at various centres of the Union. A total of 920 candidates was examined although 1,975 notifications for examination were sent out.

With regard to the written examination which is divided into two sections, 144 or 42% of those entered were successful in passing both Sections I and II, while 139 or 54% of entries passed Section I and 83 or 52% of entries passed Section II. Out of all those who entered just over half failed the written examination outright.

Regarding the practical examination, 381 out of 460 candidates were successful. Both these figures are very much higher than in previous years, although the percentage pass, 83%, is rather lower.

5. Determination of Areas

Proposal notices were published in the Government Gazette stating the Minister's intention to determine during 1950 the following additional areas in which the prohibitive clauses of the Act shall apply.

The magisterial districts of — Newcastle, Kimberley, Witbank, Bronkhorstspruit, Uitenhage, Bellville, Somerset West, Kokstad, Oudtshoorn, Kroonstad, Hermanus.

The following areas have already been determined in terms of Sections 19 and 20 of the Act — Magisterial districts of Pretoria, East London, Pietermaritzburg, Bloemfontein, Klerksdorp, Potchefstroom, Germiston, Brakpan, Benoni, Springs, Boksburg, Nigel, Vereeniging, Roodepoort, Krugersdorp, Johannesburg, Durban, Inanda, Pinetown, Port Elizabeth, the Cape and Wynberg, that portion of the Magisterial District of Bellville falling within a radius of 10 miles from the Post Office of Bellville, that portion of the Magisterial

District of Simonstown falling within the Municipal area of Cape Town and Fish Hoek.

6. Designation of Domestic Appliances Mechanic

7. Registration of Contractors.

The Board discussed both the above items and a separate report on each is being submitted.

8. Prosecutions

The attached schedule shows details of the prosecutions which have been instituted by the Board for contraventions of the Act since 1944.

9. Conclusion

The thanks of the Board are due to the clerical division of the Department for their loyal support and assistance which enabled the Board to perform the duties entrusted to it under the Act.

Finally, may I be permitted to express my appreciation to the Chairman of the Board for the facts forwarded me upon which it has been possible to frame this Report.

PRESIDENT:

Thank you, Mr. Fraser, for a very interesting and comprehensive report of the activities of the Wireman's Registration Board. As we have Mr. Smith with us, I would ask him if he would like to say something on this Report.

Mr. H. O. SMITH, Chairman, Electrical Wiremen's Registration Board:

Mr. President, Gentlemen: I have addressed you in connection with the Wiremen's Board at your previous meetings. Our relationship has always been very friendly and perhaps you have various questions to ask me in connection with the Board. I have not very much to add to Mr. Fraser's Report, but it might interest you to have some figures which are a bit more up to date. It should be realised that Mr. Fraser's Report only covers the activities of the Board up to the end of 1949.

We have frequently been accused of unreasonable delay so that candidates have had to wait for months for examinations. I would like to give this Convention an assurance that, owing to the extra exam. which the Board was able to hold in November, 1949, the backlog has practically been wiped out. As a rule we only have two written examinations per annum. Last year we had three, which enabled us to handle more candidates, and also reduced the waiting period for a candidate to enter for that examination from a maximum of six months to four months. We also increased the number of practical examinations to nine, the previous maximum being eight in 1947. We managed to handle a greater number of candidates than we ever had before to an extent of 92 more than in 1947. The total number of candidates that were examined was 460, of which 381 passed. Another written examination is being held on the 24th June and only 402 candidates had to be notified for that examination, whereas as a rule about 600 would have had to be notified. There are perhaps another 600 odd men on the books awaiting examination: these have been notified from four to five times of examinations to be held, but they have not entered or made any excuse for not attending or let us know their latest address, consequently they are struck off the mailing list. It has occurred, however, that after four or five years, a man suddenly comes to light again and wishes to know when the next examination is to be held, in which case he is replaced on the list to be notified. The largest number awaiting examination is in Johannesburg, where there are 148; the next largest number is in Cape Town, where there are 71 awaiting examination. The written examination is held in all centres and any candidate has the privilege of writing the examination in his own town, when arrangements are made for an invigilator.

Coming to the practical examination, there are only 195 awaiting examination. The next exam. will be held at the end of this week, i.e. 13th May, 1950, when we will be able to handle over 50 and the backlog will practically be wiped out after two or three more examinations.

I would like to take this opportunity of returning Mr. Fraser's compliment and thank him for the very helpful and efficient manner in which he acts on the Board.

PRESIDENT:

Thank you, Mr. Smith, for your very fine report. I think we have all got a better picture of the position than we have ever

ELECTRICAL WIREMEN'S REGISTRATION BOARD
PROSECUTIONS

Date	*Place*	*Accused*	*Contravention*	*Plea*	*Verdict*	*Sentence*	*Remarks*
9·8·44	Cape Town	J. A. J. Cornelissen	Section 28(*a*) of Electrical Wireman & Contractors Act	—	Guilty	£6 or 1 month	
9·8·44	Cape Town	R. Locke	Section 28(*a*) of Electrical Wiremen & Contractors Act	—	Guilty	£6 or 1 month	
29·9·44	Cape Town	P. C. Williams	Section 28(*a*) of Electrical Wiremen & Contractors Act	—	—	—	Case withdrawn by Board on 29·9·44
27·11·44	Cape Town	R. F. Locke	Section 20(*a*)	—	Guilty	£3	
27·11·44	Cape Town	E. Price	Section 20(*a*)	—	Guilty	£3	
27–11–44	Cape Town	G. L. Stoddart	Section 20(*c*)	Guilty	Guilty	£10	The accused signed Admission of Guilt.
27·11·44	Cape Town	B. M. Jones	Section 20(*c*)	Guilty	Guilty	£10	The accused signed Admission of Guilt
6·3·47	Cape Town	D. Lipshitz	Section 20(*a*) of Electrical Wiremen & Contractors Act	Guilty	Guilty	£7 10s.	Accused was allowed to sign an Admission of Guilt—See minute 8/17/3/6 from Divisional Inspector, Cape Town, dated 11·2·47.
?	East London	B. Bellingham	Section 20(*a*) of Electrical Wiremen & Contractors Act	—	—	—	Case withdrawn: Divisional Inspector reported that accused was 3 months ill in hospital and for that reason was unable to return the certificate which has since been received from him.
3·6·47	Pretoria	F. Stirn	Section 20(*a*) of Electrical Wiremen & Contractors Act	Not Guilty	Not Guilty	Discharged	The accused was defended by Mr. Edelstein and was found not guilty and discharged for the reason that the Installation Inspector, under cross examination, stated that he was not sure whether the person who performed the wiring work, was the person A. W. Schneider cited in the indictment and who had since been deported to Germany.

3-6-47	Pretoria	A. W. Schneider	Section 20(a) of Electrical Wiremen & Contractors Act	Withdrawn	—	—	Accused deported to Germany.
2-4-47	Pretoria	J. C. F. Krause	Section 17(3) of Electrical Wiremen & Contractors Act	Guilty	Guilty	10/- or 5 days	
8-5-47	Pretoria	J. H. van Zyl	Section 17(3) of Electrical Wiremen & Contractors Act	Guilty	Guilty	10/- or 5 days	
?	Johannesburg	J. Reisher	Section 17(3)		Guilty	10/-	
1-8-47	Pretoria	M. E. Ristow	Section 20(a)	Not Guilty	Guilty	£3 or 6 days	The accused was defended by Mr. Chewitz.
6-9-47	Cape Town	B. Lipshitz	Section 20(a)	—	Guilty	£15	
7-11-47	Pretoria	A. Siegert	Section 20(a)	Guilty	Guilty	£1 or 7 days	Mr. Piccard appeared on
7-11-47	Pretoria	K. Hubsch	Section 20(a)	Guilty	Guilty	£1 or 7 days	behalf of accused.
7-11-47	Pretoria	L. Hubsch	Section 20(a)	Guilty	Guilty	C & D	do.
11-12-47	Johannesburg	A. Lewis	Section 17(3)	Guilty	Guilty	£2	
29-12-47	Pretoria	P. Henderson	Section 17(3)	Guilty	Guilty	£1 or 5 days	
16-3-48	Cape Town	J. D. McDonald	Section 19(1)	Guilty	Guilty	£6	Admission of Guilt
1-12-49	Johannesburg	R. A. Wulff	Section 20(c) a.r.w. (b) & (g)	—	Guilty	£2	Admission of Guilt
1-12-49	Johannesburg	A. Cruickshank	Section 20(c) a.r.w. (b) & (g)	—	—	—	Charge withdrawn.
20-12-49	Cape Town	V. Geale	Section 19(1) 20(a)	Guilty	Guilty	£10 or 40 days I.H.L.	
22-12-49	Cape Town	A. Pye	Section 17(3)	—	Guilty	£3	Admission of Guilt
22-12-49	Cape Town	P. C. Dockrell	Section 17(3)	—	Guilty	£1	
24-12-49	Cape Town	K. H. Pead	Section 19(1)	—	Guilty	£5	Admission of Guilt
24-12-49	Cape Town	G. Wales	Section 19(1)	—	Guilty	£3	
17-1-50	Cape Town	I. Wolfe	Section 19(1) 21 (a)	Not Guilty	Acquitted		
17-1-50	Cape Town	G. Nieman	Section 19(1) 21(a)	—	—	—	Charge withdrawn.
27-2-50	Johannesburg	D. A. Colman	Section 17(3) a.r.w. Section 28(1) (f)	—	Guilty	£2	Admission of Guilt.
27-2-50	Durban	D. Donnelly	Section 17(3) a.r.w. Section 28(1) (f)	—	Guilty	—	Cautioned and Discharged.

had before. This subject is now open for discussion.

Mr. D. A. BRADLEY, Port Elizabeth:

Mr. President: Arising out of that report, can the representatives tell us the number of licensed natives or coloureds. If they have no statistics available it is quite all right, but I had an occasion recently when a native applied to me for a position and he held a Wireman's licence.

Mr. J. C. FRASER, Johannesburg:

Mr. President: The Board has no colour bar; any application that comes in front of it is dealt with on its merits.

Mr. H. O. SMITH, Pretoria:

I can only support Mr. Fraser and point out that in all our industrial legislation there is no colour bar. The only exception is the Mines and Works Act, and that applies only to the Transvaal and Free State.

Mr. G. J. MULLER, Bloemfontein:

I would like to add my small quota of thanks to both Mr. Fraser and Mr. Smith for their reports and the work they have done in this connection. The official basis has more or less been accepted in my area. As a result we have had certain complaints from the trades people. The first complaint is that there seems to be a delay in advising candidates that they have failed. In other words, they sit waiting for something to happen. Whether this is so is difficult to say. I have had some correspondence with the Chief Inspector which did not always tally with the stories that I got from the men concerned. However, I would like Mr. Smith just to check up on this question, that candidates can be notified earlier so that they can prepare for the next examination. Then, from the Contractors' side, when we ask them to terminate the services of unlicensed men—we merely put it to them that we will be forced to act under the law—they point out that they can prove that quite a large percentage of electrical workers in other parts of the country are still unlicensed. I don't know whether a survey has been made — it might be helpful if these details are obtained from the various centres. The Inspectors might not always be aware of the position. However, if Mr. Smith could get us some information on this question it would be helpful in dealing with the Contractors in the area. Another matter I had a chat with Mr. Smith about is that immediately the men were turned off by the Contractors, they marched over to the Public Works Department and were all re-engaged. Apparently the Public Works Department has some dispensation in the matter. I have written to the local representative and he is at a loss to find chapter and verse in law, but he will be writing to me in due course. However, the matter is of general interest and it may have been experienced in other areas.

PRESIDENT:

Thank you, Mr. Muller. Mr. Smith, would you like to reply?

Mr. H. O. SMITH, Pretoria:

Thank you, Mr. Muller, for your complimentary remarks. Perhaps they were not so complimentary when you spoke about the delay. You must understand that we have 400 candidates for the written examination and in order to ensure uniformity throughout the Union, we have only one examiner and as he does this as well as his own job, it takes him from four to six weeks to mark all the papers. However, I will put this before the Board at our next meeting and it may be that we can come to some arrangement. Even if a man is only notified after six weeks that he has failed, he still has another two months before the next exam.

I don't think that he is handicapped by the delay.

Mr. Muller wanted to know about the proportion of registered to unregistered men. That, of course, is impossible for the Board to say, because every year quite a large number of old Wiremen finally apply for registration, to which must be added apprentices who qualify and need registration. In addition to that, we have quite a large number of immigrants coming in who deem themselves eligible for registration. It should be noted that before an area is declared the Board circularises the local supply authority, who is then asked to get a report from every contractor stating the number of registered and unregistered men. Only after it has been established that there is a reasonable

proportion of registered men in the area who it is deemed are able to do the work in that area does the Board recommend to the Minister to have that area declared and then it has to be advertised in the Gazette for twelve months before a declaration may be made. In regard to the case when the Public Works Department took on unregistered men, I think Mr. Muller is to be congratulated for stopping them from working. I feel I should take this opportunity of appealing to you to enforce this Act as strictly as you can. We have over 4,600 men registered and there is no excuse for continuing to allow unregistered men to perform illegal work. In connection with this there is a widespread misapprehension that an unregistered man who is a fully-fledged journeyman is allowed to do wiring under the supervision of a registered man. The only unregistered person who is allowed to do that is an apprentice or an improver. A fully-fledged journeyman is not allowed to do wiring work in a declared area unless he is registered. Many installation inspectors of suppliers have permitted this — it is illegal and must be stopped. I must ask you to take all necessary steps to enforce the Act one hundred per cent.

Coming back to the Public Works Department(it is an established principle that no Act of Parliament covers a Government Department or, in other words, covers the Crown, unless it is explicitly stated in that Act as, for instance, the Factories Act, which states "This Act shall cover the Crown." There is no such section in the Wireman's Act which therefore does not cover the Crown and so the Public Works Department is exempt from the Act and need not employ registered men. At the last Board meeting this aspect was discussed and it was decided to appeal to the Public Works Department to employ only registered men in those areas where the Act has been declared. There is one aspect, however, which makes the position not so undesirable from a safety point of view as it may appear, and that is that the wiring work done by the Public Works Department is well above the average of the ordinary Contractor and, therefore, the fact that unregistered men are working for them is not as serious as it might be with the ordinary Contractor.

Mr. G. J. MULLER, Bloemfontein:

The real complaint comes from the Contractors. They feel that the Council is merely robbing them of men to enrich the Public Works Department and the Department is to a very large extent dependent on the goodwill of the Contractors. You cannot operate very satisfactorily if you have no co-operation from the Contractors. This is undermining co-operation because they feel that by enforcing the law in this case, we have not removed these men from the area, but we have deprived them of the services of these men and given them to the Public Works Department.

Mr. H. O. SMITH, Pretoria:

All I can say to Mr. Muller is that I must repeat my last remarks that the Board is aware of the position and I will report to them your particular difficulty that they have robbed certain employers of their employees. We will try to correct that position by making representations to the Public Works Department and asking them to co-operate with us and with you by not employing unregistered men in the declared areas.

PRESIDENT:

Thank you very much indeed, Mr. Smith. I think we all agree that the Public Works Department is maintaining a very high standard and we are very thankful for that. Is there anybody else who wants to speak on this subject?

I think we have time to go on to the Registration of Electrical Contractors.

REGISTRATION OF WIRING CONTRACTORS

Mr. J. C. FRASER, Johannesburg:

This matter has been under consideration since the 1944 Convention and the following is a review of progress since that date.

1. The question of the registration of Wiring Contractors was discussed at the 1944 Convention of the A.M.E.U. where the following motion was adopted:

"That the Electrical Wiremen's Registration Board be asked to investigate—

(a) the possibility of the Act being amended to enable suppliers to prescribe minimum requirements for "premises" [Section 21a (i)] and "equipment" [Section 21a (ii)];

(b) the possibility of the Electrical Wiremen's Registration Board being given control over contractors on the same lines as now applied to wiremen."

2. As a result of the above a letter was sent to the Board by the Secretary of the A.M.E.U. during June, 1944.

3. A questionnaire was sent out by the Secretary of the Electrical Wiremen's Registration Board under cover of a letter dated 7th July, 1944, to various municipalities and to the Secretary of the A.M.E.U. The latter obtained from certain Municipalities copies of their replies to the Board. These were analysed and collated in the Electricity Department, Johannesburg, and a report was drawn up making proposals under each question. This report was sent to Engineer Members of the A.M.E.U. who were requested to be prepared to discuss the proposals at the 1945 Convention, so that these could be adopted or amended and finally sent to the Board as the consensus of opinion of the A.M.E.U.

4. At the 1945 Convention it was agreed 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 from eleven of the major towns in the Union were analysed and suggested proposals were submitted to the 1946 Convention. At this meeting a report on the questionnaire from the Electrical Wiremen's Registration Board was also presented by the Chairman of the Board. After discussion on these two reports it was agreed:

(a) to accept in principle the registration of wiring contractors on a national scale by means of an amendment to the Electrical Wiremen and Contractors' Act;

(b) to adopt the recommendations of the Chairman of the Board with such minor amendments as the Executive Council of the Association might, in consultation with him, consider desirable.

(See Proceedings of the 20th Convention: pages 139-154.)

6. At the 1947 Convention a report was read from the Chairman of the Board. In this it was stated:

(a) In July, 1946, a request was made by the Board to the Secretary of Labour that an amending Bill be prepared.

(b) The Department in replying expressed doubts as to the necessity for such amendments, and also informed the Board that it would be impossible to introduce a Bill of this nature during the 1947 session of Parliament, but that if desired the matter would be reviewed during the year.

7. The Chairman of the Electrical Wiremen's Registration Board in a letter dated 24th October, 1947, stated that the Board had decided to renew its request but required further evidence for presentation to the Minister. A reply, based on drafts prepared by Mr. Kinsman of Durban and the General Manager of the Johannesburg Electricity Department, was sent to the Chairman of the Electrical Wiremen's Registration Board. It was suggested that the Minister of Labour be asked to meet a deputation consisting of representatives of Electrical Contractors, Trades Unions and the A.M.E.U.

8. The following organisations were approached for their views on the matter: The National Federation of Building Trade Employers of South Africa; Federated Chamber of Industries; Electrical Engineering and Allied Industries Association; South African Electrical Workers' Association; Amalgamated Engineering Union; Building Workers' Industrial Union; Western Province Electrical and Allied Trades Union; Electricity Supply Commission; The Victoria Falls and Transvaal Power Co. Ltd.; The A.M.E.U.

The following replies were received from the ten Associations, Supply Authorities or Trades Unions approached: seven were in general agreement with the proposals; one had not been affected and could not therefore offer useful comment (V.F.P.); the Witbank, Cape Town, Border and Kingwilliamstown Undertakings of the E.S.C. were in agreement; the Natal Undertaking opposed the proposal strongly as (a) an attempt to create monopoly in contracting

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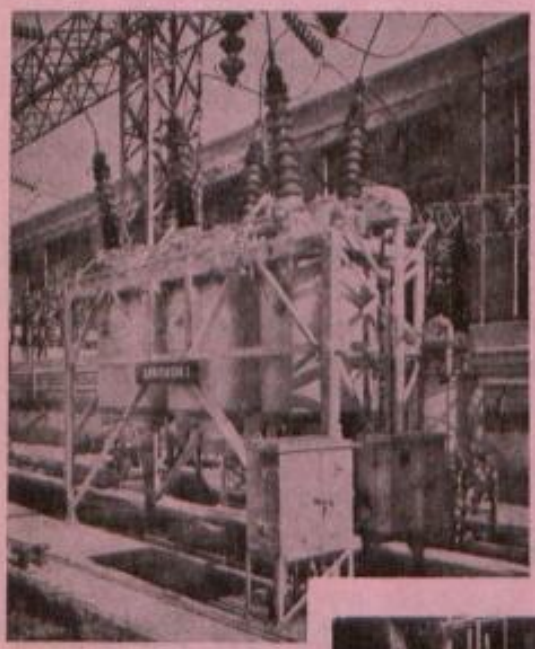

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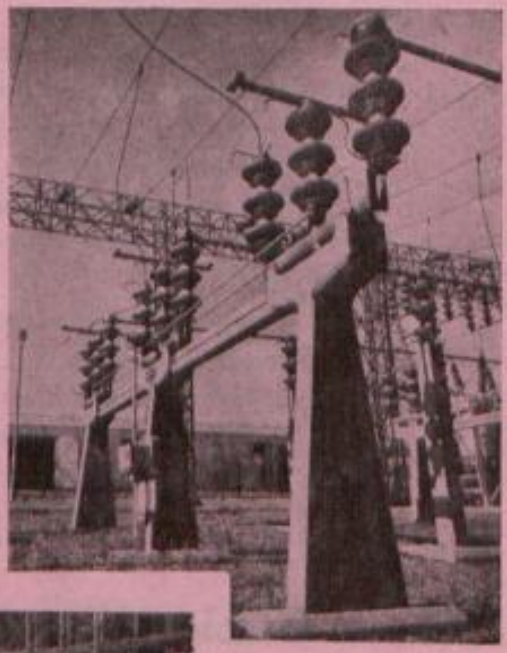

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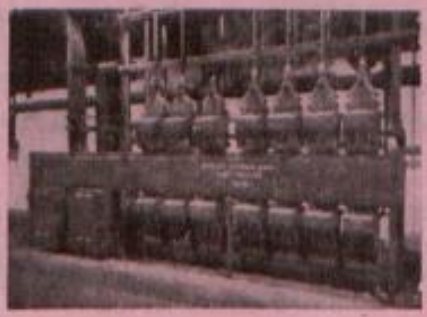

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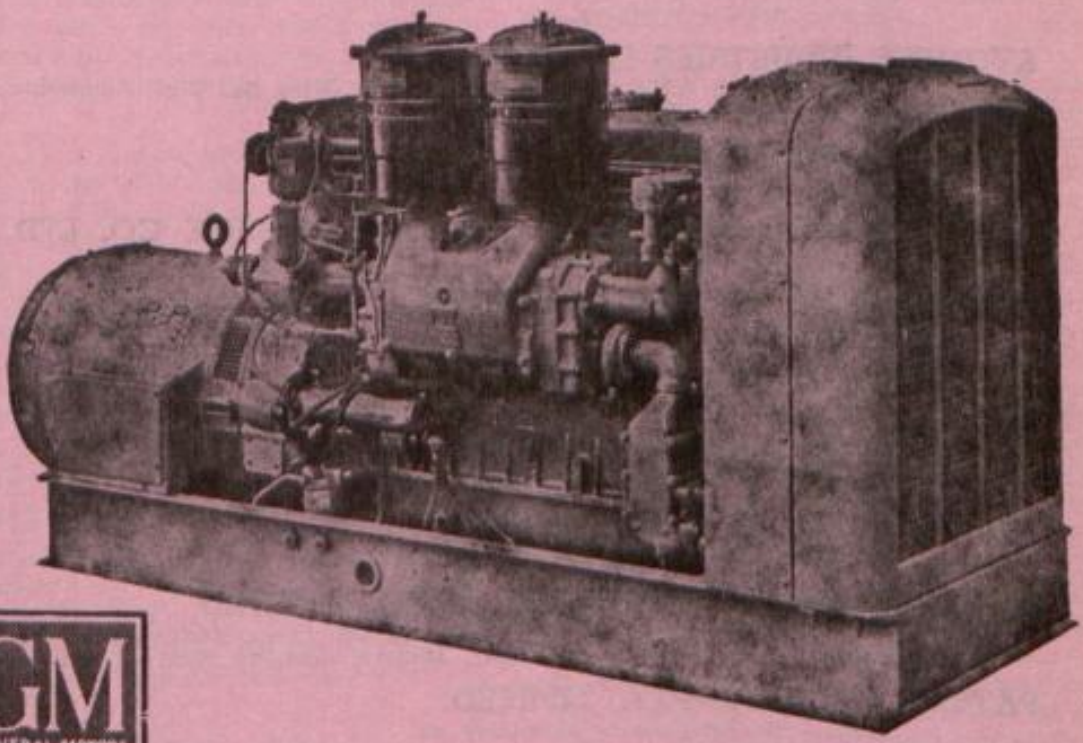

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business; (b) likely to force up prices still further; (c) unnecessary.

9. At the 1949 Convention Mr. H. O. Smith, Chief Inspector of Factories and Chairman of the Board, reported on a meeting which had been held on 30th November, 1948, with the Secretary for Labour, who had undertaken to place the Board's views before the Minister. (1949 Proceedings: page 97.)

10. At a meeting on 15th March, 1950, the Chairman informed the members of the Electrical Wiremen's Registration Board that the Department had decided to amend the Electrical Wiremen and Contractors' Act so as to enable the Governor-General to frame the necessary regulations to deal with the registration of electrical contractors through means of regulations. The idea was to lay down certain minimum requirements which contractors must comply with before they would be allowed registration.

11. At a subsequent meeting of the Board on the 11th April, 1950, it was reported that in drafting the amendment certain difficulties had been encountered and it now appears that the Minister may not be prepared to amend the Act to allow for registration on a national basis, and it is therefore left to the Convention to discuss the alternative of the various Supply Undertakings laying down uniform requirements for local registration with provision for reciprocal recognition.

PRESIDENT:

Thank you, Mr. Fraser. I have just had the signal that tea is ready. I think we have done a good day's work and that we can resume discussion on this to-morrow. We will now adjourn until to-morrow at 9.30 a.m.

10th MAY, 1950

Convention resumed at 9.30 a.m.

PRESIDENT:

Good morning, gentlemen. We left off with the Registration of Electrical Contractors. We had the report on that and the matter is now open for discussion.

Mr. W. M. ANDREW, King William's Town:

Mr. President and Gentlemen: It was two years ago in East London that the question of the possible registration of native trainees came up in connection with the Vocational Training School which was opening at King William's Town to instruct natives on wiring work so that these trainees, under supervision, would be able to wire the native houses being erected. My friend, Mr. Smith, will no doubt remember that at the time he quite clearly said that in so far as the Wiring Board was concerned there was no colour bar, but he must also have said it off the record because his statement did not appear in the Proceedings.

In our area we have one or two difficulties which I think would only be correct to bring forward to our Wiring Board Chairman and its members. I should have added that I want to give a little background before commenting on the contracting side. This background is that we have in the Border, an area comprising Municipal areas, as well as Muncipal areas which have been taken over by the Commission. In the area, but outside the Municipal area, we have villages and the native locations.

The point therefore arises as to what is the position in relation to electrcal contractors being registered.

It must be remembered that the principle which the Native Affairs Department has in mind at Zwelitsha is that all traders, all shops and everything in connection with the township wll be native owned and native run. The first shop has been opened and it is run by a company formed by six natives.

Sooner or later it would it would seem to me that the Urban Planning Council would require, or invite tenders, to open an electrical contractor's shop for the sale of lamps, etc. That is a long time away, but it is something we should take heed of today. When this matter was raised at East London it was pointed out as a possibility that the Wiring Board would examne this question of native trainees and probably issue them with some licence endorsed as being suitable for wiring work, but that is bound to lead to a greater scope, as a result of misunderstanding, of activities by the trained natives, in other areas.

It may be that the training school has been greatly reduced on account of financial stringency, but I would ask Mr. Smith on behalf of the electrical contractors in

our area to take heed of this aspect and to keep an eye on it to avoid any difficulties before they actually appear. Thank you very much, Mr. President.

PRESIDENT:

I think the report we got from Mr. Fraser was that the Government was not going to proceed with the idea of bringing the control of electrical contractors under the Government; they still remained under the local Municipality. It appears to me that it is still a local matter. Is that the position?

Mr. A. FODEN, East London:

I would like to reply to that. You are assuming that the area to which Mr. Andrew referred is King William's Town. Mr. Andrew's point is that it is in the Border Area of the Electricity Supply Commission. Should these native wiremen have a licence or an endorsed licence allowing them to do a certain amount of work, the possibility is that these people may get further afield where supervision is not so strict, and perhaps their work will become a danger to the public in general.

Col. G. G. EWER, Past President.

Mr. President and Gentlemen: I feel that I should say just a few words because I suppose I have been more or less responsible for the training of the natives referred to by Mr. Andrew. I do not think you need fear any competition from these Natives because there are only about 20 in the whole country and they have been trained in the wiring of native housing only. They will never become fully qualified artisans. As far as the Zwelitsha Township is concerned, the Native Affairs Department will supervise the wiring. I do not think there is any fear of the electrical wiremen's licence being given to the natives. The whole of the wiring will be carried out under the supervision of European wiremen. If the King William's Town area is declared by the Minister it is understood that the township will be exempt. So I do not think you need worry very much. Further, Parliament is at present considering the Native Building Workers' Bill. This Bill will provide for the training of natives in the building trades but they are only to be trained for work on native buildings in native areas. They will be prohibited from working in European areas.

PRESIDENT:

Thank you. Does anyone wish to speak further on this?

Mr. W. H. MILTON, Electricity Supply Commission:

Mr. President, Gentlemen: There is one aspect of the licensing of contractors which may be overlooked and which I feel is very important and that is licensing in the Commission's areas of supply. I am not questioning the desirability that Municipalities should establish uniform regulations for the licensing of Electrical Contractors. The incidence of reticulation by the Commission itself is, however, probably far more extensive than many people realise. In the Cape, for example, we have Bellville—Parow-Goodwood, Caledon, etc.; in Natal we have Volksrust, Colenso, etc.; in the Border, King William's Town and Alice; in Witbank, the Witbank Municipal area. When it comes to the question of licensing Contractors for operating in these areas presumably we must look to the Municipal Authorities to frame and apply the necessary bye-laws. These Municipal Authorities, on the other hand, have no particular interest in the electrical work carried out and they are not likely to take into account the deliberations of this Association. You may have different regulations or even no regulations at all applicable in areas, for example, surrounding Cape Town while Cape Town may impose rigid standards. Boundary infringements are sure to occur. It would seem, therefore, that further pressure should be brought to bear on the Labour Department to achieve uniformity in the provisions for the licensing of contractors.

PRESIDENT:

Thank you, Mr. Milton.

Mr. H. A. EASTMAN, Cape Town:

Mr. President: I am reminded by the remarks passed at this meeting that at a previous Convention when we first of all learnt that the Government might find some difficulty in subscribing to our demands that a measure of uniformity be introduced by Government legislation on this question, we found very good reason

for rebutting that attitude and I think it was Mr. Clutterbuck who put forward to the Convention arguments on our behalf. We were delighted to find in the Government service so strong an advocate of our ideas. I hope I am not presuming too much when I say that I personally think that the present Inspector of Factories also sees a number of satisfactory reasons for introducing uniformity in this matter but there are difficulties to which he has drawn attention. I think it is very necessary to have some uniformity on the matter, especially for the reason to which Mr. Milton has drawn attention, namely the existence of the Commission's undertakings in and around large centres, and also because there are in some places Municipalities very close together all with different regulations or none at all on certain subjects, not to mention the fact that the regulations in one Municipality are not applicable in another. I conclude by hoping that we may still find some assistance on the part of the authorities, including the Wiremen's Registration Board, in trying to bring about the uniformity which we desire.

PRESIDENT:

Thank you, Mr. Eastman.

Mr. D. A. BRADLEY, Port Elizabeth:

I wholeheartedly support the comments made by Mr. Milton, Mr. Eastman and Mr. Andrew. I think we have got to have, if at all possible, some uniformity throughout the Union in the registration of Contractors. This is brought to my mind through the necessity which we considered in previous Conventions concerning the selling of electrical goods just solely for the profit that may be made. I support any possibility of us continuing to press the Government to make some uniformity available to us for the registration of Electrical Contractors. The term "Contractor" is rather broad but that would include the shopkeeper who might make the electrical sales department a branch of his contracting. All these things are interwoven and I hope this Convention will support the reasoning that we should request further consideration on this very important matter.

PRESIDENT:

Mr. Smith, will you sum up please?

Mr. H. O. SMITH, Pretoria:

Mr. President: I would like to make it quite clear at the outset that this question of registration of Contractors has now been considered by the Labour Department for a period of six years and I would also like to emphasise that the Government, or rather this Department and particularly the Secretary of Labour, has considered this problem very sympathetically. Now your representative on the Board has come to you and has reported that after six years consideration and weighing up all the implications involved, the Department has finally decided that it cannot undertake this work. It therefore seems to me futile for you to form resolutions to urge the Government to do something, seeing that you have done this for the past six years. The problem has been tackled sympathetically by my Department; we have explored every possible avenue to bring this about, without a major amendment to the Act, which the Minister will not permit. I, therefore, must urge you again, gentlemen, to try and put your house in order by whatever means you have at your disposal. You have succeeded in bringing about a wonderful set of regulations for wiring. Why cannot you do something similar regarding registration for Contractors. I would just like to point out once more that continual pressure on the Government will not bring you any further.

Mr. C. KINSMAN, Durban:

Mr. President: We have heard from our own representative the lack of success that has attended our approach to the Government and we have heard Mr. Smith's advice, and I think it is very sound advice for two reasons. Technical matters, on which probably we are best fitted to deliberate, are the particular province of the Association and this Association is entitled to make representations on technical matters to the Government, but when we deal with the question of licensing of Contractors we may not be thanked by our Town Councils for doing so. It is a matter of policy rather than a technical matter. I think we would be well advised to take the advice of Mr. Smith and to resolve that the matter be referred to the Executive of the Association with instructions to investigate the

best means of bringing about uniformity of the Muncipal licensing of Contractors and that our approach when we have reached some conclusion on that matter should then be through the United Municipal Executive rather than direct to the Government, because I feel that this is a Municipal matter. I move that this Convention expresses to the Executive the desirability of uniformity of licensing of Electrical Contractors and instructs the Executive to take such steps as it sees fit to that end.

PRESIDENT:

Thank you.

Mr. J. C. FRASER, Johannesburg:

Mr. President: As your delegate on the Board I would like to support Mr. Milton's and Mr. Eastman's point of view. When this matter was referred to our members originally the replies which the Board received showed that there would be a great many difficulties to overcome before we could get standard regulations throughout the country. I have given you the results of that ballot in my report. There is one point that I, as your delegate, am not happy about and that is in regard to the Department of Labour saying that they are unable to do it. It is true that they have found difficulties in amending the Act, but these have not been disclosed. Anyone may have his own opinion and I have mine, but I think it is up to the Department to advise the Association as to why they cannot bring this amendment about, and then the starting point for the Convention is to see what they can do. I feel that it will be a very difficult thing for this Association to bring about a complete solution to this question and I am in favour of asking the Government if they have really come to the conclusion that there is nothing more they can do and would they give us the reasons why.

PRESIDENT:

Thank you, Mr. Fraser. Are you putting that as a definite resolution. We have a clear expression of opinion from Mr. Smith on the Government side. We have a definite resolution from Mr. Kinsman that we should refer this to the Executive and find ways and means of coming to uniform by-laws. This has been proposed and seconded that the matter be referred to the Executive with the object of endeavouring to come to more uniformity in this matter and I feel that we should try before again approaching the Government after what Mr. Smith has told us, but the matter is in your hands. Are there any amendments or do you want this put to the vote.

Mr. W. H. MILTON, Electricity Supply Commission:

If I may speak in support of Mr. Fraser, and sound a note of warning before a vote is taken. Many years ago the wiring regulations were dealt with and it was decided that in order to implement uniformity the Government should promulgate those regulations. When it was put to the Government Department we were told that the Government could not accede to our request, the objection being primarily on the grounds of cost. Now no reason has been given to this Association in the present matter. You may find that it is again only a matter of "cost"! I feel, therefore, that before any decision is taken in this matter that you should ascertain why the Labour Department finds it impossible to proceed with the matter themselves.

PRESIDENT:

Thank you, Mr. Milton. I would point out that although this matter is referred back, it is still open to find out from the Government what the reasons were and, of course, to try and overcome those reasons.

Mr. C. KINSMAN, Durban:

Mr. President: The wiring regulations were not promulgated by the Government. They were promulgated by the Provincial Councils, in whose hands lie at the moment control of local government.

PRESIDENT:

This is a resolution which does not close down on the matter but allows us free scope to contact the Government. If there are no amendments I will put the motion to the meeting.

Mr. J. C. FRASER, Johannesburg.

I do not want to propose an amendment, but I think we should press the Government for the reasons why they are not able to implement our desire which has been discussed for over six years, before we turn to devise something ourselves to take its

place, and if Mr. Kinsman would amend his resolution to that effect I will support him.

Mr. C. KINSMAN, Durban:

I do not see that it needs any amendment. I think that the matter has been sufficiently discussed. According to my recollection the resolution did not prohibit us going to the Government.

PRESIDENT:

I take it, Mr. Fraser, that you want a directive to the Executive to find out why this application was turned down. Those in favour. Carried nem. con.

We now pass on to Item 5, S.A. Bureau of Standards — Safety Codes and other Committees.

S.A. BUREAU OF STANDARDS SAFETY CODES AND OTHER COMMITTEES

Mr. J. C. DOWNEY, Springs:

As your representative on the Committees of the South African Bureau of Standards, the following report only deals with matters on which this Association has representation, and as such by no means covers the large field of activities other than electrical that is now being dealt with by the Bureau of Standards.

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(2) Quality and general specifications.

(3) Codes of practice.

(4) The Committee for the approval of new electrical products.

The following specifications have now been published and are available from the Bureau.

Safety specification for electric radiators. No. SV 103-1949.

Safety specification for fixed electric water heaters. No. SV 105-1949.

Specification for tungsten filament general service lamps. No. 56-1949.

You will note here that the suggestion by Mr. Gripper at the last convention in regard to the letters SV has been adopted by the Bureau.

Eleven specifications are now in course of publication including the Electricity Meter Testing Code.

Seven other specifications are under review following comment; eleven specifications have been issued for comment; and four other specifications are in course of preparation, thus making a total of twenty-two specifications still to be dealt with.

An item of particular interest to Electrical Engineers is the specification for Ceramic Products and porcelain insulators which will be circularised for comment shortly.

Difficulty was experienced in regard to Electrical Ceramic Products owing to the inability of obtaining suitable materials, on which to base the draft specification as very few specifications existed.

This specification deals with recommended dimensions, permissible tolerances, tests for porosity, absorption, thermal shock and hardness.

Another specification that has received a great deal of consideration is the quality specification for Fixed Electric Water Heaters in regard to test pressures, thickness of cylinder walls in the various types used for domestic and commercial use.

The specification for Insulating Mouldings was shelved after a long and protracted discussion as it was felt that a specification of this nature was far too ambitious at the present time.

The specification for Miniature Circuit Breakers is progressing and should be out for comment during the year.

As the number of meetings being held during the year was increased, representatives of the various bodies found it difficult to attend all the meetings called, and a change in procedure was adopted in order to obtain a better balance of opinion. The present procedure is that all draft specifications are dealt with by technical sub-committees, and the main original co-ordinating committee then deals with all the completed Electrical Specifications prepared by the technical sub-committees. This procedure was adopted as it was considered it would facilitate liaison between the Bureau and large organisations, such as the A.M.E.U., E.S.C., S.A.R., P.W.D.,

S.E.I.F.S.A., etc., and would make it possible to keep these organisations through their representatives on this Committee informed of the progress of the work.

It will be appreciated that owing to the large number of technical committee meetings in addition to the main co-ordinating committee meetings being held, that it would not be possble for me as your representative to attend all meetings to be held, and I am pleased to report that Mr. J. L. van der Walt of Krugersdorp and Mr. L. Smith of Boksburg assisted in this work by attending to the work of some of the technical sub-committees as A.M.E.U. representatives. In addition, Mr. J. C. Fraser has been kind enough to attend to the Approvals Committee on your behalf.

The President's bulletins have conveyed the activities of the latter committee to you.

In conclusion I wish to thank Mr. Fraser, Mr. van der Walt and Mr. Smith for their able services in the work they have done in assisting me with the work of the Bureau and finally I wish to thank the Director and Staff of the Bureau of Standards for all the consideration and assistance I have received from them during the past year.

PRESIDENT:

Thank you, Mr. Downey. I think this Association does owe a debt of gratitude to Mr. Downey for his very good work in keeping contact with the Bureau of Standards and thanks are also due to the gentlemen who have helped him in this important work. The matter is open for discussion and comment if anyone wishes to speak on it. Would Mr. Ritchie care to speak?

REPORT ON THE ACTIVITIES OF THE BUREAU OF STANDARDS

Mr. J. RITCHIE, Director, S.A. Bureau of Standards:

Mr. President: I have prepared a short report of the work of the Bureau which covers a slightly wider field than that covered by Mr. Downey.

During the past twelve months considerable expansion has taken place in the activities of the Bureau which now comprises 26 technical sections. The Standards Council has formed 145 technical committees to deal with the preparation of some 275 specifications and codes of practice, of which 125 have so far been approved and published or are in the course of publication. The need for these specifications and codes and the urgency of the work is evident from the fact that the Bureau does not embark on any work unless a sound case for its necessity has been established and the Standards Council, in consultation with the Standards Institution or on advice of special exploratory committees, has satisfied itself that the introduction of a particular specification or code is desirable or essential.

A start has been made on the granting of permits to South African manufacturers for the use of the Council's **standardization mark** on commodities which comply with the requirements of the Council's quality specifications. It is pleasing to note that many manufacturers have improved their processes of production and the conditions under which their commodities are made so as to ensure that their products will conform to the Council's specification. Since the introduction of the specification for storage batteries, for instance, a considerable improvement in the quality of South African manufactured batteries can be noticed and manufacturers have generally made full use of the Bureau's testing facilities to test and re-test their products against our specification.

The **testing equipment** in the Bureau's laboratories has greatly increased during the past year and most of our laboratories are now equipped with modern testing plant and are capable of dealing with the demand for testing facilities from industrialists, government departments, tender boards and local authorities. Some of the more interesting instruments which have been received recently include a Sperry supersonic reflectoscope for the non-destructive testing of materials, spectographic equipment for the analysis of metals and alloys, flame-proof testing equipment built in our own workshops and a 120,000 lb. universal testing machine. On the electrical side a 150 kilovolt testing transformer is on order, but meanwhile an improvised high voltage outfit is capable of dealing with most of the present requirements. We are also contemplating the installation of a short-circuit generator for switchgear and H.R.C. fuse testing.

Electrical Specifications

During the last 12 months the Bureau has been dealing with electrical quality and safety specifications, of which 7 quality and 18 safety specifications have been finalized and are now available, or will very shortly be available. The others, it is hoped, will be published before the end of this year.

I do not want to take too much of your valuable time and shall therefore only summarize the quality specifications.

Two specifications for **paper-insulated cables,** one for general purposes and one for heavy duty are in the process of being published. The former, dealing with cables up to and including 22 kilovolts, is based on the dimensional requirements of B.S. 480 of 1942 and the latter, covering cables up to 11 kilovolts, is based on the dimensional requirements of B.S. 760 of 1938, which is generally preferred to the more recent edition of 1943.

A specification for **P.V.C. insulated conductors,** also covering P.V.C. sheathed cables and flexible cords and P.V.C. insulated hard-drawn copper conductors for overhead service connections has been finalized and will be available in about one month's time. Particular attention has been given to this specification so as to ensure that only reliable P.V.C. compounds would comply with the specification. From many tests carried out at the Bureau it appears that the performance of this insulating material has improved considerably since its introduction during the war years, and it is one of the objects of this specification to overcome the once well-founded prejudice against this type of cable which existed and to a certain extent still exists among electrical engineers. P.V.C. insulated cables which were examined after they had been used in conduit and suspended in free air for a period of two to three years showed no signs of deterioration.

A specification for **tungsten filament lamps** has been published and covers all general service lamps. Lamps manufactured to this specification will be of a quality equal to or better than those made overseas.

Three quality specifications for domestic electrical appliances, viz. for **fixed storage water heaters, stoves and hot-plates, and cooking** plates have been finalized. These specifications were drawn up at the request of the electricity department of a large municipality for quality specifications for such appliances as are sold under its hire-purchase scheme. It is hoped that other municipalities will also make use of this approval scheme.

Quality specifications at present still under preparation or in circulation for comment and criticism are one for **porcelain insulators and bushings** for voltages up to 44 kilovolts, four specifications for portable heating appliances, viz. **electric kettles, irons, toasters and air heaters,** one for **enclosed type air-break switches and isolators,** two specifications for **miniature circuit breakers** which are now manufactured in this country, and finally a specification for rigid **steel conduit.** Steel conduit is being manufactured in considerable quantities in South Africa and manufacturers are desirous of applying the Council's mark to their product.

Meter Testing

The promulgation of the Meter Code on a national basis is at present under consideration by the Electricity Control Board. The Standards Council is anxious to proceed with this code, but has to wait until the Electricity Control Board promulgates it under their Act. Meanwhile the Standards Council has decided to publish the code for adoption on a voluntary basis, until such time as the Electricity Control Board has decided to make it statutory. We understand several municipalities have already accepted the testing procedure proposed in the code and that valuable experience has been gained in its application.

Approvals Committee

An Approvals Committee was formed in 1948 at the request of your Association to make recommendations regarding the use of new and unknown electrical products. The investigatory work necessary is carried out in the laboratories of the Bureau. During the year under review the committee met twice, and dealt primarily with the following matters:

(a) **Non-metallic conduit.** Of three applications received one was not recommended for approval and the other two were held over until a specification as defined in the Wiring Regulations should become available. The Standards Council

has not yet approved of the preparation of such a specification and is awaiting overseas developments.

(b) **Zinc-alloy die cast conduit accessories.** The committee recommended that temporary approval should be granted for these accessories provided that they complied with S.A.B.S. 26 for zinc base alloys for die castings.

(c) **Aluminium Alloy Conduit.** In connection with the recommendation for temporary approval which was made some time ago, the Electricity Supply Commission had undertaken to report on an installation made in aluminium alloy conduit buried in plaster for two wet seasons in a house at the Cape. This report indicated that very little corrosion had taken place, but the committee felt that further study of the matter was required.

(d) **Pliable piping for use as conduit.** It was decided that approval of pliable piping with paper base for use as rigid conduit be not recommended and piping made of metal only was recommended for approval for use as flexible conduit.

(e) **Aluminium-sheathed Power Cable.** The committee has recommended that this type of cable be approved for general use.

(f) **Lightning arrester for domestic installations.** The committee agreed to recommend this arrester, made of moulded material, for use in domestic wiring installations.

A large number of **other specifications and codes** of practice in which, I am sure, you would be interested, have been published or are being prepared but time permits me to mention only a few, such as refractory bricks, creosoted wooden poles, asphaltic materials, re-refined crankcase oil for internal combustion engines, concrete reinforcing bars, structural steel paints, borehole yields, flameproof enclosures, the application of timber preservatives, a welding code, drinking water standards, sewage effluents, the purification and disposal of industrial, mining and domestic wastes for discharge into natural water courses and on to lands, the protection of buildings from lightning, a colour code for workshops and factories, containers for flammable liquids, the use of wetting agents in fire fighting, a code for the sanitary practice in the food industry, a safety code for the medical use of X-ray and radio-active substances, model building regulations, including aspects of natural and artificial lighting, fire protection, ventilation, heating and cooling, etc., and many others.

It might particularly interest you to know that the Bureau is commencing work on a code for the **protection of electrical insulating materials against the attack of fungus** under tropical, sub-tropical, mining and certain industrial conditions. South Africa and the neighbouring territories are considered particularly suitable to carry out such work and a large amount of information on the experience gained during the recent war has been made available to us.

Finally, I should like to mention that the Standards Council, as the National Committee of the International Electrotechnical Commission, has taken an active part in the adoption, on an international basis, of the **M.K.S. system** of electromagnetic magnitudes and units. A committee has been appointed to sponsor the introduction of this system in South Africa as soon as international agreement has been achieved. This committee will also deal with matters of nomenclature so as to achieve uniformity in the use of technical terms and symbols by practical engineers and teaching institutions.

Before finishing this summary, Mr. President, I wish to thank you and members of your Association for the ready assistance which has been rendered in perusing and commenting on our draft specifications and I hope that this useful co-operation will continue in future. Those members who represented your Association on our Specifications Committees, viz. Messrs. J. C. Downey, J. C. Fraser, D. J. Hugo, J. L. v.d. Walt, E. L. Smith, R. W. Kane and J. Wilson, deserve special thanks as they have sacrificed a great deal of their valuable time to this work.

I wish to extend to you, Mr. President, and to the members of your Association a cordial invitation to visit our laboratories whenever you are in Pretoria.

PRESIDENT:

Thank you very much indeed, Mr. Ritchie. I think we are all delighted to know that the foundation of our Electrical Engineering is in such safe hands and again I thank you for your very fine report.

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These typical Sub-station Distribution Panels built up with Henley standard tailless type units, show how readily any desired arrangement of fuses, instruments, etc., can be assembled on an angle iron framework, making a neat and compact assembly for installation in a Sub-station. We shall be pleased to put forward suggestions for panels to meet your requirements.

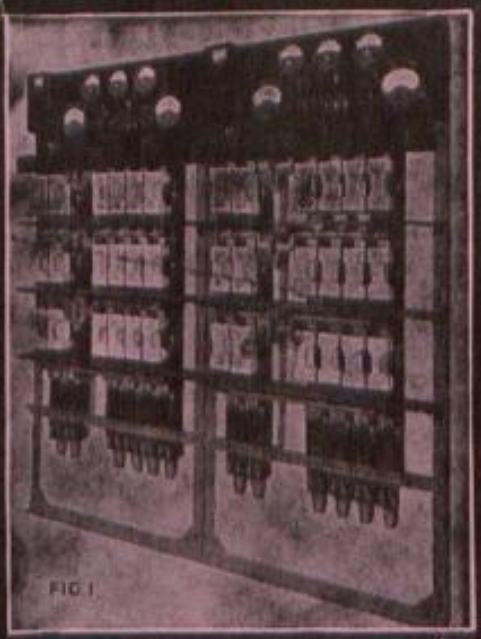
FIG. 1

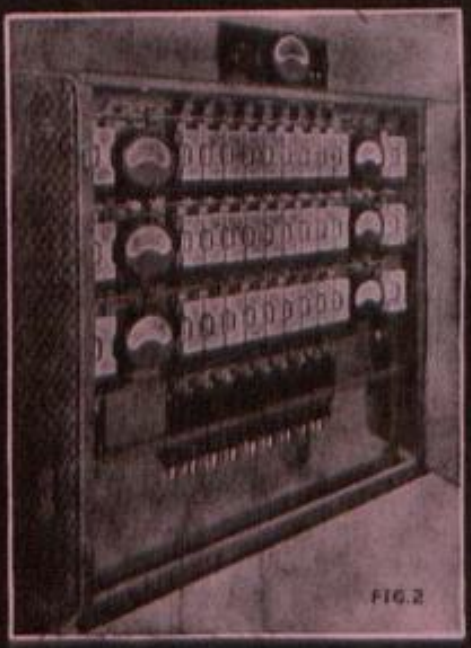
FIG. 2

Figure 1. Two panels fitted with standard Tailless Units having Current Transformers for operating the intruments. The Instrument Panel contains an Ammeter with Selector Switch for reading the current in each phase, a Voltmeter with Selector Switch and protective Fuses, three Maximum Demand Indicators and a Watthour Meter.

Figure 2. A Henley Unit Panel fitted with two Feeder Units with direct-reading Ammeters connected in the busbars on the phases, and nine Distributor Units. The Voltmeter, with Voltmeter Fuses and Selector Switch, is mounted above the Panel and woven wire screens and doors are fitted.

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The Executive have decided in order to get the four papers over there will have to be some rules. Fifteen minutes will be given to the speaker to get the gist of the paper over. Members will be given five minutes to speak to the paper and the speaker will be given ten minutes to reply.

"ASPECTS OF THE LAW RELATING TO ELECTRICITY AS IT AFFECTS LOCAL AUTHORITIES"

A. P. BURGER, B.A., LL.B.,
Legal Assistant, Town Council of Springs

I. INTRODUCTION

It is attempted here: (a) to give a general indication of the nature of that part of South African Law which relates to electricity and affects local authorities; (b) to deal in some detail with certain portions of this body of law, namely portions of law which are of practical importance and which do not appear to be clear in all respects.

In the light of the contents of (a) and (b) it seems natural to broach the question of a restatement of this part of the Law and of its standardization. A part dealing briefly with this aspect has therefore been added.

Parts II and III accordingly give a general indication of the subject matter whilst parts IV and V deal with specific problems and part VI deals with codification and standardization.

Where provincial and local legislation have been dealt with, reference has been made chiefly to the position in Transvaal. Unfortunately, space and time did not allow of a detailed treatment of the comparative aspect.

The author has tried to select material of interest to municipal councillors and officials generally, and not only to legal practitioners, and must take this opportunity to thank Mr. J. C. Downey, the Electrical Engineer of the Town Council of Springs, who has from time to time assisted him by indicating legal questions of interest to officials administering municipal electricity undertakings and by explaining technical factors involved.

II. THE SOURCES OF ELECTRICITY LAW.

In so far as it affects local authorities the law relating to electricity is a branch of Municipal Law.

In the field of Municipal Law generally there are a number of legislators—Parliament, the Provincial Council, the Governor-General, Ministers, the Administrator, the local authority itself. These legislators are also found in the field of Electricity Law.

As far as the supreme legislature, Parliament, is concerned, there are two statutes of Union-wide effect dealing with electricity. Both these affect the local authority. They are the Electricity Act, 1922, as amended, and the Electrical Wiremen and Contractors Act, 1939.

The Electricity Act sets up two subordinate legislators. Both these are empowered to introduce subordinate legislation which may affect the local authority. Under section 16 of the Act the Electricity Supply Commission is empowered to make by-laws. Under section 53 of the Act the Governor-General is empowered to make regulations. The Electrical Wiremen and Contractors Act, 1939, empowers the Governor-General to make regulations.

A further Act of Parliament which can be related to Electricity Law is the Standards Act, 1945, as amended, under which a compulsory standard for electrical equipment can be laid down.

Proceeding to the provincial level of the legislative pyramid, we find that each province has its own provincial legislation relating to electricity and its supply and control by local authorities. In Natal, the Orange Free State and Transvaal this legislation is to be found in ordinances dealing with local government in general. In the Cape Province there is an ordinance dealing specifically with this matter.

Taking the case of Transvaal: Section 83 of the Local Government Ordinance, 1939 (Transvaal) deals with the establishment of works for the supply of electricity and gas, the making of charges for these commodities and the laying down of conditions of supply. Section 132 (9) of the Ordinance deals with the licensing of electricians. Section 87 deals with the discontinuation of supply. Section 80 (94) (b) empowers the local authority to make by-laws for prescribing

conditions governing the hire of electric or gas fittings and articles to consumers. Section 80 (95) empowers the local authority to make by-laws for regulating lighting with gas, electricity or otherwise.

The provincial legislation constitutes the Administrators of the provinces and the various local authorities as subordinate legislators in regard to electricity. In the Cape, for instance, the Electric Power Ordinance, 1911, in section 8 empowers the Administrator to make regulations and in section 9 empowers the local authority to make regulations. Under section 83 (1) of the Local Government Ordinance, 1939 (Transvaal), conditions of supply may be fixed by by-law or *regulation*. In other words, the city, town or village council may itself fix the conditions of supply by by-law, or the Administrator may fix the conditions for them by regulation. In the case of a health committee, regulations are made by the Administrator.

Thus far reference has only been made to the large number of statutes emanating from different legislators. The Common Law does not deal with electricity in particular. Nevertheless, it must be borne in mind that cases dealing with the supply of electricity, the licensing and registration of electrical wiremen and contractors and the wiring of premises will often be determined in accordance with the rules of Common Law. For instance, a particular case on the supply of electricity may fall to be decided in terms of the Common Law of Contract. Where damages are caused by electricity, the dispute will be determined in accordance with the Common Law of Delict; but not only in accordance with the Common Law, because cases arise from time to time where the issue of negligence at Common Law is determined with regard to the question of whether or not there was a breach of a statutory duty, and if there was a breach, whether the breach is one which grounds an action for damages.

III. DIVISION OF ELECTRICITY LAW.

The statutes referred to do not state their substance in a systematic form. This tends to lead to overlapping and consequent obscurity.

Upon examination of the body of statute law relating to electricity, it would appear that the substance of this branch of law offers a natural division into two main categories:

(1) Laws governing the right and obligation to supply electricity;
(2) Laws relating to protection of persons and things against electricity as a dangerous substance. (The Electric Lighting and Power Regulations Ordinance, 1905, of the O.F.S. affords an example of this type of legislation.)

Category (2) can be subdivided into the following sub-divisions:

(a) Laws ensuring the suitability of—
  (i) persons who make and supply electricity:
  (ii) persons who do or undertake wiring work.
(b) Laws regulating the mode—
  (i) of making and supplying electricity;
  (ii) of doing wiring work.
(c) Laws regulating electrical equipment.

The above classification does not purport to be exhaustive or the best classification that can be devised. It is nevertheless submitted in an attempt to suggest some degree of systematization in a field where legislation does not take a systematic form.

IV. THE RIGHT AND OBLIGATION TO SUPPLY ELECTRICITY.

(A) The Right of the Local Authority to Supply Electricity

Reference must be made to the Electricity Act in order to arrive at the local authority's right to supply; but, as will be indicated, reference must also be made to the underlying strata of provincial legislation.

Section 38 of the Act provides that the local authority must obtain the consent of the Administrator before establishing an undertaking.

Assuming that the necessary consent has been obtained:

What rights of supply are conferred upon the local authority? Or rather: In what circumstances can the local authority supply electricity in a particular area?

If the area in which the local authority wants to supply is outside the area of jurisdiction of the local authority, there is no difficulty in regard to the question of whether the local authority can or cannot

supply in it. Section 39 (1) of the Act provides that notwithstanding anything to the contrary contained in any law, the local authority may supply electricity outside its area of jurisdiction with the permission of the Electricity Control Board. Therefore, if the area is outside the area of jurisdiction of the local authority, the local authority can acquire the right to supply there irrespective even of whether there is already another supplier who is supplying in the area.

It may be mentioned that the expression "area of jurisdiction" as used in the Electricity Act does not necessarily coincide with municipal area. "Area of jurisdiction" as used in the Electricity Act must be read in the broad sense as meaning those areas over which the local authority exercises control by law, which, in the case of the Transvaal, includes "outside areas" defined in the Local Government Ordinance, 1939 (Transvaal) as meaning "any land or interest in land held by a council for municipal purposes outside the municipality." (Johannesburg City Council v. Electricity Supply Commission and Another 1948 (3) S.A.L.R. 316).

If the area where the local authority wishes to supply electricity is inside its area of jurisdiction, and there is no existing supplier in the area, the local authority has a right of supply in the area which is almost in the nature of a monopoly. Section 40 of the Act provides—

> "40. No person, company, or association of persons, Government department or administration or the commission shall, after the commencement of this Act, be granted the right to supply electricity to other persons except the administration for power purposes within the area of jurisdiction of an urban local authority, or to construct transmission or distribution lines for such supply through or over any portion of such area, except with the consent of that authority, but its consent shall not be unreasonably withheld . . . "

If there is an existing supplier in the area, and the area is *not* outside the area of jurisdiction of the local authority, the position of the local authority in regard to supply in the area is difficult to determine. And it may happen that there is an existing supplier (a) when a new local authority is constituted for an area, (b) when an area is incorporated into the area of an existing local authority, and (c) when a local authority acquires an "outside area."

Section 37 of the Electricity Act provides—

> "37. The sale and distribution of electricity within every part of the area of jurisdiction of any urban local authority shall be under the control of that authority, except in so far as any authorized undertaker has lawfully acquired the right of supply within that area or portion, whether under a licence or permit or by agreement with the local authority or otherwise."

In the Johannesburg case referred to above, Clayden J. remarked as follows at page 321—

> "Two interpretations of the words in section 37 are in my view possible. The one is that it is designed to prevent a conflict in supply. If that be the interpretation it is not in accordance with the rest of the Act. The policy of the Act seems to be that the right of a supplier shall be carefully defined by licence, and in the case of possibly competing interests, by licence issued after consideration of the competing interests. And if that is the interpretation I could not I think in the present case grant a declaration of rights, because I should declare a quite undefined right, a right to supply in the area provided it did not interfere with the right to supply of the V.F.P. The other interpretation is to follow the literal wording of the section. It does not say that the local authority has the right to supply except in so far as the exercise of that right will conflict with the existing right of an authorised supplier. It does not say that the local authority has the right to supply notwithstanding the existence of another supplier. It says that the local authority may supply in its area of jurisdiction except in so far as another supplier has the right to supply. In the areas concerned the V.F.P. has a right to supply; in the areas concerned the V.F.P. has the right, in terms of its licences, to supply, 'any consumer' except for power purposes. It seems to me therefore that in the 'outside areas' concerned there is a right of supply lawfully acquired by

the V.F.P., and consequently that is a case in which the local authority cannot exercise the right to supply within this portion of its area of jurisdiction by reason of the exception set out in section 37.

"I realise that this construction involves that in fact a supplier who has obtained a licence to supply might obtain an indefeasible right to supply as against the local authority in an area subsequently acquired as an outside area; for the local authority could not obtain the right to supply under section 40, since 'outside areas' are not outside the area of jurisdiction, and the local authority might not be a person entitled to apply for a licence under sections 22 and 23 (3). But the right of supply in that area is still not a monopoly because other persons, even if not the local authority, could apply under sections 22 and 23 (3). And even if this result does not follow it is not in my opinion fatal to the view I have adopted because I think that the Legislature has said that the local authority can supply except where there is an existing right to supply the same consumers in the same area, and if the Legislature has not gone on to provide for the obtaining by the local authority of a co-existent right to supply, that does not alter the words it has used."

The Johannesburg case accordingly decides that if an area is within the area of jurisdiction of a local authority and there is another authorized undertaker who has acquired the right to supply in the area, the local authority cannot supply in the area.

Thus, whereas the local authority can, with the permission of the Electricity Control Board, always acquire the right to supply *outside* its area of jurisdiction irrespective of whether another authorized undertaker is also in the field, it can only supply to an area inside its area of jurisdiction if there is no authorized undertaker who has acquired the right to supply there. Once there is an authorized undertaker who has acquired the right to supply in an area in the area of jurisdiction of the local authority, the local authority is absolutely debarred from supplying in that area, and although another would-be supplier can acquire a concurrent right to supply in the area, the local authority cannot do so.

It is submitted that section 37 of the Electricity Act is capable of bearing a construction different from that given to it in the Johannesburg case.

It is stated in the passage of the judgment quoted above that section 37 of the Act says that the local authority may supply in its area of jurisdiction except in so far as another supplier has the right to supply.

It is to be noted that actually section 37 does not use the word "supply" in relation to the local authority. It says: "the sale and distribution of electricity within every part of the area of jurisdicion of any urban local authority shall be under the *control* of that local authority, except . . . " (my italics). The word used in the Dutch text of the Act is "toezicht."

At page 319 of the judgment there occurs this passage: "The object of section 37 seems to me to give the local authority power to supply itself in its own undertakings, and the inhabitants of the area under its control, with electricity. 'Sale and distribution' must I consider include 'supply' of electricity, having regard to the safeguarding of the right of supply of other licensees, and the use of the word 'supply' in section 39 (1)."

Apparently section 37 of the Act was regarded as the provision of the Act which empowers the local authority to *supply* electricity.

It is submitted with respect that this approach is incorrect and that the following is the correct approach:

(i) Section 37 is not a provision which empowers the local authority to *supply* electricity and which determines its right of *supply*;

(ii) Section 37 should be read quite literally —not as dealing with the right to supply, but as giving the local authority the right to *control sale and distribution* in its area, except by an *"authorized undertaker."* It must be borne in mind that the Act makes possible sale and distribution of electricity by persons other than "authorized undertakers." ("Authorized undertaker" does not include a person selling electricity to the extent of less than one million units per month. See also section 20 (2) of the Act.) It seems reasonable to take it that the Legislature wanted the sale and dis-

tribution of electricity by people who are not "authorized undertakers" (in other words, small suppliers) to be under the *control* of the local authority. In this connection section 9 of the Cape Electric Power Ordinance, 1911, is interesting. This section empowers any local authority which is an undertaker *"or in whose area an undertaker carries on operations"* to make regulations for the purpose of *"controlling"* within its area the distribution of electrical energy on private premises.

(iii) The Electricity Act does not repeal provincial legislation. It is superimposed on the provincial legislation. When it was passed the local authority was already empowered to supply electricity in its area. Taking the case of Transvaal: At the time when the Electricity Act commenced, the Transvaal local authority was already empowered to supply electricity within its area. (Section 75 (1) of the Local Government Ordinance, 1912.) This power the local authority retained. (Section 83 (1) of the Local Government Ordinance, 1939.)

(iv) The right of the local authority to supply electricity in its own area is accordingly vested in it not by the Electricity Act, but by provincial legislation. The Electricity Act does not detract from this right.

The local authority's right to supply electricity can therefore be defined as follows:

(i) Provided the local authority has the Administrator's consent to establish an electricity undertaking, it can supply at any place inside its area of jurisdiction and it can do so irrespective of whether there is another supplier;

(ii) The local authority can supply electricity outside its area of jurisdiction, provided it has the permission of the Electricity Control Board.

(B) The Obligation of the Local Authority to Supply Electricity

Two questions arise under this heading—

(1) Is the local authority obliged to supply to all would-be consumers in its area?

(2) May supply once given be discontinued and, if so, in what circumstances?

The Electricity Act provides for compulsory supply as far as a licensee under the Act is concerned. Section 19 of the Act, however, provides that no licence or permit shall be necessary to authorize the supply of electricity by an urban local authority. Consequently, as far as the Electricity Act is concerned, there is no compulsion on the local authority to give supply.

Turning to the Transvaal provincial legislation: There is no legal provision which compels the local authority to supply. (In the Cape, apart from Cape Town, compulsory supply is provided for by the regulations made by the Administrator under section 8 of the Electric Power Ordinance, 1911. Apparently the Cape is the only province where provision is made for cumpulsory supply by the local authority.)

The question whether supply once given may be discontinued is more complicated.

Section 83 (1) of the Local Government Ordinance, 1939 (Transvaal) provides that the local authority may impose such conditions of supply as may be fixed by itself (by by-law) or by the Administrator (by regulation).

It is to be noted that section 83 (1) does not appear to contemplate that the consumer will be automatically bound by the charges and conditions of supply laid down in the by-laws or regulations. The charges and conditions of supply must be laid down generally and the local authority must make a particular contract of supply with each consumer. Consequently it is found that the Pretoria and Johannesburg supply by-laws, for instance, provide for a form of undertaking by the would-be consumer to the effect that he agrees to the conditions of supply set out in the by-laws.

In other words, supply of electricity by a local authority in Transvaal is not by force of law, but by virtue of contract, although the law determines the contents of the contract.

Looking at section 83 (1), it appears that there is nothing to prevent the by-laws which determine the conditions of supply, and therefore also the contract, from providing that supply may be discontinued at the will of the local authority. For

instance, the by-laws can provide that supply may be cut off upon notice duly given.

Section 87 of the Ordinance provides as follows:

"87. If any person neglect to pay any charge for electricity, gas, or water or any other sum due to the council in respect of the supply thereof or in respect of any advances made under subsection (4) of section *eighty-three* of this Ordinance, it may cut off such supply, and for that purpose may cut or disconnect any pipe, electric wire, line, or other work through which the electricity, gas, or water may be supplied, and may, until such charge or other sum together with the cost incurred by the council in cutting off such supply of electricity, gas, or water, is fully paid but no longer, discontinue the supply thereof to such person."

Consequently, even if there is no provision in the by-laws for discontinuation of supply, supply may still be discontinued in the circumstances mentioned in section 87.

The maxim "the inclusion of the one is the exclusion of the other" is one of the rules of interpretation of statutes, and the question may arise: Considering that section 87 lays down in what circumstances supply may be discontinued, can the local authority discontinue supply in any other circumstances, even if the by-laws fixing supply do provide for discontinuation of supply in such other circumstances?

It is submitted that section 87 was inserted through extreme caution, that the rule of interpretation referred to is not applicable in the present case, and that the contract of supply can provide for discontinuation of supply in circumstances other than those mentioned in section 87.

V. PROTECTIVE LEGISLATION BY THE LOCAL AUTHORITY

The Licensing of Electrical Contractors

The Electrical Wiremen and Contractors Act, 1939, defines "contractor" as meaning "any person who undertakes, or holds himself out, whether generally or to any specific person, as being prepared to undertake, the carrying out, otherwise than as an employee, of any wiring work for or on behalf of any person."

"Wireman" is defined as any person who does wiring work in person.

In terms of these definitions the contractor may be a wireman, but may also not be a wireman. The contractor may, for instance, be a body corporate such as a company which cannot be a wireman, or the contractor may be a natural person who is not a wireman, but employs wiremen to work for him.

Section 21 of the Act provides—

"21. If in any area in which a supplier is under any law authorized to supply electricity, any person is in terms of any law or in terms of any by-law made by such supplier, required to be the holder of a licence or to be registered if he carries on the business of a contractor—

(a) no person shall in such area carry on any such business unless he is the holder of a licence or registered; and

(b) such supplier may refuse to issue such licence or to effect such registration if the applicant for such licence or registration—

(i) is not the occupier of premises which are suitable for carrying on the business of a contractor; or

(ii) is not in possession of adequate equipment for carrying out and testing wiring work; or

(iii) has done, caused or permitted to be done any wiring work in a negligent or inefficient manner or in contravention of any by-law of the supplier; or

(iv) has carried on the business of a contractor without being the holder of a licence or registered; or

(v) has been convicted of any offence under this Act."

Section 26 of the Act provides—

"26. Any reference in any law or by-law referred to in section *twenty-one* to an electrical contractor shall for the purposes of the said section and of section *twenty-two*, be deemed to include a reference to a contractor as defined in section *one*."

"Supplier" is defined so as to include a local authority supplying electricity.

It appears, therefore, that section 21 of the Act contemplates that the local authority will in its area of jurisdiction have or make

by-laws for the licensing of electrical *contractors* so as to control them, apart from the control imposed by the Act on electrical wiremen.

Section 21 does not, however, empower the local authority to make by-laws, and before a local authority can make by-laws it must be empowered thereto by enabling statute.

It would appear that the Transvaal local authority has not the power to make by-laws for the licensing of electrical contractors. Section 132 (9) of the Local Government Ordinance, 1939, only empowers the local authority to licence *electricians*. In other words, the local authority can license the *occupation* of an electrician, but not the *business* of electrical contractor.

But even if the local authority were empowered by provincial legislation to make by-laws for the licensing of electrical contractors, it is not clear that the local authority would be in a position to exercise control over all electrical contractors.

Section 21 (a) of the Act provides that no person shall in the area carry on the business of electrical contractor unless he is the holder of a licence or *registered*.

"Registered" is defined as "registered in accordance with the provisions of this Act."

Although there is strong ground for argument that this was not the intention of the Legislature, the position nevertheless appears to be that a person who can show that he is a registered wireman can carry on business as an electrical contractor without being licensed or registered as such by the *local authority*.

It would appear that the local authority can only acquire control by licensing or registration over all electrical contractors if it is empowered to make the necessary by-laws and if the Electrical Wiremen and Contractors' Act is suitably amended.

VI. CODIFICATION AND STANDARDIZATION

The above is illustrative of the fact that the Law relating to Electricity is by no means certain. It is also a fact that it varies in important respects from province to province and from place to place. Also, different classes of local authorities have different powers.

As far as uncertainty is concerned, it would appear that only systematic codification can bring about certainty.

The fact, however, remains that there are a number of legislators in the field, and where this is the case, even the most elaborate precautions in drafting may not always result in clear exposition of the law.

Both the uncertainty of this branch of law and the lack of uniformity seem to be due to a considerable extent to the fact that there is a plethora of legislators legislating in respect of the same persons and in respect of the same subject matter.

It is submitted that an Act of Parliament on the lines set out hereunder will improve the position considerably:

(i) The Act should codify the existing law in a systematic manner;

(ii) The Act should restrict the power to legislate in this field to Parliament, save that it should confer relatively wide powers of subordinate legislation; but confer these on one subordinate legislator, say the Governor-General, legislating in consultation with the present subordinate legislators.

Actually the branch of Municipal Law dealt with here is illustrative of the lack of certainty and the lack of uniformity which are to be observed in the whole Municipal Law. A full realization of the problem only comes about when it is viewed in this perspective.

It has been proposed that a Ministry of Local Government should be established with a view to placing local authorities under the control of the Union instead of under provincial control. At present, of course, the local authority is in many respects under dual control.

Whatever the merits or demerits of the proposal may be, it is calculated to result in greater uniformity of municipal laws and organization and is more likely to create the conditions where muncipal laws can be codified and made readily available.

In present circumstances improvement can be brought about if the various legislators would legislate in close co-operation and make uniform laws as far as possible.

It is also desirable that when Parliamentary legislation affecting local authorities is drafted, it should be drafted in close co-operation with persons thoroughly familiar with and experienced in the Municipal Law and organization of the local authorities affected.

PRESIDENT:

Thank you, Mr. Burger. You have beaten the amber light by three minutes. I think that we are very much indebted to you for your paper because those of us who have legal advisers usually find after discussing our problems that suicide seems about the only way out. I think that this paper will be of considerable help to us all. The matter is now open for discussion.

Mr. J. L. VAN DER WALT, Krugersdorp:

Mr. President, Ladies and Gentlemen: The old saying goes: "Fools tread where angels fear to whisper" and I am certainly not going to whisper, Sir. The author has presented a paper well worth studying by all Municipal Electrical Engineers. It is a paper long overdue. It is a pity, however, that the author's time was so limited, that he was only able to treat the Law as it affects the Transvaal Local Government Ordinance. There may be some truth in the belief that in future a lawyer will be required to run an Electricity Undertaking, not an engineer. The author mentions two statutes — the Electricity Act and the Wiremen's Act. Our old friend and/or foe, the Factories Act, has not been mentioned. Is it because it has been exhausted as far as controversies are concerned?

With regard to the Electricity Act may I venture the following remarks. The local authority is often mentioned in the Act. Its powers are defined as if a licensee, yet it is not a licensee. The local authority only becomes a licensee when reticulating outside its area of jurisdiction. I maintain, Sir, it will be a healthier state of affairs if local authorities become licensees. May I quote as an example (and in this instance may I whisper it, Sir) did the Electricity Supply Commission comply with Sections 23, 30 and 40 when the change-over took place and amendments were made to licences and areas of jurisdiction? I am thinking of supply to Mines in Municipal areas on the Reef. I do not hold out that the local authorities would have liked to, or could, supply, but they would have felt ever so much more important if approached.

The second Act — the Wiremen's Registration Act — brings the following to my mind. Section 22 provides for cancellation of registration of contractors by local authorities. How does the learned author interpret this section if local authorities have no power to register, as registration is only in the hands of the Board?

The Act frequently refers to the "Electrical Engineer" but gives no definition of an Electrical Engineer. It is a complaint of Engineers, Sir, and therefore Electrical Engineers as well, that they have no legal status and yet, as is clear from the paper, is beridden with legislation. This is a fact that should be remedied, and I would like to see a motion from this body supporting the movement at present on foot to obtain legal status for the Engineer.

From practical experience I have found a loophole in the Act. Section 20 provides that no unlicensed wireman shall do wiring work. The latest fashion is that the person at whose request the wiring work was done professes not to know who did the work and a Magistrate ruled that the owner of the premises is not to be held responsible and that the local authority failed to prove that the work was done by an unlicensed wireman. Is the author not of opinion that Section 17 of the Act was intended to overcome this loophole?

In conclusion, Sir, I would like to congratulate the author on this valuable paper on the legal aspects as it affects us, and I wholeheartedly agree with him in the need for standardization. Mr. Burger has rendered this Association a great service for which we should be grateful to him.

Mr. C. G. DOWNIE, Cape Town:

A paper on this subject is most welcome. We are usually so absorbed in doing or managing so many other things involved in the service of electricity supply that we are apt to forget or neglect the legal aspects.

The paper which Mr. Burger has presented to us deals with certain sections of the Electricity Act and the Electrical Wiremen's and Contractors' Act. He has also delved into Provincial Council Ordinances that govern electricity supply. The compilation of this paper has been the result of much study and research. Mr. Burger has put a lot of hard work into it and we have to be very grateful to him for this.

The legislation to which Mr. Burger has concentrated his attention and on which he has given us his opinions is of course

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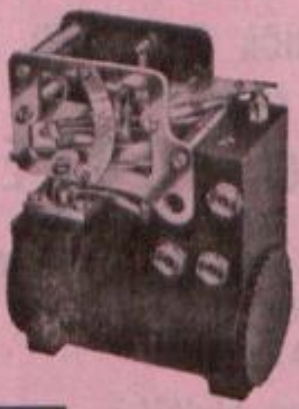

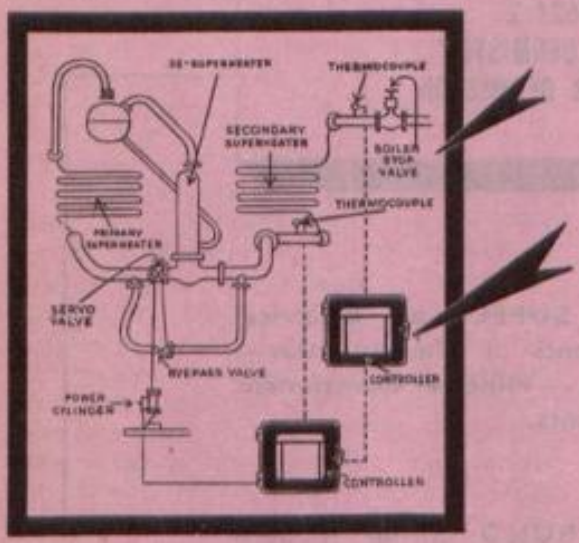

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not the only legislation that governs and controls our operations. There are also the Workmen's Compensation Act, the Apprenticeship Act, and even the Hire Purchase Act. Then, of course, there is that popular and formidable piece of legislation called the Factories, Machinery and Building Work Act (1941) with its 46-hour week. I have often wondered whether the chap who decided on 46 hours learnt simple arithmetic! It would be most illuminating, I'm sure, to see the result of close study and research into this Act on the lines such as those carried out by Mr. Burger into the Electricity Act and the Wiremen's and Contractors' Act.

Mr. Burger in his paper deals specifically with Sections 37 to 40 of the Electricity Act. Section 37 covers the sale and distribution of electricity within an area of an Urban Local Authority. Section 38 makes it necessary for a local authority to apply to the Administrator for, and to submit reports on, proposed new Undertakings or extensions to existing Undertakings. Section 39 covers the supply by a local authority outside its area of jurisdiction. Section 40 deals with the exclusion of other Undertakings from local authority jurisdiction. These are the sections which govern the supply of electricity within local authority and are, therefore, of considerable concern to this Association.

Mr. Burger has referred to the case in the Transvaal between the Johannesburg City Council and the Electricity Supply Commission 1948, upon which the decision was given that "if an area is within the area of jurisdiction of a local authority and there is another authorised undertaker who has acquired the right to supply in the area, the local authority cannot supply in the area."

It is most intriguing to learn that after careful study Mr. Burger comes to the conclusion that "provided a local authority has the Administrator's consent to establish an Electricity Undertaking it can supply at any place outside its area of jurisdiction and it can do so irrespective of whether there is another supplier."

This now brings me to the main reason for entering into the discussion, and that is to ask the question whether, should a local authority extend its area of jurisdiction at any time, that local authority can carry into the extended area the right which it already possesses to supply electricity in its own area irrespective of whether another supplier has already acquired the right to supply there.

With regard to the Electrical Wiremen's and Contractors' Act, and the licensing of wiring contractors, it is suggested that the wording of the Act is such that, because a man has been registered under the Act (i.e. he has become a "registered wireman") he could try to set up in business as a wiring contractor and thus embarrass those local authorities who have promulgated regulations for the licensing of contractors. All I can say in regard to this, Mr. President, is that it had better not get round amongst wiremen in case some of them should try to exploit this apparent anomaly in the Act.

What Mr. Burger's paper brings out most of all is the need for legislators throughout the Union, not only Government, but also Provincial and Municipal, to legislate in close co-operation. It is to be hoped that Mr. Burger's suggestions in this connection will ultimately materialise.

Mr. W. H. MILTON, Electricity Supply Commission:

Mr. President: I have made just a few marginal notes in connection with the paper on points which I consider are of extreme importance. I would like to associate myself with the other speakers' congratulatory remarks on this paper. One is usually told that matters of interpretation of an Act in respect of somewhat obscure points require a court hearing in order that the real meaning may be established.

There is one point in connection with which I feel Mr. Burger is at fault. He mentions the fact that damage caused by electricity would be the subject of a case under common law. There is a special provision in the Electricity Act which overrules the ordinary requirement of common law in relation to this very point. Under the Act, Sections 49 and 54 deal with evidence in proceedings, and you may well find in this that it is not necessary for a plaintiff to prove negligence by the supply authority. Under common law, I understand that it is necessary that negligence be proved. In other words, if damage is caused, the supply authority is held responsible and the only defence that may be put forward is proof by the supply authority of

negligence on the part of some person not in his employ, or negligence on the part of the plaintiff in the case.

As regards the question of the overlapping areas of supply, I think a very important point has been raised. The author states that he does not agree, with all due respect, to the findings of the Magistrate, but I think again he should give further consideration to the point of view he has expressed. The Act states under Section 37 that the sale and distribution of electricity within the area of jurisdiction shall be under the sole control of the supply authority except where such right of supply has been obtained lawfully by agreement or otherwise. That means that if the supply authority (or the licensee) has obtained specific rights in an area of supply of a local authority, that authority has no control over the sale and distribution. Otherwise the explanation is of no point. If then the argument is put forward that it is the sale and distribution of electricity which is under the control of the urban local authority, and therefore you must not consider that that sale and distribution removes from the Municipality the right of supply, we reach this rather anomalous conclusion. Whilst the urban authority has no control over sale and distribution yet it has the right to supply. I put it to you that it would be rather a peculiar position if a Municipality could supply but not control the sale and distribution of the article supplied. In my opinion the ruling of the court must be accepted.

As regards the main point on which I would like to speak, that is the disconnection of services to a consumer, it would be very appropriate if the Municipal Ordinance included the particular section of the Act which provides for licensees to disconnect.

Mr. A. R. SIBSON, Bulawayo:

Mr. President, Gentlemen: I would like to congratulate Mr. Burger not only for giving us this paper but for breaking new ground thereby. In doing so he has fulfilled that other function of this Association whereby it represents the Councils and all their interests as well as the Electrical Engineers. In the concluding paragraph of his paper he makes a plea for a more rational approach to the various Acts of Parliament with which we have to deal. I would like to suggest that he should go further than that and extend that plea to those persons who are given powers of framing regulations, because it is the regulations which cause us so much concern. The various classes of regulations which come under our purview include such things as Post Office regulations, Electricity Supply regulations, and in Rhodesia we have Civil Air Board and Town and Country Planning regulations, and these are very often framed by persons without reference to anybody else. In Rhodesia, when electricity supply was initiated, there were Post Office regulations existent which required all overhead lines to be insulated throughout. Fortunately that clause has now been eliminated, but there are some others that appear to me to have equally little foundation. Again, under the regulations made by the Civil Air Authorities I find that it would be practically impossible to have any overhead lines at all in Bulawayo. I want to suggest that you might add to Mr. Burger's plea a very strong suggestion from this body that all those people who frame regulations which concern us would be advised to send to the Executive of this body any draft regulations that they may have in mind and give us an opportunity of commenting on them and sometimes suggesting other ways in which the aims could be achieved without bringing the same difficulties in their train.

Mr. D. W. RITSON, Stellenbosch:

Mr. President: There is one aspect in this matter. A Municipality extends its boundaries. The Electricity Supply Commission is supplying in those extended areas. What authority has the Municipality to request the Electricity Supply Commission to discontinue their supply? That is a question which will be raised down Stellenbosch way, so I think it is advisable to bring it up.

Mr. E. L. SMITH, Boksburg:

Mr. President: In answer to Mr. Ritson's question I have a letter from the law adviser of the E.S.C. It reads: "A council can only reticulate in its own areas. Even if the new areas are to be incorporated in the Municipality, permission must be obtained from the Commission." In other words, the Municipality cannot supply

without the permission of the Electricity Supply Commission.

Mr. H. A. EASTMAN, Cape Town:

Mr. President: I want to add my quota of appreciation to Mr. Burger for his very valuable and instructive paper in the course of which he has drawn attention to the large number of anomalies and weaknesses in the laws and we, I am sure, will all agree very heartily with the suggestion contained in the last paragraph to the effect that there is a real need to rationalise these laws in co-operation with Municipal electricity supply authorities. He has not given all the anomalies. Might I add one or two that have perhaps been experienced by others. We have a permit in Cape Town to give supplies outside the Municipal boundaries but outside that boundary we are not empowered to enforce any of our regulations for the supply of electricity. It seems absurd. The alternative is to refuse to give supply in the event of either the consumer or contractor being out of compliance with regulations. Of course, if an installation is unsafe we refuse to connect it up, or we disconnect it but it means that outside the area of jurisdiction of the Municipality of Cape Town a contractor or wireman can do as he pleases. We have tried prosecutions to bring people into line without success in some cases. It might be said, of course, that the obvious way of bringing cases into line would be to refuse to give supply. This is wrong because we exist for the very purpose of giving supply to consumers and to refuse to give supply because, for example, a contractor has refused to give us notification of an extension, or to refuse to give supply for any other breach of the regulations by a contractor penalises an entirely innocent person. It is all very fine and large putting into the wiring regulations a clause to the effect that all materials shall be to the approval of the Engineers. There is nothing in law to enforce that. When the City Council was approached by Heads of Departments some time ago to get an amendment to the Ordinance to grant Heads of Departments powers of delegation, the Council was suspicious and turned the proposal down. A previous speaker suggested that Municipal Councils should become electricity supply licensees under the Act. It should not be overlooked when considering this suggestion that as the Act now reads this would clearly and specifically lead in due course to all such undertakings being expropriated by the Electricity Supply Commission. Mr. President, I want to stress again the great debt of gratitude we owe to Mr. Burger for bringing all these matters to our notice.

Mr. G. J. MULLER, Bloemfontein:

Mr. President: Before dealing with the matters arising from this paper I would like to add my thanks for the paper, which I think we all agree has been long overdue. We have quite a bit of our time taken up with technical aspects and we are apt to overlook the incidence of the law, which at times pushes itself forward. The first question that struck me was the status of supply authorities in rural areas. As far as I read the paper there is no clarity on that subject. The local authority, by the permission of the Control Board, has authority to supply in an area adjoining its Municipal area, but it is quite indefinite as to what its status is. From the discussion it would appear that the local authority has very little standing there. As far as I can understand it has no authority to impose its regulations and by-laws outside the area of jurisdiction. It is only authorised to supply within the Municipality boundaries.

Mr. H. A. EASTMAN, Cape Town:

Mr. President: We are empowered by the licence granted to give supplies outside the Municipal boundary, but we are empowered to enforce the Municipal regulations within our own boundaries only.

Mr. G. J. MULLER, Bloemfontein:

The other question was the question of tariffs. The tariffs for the rural areas are subject to the approval of the Control Board. Once this area becomes part and parcel of the supply area of the local authority, for every change of tariffs (which are normally passed by the Administrator) would the tariffs in such cases also be subject further to the approval of the Control Board, as this constitutes an alteration in the conditions of permission. On the subject of claims I have a note, and I understood Mr. Burger to say that local authorities would have the right to dis-

continue supply. I cannot find anything in law to prevent them from discontinuing supply but doubt whether common law would not bring in the provisions of the law for breach of contract. Claims for damage may arise from leakage. An animal may be killed on a line. Local regulations safeguard the Council against any damages from causes outside its control or the negligence of its officials, but again the question of common law may crop up. Then you may have claims for damages for high or low voltage due to the inability of the Council to alter its system fast enough for the growth of loads. It might be impossible to get the mains and sub-stations ready in time. Loss of supply is another cause for claims for damages. In fact, industry may claim considerable damage through loss of current from unforeseen causes for a matter of a few hours. Mr. van der Walt mentioned this question of the desirability of local authorities becoming licensees. As I read the Act, local authorities have control within their area, and I would regret any move in the direction of local authorities becoming licensees, also from the point of view that licensees are liable to be taken over by the Commission whereas, at the moment, if the Council wishes the Commission to take a hand they do so by mutual agreement.

Mr. C. KINSMAN, Durban:

Mr. President: Apart from joining others in thanking Mr. Burger for the very useful service he has rendered us, there is one point which I want to raise and that is a point of information. I have no written record of the incident to which I am going to refer, but it was a verbal report to me by the defendant in the case. The case hinged on the interpretation of the word contractor. In a certain town on the Natal South Coast there is a firm of contractors licensed in its own Municipality and it was doing wiring work in a neighbouring township where it was not licensed; the firm was charged in that they did not have a contractor's licence in the township in which the firm was working. It was taken to the Court where the defending attorney pointed out that the interpretation in the Act defines a contractor as being a person who undertakes to carry out wiring work; the defence was that the undertaking to carry out the the contracting work was done in the town in which the firm held a licence and that there was nothing to prevent the firm doing the actual work in other towns. That is a matter of interest to which attention might be directed and some consideration given as to what is a contractor.

Mr. J. C. FRASER, Johannesburg:

Mr. President and Gentlemen: The paper which has been delivered by Mr. Burger is notable in several aspects. It almost goes without saying that it is a most able exposition of a difficult subject. The aspect, however, which appears more forcibly to members of the Association is that Mr. Burger has displayed the originality of mind to expound in such a clear understandable manner some of the more important implications of the ever increasing legislative measures affecting our industry. Most of us at some time or another have posed the very questions he has raised and answered; most of us remember those feelings of frustration after wading through pages of statute and emerging still doubting whether we have a correct conception of our authority or obligation or whether in some other set of regulations or statute there lie hidden other clauses which would modify our conceptions of what the law really means.

Talking of what the law really means Mr. Burger has made it quite clear to us that lawyers and judges are capable of placing interpretations on statutes and regulations which is quite beyond the ingenuity of we mere engineers to conceive. Must the regulations be read literally giving each word its due weight and meaning, or must one try to imagine what was in the mind of a Parliament many years ago in framing the laws?

A good case in point is the reference by the author to the lawsuit between the City Council of Johannesburg and the E.S.C. The possible interpretations of statute are revealed by two differing lines of interpretation in the judgment and a third rather convincing construction by Mr. Burger.

I feel that it is only fair to say to those members of this Association who may believe that this judgment is the final word, that the Johannesburg City Council, should the necessity arise, will once again consider the advisability of proceeding to the Appellate Division on this pont. The sole reason

why the City Council withdrew its appeal against this judgment is that the E.S.C., after the appeal had been lodged, ceded to the Council without prejudice of the rights to supply and reticulate the areas which were the subject of litigation.

Regarding the question of Electrical Contractors we, in Johannesburg, do not consider that there is any flaw in our by-laws. It is doubted whether Mr. Burger's conclusion that a wireman registered under the Act as an electrical contractor need not be licensed or registered by the local authority. It seems possible that the word "registered" in Section 21, despite its definition in the Act, means registered by a local authority in terms of its by-laws. It is to be noted that the definitions are qualified by "unless the context otherwise requires." The context of the word "registered" in Section 21 of the Act refers to registration by a supplier under some law or by-law. It seems that it would be completely meaningless to seek registration under the Act. The easier and better way of clearing up any doubt in this point would be an amendment of the Local Government Ordinance.

Mr. H. J. GRIPPER, Port Elizabeth (communicated):

Mr. President and Gentlemen: Mr. Burger, and indeed the Association, are to be congratulated on the presentation of this paper which covers a field of great interest to Electricity Undertakings and our thanks are due to Mr. Burger for having gone to the trouble he has done to explain the workings of the law in such an interesting and enlightening manner. I look forward to the day when City Treasurers and Town Clerks are invited to address our Association and possibly vice versa. I have always urged that the legal aspect of our business should be given greater prominence, not only at our Conventions, but also in bulletins and in our "official organ." Matters which may be commonplace or the reverse in one centre very often cause considerable difficulties in another and the interchange of experiences will be of very great value indeed.

Mr. Burger has drawn attention to the operation of the Electricity Act to-day. I maintain that this Act states clearly what is required of an Undertaking prior to its application for a licence and it emphasises rigid adherence to the subsequent performance under that licence in return for the monopoly so given. To my mind also there is a very definite obligation under the Act to supply all prospective consumers who are able and willing to pay the cost involved. Apart from the moral obligations and the Cape Provincial ordinances, it would appear however that in other Provinces of the Union the Electricity Act covers only rural areas.

Mr. Burger deals at some length with a somewhat academic viewpoint in regard to the obligation to **continue** to supply a consumer. Surely this can only be considered in parallel with the question as to whether or not the consumer in turn can continue to pay and to observe the regulations governing his acceptance of the supply?

Members will no doubt raise many interesting points of law which have not been covered specifically by Mr. Burger in his paper. For my part I venture to suggest that the more interesting aspects of the law in its effect on Electricity Undertakings are those covering the drafting, framing and enforcement of by-laws, the loss relating to claims by the public for damages sustained, protection of the Undertaking's property, for example, street light globes and overhead wires, meters, etc., protection of the Undertaking's staff, for example, attacks by wild dogs on meter readers, theft of current, etc., etc. The obligations on the part of a Municipal Undertaking to illuminate streets for purposes other than traffic safety is a matter with which we are often confronted.

Difficulties are often experienced in the framing of special agreements with large consumers. In this respect I maintain that the bye-laws and tariff of charges of any Undertaking should be sufficiently comprehensive to enable us to dispense with such agreements. The signing of an application form should provide a complete contract in all but the most special cases.

Occasionally a consumer requires a contract to be drawn up indemnifying him against loss or damage in the event of accident or failure of supply. In such event the supplier may also consider it prudent to call for an indemnity in the event of any damage being caused to his plant or equipment on the consumer's premises. Such matters may crop up only very infrequently,

but it is of interest at this stage to note a decision given in a case Botes vs. Potchefstroom Municipality and De Lew in 1941 when Judge Malan is quoted as having stated:

" . . . if a person supplies a dangerous article to another and it passes out of his control and under sole control of that other, and the latter thereupon negligently uses it in such a manner as to cause injury to a third party, the supplier will not be liable in damages to such third party unless he placed the dangerous article in the possession of a person who was obviously **unskilled** or **unable to control it,** or unable or unlikely to use precautionary measures."

I quote this as a matter of general interest and feel that it might be worthy of consideration by members who may have met with cases of a similar kind.

It is evident throughout Mr. Burger's paper that he has laboured under the difficulties resulting from the differences in the various provincial ordinances and it is unnecessary for me to stress at this stage the desirability for uniformity in bye-laws between various Undertakings and in the Ordinances of the separate Provinces. This, of course, introduces a task of considerable proportions and would entail the careful selection of the best features from numerous existing bye-laws and Ordinances.

No mention is made in the paper covering the law in the shape of the Factories Act or the Mines and Works Act. The responsibilities of the Engineer and Manager of an Undertaking are seldom fully realised. Besides being enforced by law to maintain uniformity and continuity of electricity supply, particularly if the powers of the supply authority are delegated to the Engineer in person, the Engineer is also held personally responsible for the safety of the plant and personnel under his charge.

In adding my thanks to Mr. Burger for breaking new ground, I trust that the Convention will give this paper the attention it undoubtedly deserves and that the ensuing discussion will be both interesting and a valuable contribution to our Proceedings.

Mr. A. FODEN, East London:

I join in the praise of Mr. Burger on his very interesting address. I would like to ask Mr. Burger one question and that is, do I understand that where a local authority after getting the necessary permission from the Electricity Control Board to supply energy outside its area, the local authority's by-laws are ultra-vires? In so far as East London is concerned each consumer fills in the necessary "Application for Supply" form which is worded that he undertakes to comply with the local authority's by-laws. Is that signed contract ultra vires? That is the question which I would like to put to the author.

PRESIDENT:

Would Mr. Mullins of the Control Board like to have anything to say?

Mr. C. MULLINS:

I don't think there is anything contentious in this matter

Mr. E. L. DAMANT, Electricity Supply Commission, Durban:

Mr. President: I am a visitor here to-day, so I won't reply in any detail to all the "compliments" that have been thrown at the Commission. I do thank you, however, for enabling me to make known certain facts about the Commission, its problems and its achievements.

There is no doubt that the Commission is a body which has made its presence felt, and I do feel, made it felt to the benefit of all you people here. Your President said he was interested to know that we were in trouble elsewhere besides Natal. We are not in trouble anywhere except to supply you with all the power that you are demanding, and we have not failed you yet. I would remind you that in Britain, ever since the war, they are 20 per cent short of all their requirements. When I was in the States in 1948, half a dozen states were easing load during the peak hours. Canada was also short. So you see the E.S.C. has done something for you in this very difficult time. I would also like to tell you that in Natal we have spent approximately £9,000,000 in providing you with electricity and I think that is more than the total capital which all the Municipal Undertakings have invested in Natal. Our plans for the next three years involve an expenditure of approximately ten million pounds. Our main object is to assist you

and we will continue to do so even though we appear to be in such dire difficulties with our Inland Bodies Association in Natal. We wll no doubt overcome these difficulties.

I would also emphasise that since the war we have not increased our tariffs. Since we established ourselves in Natal we have reduced our tariffs three times and nobody queried our legal right to adjust our tariffs. Now we wish to increase the tariffs by 10 per cent. The percentage method of raising tariffs or prices is quite a common one even with Municipalities, vide your system of discounts.

I also would like to take this opportunity of thanking the author for putting before us the difficulties that we are up against in all the existing legislation which has been enacted by the various Provinces and by the Central Government. I hope that something will be done to clarify and co-ordinate this legislation.

PRESIDENT:

I would like to assure Mr. Damant that if they reduce their tariffs we will not question the legality of it. I call on Mr. Burger to reply, and I think we can perhaps agree to stretch the ten minutes because he has a host of questions to answer.

Mr. A. P. BURGER, Springs:

I must indeed say that it is a host of questions and that it has been most interesting to me to hear these questions. I don't think it will be possible for me to cover every aspect that has been raised, but there are a few points which I shall endeavour to reply to. There is first of all this question of area of supply and the reference to the Johannesburg case. It was very interesting to me to note that Johannesburg would in a future event appeal against that decision because I got the impression that it was rather peculiar that it did not do so. In a future case it will be necessary to go to a full Bench, though not necessarily to the Appellate Division. I must say that it is a difficult question to interpret laws, and rules apply which are often somewhat obscure to the layman. This is a case in point and I must point out that it does appear to me that Johannesburg would have had a very good case on appeal. There has been reference to the question of damage caused by electricity. I did contemplate dealing with this question. I am sorry that I did not. The position is that the law of negligence is still relevant. As far as the Electricity Act is concerned it has been held by the Court that all the Act does is that it transfers the incidence of the onus of proof in the case. In other words, the Act shifts the onus to the supplier to prove that he was not negligent. Negligence is still a relevant factor even under the Act.

In regard to discontinuation of supply, that is a matter which depends on the contract. I may mention here that the reference that has been made to the question of supply in outside areas is one of difficulty. A Municipality has a very limited area of legislation. Like all subordinate legislators it must restrict its legislation to the Muncipal areas. Therefore its bye-laws are not applicable outside the area. They only become applicable to persons inside the area but the alternative has been mentioned and that is that where supply is to an outside area it must be by contract and where the bye-laws stipulate that a contract is to be signed, it is quite in order. It will not help the local authority very much against people outside the area, but it does ensure that they sign the contract which will secure the position of the local authority. There has also been a reference to the definition of contractor. It has been very illuminating to me to hear the counter-argument which has been made on this point but it appeared to me that the magistrate might have erred in giving such a literal interpretaton of "contracting." There has also been reference to the question of making bye-laws or regulations governing electrical contractors. As far as the Transvaal is concerned the position appears to be that the Transvaal local authority has not got the power to make by-laws governing this matter. It appears to be different in the Cape and other provinces. The question of the Act does depend on the meaning of this word "register." It is a fact that "register" has been defined so as to make it possible for it to be used in a different context to the one in the Act. The difficulty, however, is that there is a criminal sanction to the particular section of the Act. Where this is so the Court is very strict in its interpretation and if it appears to the Court that there is an interpretation which can

be used for the acquittal of the accused, the Court gives that interpretation. It was never intended that this word should have the definition given to it under the Act, but it may happen that where a person is accused in the criminal court, the Court may give its decision in favour. It is in these circumstances that I personally would suggest that an amendment to the Act should be made because the position is that it is always very expensive for a local authority to litigate. In fact, one can always give it as a maxim to legislate rather than to litigate. Mr. President, I think I will deal only in general with the various other points raised. In general they have all brought out the great need for clarifying legislation which will contain a comprehensive statement. It has been suggested that Parliament will have to separate political and legislative functions because there are many statutes which as time has passed, and as South Africa has become a more developed country, require to be redrawn so as to bring them up to modern conditions. Many of the Acts and Ordinances with which Municipalities have to deal are greatly antiquated. There has been reference here to the omission from my paper of certain other Acts which are clearly of importance to the Electrical Engineer, such as the Factories Act. I had to confine myself to law which governs electricity more particularly but there is no doubt about it that the Electrical Engineer also requires assistance in regard to these Acts and it has occurred to me during the course of this very interesting discussion that what is needed is a handbook for Electrical Engineers in which they will readily have all the legislation affecting them immediately. I think such a handbook coupled with standardisation and codification of the law will perhaps result in Electrical Engineers not having unduly to worry about legal problems.

In regard to the written comments which Mr. H. J. Gripper of Port Elizabeth has so kindly forwarded, I would first of all like to express my thanks to Mr. Gripper. His comments show how the experienced Engineer inevitably through practical necessity develops an interest in the law applying to his undertaking. I note the emphasis which he lays on inter-provincial unity and agree with him that it will be a task of considerable proportions to select and codify the law relating to electricity. It does seem however that the task will be worth while.

PRESIDENT:

Thank you very much indeed, Mr. Burger. This Convention appreciates the paper which you have given and we can be left in no doubt as to its importance. I hope you will carry on with the suggestion regarding the handbook.

The Conference will adjourn.

THURSDAY, 11th MAY, 1950

The Convention resumed at 9.30 a.m.

PRESIDENT:

Well, gentlemen, we will now take the paper by Mr. Asselbergs, of Barberton, on Automatic Protection of Diesel Power Plants.

"AUTOMATIC PROTECTION OF DIESEL POWER PLANTS"

By

P. C. ASSELBERGS, A.M.I.Cert.E.,
Town and Electrical Engineer,
Barberton.

Introduction

This paper deals with a system of automatic protection of diesel engines and its preparation was engendered by the intimation that a paper on diesel engines would be welcomed at the 1950 convention of this association.

At the outset it must be emphasised that this paper is not to be regarded as an expert's treatise on the matter. The object is rather to indicate what can be achieved generally by giving a description of the system in use in Barberton and by giving some details of the operating results, from the technical as well as the financial point of view.

It was felt that the subject would be of interest to a sufficiently large number of members to warrant a paper, even though the principles involved are far from new: probably quite a number of generating stations are equipped with one or more of the items making up the whole of the protective system as described hereafter.

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Too few papers on power stations and ancillary subjects read before various engineering institutions cater for the large group of engineers who are in charge of the smaller diesel generating stations. It does not seem to be generally admitted that their problems can be as manifold and baffling as those occurring in many a "super" station. The solution for many of their problems cannot be found in engineering hand and text books and they have to learn through bitter experience or the experience of others.

If therefore this paper would be instrumental in solving some member's difficulties, or result in improved efficiency in some undertaking, it will have fulfilled its purpose.

Historical

It would not be amiss to start with a resume of the history of the Barberton electricity supply as this will explain how its protective system originated.

The first plant erected in Barberton was a secondhand steam plant which proved to be very inefficient and expensive to operate, with the result that the electricity department functioned at a considerable financial loss.

An extensive investigation was carried out with the object of placing the undertaking on a sound financial footing and as a result of the investigation a hydro-electric plant was installed.

As is the case with most hydro schemes the site of this new plant was some considerable distance from the town. The station had to run in parallel with the then existing steam plant in town, and to avoid a duplication of operating staff the hydro station was elaborately equipped with a protective system and remote control. The latter was operated from the steam generating station in town.

At the time of installation, the hydro station was capable of meeting the whole town load with the steam station as a "stand by," but the time came, and that very soon, when additional plant had to be installed. For various reasons which need not be gone into here, a crude oil engine was chosen as prime mover and in view of the most satisfactory operating results obtained with the protective system at the hydro station, the then electrical engineer, Mr. B. W. Cowley, went thoroughly into the possibility of installing a similar protective system for the crude oil plant. He worked out a scheme and in due course the Town Council called for tenders for a generating plant which was to include all the necessary devices for running the crude oil engine in parallel with the hydro plant, as well as for the automatic protection of both crude oil engine and alternator.

From the tenders which were eventually received it was clear that very few firms had confidence in the scheme as specified, because, with the exception of one or two, the tenderers made alternative suggestions and proposed various modifications, which ranged from minor adjustments to such drastic alterations as an additional flywheel to the Pelton wheel.

This information is given to show that, at that time, nearly all of the firms who tendered must have doubted whether the whole system as specified was practical. The results obtained have, however, been very satisfactory and later additions to the power station have been designed and installed on identical lines.

The first of the protective systems was installed in 1936 and, since the firm supplying the equipment at that time gave a fair amount of publicity to it, it was thought that the system by now would be well known and would have been more generally adopted. When however in 1947 the Barberton Town Council called for additional generating plant similarly equipped it was apparent from the tenders received that the system still was not so generally known as could be expected, and comparatively few firms were able to comply fully with the specifications.

This last-mentioned fact was in the first instance responsible for this paper.

Purpose of the System

As is indicated by its descriptive name, the primary purpose of the system is to protect plant against possible damage from various causes, as is explained later on in this paper. By doing this automatically, any error of judgment or lack of supervision on the part of the operating staff is rectified and the human element largely eliminated.

By carrying the installation of protective devices through far enough, it is possible to run a station unattended and to dispense with one, two or even all three shiftsmen normally considered necessary to run a power station.

The savings which can be effected in this way are very considerable and more than make up for certain disadvantages attached to the system.

When examining the various items of annual expenditure making up the total cost of generating electricity, it will be found that labour forms a very large proportion of the total expenditure. This is particularly manifest in the case of a small generating station, where three shiftsmen must be employed even though the number of units generated is low.

Although with automatic protection considerable savings can be effected by reducing the number of shiftsmen employed, the financial advantage, under particular circumstances, may be only a secondary condition. There are numbers of small power stations which, for special reasons, have to be erected in out of the way and rather inaccessible places. When there is a shortage of labour it may be extremely difficult to engage the required personnel, particularly where a small undertaking, for obvious financial reasons, could provide suitable accommodation on only a very limited scale, if at all. Automatic protection provides a way out of this difficulty.

A steam generating station with boilers, steam engines and a large number of essential auxiliary services cannot possibly be left unattended and requires, even when loads are very light or when fires are banked, both european and native labour to supervise and run the plant.

In contrast to this, a crude oil engine is of a very much simpler construction and, provided it is well maintained and not overloaded, is a very reliable source of power.

The work involved in running a crude oil plant is largely supervisory—very little manual work is performed by either european or native staff. It is this last fact which makes it possible to operate a crude oil station unattended provided sufficient safeguards are taken to protect the plant from damage in case of a breakdown.

In some crude oil engines, especially the small high speed type of engine which is being installed in increasing numbers, certain protective devices have been incorporated as standard equipment. These devices make it possible for shiftsmen to absent themselves for short periods from their stations, and allow them to do certain work not directly connected with the plant, even to the extent of doing a certain amount of work on the distribution side of the supply.

By providing an elaborate system of protective devices it is possible, however, to go further than that, and if carried far enough, the stage can be reached where there is no danger in running the generating plant practically completely unattended, the attendant being required only to start up and parallel the engines and to shut them down again. Even to perform this latter operation, the shutting down of the engines, the necessity for the presence of an attendant can to a large extent be eliminated by the installation of special devices to perform this function.

Description of Plant

The first essential to be provided on a plant which is to run unattended is an arrangement whereby the prime mover is stopped before serious damage can be done to it, due to failure of one or more of the essential parts or services. At the same time it is also necessary, should an engine fall out, that the person in charge of the station is made aware of this by means of some visible and/or audible device, installed in his home and operated by the safety circuits in the power station.

To guard against damage to the engines protection is provided against the following contingencies.

1. Excess bearing temperature.
2. Excess alternator winding temperature.
3. Excess lubricating oil temperature.
4. Reduction of cooling water flow.
5. Drop in lubricating oil pressure.
6. Reversal of power.
7. Over voltage.
8. Over load.
9. Over speed.
10. Under speed.

To enable all these contingencies to be guarded against an electrically operated system is installed which shuts down the engine and trips the circuit breaker of the generator, thus completely isolating the generating set affected, should any of the above contingencies arise.

To take care of cases 1, 2 and 3 where temperatures may exceed those encountered in normal running thermostats are provided. These are located in the alternator bearing housing, in the alternator windings and in the lubricating oil return pipe between the engine sump and external oil tank respectively. These thermostats have electrical contacts arranged to complete a circuit should the temperature rise above pre-determined limits.

To protect the engine against a reduction of the flow of cooling water below a certain limit and to protect it against overheating, either a thermostat in the cooling water flow or alternatively an adjustable flow meter with electrical contacts can be provided. Both these instruments must be set to suit operating conditions on the site depending on the makers' recommendation with regard to cooling water temperature.

To guard against a failure of lubricating oil supply a pressure gauge with adjustable electrical contacts is provided and placed in the lubricating oil pipe which supplies all bearings. The gauge can also be set to operate at any pressure depending on the minimum oil pressure recommended by the makers of the oil engine.

With regard to 6, 7 and 8 protective relays of this type are known and do not require a description.

Overspeed and underspeed are taken care of by one or more centrifugal switches which are driven off the main shaft.

Overspeed protection is provided to guard against the possible failure of the governor of the engine whereas underspeed protection guards against both governor failure and against overload. Of course, overload protection is also provided on the electrical side of the installation, but apart from external sources, overload can also be caused by internal faults such as the seizing up of a piston and it is for this reason that an underspeed relay is required.

As can be seen from the wiring diagram the corresponding electrical contact is made should any abnormal condition develop and a circuit is completed through a drop relay on the alarm panel and a tripping relay embodied in the main oil circuit breaker. The drop relays control red lamps carried on an alarm panel, each one of which is marked so that the operator, on entering the power station, can see immediately for which reason the generating set has stopped. This visible indication minimises the time spent by the attendant in trying to ascertain the cause of the shut down and ensures that the set is put back into service with the minimum delay. The whole system of alarm devices and signal relays is supplied from a 24 volt accumulator.

When the tripping relay comes into operation through any one of the causes enumerated earlier, the main oil circuit breaker is tripped, which takes the alternator off the busbars. At the same time the alarm relay is de-energised and the hooter circuit completed. An additional contact is also provided on the oil circuit breaker which is used to energise the engine-shut-down relay.

To actuate the fuel cut-off lever, various devices may be employed. One consists of a heavy electro-magnet which on being energised lifts and moves the control lever in the "off" position.

In another device a heavy weight is raised when bringing the control lever in starting position, and a latch inside the device holds the control in this position. When the circuit breaker is opened by the tripping relay, an additional contact energises an electro-magnet which pulls away the latch thus releasing the weight which acts on the fuel cut-off lever and shuts down the engine. Any one of these devices must be arranged to break its own circuit after operation as otherwise overheating of the electro-magnet would occur and in addition an excessive drain would be imposed on the accumulator.

Briefly the sequence of events in shutting down an engine is as follows:

Any fault on the engine operates the appropriate drop relay. This relay energises the tripping relay which opens the main circuit breaker. The auxiliary contact on the circuit breaker energises the shut down relay and the engine shuts down.

It is evident that the whole system must be made inoperative whilst starting up and for this purpose a small switch is provided with which the system is brought into operation only after the engine has been started and has been put on the busbars.

As mentioned earlier in this paper the manual shutting down of the generating sets has also been largely eliminated and thus another saving in labour is effected.

This automatic shut-down device has proved to be entirely satisfactory. Prior to the installation of this device it was necessary for the attendant to come out at night time, usually about 11 p.m. to shut down the engines after the peak in the evening load had subsided and he had to be paid overtime for this. With the new arrangement, not only is overtime saved but also the working hours of the attendant are more satisfactory.

With the shut-down device a set can, at a predetermined time, be made to shed its load and to shut itself down. The device is used in Barberton to shut down all crude oil engines and to transfer their load to the hydro-electric station, which latter takes the night load. The hydro however is not an essential part of the scheme and the arrangement would work equally well with crude oil engines only.

The general arrangement is as follows:

An ordinary time switch directly energises the solenoid on the fuel cut-off lever, by-passing the intermediate relays operating under fault conditions, and as explained earlier, the fuel of the oil engine is then cut off. This by-passing of relays is necessary in order to prevent the oil circuit breaker from coming out before the load has been removed.

The fuel is not cut off suddenly but gradually. This has been attained by controlling the rate of movement by means of a piston working in an oil filled cylinder. The speed of travel of the piston can be adjusted so as to obtain a smooth transfer of load.

As the fuel is cut off, the engine sheds its load which is gradually taken over by the remaining running engines. This process continues until all the load is removed from the engine and the alternator begins to run as a motor. At that moment the reverse power relay comes into operation and trips the main oil circuit breaker thus taking the whole set out of commission.

Advantages

The advantages of automatic protection are the following:

1. The station is absolutely foolproof, that is to say, whenever any fault occurs which is liable to cause damage to the generating equipment the relative set is automatically shut down, independent of the vigilance of the attendant.
2. It is feasible and perfectly safe to run the station completely unattended and the person in charge of the station is free to attend to other duties. As an alternative one shiftsman only may be employed, who would do the usual maintenance work on the engines and equipment.
3. Generating costs are reduced by saving in labour. The amount of this depends on whether all or only part of the shiftwork is eliminated and on the ruling rates of pay.
4. The visible and audible warning devices give a clear indication of the cause of a shut down and time is saved in rectifying the fault and bringing the engine back into operation.

Operating Conditions

To obtain the most satisfactory results with the automatic protective system, when running a station without attendance, the following operating conditions should obtain:

1. Sufficient engine capacity should be available i.e. with **n** engines running, **n-1** engines should be able to meet the load.

   If the station capacity is insufficient, a shut-down of one engine would effect the whole station by causing an overload on the remaining engines, finally resulting in a temporary "black out" until such time as the fault has been remedied.
2. The total installed capacity of the generating station should preferably not be divided over a large number of small units, but rather over a small number of large units.

If there is a large number of small units, too much synchronising of engines and balancing of load has to be done, which at night time would mean an excessive number of hours overtime being worked by the power station attendant.

The amount of overtime paid would then to a large extent offset the saving in wages effected by the elimination of shift work.

3. The characteristics of the governors of the various engines installed should not differ between too wide limits.

This is rather an important point when considering the installation of an automatic protective system or when installing additional machinery which has to run unattended.

Specifications with regard to governor characteristics should be exact and tenders should comply with those specifications as closely as possible.

Governors

With regard to governors, the ideal to be aimed at would be that the percentages of momentary and permanent speed variation should be equal for all engines.

With equal permanent speed variation, engines will take up any variation in load and share this load in proportion to their maximum rating i.e. with increasing load the engines will reach full load simultaneously and conversely with decreasing load will idle simultaneously. It is here assumed that the load distribution originally was set so as to divide the load over the various engines in proportion to their rated capacity.

With unequal permanent speed variation, the engine with the smallest percentage variation will take a larger share and would be on full load, and finally on overload, before the total load on the station would be equal to the total installed capacity. In the same way, with a drop in load on the station, the engine with smaller speed variation will drop its load more rapidly and may even trip out on reverse power before required to do so. The engine would then be no longer available should the load come on again.

The above difficulties with unequal governor characteristics may appear a serious handicap, but most stations will experience no difficulties with small differences in governors. Where, however, the station load fluctuates heavily for example where a station supplies one or two large consumers, switching in and out comparatively large loads, difficulties will be encountered.

Apart from difficulties with governors, the tenderers for the original Barberton scheme visualized that differences in speed of various engines would have an adverse effect on the stability of the power station, and most of the firms tendering on the specifications for the proposed system were very dubious on this score. After fourteen years of successfully operating the system these doubts have been proved to be unfounded, and difficulties usually anticipated when running high speed and low speed engines in parallel would appear to be largely theoretical.

Overload Setting

Although engine makers usually allow for 10% overload to be carried by engines for short durations, it is good practice not to make use of the extra capacity, as overloading invariably leads to increased maintenance cost and decreased availability.

Overload protection on the electrical side usually does not allow for accurate enough setting to prevent overload on a crude oil engine. For one thing, overload protection on oil circuit breakers is governed by current and not by KW. The maximum loading on the engine at which the O.C.B. will trip varies therefore with the power factor of the load and would be lower during daytime and higher at night-time With the power factor varying between say ·7 and ·9 the overload setting on a KW basis would vary almost 30%.

Furthermore, overload tripping gear on O.C.B.'s is never precision-built and the mechanism cannot be expected to operate consistently at exactly the current for which it is set. The type consisting of trip coils short circuited by fuses is particularly unsatisfactory. Not only is accurate setting impossible with this type but ever present vibrations cause the fuse wire to fatigue and break, and the generating set may trip out at the most unexpected moments.

It has been found very useful to have a mechanical load limiting device on the crude oil engine as an additional protection against overloading it. The most convenient way to prevent this overloading is to limit the travel of the fuel pump control racks beyond full load. Any load exceeding the rated capacity of the engine will then cause the engine to slow down and eventually to trip out on "underspeed."

Disadvantages

One of the disadvantages of the automatic protective system, as already mentioned, is that the system does not work satisfactorily when the station is running with a load approaching its total installed capacity. As pointed out any fault on one engine causes it to shut down and the remaining engines, not being able to cope with the load, will also trip out on overload, resulting in the whole system or parallel running engines collapsing and causing a complete blackout.

Another disadvantage lies in the inherent shortcomings of any automatic system, i.e. when not regularly in use they may fail to operate when required. To guard against this the remedies are: rigid inspection of the system and frequent testing.

On the other hand this last disadvantage need not weigh too heavily. Any power station which is well maintained requires very little actual work from the shiftsman. For this reason, human nature being what it is, the shiftsman is more likely than not to be anywhere else but at his post should a fault occur. A supervised station is therefore as likely to suffer damage, through negligence on the part of the shiftsman, as an unattended station is from failure of the automatic gear.

Cost of Installation

Recent quotations for automatic protection equipment varied between very wide limits but a satisfactory set of relays suitably wired and erected could be purchased for approximately £500 per engine. It is here assumed that normally a generating set is equipped with such items as overload and reverse power protection and that these do not have to be provided when converting to automatic protection.

Assuming that a station has three generating sets, the cost of conversion would be around £1,500.

If this amount is financed from a loan repayable over 10 years the annual loan charges would be approximately £100.

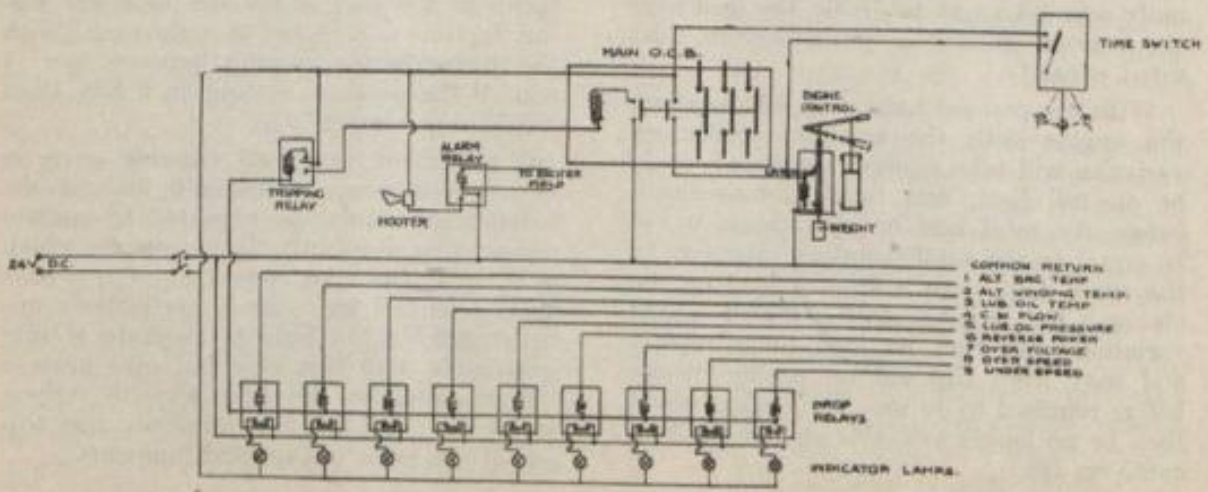
Saving of Labour Costs

The saving which can be effected depends on:

1. Number of shifts dispensed with,
2. Ruling rates of wages, cost of living allowance, etc.

As an example it will be assumed that two of the three shifts are to be eliminated and further that the ruling rate of wages for shiftsmen is as low as £20 per month.

SCHEMATIC DIAGRAM FOR AUTOMATIC PROTECTION.



Per shiftsman, the annual saving would then amount to:

Wages	£240
Cost of living allowance	57
Pension fund contribution ...	18
Overtime: Sundays and 2 hours weekly	95
	£410

Not all of this is saving, however, as a certain amount of overtime has to be worked by the remaining shiftsman after normal working hours. The extent of this overtime depends on the daily load curve and number and size of engines installed. As an average the overtime should not exceed 9 hours per week. Under the assumed conditions, the extra amount paid in overtime would be £60 and the final nett saving on the wages of two shiftsmen would be £760 per annum.

The cost of installing automatic protection would therefore be recovered within two years. Alternatively, after deducting loan charges a nett saving of £660 per annum could be expected.

General

Although individual parts of the system as described in this paper are well known and far from new, the whole system of automatic protection would appear to be practically known and not practised. It is beyond doubt that there are numerous small power stations which would benefit by the installation of an automtic protective system, not only because of the added protection of the plant but also because of possible financial gains. There are a good many small power stations which operate at a financial loss notwithstanding very high tariffs (sometimes because of high tariffs). With the installation of an automatic protective system and the elimination of most of the labour costs such a station could be made to show a profit.

There is also the case of those smaller communities (Health Committees and Village Councils) which are very anxious to embark on electricity schemes but cannot afford to, especially at the present time, with the heavy capital costs of generating plant with consequent high capital charges. In these instances the adoption of an automatic system might put an entirely different light on the financial aspect of a proposed scheme and make it economically practicable by the offsetting of high capital charges with reduced labour costs.

PRESIDENT:

Thank you, Mr. Asselbergs. This paper should be of particular interest to the smaller centres and I hope we are going to hear some of their views. I have a note that Mr. Ramsay would like to speak.

Mr. ERIC W. RAMSAY, General Motors South Africa Limited, Port Elizabeth:

Mr. President.

Being only a guest delegate to this convention I am very grateful for your permission to join in the discussion on this paper. At the same time I feel I should take this opportunity of expressing more formally than perhaps has been done on previous occasions how much the engineering firms and equipment suppliers appreciate the invitations which you extend to them.

While to some people the selling and buying of machinery and equipment may be just hard business, nevertheless we all of us like to feel that our efforts towards providing the most efficient and up-to-date equipment of which we are capable are a contribution to the country's progress, and it is in the municipal field where we get the most satisfaction in that respect. Mutual friendly co-operation and assistance is the normal outlook and it is most clearly exemplified in this practice of yours in inviting us to join you in your deliberations every year. Long may that spirit continue and your association prosper.

It is very pleasing indeed to have such a paper as Mr. Asselberg's on the agenda, because all who are fortunate enough to be in contact with the scores of small municipalities throughout South Africa must agree with him that they are too often overshadowed by the comparatively immense activities of the larger centres. We in the larger towns cannot fully appreciate what a contribution these small undertakings make to the country's welfare, and how much foresight and courage has had to be shown to bring them to fruition, and often to keep them in operation.

I hardly think there is time, neither would this be a suitable opportunity to dis-

cuss in detail the technical apparatus involved. All here, especially engineers, will appreciate fully that many hours could be spent and many papers could be written on the subject but, with your permission, Sir, I will submit a technical description of a complete protective system incorporating automatic starting, paralleling and stopping which has recently become available as standard optional equipment. Mr. Asselberg's paper, however, raises matters of fundamental importance to many small municipal electrical undertakings, and I would like to comment briefly on these.

Now, as the author rightly surmises, automatic protection of Diesel Engine Generating Plant is not uncommon. Some such devices have been in use in this country for very many years and, in this connection, the work of the late Mr. Ardendorf should not be overlooked, and quite a few smaller municipalities in the Cape Province have had these devices in operation for a long time. Today, protective devices are standard practice on sets used by over sixty munipical power stations in this country. These devices serve to shut down the engine in the event of low oil pressure, high cooling water temperature and overspeed, while, of course, there are the standard protective devices on the electrical end. As a matter of opinion, I feel that this protection is really all that is required unless the system is to become too costly and too elaborate.

Suggestions which the author puts forward regarding the benefits which automatic protective systems can bring to small power stations are an important aspect of the paper and they call for comment. These sugestions immediately bring up a matter which is of paramount importance, and it is this. All who have had anything to do with the small power stations in this country and who have their interests at heart agree that the principal problem is that of adequate maintenance and supervision of plant. Under the excellent procedure governing municipal installations, which procedure involves the municipal engineer, an independent consulting engineer, the Electricity Supply Commission and the Provincial Administration, we must all appreciate that where any scheme reaches the point where plant is installed, then there is every asurance that that plant is of good quality and adequate to do the job for which it has been designed. It is an old truism, however, that an engine is only as good as the attention it receives, and this question of the attention which plant receives has been a matter of concern not only to the suppliers, who, of course, are vitally interested in their good name, but, I may say, that it has been a matter of concern to the Electricity Supply Commission. When all is said and done, even a small power station of 200 KW capacity represents a relatively considerable capital outlay and, furthermore, the operating expenses can be quite large in relation to the revenue of the community which uses it.

From an ultimate cost angle, the importance of adequate and proper maintenance supervision cannot be over-stressed and the councils of small municipalities should pay more attention to this aspect when committing themselves to the relatively large capital outlay which even a small power station represents, and if the discussion on this paper should promote even a little interest in this respect, a useful purpose will have been served.

I bring this up, not only to ventilate this matter of proper supervision of plant, but to correct any impression which Mr. Asselberg's paper might give — that a fully automatic system would minimise the necessity for supervision and maintenance. I am sure the author does not intend to convey any such impression. However, it must be appreciated that keeping such devices as he describes in full working order would be absolutely essential, and it is doubtful whether adequately qualified personnel would be available to do this, especially if the system was adopted because of the possible reduction in labour costs which it might make possible. I would rather see the wages of three shiftsmen consolidated to provide one good maintenance engineer rather than see them "saved."

Under the heading of "advantages" the author says that a station with automatic protection such as he describes will be absolutely fool-proof, but that surely is a doubtful statement because the automatic devices are still subject to human supervision.

Under "operating conditions" on page 8 of the pager the author indicates that suffi-

cient engine capacity should be available, i.e. with **n** engines running, **n**—1 engines should be able to meet the load. I am afraid that this condition would preclude the use of the complete system for the large majority of small stations.

It will be appreciated that the average small municipal power station is usually constituted of two larger units each of which is capable of meeting the peak demands, and a small unit for night loads. A typical sample is a station comprising two 75 KW sets and one 25 KW set. Such a station would cater for a peak load approaching 75 KW and the two 75 KW sets would ensure constant power in the event of a breakdown or maintenance work being carried out on one of the engines., while the 25 KW set would cater for the comparatively light night loads.

To be fully automatic in the manner suggested in this paper the two larger sets would have to work all the time at half-load, which would not be very satisfactory. However, for such purposes there is now standard equipment, which, upon failure of one of the units, can bring the other unit into operation and on to the bus-bars with only a momentary break. Such systems do not cost anything approaching the £500 per engine indicated in the paper. A typical system is now described:

Description

Fig. 1 illustrates the application of the various units of a completely automatic engine control system for starting, protecting while running, and stopping a Diesel engine as a stand-by source of power for for driving generators, pumps, compressors or any other unattended piece of equipment. The device is controlled by the closing and opening of a control circuit actuated by electric, pressure, temperature or humidity sensitive devices.

The main pictures in Fig. 1 are of a four-cylinder 50 KW generator set. The individual illustrations surrounding the main pictures show the installations of the various starting units on both 25 KW two-cylinder sets and on larger three, four and six-cylinder 35, 50 and 75 KW units.

A schematic wiring diagram displayed in Fig. 2 shows how each piece of equipment is wired into the electrical circuit. The diagram in Fig. 3 illustrates a typical installation of a Diesel engine- driven generator set equipped with the automatic engine starting and throwover. The discussion below under "operation" explains the function of each piece in the operation of the entire device.

As applied to the engine, the various pieces of the device may be divided into two classes — those mounted on the engine and those mounted in the control cabinet.

Those pieces mounted on the engine and the symbol by which each one will be identified hereafter are:

CM —Diesel Engine Cranking Motor.
WTS —Coolant Temperature Switch.
CMR —Diesel Cranking Motor Relay.
LOS —Lubricating Oil Pressure Switch.
FOS —Fuel Oil Pressure Switch.
ABD —Air Box Damper Solenoid.
OSG —Overspeed Governor.
FS —Fuel Rack Solenoid.
TS —Throttle Solenoid.

Those pieces mounted in the control cabinet and the symbol by which each will be known are:

CS —Control Switch.
TR —Timer Control Relay.
LO —Low Oil Pressure Relay.
WT —Water Temperature Relay.
OS —Overspeed Relay.
AR —Auxiliary Relay.
TM —Timer Motor.
C —Clutch.
L —Limit Switch.
L1 —Overcranking Indicating Lamp.
L2 —High Water Temperature Indicating Lamp.
L3 —Low Tube Oil Pressure Indicating Lamp.
L4 —Overspeed Indicating Lamp.
TB —Terminal Block.

The entire system is made ready for operation by the **control switch** (CS) shown diagramatically in Fig. 2. This switch has four positions, namely:

Position 1 — Automatic Test.
Position 2 — Automatic.
Position 3 — Off.
Position 4 — Manual Test.

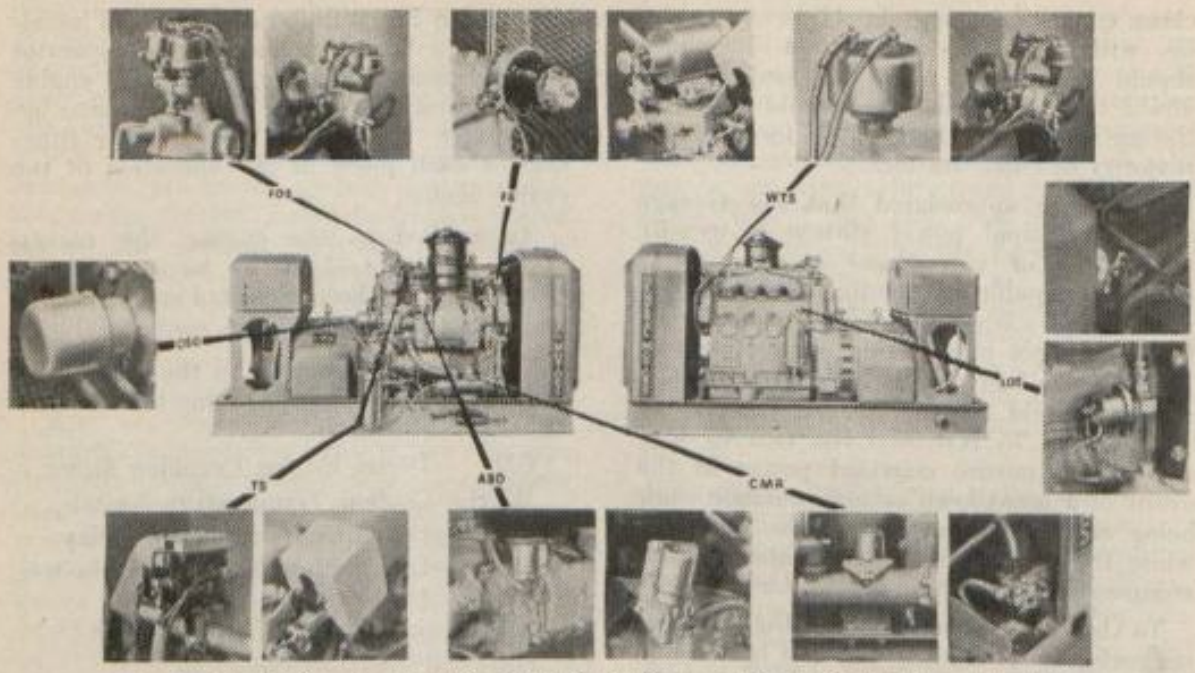


Fig. 1.—Application of Automatic Starting Device to a Diesel Engine Generating Set.

Position No. 1 — Automatic Test is used for periodic testing of the equipment by short-circuiting the contacts of the low voltage relay. In this position, when under normal conditions, the engine will start and continue to run as long as the control switch is on the automatic test position.

Position No. 2 — Automatic is used for normal operation of the set. In this position, the set will be started by the closing of the low voltage relay contacts and will continue to run as long as these contacts remain closed. When the relay contacts open, the set will shut down and the automatic starting equipment will reset for the next operation.

Position No. 3 — Off is used when it is desired to make the entire automatic engine starting equipment inoperative.

Position No. 4 — Manual Test is used for operating the set manually in the event the automatic starting equipment becomes damaged or inoperative. The set may then be started by pushing the starter button on the engine instrument panel.

Chief among the instruments mounted on the engine is the overspeed governor (OSG). This device consists of two flyballs which actuate a plunger and, in turn, operates two micro switches. When the engine is at rest, one micro switch is open and the other switch is closed. These switches have a four-fold purpose:

1. Serve to de-energize the cranking motor circuit as soon as the engine fires and reaches a self-sustaining speed. (Normally closed switch.)
2. Hold the cranking motor circuit open as long as the engine is running. (Normally closed switch.)
3. Reclose the cranking motor circuit as soon as the engine stops. (Normally closed switch.)
4. Protect the engine against overspeed. Normally open switch.)

The Motor Driven Timer Relay (TR) located in the control cabinet is equally as important as the overspeed governor on the engine. This relay is unique and important for the following reasons:

1. It responds to an impulse set up in the control circuit to start or stop the engine.
2. It controls the duration of the cranking and rest periods.
3. It determines the number of cranking and rest periods.

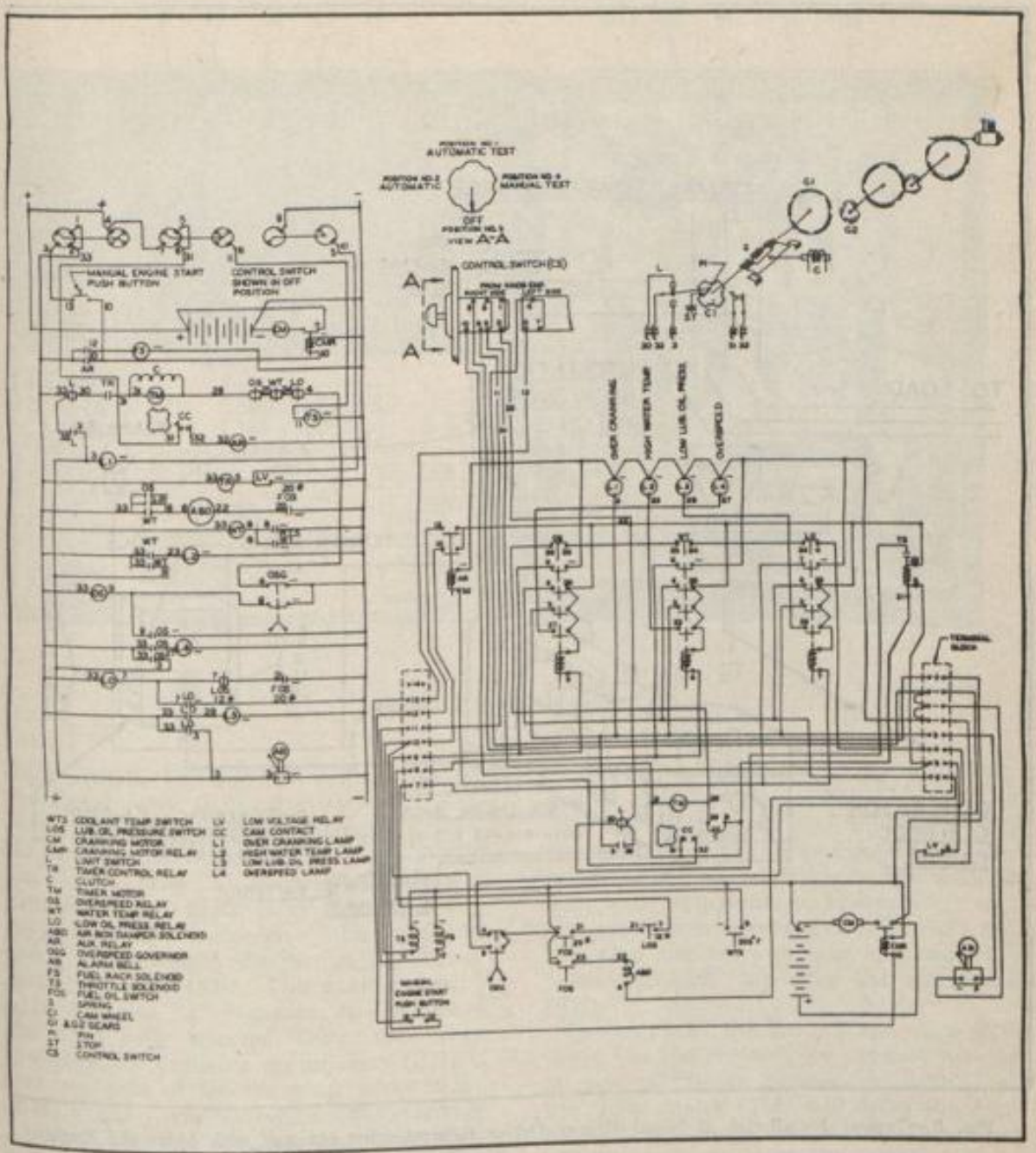


Fig. 2.—Schematic Wiring Diagram for Automatic Starting Device.

4. It resets itself after each successful start.
5. It rests itself after going through an unsuccessful series of cranking attempts and then locks itself out again against further cranking attempts.
6. The relay will not attempt to crank the engine after an abnormal condition has caused an engine shutdown.

The timer relay (TR) illustrated diagrammatically in Fig. 2 and photographically in Fig. 4 consists of a timer motor (TM) driving a train of reducing gears terminating in gear (G2), as one part of the mechanism; and a shaft—with a gear (G1) at one end and a cam wheel (C1) at the opposite end—in a hinged support and a spring (S) to return gear (G1) to its initial

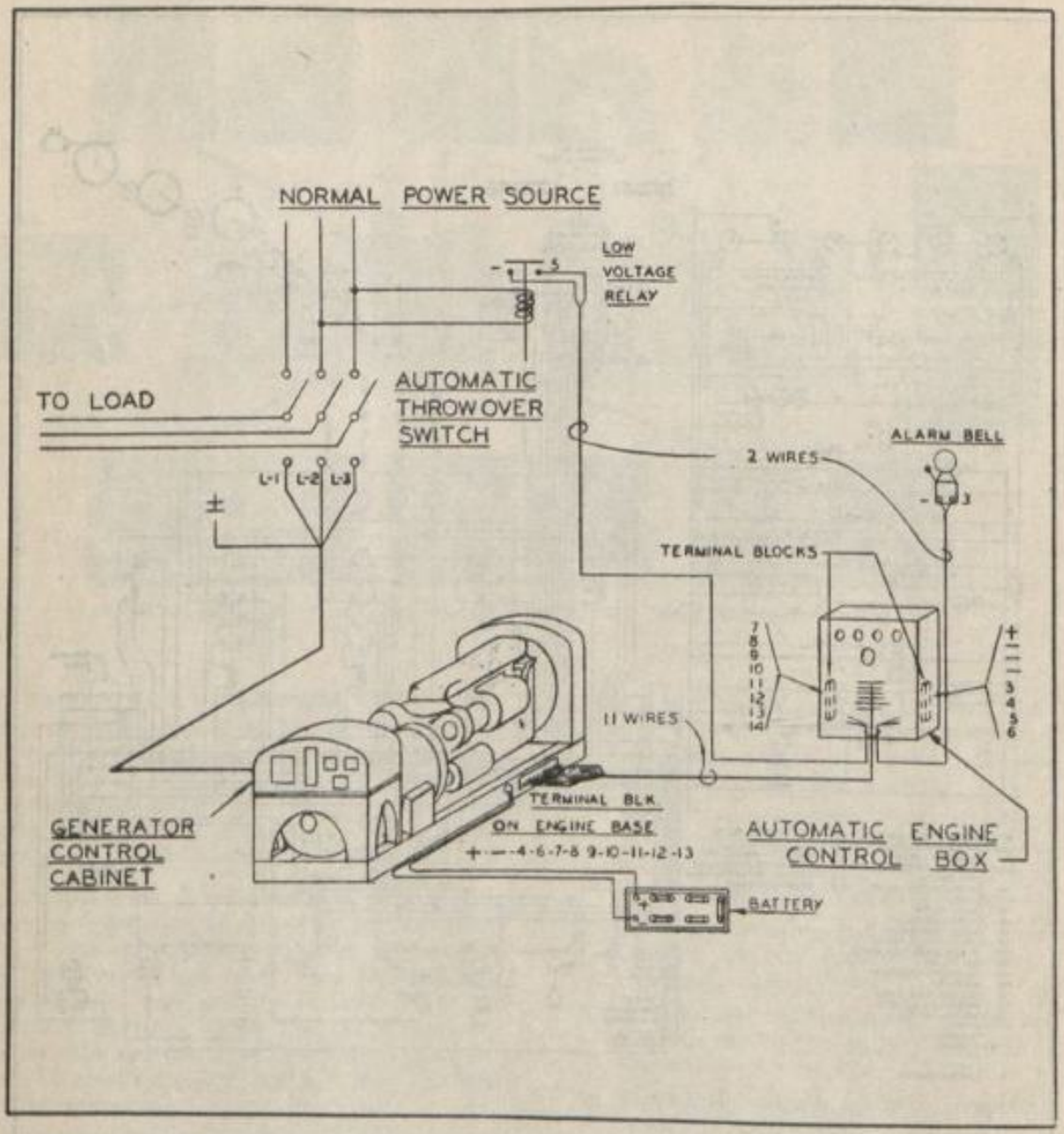


Fig. 3.—Typical Installation of Diesel Engine Driven Generator Set equipped with Automatic Engine Starting and Throwover.

position as the second part of the mechanism.

Normally, gears (G1) and (G2) are disengaged. When disengaged, spring (S) returns gear (G1) clockwise to its initial position until pin (P1) on cam wheel (C1) strikes stop (ST).

Operation. — Suppose the control switch (CS) is set in No. 2 position for "automatic" operation, as described on page 3; then the operation of the mechanism is as follows:

When an emergency condition arises — such as a failure of bus bar power — the low voltage relay (LV) contacts close, thus energizing the timer control relay (TR). When (TR) is energized, its "a" contacts close and energize the timer motor (TM), providing the "b" contacts of the

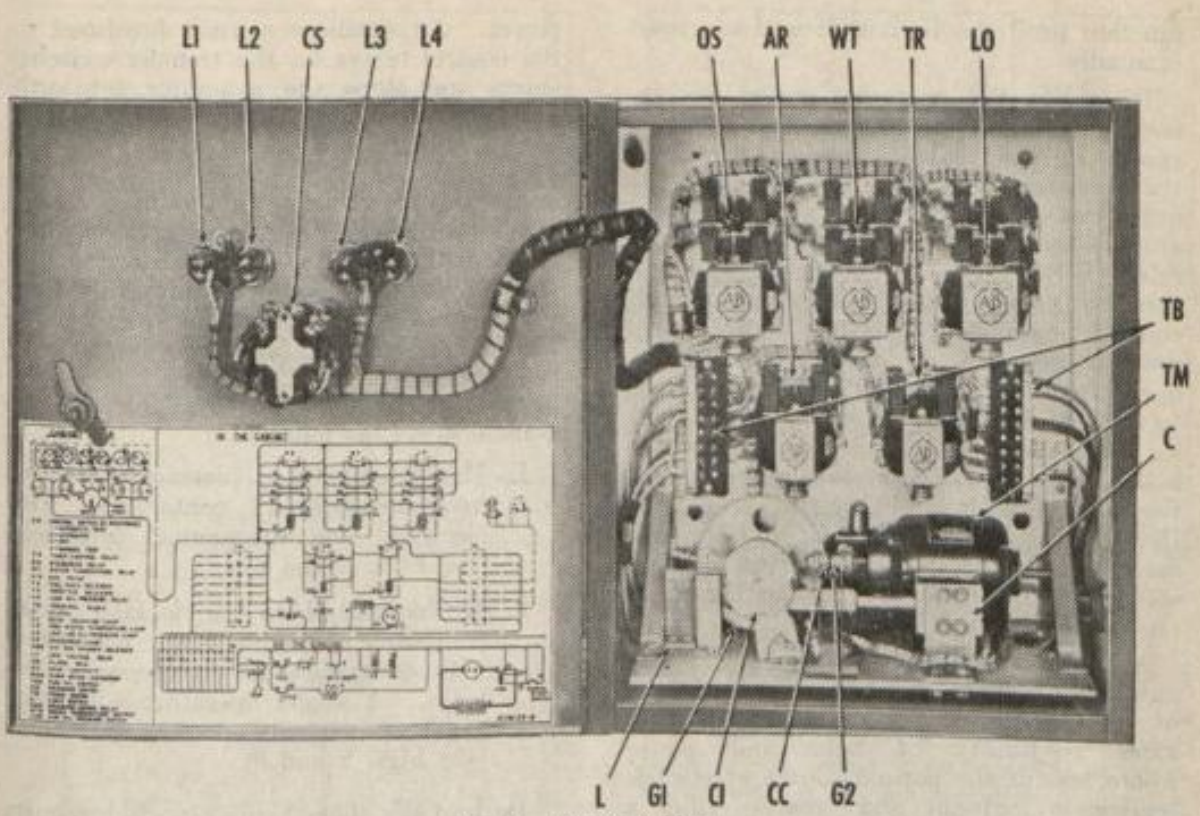


Fig. 4.—Control Cabinet.

limit switch (L), the "b" contacts of the overspeed relay (OS), the water temperature relay (WT), the low oil presure relay (LO), and the overspeed governor (OSG) are closed. The "a" contacts of the timer control relay (TR) also intermittently energize and de-energize the auxiliary relay (AR) through the cam-actuated contacts (31) and (32). The auxiliary relay (AR) has two "a" contacts: one energizes the fuel rack solenoid (FS), the other energizes the cranking motor relay (CMR). The contacts of the cranking motor relay (CMR) close and energize the cranking motor (CM). As soon as the engine fires and attains a speed of approximately 700 r.p.m., the "b" contacts (4-) on the overspeed governor (OSG) open and de-energize the timer motor (TM) and the clutch (C), which in turn de-energizes the auxiliary relay (AR), and it in turn de-energizes the cranking motor relay (CMR), which in turn de-energizes the cranking motor (CM). As soon as the clutch (C) is de-energized, the gear train breaks and the cam wheel (C1) returns to the starting position ready for the next operation.

The above sequence having been completed, the engine is running under its own power at rated speed and will continue to run until the low voltage relay (LV) opens or an abnormal condition arises such as high water temperature, low tube oil pressure, or engine overspeed; any one of which will stop the engine, light the respective indicating lamp and ring the alarm bell (AB).

In the event the low voltage relay (LV) closes but the engine does not fire, because of lack of fuel or mechanical difficulties, the timer motor (TM) will drive the four-lobed cam through one revolution making four attempts to start the engine. If, at the end of the fourth cranking attempt, the engine has not fired, the cam wheel (C1) will open the "b" contact (30) and close the "a" contact (3) of the limit switch (L), thereby de-energizing the timer motor (TM), the clutch (C), the auxiliary relay (AR), the throttle solenoid (TS), the fuel rack solenoid (FS), the cranking motor relay (CMR), and energizing the overcranking indicating lamp (L1) and alarm bell (AB). The device is now locked out and will not

function until the limit switch (L) is reset manually.

If, during the operating period, an abnormal condition should occur in the engine speed, in the coolant temperature or in the low oil pressure, the respective relay — overspeed relay (OS), or the water temperature relay (WT), or the low oil pressure relay (LO) — will be energized, which in turn will seal itself IN through an "a" contact, energize the air box damper solenoid to close the air inlet to the blower, open the timer motor (TM) control circuit to prevent an attempted engine start, light its respective lamp and ring the alarm bell (AB). As soon as the engine stops, the fuel oil switch (FOS), in series with the air box damper solenoid (ABD), will open and de-energize the air box damper solenoid (ABD) and prevent further drain on the battery.

A Diesel engine-driven generator set with automatic starting device and the addition of automatic transfer switches provides continuity of light and power where loss of the normal source of electric service is frequent and creates either a hazard or an inconvenience. Standard transfer switches are available which will transfer the load automatically to the generator set on failure of the normal source; also, will transfer the load back upon restoration of the normal source of power. An auxiliary contact furnished on the control relays for the transfer switches starts and stops the generator set automatically through the automatic engine engine starting device.

For the convenience of automatic starting device users, the following information is offered on automatic transfer switches to transfer electrical loads automatically from the normal source of power over to the Diesel generator set and vice versa.

Transfer switches are available in two general types, as follows:

1. Magnetically held, consisting of two magnetically-held contactors with electrical and mechanical interlocks (see Figs. 5 and 6).
2. Mechanically-held or locking type, consisting of double throw contactors with electrical and mechanical interlocks. A single operating coil energized momentarily operates the switch (see Figs. 7 and 8).

Both of the above types of switch require one or more low voltage relays to provide load transfer in an emergency when any normal line voltage fails below the minimum required and to return the load to normal when all normal line voltages have been restored to normal.

AUTOMATIC TRANSFER SWITCHES FOR ELECTRICAL LOADS

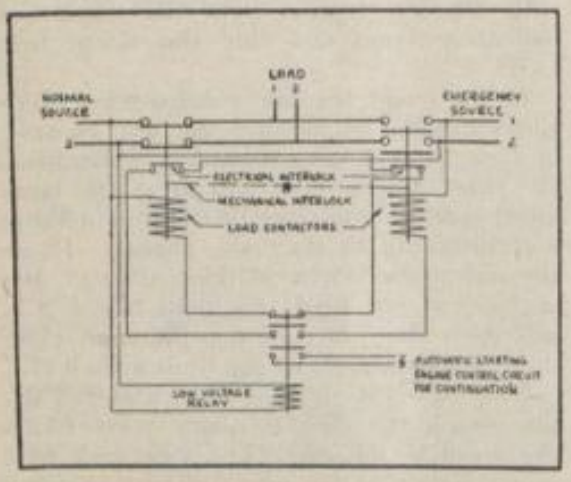


Fig. 5. — Magnetically-held Automatic Transfer Switch Wiring Diagram for Single-phase or D.C. Load.

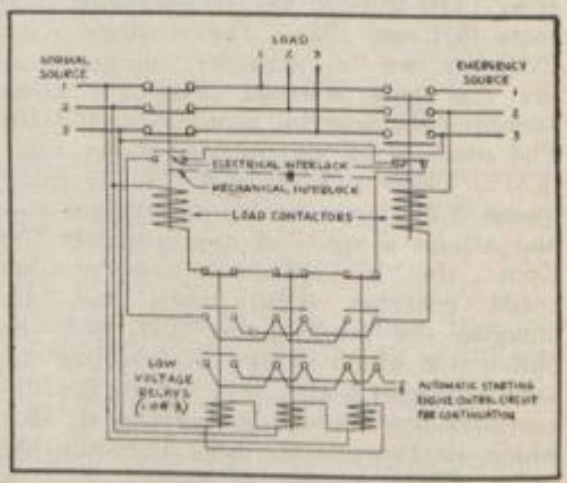


Fig. 6. — Magnetically-held Automatic Transfer Switch Wiring Diagram for Three-phase Load

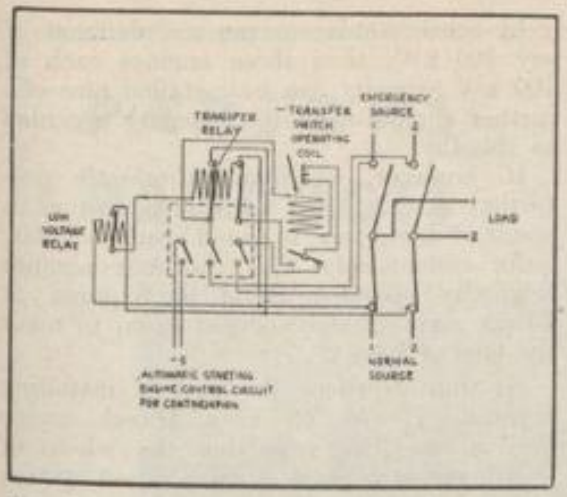


Fig. 7. — Mechanically-held Automatic Transfer Switch Wiring Diagram for Single-phase or D.C. Load.

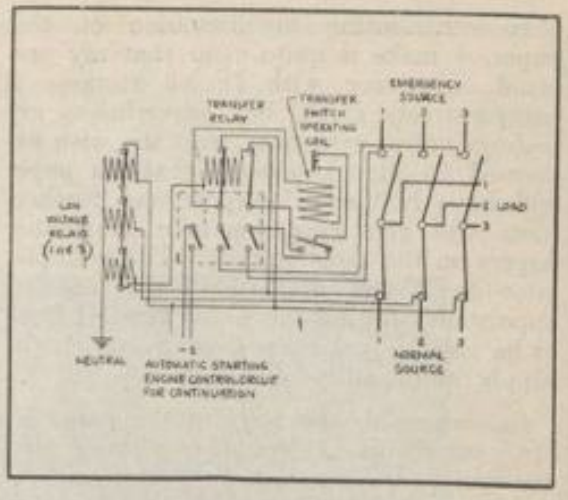


Fig. 8. — Mechanically-held Automatic Transfer Switch Wiring Diagram for Three-phase Load.

Three typesof **low voltage relays** are suggested for control:

1. Induction type low voltage relay having time delay in opening, closing, or both; also, can be adjusted to function on reduced voltage instead of complete voltage failures.
2. Standard auxiliary relay used as a low voltage relay. This type has no time delay feature on either opening or closing.
3. Dash pot type relay, having time delay features.

In cases where normal source of power is fed from an automatic substation, a time delay relay is recommended to prevent unnecessary starts and stops of the Diesel generator set during difficulty on a reclosing circuit.

Transfer Switch Capacity. — The capacity of the transfer switch should not be less than the capacity of the normal source of power or the capacity of the stand-by generator set, whichever has the greater capacity.

The author further indicates that with his automatic system installed the capacity of the station should preferably comprise a small number of large units rather than a large number of small units. This, however, may not be really economic and within well defined limitations an advantage might lay in having smaller units. For example, a station with a total installed capacity of 200 only comprising two 100 KW units, would lack flexibility in meeting various loads economically as compared with a similar installation comprising, say, two 75 KW sets and one 50 KW set.

One other point, the paper indicates the controls as operating on the fuel pumps: it may be found that shut down of the air supply is better, as this will ensure fuel in the pipe lines right up to the injectors and avoid damage to the pump, injectors or injectom-cum-pumps. I think that the special conditions at the author's substation have been favourable for this development and that such conditions do not always exist. Nevertheless, their success will encourage further research and development.

Mr. W. M. ANDREW, King William's Town:

Mr. President and Gentlemen: In agreeing to write a paper for this Convention on Diesel Plant, Mr. Asselbergs can rest assured that he has done the Convention a further service, and I heartily endorse his introductory paragraphs to the paper, particularly with reference to his statement that too few papers cater for the larger group of members who are interested in the small Diesel Generator Stations.

In contributing to discussion on this paper, I make it quite clear that my personal experience with Diesel Stations is comparatively short, but nevertheless my feelings are in sympathy with the wish expressed by Mr. Asselbergs that his paper will have fulfilled a purpose and furthermore will give encouragement to further papers on the same subject. For example, later on in this discussion or at another opportunity during the Convention, I hope to be able to make some comments on the supply and quality of fuel oils.

In coming to the body of the paper by Mr. Asselbergs, I would emphasise that my comments are put forward in a real endeavour to deal with several thoughts that occurred to me on their merits.

On the question of Automatic Protection of Diesel Engine Plant as put forward in the paper, it would appear to be essential to bear two important factors in mind.

The one is that the Diesel plant described by Mr. Asselbergs is in effect a standby plant to the hydro station, which Barberton is fortunate in having available, although obviously some of the Diesel units will be continuously required to make up the difference between hydro station output and the system demand.

And the second point is that it is essential to remember that the purpose of the system of automatic protection installed at Barberton was to avoid the duplication of staff under two different stations, and it is possible that the idea grew from the fact that the hydro station was comparatively easily adapted to automatic operation.

On page eight, under the heading "Operating Conditions," it is quite correctly pointed out that sufficient engines must be available to be able to meet the load should any one engine fail, namely if there are **n** engines on load than **n-1** engines should have sufficient capacity to meet the same load.

Now in a station with four similar engines installed to meet that requirement, it is only possble to reckon on 75 per cent of the capacity of each engine for available output, the remaining 25 per cent aggregate for each engine is the equivalent of a further engine required for standby.

In other words, to meet a demand of say 300 kW, then three engines each of 100 kW capacity can be installed plus one further engine of similar capacity regarded as standby.

If, however, we instal automatic protection and incurred additional cost as a result of doing this, it would seem to follow quite conclusively that the four engines originally installed would be required at 75 per cent capacity output each, to meet the load of 300 kW.

So that in effect the cost of installing automatic protection in a Diesel engine station used for supplying the whole of the power of a town or distribution system must not only be the cost of the automatic protection, but also the cost of an additional engine together with generator, switchgear, etc., and an additional cost of this nature becomes a little bit difficult to offset against savings of labour as may obtain on dispensing with the service of shiftsmen.

It is admitted that during periods of daily peak load, it would seem feasible to operate without an automatic protection being operative, and the station under manual attendants. This may mean that for a period or periods totalling three to four hours per day, the automatic protection is out of commission, but contrary to this point of view one is faced with a similar set of circumstances when any one of the four engines is under repair, and the period under such circumstances for manual attendants must necessarily increase for the same reason.

Assuming that in Barberton the hydro station is working as a base load station at high power load factor, I would be glad to have Mr. Asselbergs' description and method of operating his Diesel station, especially as he has pointed out that the hydro plant is not the essential part of the scheme at Barberton. One would have thought that with fuel costs affecting variable unit costs as they do to-day, the hydro plant would be used to maximum advantage.

On the other hand, it may well be that at Barberton the hydro plant is regarded as the fifth engine to which reference has been made already.

There are several other points arising in the paper on which I would be glad to have further information; for instance, Mr.

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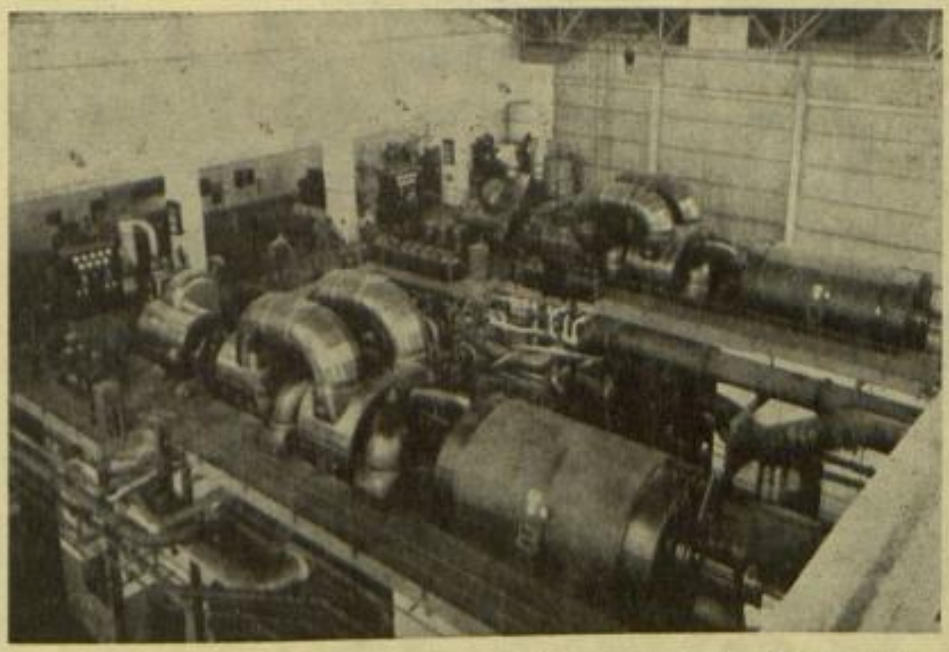

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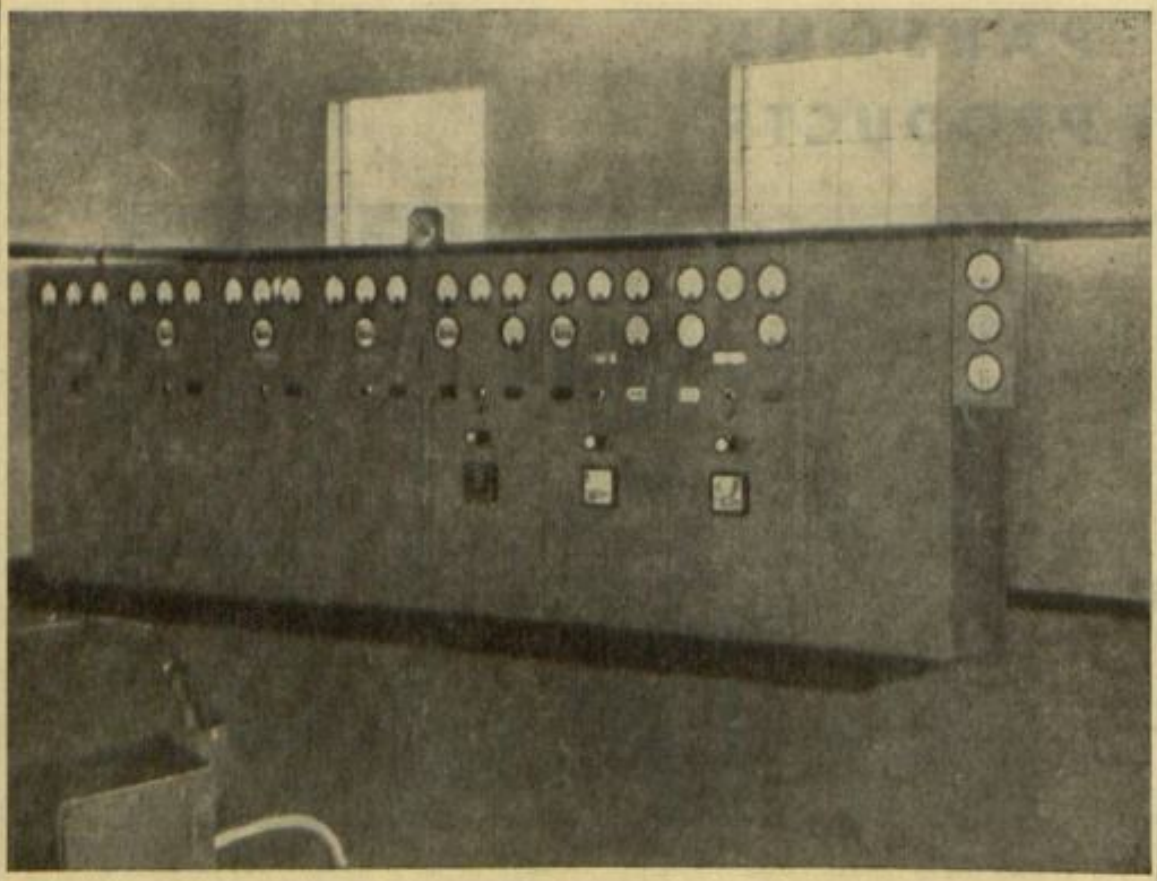

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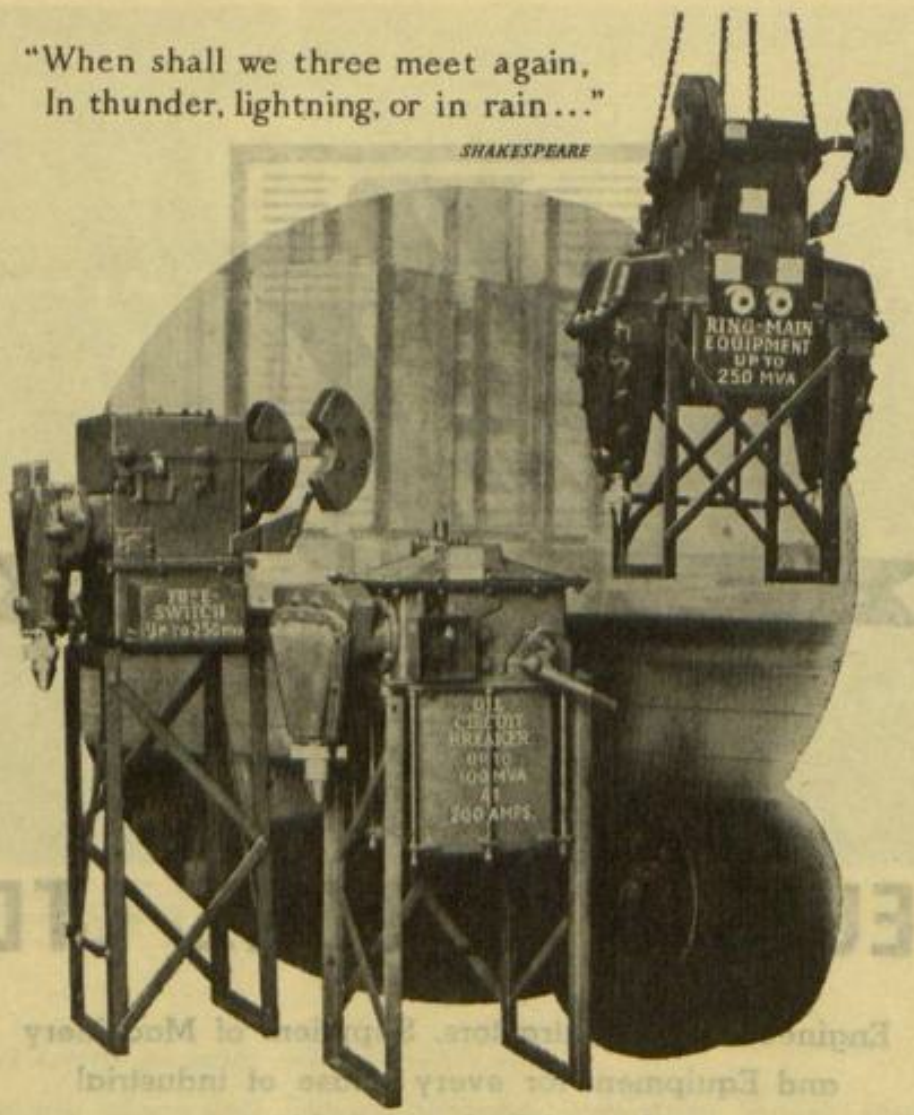

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Asselbergs' reference to all three shiftsmen, normally considered necessary to run a power station. I think that it would be more correct to say four shiftsmen are required, the fourth being a relief man.

Under the sub-heading paragraph "Description of Plant," we are given a very interesting insight to the arrangement of automatic protection at Barberton. Reference is made to the method of shedding load by means of a fuel cut-off arrangement. I would like to know whether the fuel is cut off entirely by this arrangement or is the gradually controlled operation of the valve such that a sufficient quantity of fuel will pass to enable the engine to idle, and whether there is no further arrangement for final stopping of the engine.

This question is put forward because it should be fairly well known that in certain arrangements of fuel oil injection, namely where the injector does the dual function of injecting and pumping, and the fuel oil is used as a lubrication for the pump, on no account must the engine be stopped by shutting off the fuel oil supply in the manner described. Where, however, fuel oil pumps are separate to injectors, it would appear that the fuel oil can be shut down in the manner described.

Mr. Asselbergs' reference in a few lines to rigid inspection, frequent testing and annually implied routine repairs prompts me to comment that in most smaller Diesel stations that I have been able to visit, the workshop facilities for repairs have been quite inadequate, and I would suggest to the Convention that a paper next year on Workshop Equipment for Diesel Stations together with essential testing equipment and tools would fulfil a further useful purpose.

Commenting on the protection which is installed in respect of each engine, it should also be borne in mind that a Diesel engine may fail for several reasons other than those mentioned; for example, failure of injector or failure of fuel oil pump or even the running of a main or big-end bearing, and it would appear to be essential that if a case can be made for installation of automatic protection, there should be reasonable certainty that the engine in fact will be shut down in the event of the above defects occurring.

In conclusion I would once gain express thanks to Mr. Asselbergs for his paper, which I can assure him has been very carefully read by myself, but I do believe that in any approach to the remarks set out in the paper, it is once again the question of studying and costing economically each case on its merits, and I would add that in my opinion there is much room for the installation of alarm equipment to give automatic warning of pending trouble in most existing Diesel stations. At present reliance seems to be placed on the shiftsmen's observations of instruments once every half hour or hour. There are certain essentials such as lubricating oil temperature and pressure, cooling water flow and temperature, which should of necessity be fitted with warning and/or alarm indicators.

Mr. F. STEVENS, Ladysmith:

Mr. President: I would like to congratulate Mr. Asselbergs on his paper which I read with particular interest as I once managed an undertaking with Diesel plant and was faced with the same problems that prompted him or his predecessor to convert their power station to automatic operation; that is how to cut down on the wage bill and eliminate mistakes made by some shiftsmen. What they attempted was a bold move in view of the adverse opinions expressed by the suppliers of the control equipment and that, as far as I know, there are no other instances in this country where a comparatively small Diesel plant comprising two or more sets is operating unattended. The Electricity Supply Commission has Diesel plant operating automatically at Volksrust, the difference being that it is built for operating unattended and is much larger than the plant at Barberton.

As the labour question is getting more difficult, it behoves the Engineers of Electricity Undertakings that are not likely to become bulk supply consumers for some time to take the opportunity that offers at this Conference to discuss with Mr. Asselbergs the working of Barberton's power station and satisfy themselves as to whether it is possible and worthwhile converting their own plants to automatic working. Thank you, Sir.

PRESIDENT:

Thank you, Mr. Stevens.

Mr. H. J. GRIPPER, Port Elizabeth (communicated):

Mr. President and Gentlemen: I would like to thank the author for his valuable contribution to our Proceedings and to state that the contents of his paper must be particularly encouraging to those of our members whose jobs are their hobbies. Most of us know how intriguing it can be to develop automatic operations or processes which save time or money and form a subject of continuous interest during the processes of development and in their subsequent operation. Much of the subject matter of this paper can be applied in other directions apart from the operation of Diesel engines.

The Municipal Electrical Engineer can show the interest which he holds in the welfare of his town by work of this nature, while on the other hand it is comparatively easy for him or his Council to take fright at the initial capital expenditure required and follow a path of somewhat less resistance only to find that the initial savings of capital and effort are followed by maintenance expenditure and some fairly unpleasant headaches.

The author's reference to his original automatic equipment being given publicity and yet not becoming common knowledge to firms who were required to tender for similar equipments later on, just indicates how fully the average Engineer's plate is filled to-day for he cannot hope to absorb all that appears in print. Conferences such as this, with visits abroad and to other centres are of considerable value, but in spite of this the Engineer is usually obliged to take his holidays on busmen's lines if he hopes to keep up to date to any extent at all. There is also the danger that later in life he may start settling down and taking less notice of developments and improvements, consoling himself with the thought that "we won't have that there here, so why worry!"

In automatic plants such as those described by the author, it is necessary to appreciate the importance of the part played by our old friend the accumulator. This accumulator or battery performs a very essential stand-by duty and its failure would mean the collapse of the whole essential stand-by duty and its failure scheme.

I note that the author, Mr. Asselbergs, refers to the necessity for running one more engine than would be required to carry the load and yet elsewhere he urges that the plant should preferably consist of a few large engines and not a greater number of small ones. It becomes very necessary, therefore, to watch the financial effect of these opposing factors in relation to the labour costs which are to be saved by automatic operation.

Dealing with the operation of the equipment described by Mr. Asselbergs, it will be noted that much depends upon the reliability of the reverse power relay on the electrical side. In fact this relay will probably be the one to operate before the under-speed protection apparatus, certainly in cases where other machines are running in synchronism.

In conclusion, I am pleased to note the author's remarks in parenthesis that many small power stations may be operating at a financial loss "**because** of high tariffs."

PRESIDENT:

Does anyone else wish to contribute to the discussion?

Mr. H. O. SMITH, Pretoria:

Mr. President: Of course I was not prepared to have to say anything on this subject. I have seen more plants operated than the average engineer; I think the only subject about which you are interested in to hear from me is how do the regulations apply to this type of plant. I take it that is what Mr. Milton invited me to speak on. Well, I have quite frequently had applications for exemption from one or two shifts operating automatic plants. The position, to my mind, is really quite simple and that is, what is the purpose of the regulations? The object is the preventing of accidents, safeguarding of life and limb, and to a certain extent preventing damage to the machinery itself because such damage might make it dangerous to life and limb. Therefore, regarding the main object of the regulations all you have to consider is this. If you run a plant automatically and it is perfectly safe, you are entitled to do so. The precaution you

should take, of course, is to lock up the place and see that no unauthorised person can enter the place whilst the machinery is running and interfere with the machinery and, if you are satisfied to leave this machinery entirely unattended, you are within your rights and you comply with regulations. The regulation says that any person operating machinery which for the avoidance of accidents requires constant attention shall not for any reason absent himself. I quote again: "which for the avoidance of accidents." If you are satisfied that there are no accidents possible, there is no reason why you should not absent yourself.

PRESIDENT:

Thank you, Mr. Smith. I think the time will only permit of asking Mr. Asselbergs to reply. He can, if he likes, give a written reply later.

Mr. P. C. ASSELBERGS, Barberton:

Mr. President: In the first place I would like to thank the various speakers for their kind remarks. It has been a pleasure to write the paper because I was convinced that the subject would be of interest to a good number of members present, although they apparently could not get that far to make a few comments. I will deal briefly with the few points raised by the various speakers. Mr. Ramsay mentions, amongst other things, the high cost of too much protection. Of course, protection is really a matter of economics. One has to work out what it costs to put it in and balance this against what one gets back. There is no limit to the amount of protection that can be installed. The sky is the limit but it is simply a matter of what returns one gets and each individual case must be worked out separately. You cannot apply general rules.

There is the question of a qualified fitter. You can eliminate shift work but you must have a man who is qualified in maintenance work. In Barberton there is only one man employed in the station and he is actually on shift during the day-time doing running repairs. Therefore we have not dispensed altogether with an attendant at the station.

There is the question of the number of engines required to be running. Mr. Andrew raised that point too. I realise there are stations which are very small, but even the smallest station should have a stand-by engine, and where automatic protection is installed this stand-by engine can just as well be running on part-load instead of standing idle. Therefore to run one engine more than is strictly required to meet the load does not mean the installation of an extra engine.

It has been mentioned to me by someone that he would object to the engines not running on full load all the time, the argument being that the fuel oil consumption would be higher running engines on half load than when running the engines on full load. However, I consider it a bad practice to run an engine continuously on full load. One sure way of ruining a good Diesel engine is to run it continuously on full load, notwithstanding the guaranteed maker's rating and the usual 10 per cent permissible overload. Apart from this consideration, the fuel consumption curve for a Diesel is fairly flat and the increase in fuel consumption would not be a big factor.

From Mr. Andrew's remarks it seems that there is some misunderstanding as to the methods of fuel cut-off employed. It would be impractical to empty the fuel lines as this would mean that all lines would have to be primed before the engines could be started up again. Instead of this, the cut-off is effected by stopping the fuel pump, i.e. the control racks of the fuel pumps are pushed in the "off" position. Therefore the cut-off system does not allow the engines to idle but stops them completely and immediately.

In reply to another of Mr. Andrew's queries, I must say that the hydro plant is not essential for the successful operation of the system; in fact, the hydro station in Barberton is too small—it is only about 80kW capacity. The system will work equally successfully with crude oil engines only.

With regard to the Factories Act, I am not sure whether Barberton did apply for exemption for running the station unattended. I must say that the Department of Labour has always been very co-operative even to the extent of giving us exemption from the requirements that a man who works on Sundays must be paid eight hours overtime, irrespective of the

number of hours worked. However, we never made use of this exemption for two reasons. In the first place it was realised that although a shiftsman had to turn out only for about half an hour on Sundays he was more or less on standby duty and it would not have been quite fair to pay him only, say, an hour overtime. In the second place, by the time we had obtained the exemption, the load on the station was so high that the only days available for doig repair work were the Sundays, and the number of hours worked on Sundays invariably exceeded eight.

I would like again to thank the various speakers, Mr. President, and I hope somebody will benefit from the various schemes I have described.

PRESIDENT:

Thank you very much indeed. Tea is ready and I would like you to cut it short because we have got a few other items on the agenda to finish besides the papers; so will you please listen for the bell and, when it comes, just come straight down.

Convention resumed at 10.50 a.m.

PRESIDENT:

Now, geneltmen, we have a quarter of an hour in hand before Mr. McDonald begins his paper and as Mr. Ritchie of the S.A. Bureau of Standards will not be here to-morrow we are reverting back to the discussion on the S.A. Bureau of Standards and Meter Testing Code.

Mr. C. MULLINS, Electricity Control Board:

Mr. President: Yesterday Mr. Ritchie mentioned that the Meter Testing Code was awaiting the decision of the Electricity Control Board in regard to the promulgation of the code on a national basis. As a member of the Control Board, I can assure you that the Board is not satisfied that all Municipalities wish the compulsory testing of meters to be brought into being, because many of them will have to put up their own stations. It is no mean matter, and as the Board has not had sufficient information or proof that the error of existing meters really warrants such an enormous expenditure for a purpose of this kind, it is not prepared at this stage, and until it is satisfied on these points, to incorporate the Meter Testing Code in its regulations. It is no small matter to despatch meters to a testing centre; it is a costly business and if these meters have to travel far, I feel very perturbed about the result of the first meter reading and, furthermore, it would mean that Municipalities would have to have a larger number of meters to replace meters taken out for testing. It is generally understood that the requirements of small Municipalities could be met by a sub-standard or master meter for checking their own meters. When all is said and done, if a consumer has a complaint about his meter he can have it tested and if the meter is in error, the authorities put it in order; if on the other hand the meter is found to be correct he has to bear the cost of the test. I understand that the cost of testing a meter is going to be in the neighbourhood of 16s. to £1. Some few years ago a couple of meters could be bought for that price, so why put an unnecessary charge on to those small Municipalities who can ill afford to increase their charges. As previously stated, the Board is not prepared to incorporate the Meter Testing Code in its regulations until it is more satisfied that the errors in existing meters warrant it.

PRESIDENT:

Thank you, Mr. Mullins. Are there any further comments on the S.A. Bureau of Standards address by Mr. Ritchie and this question of the Meter Testing Code?

Mr. G. J. MULLER, Bloemfontein:

Mr. President: Just a few words. As regards Mr. Ritchie's paper yesterday the only question that is worrying us lately, to which the Bureau can be of great assistance (I have chatted about it with Mr. Ritchie so that this matter can perhaps be accellerated) is the question of materials arriving on the market which we cannot readily prove their worth. We do not always have the facilities, nor the time, and feel that it should be possible for the Bureau of Standards to make it imperative for material to be labelled in some way, or to have some registered tag, to indicate that it has passed the Bureau's requirements. We have recently had a washing machine which is extremely poor. It

should be very clear on any material so that consumers may know that this material complies. I am rather sorry that the Control Board has taken up the attitude that they are not satisfied that the error in meters is large enough to warrant the expense. I feel very strongly on over-legislation bordering on Bolshevism, but this is not a socialistic measure. It is more or less on a par with the Weights and Measures Act.

Mr. J. RITCHIE, S.A. Bureau of Standards:

Mr. President: As I stated yesterday, we do not undertake any work unless we are requested to do so, and I would like to make it quite clear that we drew up this code at the request of the Municipal Electrical Engineers. I do not wish to enter into the argument as to whether it should be put into operation or not. We are only there to render a service, that is to do the required check work under the Meter Code if it is put into operation. I do not think we need go over all the arguments again as to whether the meters are accurate or not. Mr. Muller drew attention to some which were 10 to 15 per cent out. Mr. Mullins has remarked that the meters may not be able to travel. Care has been taken of that issue and special cases have been designed. In England similar cases are used and I don't think there need be any fear of damage. The testing cost of course includes cleaning and overhauling.

With regard to Mr. Muller's point, I am afraid we cannot undertake the approval of any imported articles at the moment. A Commonwealth conference will be held next year at which we will discuss this question, but at the moment we cannot extend the scheme to imported articles.

PRESIDENT:

Thank you very much indeed, Mr. Ritchie. I think now we can get on with Mr. McDonald's paper, that is, The Engineer in the Office.

"THE ENGINEER IN THE OFFICE"

F. G. McDONALD, A.M.I.E.E.,

Assistant City Electrical Engineer and Transport Manager, Pietermaritzburg

INTRODUCTORY

An Engineer in charge of an Electricity Department is apt to concern himself primarily with those aspects of his Department—and those items on his Estimates—which come under the headings "Generation" and "Distribution," and to regard matters of "Management" or "Administration" as so many necessary evils which take up far too much of his time. He will make it his duty to search out inefficient practices in his Distribution system, but he may often permit wasteful methods to carry on for years in his office, unnoticed and unchanged.

Although he may spend 90% of his time at his desk, an Engineer may leave the actual running of his office to his clerks, the specialists. Or, particularly in the smaller Undertakings, he may think that office organization is not a matter for his Department, but should be looked after by the Town Clerk, or the City Treasurer.

An Electricity Department is only one section of a Municipality, and very important matters in its administration may lie right outside the control of the Engineer. This does not mean, however, that he should take no interest in the "office" side of his Department. It is the purpose of this paper to focus attention on some ways in which attention to "office-work" may improve the efficiency of an Undertaking.

I have divided these matters into two classes:

A. Matters essentially clerical where engineering methods can bring improvements.

B. Matters essentially technical where good office methods can improve efficiency.

And I have concluded with:

C. Some notes on Charts.

In spite of its title, my paper does not concern mechanized office systems, steel furniture, or inter-communication sets.

A. ENGINEERING METHODS IN OFFICE MATTERS

The office side of a Department is a mixture of secretarial and accounting work, with typists, pay clerks, cost clerks, record clerks, and ordinary clerks, all busy at their own particular jobs; most of them content to keep established routines going, and happy when their work is "up to date."

Yet in most cases, these established routines have not been designed—they have evolved. Like Topsy, nobody never made them, they growed. Perhaps they started off simply, but as the job developed, little modifications were made from time to time to meet new requirements. Often these modifications remain long after the reasons that introduced them have ceased to be.

A thorough investigation into how any particular job gets done will unearth in most cases a complicated procedure that involves files, cards, books, forms, chits, telephone calls. The machinery works, but it is of Heath Robinson design.

Now, it is not safe to tinker with a Heath Robinson machine; if one cog is left out, the whole machine may stop. It is much safer to "rub it out and begin again."

To start a new office routine means first to strip this existing procedure, and to find out:

(1) What the job is,
(2) Where the facts and figures come from,
(3) Who is interested in the result, and why.

After that it is only a matter of designing stationery.

In the following notes, an attempt is made to indicate various ways in which office routine can be improved. In all cases, examples are given of actual changes made in Pietermaritzburg. To give full details in every instance would be tedious; specimens of the actual stationery used can be supplied to all interested. After each separate change has been made, the notable thing has been, not that a new method was introduced, but rather that the old method persisted for so long.

1. FILING AND THE TREATMENT OF CORRESPONDENCE

The most important thing in any office is the Filing System. A bad filing system means a muddled organization, waste of time, and duplication of work. Most Undertakings will have proper filing systems in use, but many have not. The following notes on the Pietermaritzburg system are mainly for the benefit of Engineers in the smaller Undertakings.

Subject Filing. Our letters used to be actioned "loose," then filed by the name of the Addressee, and indexed on cards. Important matters became spread over several files, and all files dealt with a variety of subjects—important and petty. From this we changed to a system of filing all papers by Subject. Each file now contains a complete story, with letters, reports, memoranda, cuttings, etc., all together To minute any file to an official puts him in possession of the whole story. The main features of the system are given below:

File List. A list of files is issued to all officials and sub-Departments.

Files are numbered 1-300, and grouped:

1-99 Administrative matters, Staff matters, etc., which are common subjects to the whole Department.
100-199 Electricity Department matters.
200-279 Transport Department matters.
280-299 Traffic matters.

This main grouping is of course peculiar to our special local requirements.

For convenience, file covers are tinted Buff—Administration, Pink—Electricity, and Blue—Transport, and suffix letters /E, /T, and /Tfc are added to file numbers.

A typical block of files is 65-69 Conferences, and a typical family of files within the block is:

65/E	Convention, A.M.E.U.
65/1/E	Convention, A.M.E.U. 1950, Pietermaritzburg.
65/1/1/E	Convention, A.M.E.U. 1950, Programme.
65/1/2/E	Convention, A.M.E.U. 1950, Delegates and Accommodation.
65/1/3/E	Convention, A.M.E.U. 1950, Proceedings.
65/1/4/E	Convention, A.M.E.U. 1950, Sundry.
65/2/E	A.M.E.U. Rand Undertakings —Minutes of Meetings.

Files are cross-referenced with the Town Clerk's and other Departments' files, but no work is ever done except on our own files. With each new aspect of a matter, a new file or sub-file is opened. When a matter is concluded, the file is closed. Its number could not be re-used. Files like 12/1—Minutes, Electricity Committee—simply carry on from year to year.

Correspondence. Corespondence received is noted in a Register, and placed immediately in the appropriate file. The file number is noted in the Register, so that it can be traced later. The letter (now an enclosure on the file) is minuted to the official responsible. He will of course make sure that all outgoing letters bear the correct Reference Numbers, so that he can find them again. File covers record all movements of the file, and enclosures record all action taken.

The file cover is more than a container into which letters can be put so that they can be found again—it is a tool to help with the administration and technical work of the Department.

Daily File. A special copy of every letter going out from the Department is prepared for the "Daily File." This is an "Information" file which is circulated to all senior officials so that they may know what is going on. Two folders are in use—which circulate on alternate days, so that one is always ready for the day's correspondence, and the file circulates *quickly*. Confidential letters are not circulated, neither are letters concerning staff personal matters.

2. ELIMINATING REPETITION

A check on an office routine will often show that some steps in the work are mere repetition and can be dispensed with. As an example:

Consumers' Records. We maintain a Card Index of Installations, showing apparatus installed, Meter Number, etc., and also the results of Tests and Inspections. We have replaced the Cards formerly used by Envelopes, ruled on the outside exactly as cards. Previously, the summarized particulars of each new Inspection had to be entered on the Cards, transferred from the Inspector's Reports by a clerk specially employed for this job. Now, the whole report is just slipped inside the Envelope.

We have now a more accurate record, with much more information, and less work.

3. ENCOURAGING DIRECT ACTION

Duplication of effort can also be avoided by encouraging every section of the staff to do their work in a direct way, so that work goes out, and does not just circulate within the Department. When an official deals with an incoming letter, for instance, it is better that he submits a draft reply rather than a report giving the information on which a reply must be based. As an example:

Installation Inspectors' Reports. Our Inspectors used to pass manuscript reports on their Inspections to the typing office, from where letters advising consumers of defects found were sent out as required. They now carry a pad of pro-forma Inspection Reports. When an inspection is made, they hand a Report, noting any defects found in the Installation, to the consumer or contractor. Carbon copies are retained for office and "follow-up" use. The system saves time and typing, and rules out reports of defective wiring being "lost in the post."

4. HELP FROM THE DRAWING OFFICE

Drawing Office methods are much better than typing and duplicating for many types of office records, and particularly for schedules which are required for reference by several people, and which must be amended from time to time. As an example:

Substation Register. Schedules giving particulars of Substations once had to be typed out regularly for all sorts of purposes —Rents, Rates, Insurance, etc., and for technical uses within the Department. These schedules were flimsy, and their accuracy was always in question. We now have a permanent "Substation Register," which consists of a folder containing a dozen sheets of printing paper. The original sheets are on tracing cloth, specially ruled. The schedule shows all the information required for Fire Insurance, Rents, Rates and other "office" purposes, as well as basic information required by the distribution staff. The master tracings are kept up to date at all times, and any number of sets of prints (with Revisions indicated in ordinary Drawing Office style) can be prepared whenever required. The new Register is accurate and convenient. It is durable and remains legible when in daily use.

Similar methods are used for other schedules which are subject to periodical amendment and modification—Registers of Road Vehicles and Plant, of Wayleave Agreements, of Street Lights, Pole Signs, etc. Most of these schedules are on foolscap sized paper.

5. FORMS AND SPECIAL STATIONERY

It is a custom to make jokes about filling in forms, and it certainly has been known for specialists in Government Departments and military organizations to deal with simple matters on very complicated stationery.

Nevertheless, printed forms can be most useful devices for doing office work. Whenever clerical routines are repetitive, they can usually be made easier and more accurate by specially printed stationery.

When designing a form the aim is to make the form do the maximum of work for the clerk.

(a) Forms should be easy to fill in. A good type of form is the one on which there is little to do but mark selected headings with an "X."

(b) Forms should carry their own addresses. When raised in duplicate or triplicate, each copy should show its destination.

(c) Forms should be of sensible size, so that they can be filed easily. Tinted paper and distinctive type help towards easy identification.

(d) Forms should bear concise titles, so that they will be referred to correctly.

(e) Unless their application is obvious, forms should have printed on them notes explaining when and how they are used.

(f) If one form can be used for a number of related purposes, this is better than having numbers of separate forms.

As an example:

Accounts Memoranda.

In Pietermaritzburg, meter changes, new connections, disconnections, etc., are handled by the Electricity Department, and "memoranda" are sent to the City Treasurer's Accounts Office advising the changes made. It is important that these "memos" should be accurate, and that they should be sent over with little delay; they constitute the mechanical links between the City Treasurer's office machinery and our own.

We used to use cyclostyled "Memo Sheets," with typewritten entries, using separate sheets for each purpose — New Connections, Meter Changes, Changes of Scale, Check and Transfer Readings, etc. (information on each of which is received from a separate source). These sheets have been replaced by printed triplicate pencil-carbon memo forms, used for all purposes, and sent over daily. One copy is used for amending Meter Books.

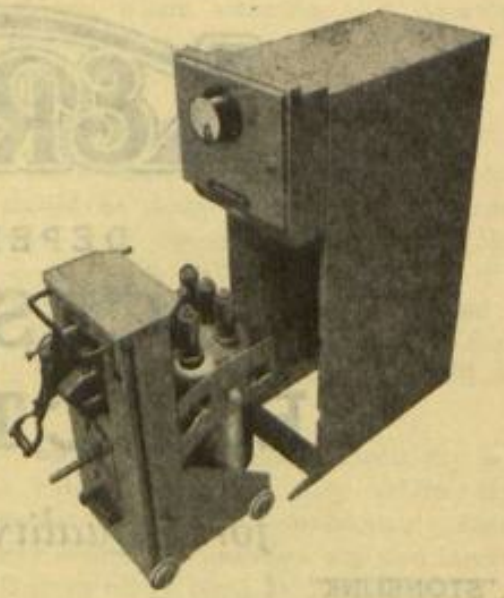
In dozens of similar matters, large and small, in

Applications for New Supply,

Advices of Connection Fees,

Commencement and Completion Notices,

Ferguson Pailin Ltd.



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B. OFFICE METHODS IN ENGINEERING MATTERS

The basic organization and, in the limit, the efficiency of any Municipal Department is determined for it by the set-up of the municipality itself: electricity departments will differ greatly from each other according to such things as

(1) Whether Committees meet weekly or monthly; and whether it is their custom to have long meetings, or short.

(2) Whether minutes are taken as executive authority, and freely circulated, or whether authority is given only by instructions from the Town Clerk.

(3) Whether the Corporation's Buying and Stores organizations are technically good, bad, or indifferent.

etc., etc.

I am omitting all reference to these basic matters in this section of my paper. Care should always be given to the design of Works Order Forms, Stores Orders and Requisitions, Estimate Sheets, etc., to try to save work, but such stationery must always be designed to suit special local circumstances which will not obtain elsewhere.

Careful attention should also be paid to the drafting of Electricity Bylaws. Bylaws are often framed (and interpreted) on academic lines, with little regard for practical engineering, and we have found it possible to simplify work in all sections of the Department simply by rewording a Bylaw. Again it is only the principle that can be noted—details are of local interest only.

The notes which follow deal with matters which could concern other Undertakings, where attention to "paperwork" has benefited the engineering side of our Department.

1. TARIFFS

It is sensible that Electricity tariffs should be designed to suit each type of load—that special loads should obtain special rates. Yet the tradition of the "tailor-made" tariff can be carried too far. A tariff which is technically correct to the Meter Department may still be a bad one.

The business of selling Electricity is not a matter concerning only cables, transformers, energy and electricians. Clerical and accounting processes are also involved. Human errors must be allowed for, as well as metering ones. It is probable that in the past tariffs have been designed with too much regard for technical problems, and too little for the problems of their practical administration. In many Undertakings tariffs have become too complicated and need streamlining.

In Pietermaritzburg we introduced last year a completely new tariff, intended primarily to encourage the domestic water heating load (which used to be negligible). The tariff was designed to leave as nearly as possible unchanged the big majority of consumers' accounts, and to eliminate sources of trouble *in the office* as well as on the network.

The main features of our new tariff are:

(a) **Simplicity**

We used to have 8 scales for in-borough, and 8 more for out-of-borough consumers. We had separate scales for Lighting, Heating and Power, and we had 2 scales which required time-switches. We now have "all-in" scales for all consumers, as follows:

(i) A "Domestic" tariff, with 2 steps, based on number of rooms.

(ii) A "Commercial" tariff, with 2 steps, based on rooms or floor area.
(iii) A "General" tariff, of the "block" type, with 2 steps, for use where a room or floor area tariff cannot be applied.
(iv) A Flat-rate tariff for Temporary Supplies.
(v) For large Consumers, a kVA Maximum Demand tariff, based on the E.S.C. tariff on which the Corporation is charged.

Out of borough consumers are charged on the same scales, plus 25%.

(b) **Saving of Meters**

Many houses and most businesses used to have two or more meters installed. We now have only one meter per consumer. Over 1,400 meters were recovered in the changeover, from a total of 8,200 consumers. No house service meters have been purchased for two years and we have stocks for a further 3 - 4 years. This means, of course, a proportionate saving on Meter Testing costs in future years.

(c) **Accounting**

With a 15% reduction in meters, there is the same reduction in meter accounts.

(d) **Stopped Meters**

Many "power" and "heating" loads are seasonal, and the old tariffs allowed numbers of meters showing no advance for several months at a time. Because of this, Stopped Meters were not easily spotted by meter readers. Now, with one meter per consumer, meter readers can easily check whether or not a meter showing "no advance" is in working order.

The system reduces errors, and makes it much simpler to notice irregularities.

(e) **Anomalies**

The old tariffs sometimes resulted in queer behaviour. For instance:

(i) To plug a reading lamp into a socket outlet wired for heating was not permissible (though often done). People who did it obtained 6d. units for ¾d.
(ii) A separate circuit had to be wired, and a separate meter installed, for the motor in a tearoom refrigerator, or for the air circulation fan in an electric incubator.
(iii) A light over a machine tool, or inside a petrol pump, meant, in the letter of the law, a separate lighting circuit, and even a separate account.

These stupidities have vanished with the old tariffs.

(f) **Installation Costs**

It is much cheaper, particularly in large buildings, to wire for one tariff, than for two or three.

(g) **Changing Methods**

The swing-over which is now being made in offices and shops from incandescent to fluorescent lighting is serious to a Department which depends on high-priced "lighting" units for the bulk of its income. So might be a change in social habits, like the adoption of daylight saving.

With the "all-in" tariffs, the seasonal variation in revenue, from winter to summer, is smoothed out, and a damper is put on the effect which social or technical changes might have on the Department's revenue.

(h) **Water Heating**

The new tariff offers the ½d. unit to any customer who makes fair use of Electricity at higher rates, so that water heating is economical to those who already use Electricity for lighting and cooking.

The old tariffs did not encourage Electrical water heating.

(This point is off my theme, but is mentioned in passing; the improvement which this load is making to load factors in suburban areas is remarkable.)

(i) **Control**

With the 2 step tariff of the form:
"Quota at 6d.,
" " 1d.,
Thereafter ½d."
it will be possible to adjust the tariff **without affecting its form** to keep pace with changes in operating costs, by adjusting the number of units on the intermediate 1d. step, or even by changing the intermediate step from 1d. to something else. With other forms of tariff, an increase means either a decision as to which type of consumers must suffer, or a surcharge of so much per cent all round. These surcharges are the path of least resistance; they "snowball," and they must become awkward when later increases must be made.

(j) **Result**

Our tariffs were changed primarily to allow the use of waterheaters. But in their design, as much importance was attached to *how they were to be applied* as to the theoretical correctness of the charge. To have a simple tariff, with few sources of error, was the aim.

In the eventual result, it is probable that the simplicity of the new tariff may be just as important as the actual £.s.d. level which it fixes.

The tariffs were brought into force in August last.

The results to date are:

Units Purchased (6 months Aug.-Jan.)—

1948/49	1949/50	Increase %
23,415,000	28,010,000	19.6%

Revenue (6 months Aug.-Jan.)—

£100,699	£115,103	14%

This rate of increase, though normal for Rhodesia or Odendaalsrus, is unprecedented for steady-going Pietermaritzburg. Our average rate of increase is 9½% per annum, and has been 10%, 11.5% and 13% in the three years since the war.

2. STREET LIGHTING RECORDS

Street lamp changes have always been recorded in Maritzburg, but during the war the system became overloaded and inaccurate. The method of keeping the record did not lend itself to regular analysis of the information.

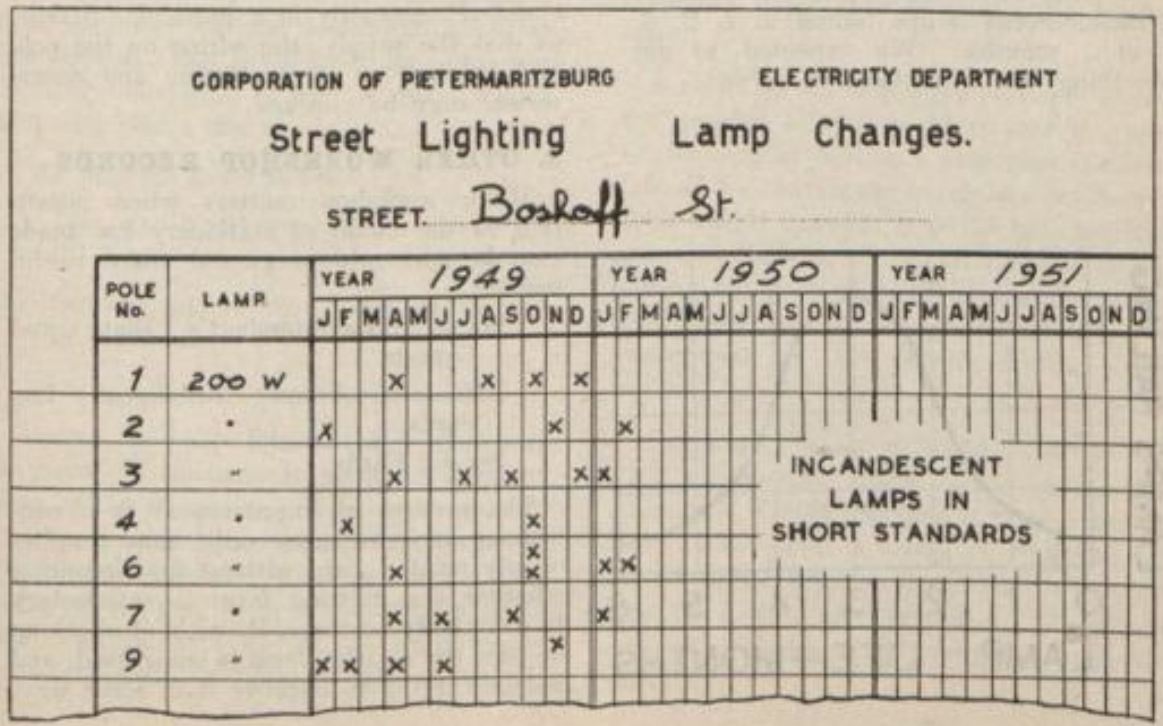
Census. To start off a new system, a complete census was taken of all street lights in the town. We found there were 3,173 lights erected instead of the 2,680 we thought we had.

Recording Lamp Changes. "Lamps out" are reported by patrol boys on bicycles, who hand in "chits" to the workshops. "Lamps out" reported by telephone are added to these. (Poles in every street are numbered serially so that lamps are identified by street and pole number.)

A Log Book is maintained in the Duty Room, and at the conclusion of their shifts, Faultsmen or Street Lighting Maintenance men enter up details of lamps changed, new fittings erected, or fittings removed. The type of lamp and wattage are given; all lamps replaced are returned to the workshop for test before scrapping.

On an average day about 30 lamps are replaced.

The Workshop Clerk transfers information each day from the Log Book to a Lamp Change Register, which is used to keep a check on lamp life. The method of keeping this Register is shown below.



Results. The book has proved for us once more the futility of test results except when taken on large numbers.

We find that:

(i) High Pressure Mercury Vapour Lamps in properly designed lanterns very often give lives of over 12 months (4,000 hours burning). Sodium Discharge Lamps burning in jackets can also give very long lives, but our experience with these is still only limited.

(ii) The expectation of lamp life based on manufacturing experience and laboratory tests are of theoretical interest only. Lamp life is affected by:

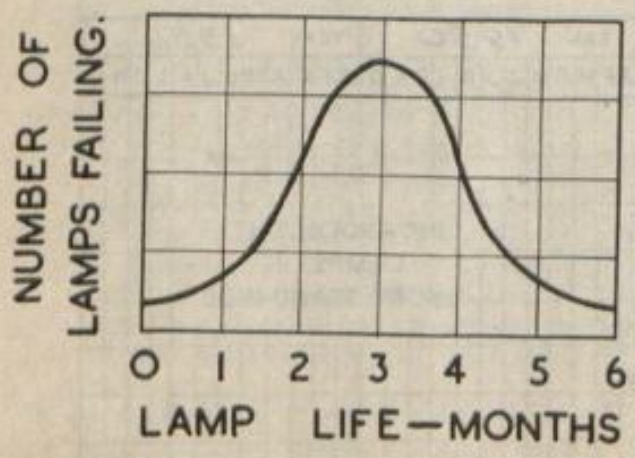
(a) Handling before erection.

(b) Type and condition of fitting. Lamps in waterproof ventilated fittings last the longest. Lamps burning in lanterns, in the inverted position, have shorter lives than lamps in hanging fittings.

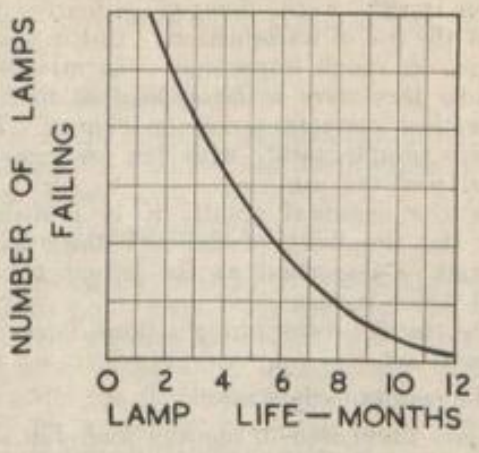
(c) Voltage. We are experimenting with 240V lamps in outside areas where long life is desirable.

(d) Small boys, rain, hail, heavy winds, and branches of trees.

We plotted after 12 months the numbers of incandescent lamps failing in 1, 2, 3, 4, etc., months. We expected to get something like a probability curve:



Instead, we got:



This result is surprising, even allowing for errors and incorrect data supplied, and for the fact that when lamps are changed by day, a wiring fault is often booked down as a faulty lamp. (Stores issues of lamps, over a period, are always less than the number of lamp changes recorded.)

It seems that if a lamp survives its first few days, or weeks, then it has a fair chance of burning over 1,000 hours, and that economy in street lighting maintenance can be got more by looking for the causes of early failures than by buying lamps with a longer designed life. The main use of our Register is to show up when lamps are changed repeatedly in a particular fitting; so that the supply, the wiring on the pole and bracket, or of the fitting and accessories, may be checked.

3. OTHER WORKSHOP RECORDS

Minor workshop matters where attention to the detail of stationery has made records easier to keep and more useful include:

Mains Superintendent's Diary and Reports.

Transformer and Switchgear Log Cards.

Service Cards.

The process of improvement is a continuous one—we never order new supplies of any printed form without first inquiring whether the existing form is satisfactory to everybody who uses it, without checking on how the existing form is being used, and without trying to improve it in some way.

Feeder and Transformer Loads. One item worth a mention is a new Card System being developed for keeping watch on feeder and transformer loads. A separate card is maintained for each cable and each transformer, disregarding equipment in lightly loaded areas. The cards are intended to give a quick *visual* record of the system loading. As far as possible, laborious drill in keeping them "up to date" is avoided: only significant readings are plotted, readings are ignored if they simply confirm figures already logged. When conditions are changed, e.g. by transferring load from an overloaded feeder or substation, then the old cards are thrown away and new ones are started.

C. SOME NOTES ON CHARTS

The use of charts to help control their work is nothing new to engineers. Charts or graphs can take the place of whole columns of figures, can save hours of study, and can "put the position in a nutshell." Yet many charts are more useful to impress laymen (or perhaps sometimes to befog them) than they are to assist in the job.

When we want to follow the progress of a variable—e.g. the Maximum Load on the System, the Monthly Units Sold, the Monthly Revenue, or the Weekly Wages Bill—we plot a chart.

We plot the chart to see:

(1) The way this variable has varied in the past, so that we can estimate

(2) the probable course it is going to take in the future.

(2) is much more important than (1).

Unless the chart lets us make some sort of guess as to what is going to happen, then what it shows is so much history: it is a record, not a chart. But when a chart *does* indicate what is very likely going to happen, then it constitutes quite the most valuable tool in the whole range of engineering stationery. The following notes describe two methods of making *useful* charts. The first is the use of Logarithmic paper.

1. LOGARITHMIC PAPER

In Figure 1 the growth of Units Purchased for the Pietermaritzburg Electricity Undertaking is plotted on ordinary squared paper. In Figure 2 the same figures are plotted on logarithmic paper.

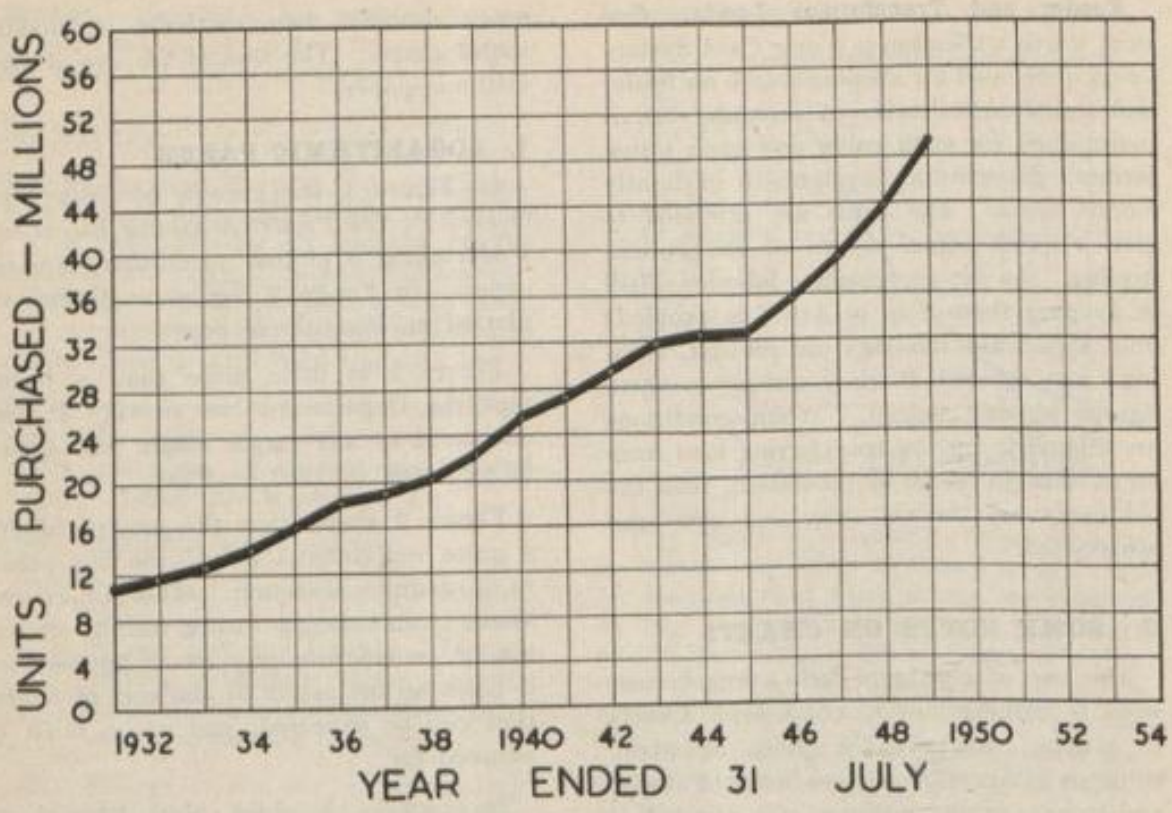
Figure 1 is little more than a record that the Department has grown. It does not point to any target result that should be achieved in 1952 or 1960.

Figure 2 shows that the growth follows a quite well-defined trend—the line points in a definite direction. This Chart can assist in forecasting future results—it will not of course prophesy exact figures, but it gives an indication of the sort of figures that can be expected, and which must be planned for.

In practice, the chief value of log charts lies in the encouragement which they give to long term planning. They keep always in view an idea of how big a job is tending to be 10 or 15 years ahead, and in doing this they make complacency quite impossible.

A chart on ordinary squared paper shows the *amount* of change from year to year. An increase of 50% in a year near the bottom of the chart looks much less impressive than a 50% increase near the top, and the general effect of the chart can be varied almost at will by the choice of scales made. Depending too on the choice of scales, a comparison of two growth curves, using squared paper, will always be misleading.

Log paper, on the other hand, shows the *rate* of change more clearly than the amount. A 50% increase in a year shows the same slope whether quantities are small or whether they are large. A straight line on Log. Paper represents a constant rate of growth—of so many per cent per annum.


UNITS PURCHASED — MILLIONS
0
4
8
12
16
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1932
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1950
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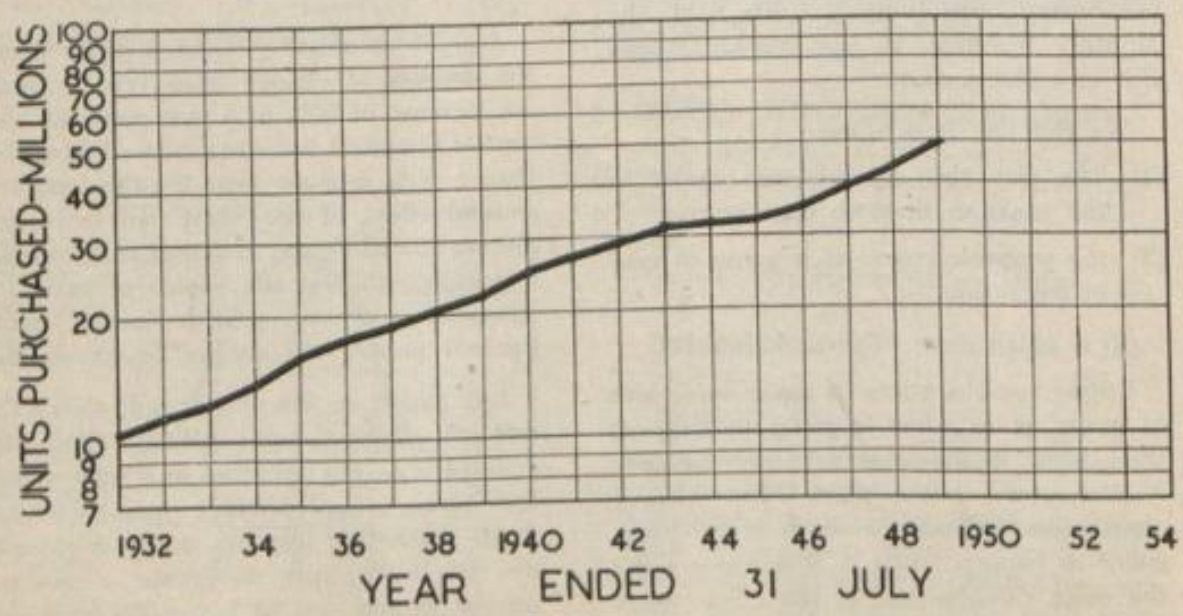
54
YEAR ENDED 31 JULY

Fig. 1.


UNITS PURCHASED-MILLIONS
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YEAR ENDED 31 JULY

Fig. 2.

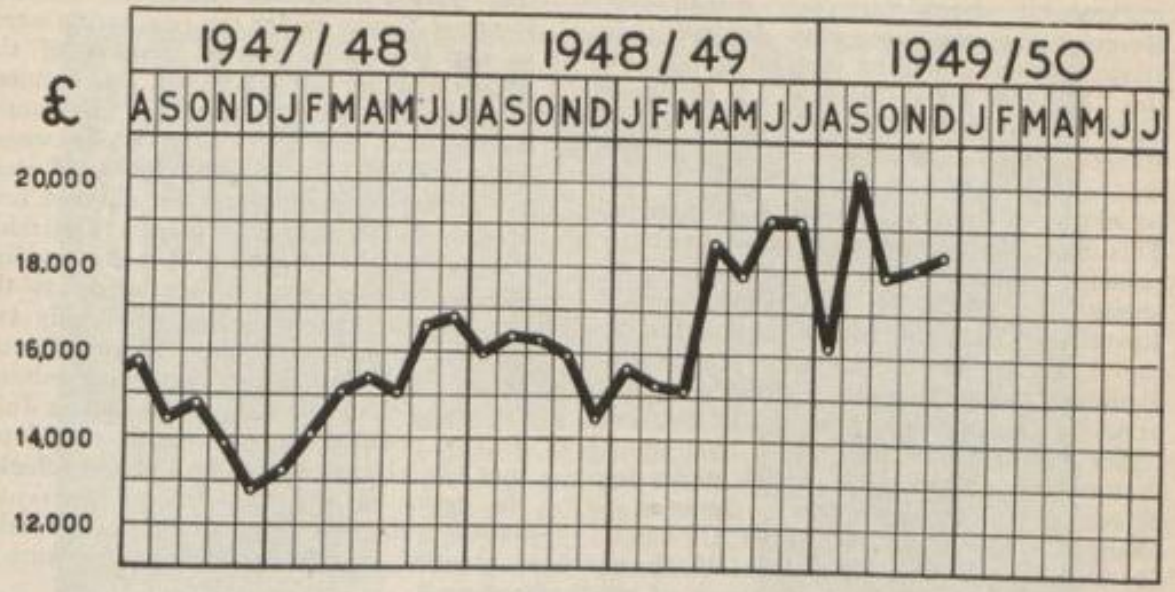

Fig. 3.

In nearly every case, Charts showing the growth of a Department, or the development of any particular section of it, should be plotted on Log. Paper. They will give a more accurate picture, and will be more useful, than charts plotted on ordinary paper.

2. THE MOVING ANNUAL TOTAL

A second method of making useful charts is the use of the "Moving Annual Total."

Figure 3 is a Chart, on squared paper, showing Monthly Revenue from the sale of Electricity. This chart is simply a record of what has happened, it is no more informative than a column of figures.

Again, by choosing other scales, the same figures could be plotted to give any other effect that might be desired. A low, wide scale would produce gentle undulations, while a high, close scale will give peaks and valleys that would worry any normal Committee.

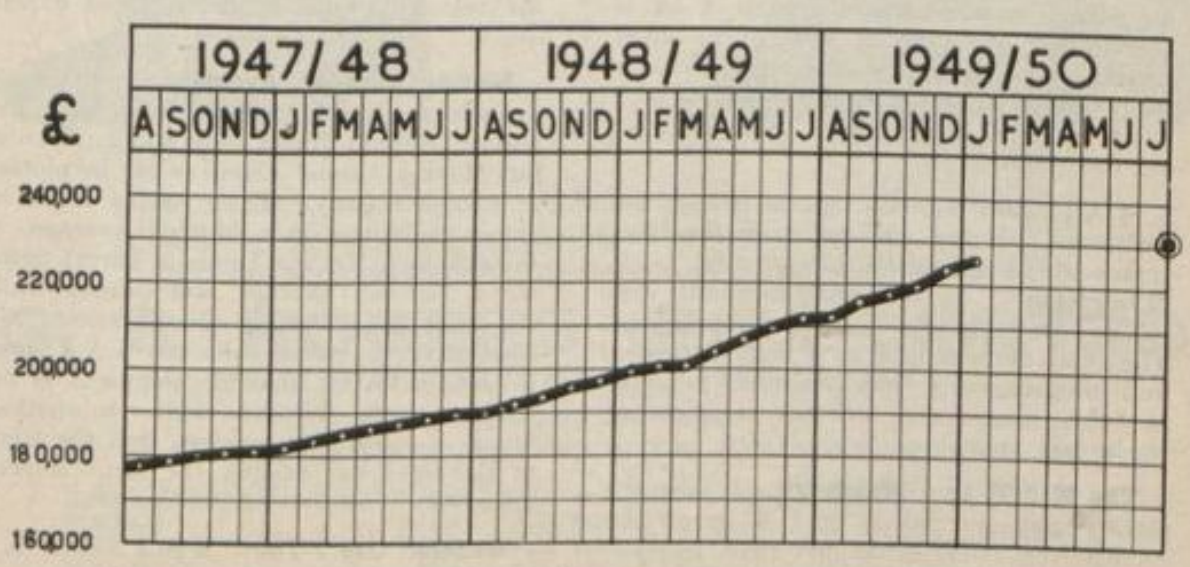

Fig. 4.

Figure 4 shows for each month the Revenue for the preceding 12 months, known as the "Moving Annual Total" or the "M.A.T." The "M.A.T." is obtained each month by adding the new month's Revenue, and subtracting the Revenue for the same month last year. It could also be obtained from weekly or daily figures. This chart shows more than what has happened: it shows what is happening. It shows the *trend* of the Department's Revenue. Each month it is possible to see if we are aiming above or below our Estimate and to forecast, with an accuracy of one or two per cent, what the 12 months' figure will be 3 months ahead. If any new factors come into play which influence Revenue—up or down—then there is a change in the trend of the M.A.T. line. By keeping "Moving Annual Total" charts of Revenue and of the main items of expenditure it becomes possible to see clearly and *exactly* how the Department is doing —whether it is improving, maintaining or losing its position.

"Moving Annual Total" lines can be used to show the trend of other operating statistics. Always these M.A.T. lines show steadiness and continuity, and give a sense of confidence. Their continuity is in contrast to the jerky progress of charts which show only the current month's figures. Analysis of monthly figures is always difficult, misleading and worrying. Besides the allowance which must be made for ordinary summer-to-winter variation, and for normal anticipation of growth, there is year-to-year variation in weather to affect figures, and there are the unpredictable factors of what meter-reading sections and what accounts ledgers have been left over for the month.

M.A.T. lines smooth out all these disturbances. Every new point on the lines represents a complete 12 months' cycle of operations. Minor month to month variations are averaged out, and disappear. The lines demonstrate in a cool, detached and unanswerable way whether progress is being made, and whether it is being made fast enough.

The M.A.T. as a Watch-dog. It is worth noting that Figures 3 and 4 cover the changeover, made in August 1949, to completely new tariffs, referred to earlier in this paper. For the first few months Revenue figures under the new tariffs were, to say the least, erratic. Study of the figures, taking into account the number of units sold, and the average price/unit, showed that nothing was seriously wrong with our calculations, but the hard cash to support our point of view did not turn up exactly according to plan. (The main reason was that a change in meter-reading and accounting routine was made at the same time.) Nevertheless, after only two months' returns, with the "Moving Annual Total" for September coinciding almost exactly with the forecast figure set in July, it was possible to state with confidence that the change in tariffs had not affected the trend of the Department's revenue. Without the chart, we should have needed 6 months' experience to become so sure.

In effect, the chief advantage of using the M.A.T. method to watch and control the progress of an undertaking is that it forces a break away from the ingrained habit of considering progress year by year, with each year a separate watertight compartment, and with the Annual results always the goal in view. It causes rather a realization that business is essentially a continuous process, that although the results of a particular financial year's operation may show a surplus, yet the business might have finished up the year in a worse position than it started, that the really important thing is not the balance sheet on any particular date, but the relative trends of income and expenditure.

Moving Annual Averages. For some quantities, like Monthly Maximum Demands, Annual Totals have no significance, but Moving Annual Averages can be plotted in the same way. There seems to be no *direct* usefulness in a Moving Average, as there is in a Moving Total—a Target figure for a Moving Average line cannot easily be fixed in advance. Nevertheless, the lines have the same value as M.A.T. lines in demonstrating that development is not made in steps, from one winter to another, but is a continuous process, and the trend of the lines has exactly the same importance.

General Use. The "M.A.T." line is a well-known device among managers of

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SHELL *Leadership in Lubrication*

SHELL

ordinary business undertakings, who must keep an eye on the trends of all sorts of factors and costs in case a change in any one of them, unchecked, changes a profit into a loss. The electricity supply industry is very much more stable than most businesses. We get winter peaks, and we are affected by industrial booms and depressions, but the degree of fluctuation in our business, from month to month, is negligible in comparison with what is a matter of course to commercial firms, whose business one week may be several times what it was the week before.

For this reason, perhaps, electrical engineers have not generally made much use of the Moving Annual Total; which shows its usefulness mainly when showing up quickly changing trends. Annual figures are normally quite satisfactory for making evident gradual changes. However, the days of stability, in its prewar sense, seem to be gone. Our industry can no longer count on reasonably steady conditions; our materials and equipment can increase 100% in price overnight, like anybody else's, and we are exposed to sudden and arbitrary surcharges on the costs of all our essentials. It is certain that under these conditions, engineers will find that a set of "M.A.T." charts, keeping a constant check on the comparative trends of their Department's "vital statistics," will help them enormously in keeping control of their undertakings.

3. PRACTICAL HINTS

M.A.T. lines, if they cover only short periods—two or three years—may be plotted on squared paper. However, when it is desired to compare two growth curves, it is advisable to use logarithmic paper, and so avoid any misleading impressions which may be obtained when comparing trends by the choice of different scales for each line. Using log paper, equal trends will always show as parallel lines. On log paper, a normal Electricity Department's M.A.T. line plotted monthly will be almost flat—this will not prevent a change in the trend becoming apparent a month or two after it starts.

The following practical hints will assist in keeping a set of M.A.T. Charts without tears.

(a) Do not try to rule up log paper, or to plot log curves on ordinary paper, using a slide rule scale. This can be done, but it makes hard work of the job. There are specialist firms printing Chart Papers in hundreds of varieties. A moderate sum will purchase a selection of papers from which it will be possible to pick for each purpose the size of sheet and the scale which makes the chart easiest to prepare, and most effective to use.

(b) Never plot a chart without noting on it the actual figures which are plotted. This will save endless checking when using the charts, and will make it easy to effect adjustments, when required, or to correct errors.

(c) Always plot charts on transparent paper, so that copies can be taken if required. And so that it will *never* be necessary to lend original charts.

(d) Keep the figures which are to be charted all in one place, so that it is not necessary to have to refer to one report for one figure and to another place for a second. It is best to keep both monthly figures and the monthly working that gives the Moving Annual Totals together, on the same sheet. One method is to use a loose-leaf book, containing specially ruled foolscap blanks (printed from a tracing cloth original). Once started off, these sheets are easy to keep up to date; they save time which would otherwise be lost in looking up figures, and they prevent the errors which are always made when calculations are done on odd pieces of paper.

CONCLUSION

It is still the tradition that the training of an engineer should be in the use of tools and the handling of machinery, in spite of the fact that when he has gained responsibility, he must work chiefly with pieces of paper. The object of this essay has been to show that engineering is still engineering, even with paper for the tools. And that the same interest, and the same degree of skill, can be exercised in designing details of an administrative machine, and in making them work, as in making and putting together parts in a factory.

Acknowledgment

Appreciation is due to Mr. C. R. Hallé, City Electrical Engineer, Pietermartizburg, for authority to use, as examples throughout this paper, facts and figures relating to his Department, as well as for his help and encouragement in the work which has been described.

PRESIDENT:

Thank you very much indeed, Mr. McDonald. The paper is now open to discussion and I shall have to hold you to the five minutes; so watch the robot.

Mr. C. G. DOWNIE, Cape Town:

Mr. President: The main job of Engineers and Managers of Electricity Supply Undertakings is to produce and supply electricity to consumers with maximum efficiency and reliability at minimum cost. All along the line, from the entry to the generating station and out to the consumer, it is our object to see to it in the various functions carried out that a high standard of performance at minimum cost of human effort, energy and materials is maintained. On the engineering and operational side of our job we are fully alive in this object by choosing and installing plant, equipment and materials which perform their duty efficiently at the lowest cost. The efforts of the designers and manufacturers of the plant and materials that we choose and use in generating, transmitting and distributing electricity are always being directed towards developing and producing these things so that they do their job with the least expenditure of energy in the process.

Now, in all the operations entailed in rendering this service of ours to the public there is quite a considerable amount of routine clerical work, recording and compilation of satistics. Do we give the same attention to ensuring that this work is done with a view to securing a high standard of performance and usefulness at a minimum of cost and effort. In this connection we have just had presented to us a unique and most useful paper by Mr. McDonald. Having as your "right-hand man," Mr. President, a chap lik Mr. McDonald who quite obviously from this paper is very much "efficiency-minded" I am not at all surprised at your constant good humour, respite your heavy responsibilities. It will be seen that this good humour has even found its way into Mr. McDonald's paper! This is a paper that should be taken very seriously and be closely studied by all with a view to seeing whether or not improvements can be carried out in the organisation and methods of our own undertakings. He has shown, for instance, how the system of filing and recording correspondence in the Pietermaritzburg Electricity Department has been reorganised to great advantage. We in Cape Town also, some time ago, were confronted with the need for overhauling our correspondence system. Although we had a system of filing under subject headings the numbering got into such a mess that in the end we had to rely on the memories of the clerks in the recording office whenever we wanted a file. A thorough investigation was carried out with the result hat in the end we adopted a system of numbering the several thousands of files we have on lines similar to those described by Mr. McDonald. Then again, a short time ago, we were confronted by the officer in charge of one of our sections with a request for additional clerical assistance. He was getting very much behind in his clerical work. We deputed one of our engneers to investigate the organisation and methods in use in this section and the final outcome was that instead of finding justification for additional clerical assistance certain changes were made which resulted in one of his clerks being transferred to another department. It was found that there was quite a considerable amount of duplication of clerical work and recording of statistics. Some of it was found to be unnecessary — hundreds of figures, for example, were being worked out to three decimals places when one decimal was enough.

I support the point made by Mr. McDonald in his paper, namely that in the attainment of efficiency in clerical work and methods it is mainly a matter of applying engineering principles.

Mr. McDonald's paper also reminds me of a course of interesting lectures that I attended in Cape Town recently. They were sponsored by the National Development Foundation whose object is, inter alia, to spread knowledge and information which will enable people to learn how to organise and use methods in their work and businesses that will result in maximum

benefit to all concerned whilst entailing the minimum expenditure of time and effort in the process. This particular course covered the subject of organisation and methods in business and industry. They were very interesting and the information imparted was so useful that I would strongly recommend you to attend these National Development Foundation courses when they come to Durban or any of the towns which those attending this Convention represent. Again I say, Mr. President, that we are grateful to Mr. McDonald for a very useful paper.

Mnr. L. ROODE, Potgietersrust:

Ek wil mnr. McDonald geluk wens met sy uitstekende lesing oor kantoorwork. Ons het ook 'n noukeurige studie gemaak van die verskillende vorms tentoongestel in die teekamer. Ek sal nie graag wil hê u moet weet hoever my kantoor kortskiet van die standaard wat u bereik het nie. Ek het die twee prentjes in u lesing ook gebustudeer. Die eerste een is 'n goeie meergawe van my kantoor, buiten dat die bakkie in my kantoor 'n bietjie voller is. No. 2 tekening is ek ne aan skuldig nie, omdat ek te veel te doen het om koerant te lees in my kantoor.

Sonder om nou juis Pietermaritzburg te kritiseer oor sy tarief, wil ek tog my verbasing uitspreek dat plaaslike owerhede so onvoorwaardelik vashou aan die kamer tarief. Alhoewel dit die plig is van 'n plaaslike owerheid om reg te laat geskied aan alle groepe van sy bevolking, pas dit die owerheid nie om 'n onderskied te maak tussen een verbruiker en 'n ander nie. Wat ek bedoel is dat: Een van die fondamentele beginsel van die kamer tarief is dat die arm man bly in 'n klein huisie, en de welgestelde man in 'n groot huis. Dit is nie vanselfsprekend die geval nie. Wat wel die gemiddelde geval is, is dat die man met 'n groot familie verplig is om 'n groot huis to bly, terwyl die ryk man met sy gewoonlike een of twee kinders in 'n kleiner maar deftige huis bewoon. 'n Ander faktor wat die kamer tarief weer ondoelmaatig maak is dat baie mense huise huur, en dus is die waarde of grootte van die huis nie 'n refleksie van sy finansiële toestand nie. Myns insiens kan die problem as volg opgelos word. My aanbeveling is gebaseer op die veranderstelling dat hoe armer die verbruiker is, hoe minder elektrisiteit hy gebruik. Neem nou 'n praktiese voorbeeld om my aanbeveling to illustreer:-

Bestaande kamer tarief: 5 kamer huis @ 3 eenhede per kamer.

15 eenhede @ 1/- per eenheid ...	15	0
Volgende 20 eenhede @ 3d. ,,	5	0
	20	0

Res @ ½d. per eenheid.

In plaas van die kamer tarief kan die volgende twee tariewe aanbeveel word:

Tarief A:

15 eenhede @ 1/- per eenheid ...	15	0
Volgende 20 @ 3d. per eenheid ...	5	0
	20	0

Res @ ½d. per eenheid.

Die gemiddelde prys per eenheid vir die eerste 35 eenhede is dus 7d. per eenheid.

Tarief B:

Alle eenhede @ 7d. per eenheid, met 'n minimum van 8/- per maand of gedeelte van 'n maand.

Vir besighede kan dieselfde prinsiep toegepas word. 'n Bykomende stipulasie moet egter gemaak word dat geen gebruiker van een tarief na die ander mag oorskakel binne die bestek van drie maande nie.

Mr. President and Gentlemen: I again wish to express my sincere acknowledgment for this valuable paper by Mr. McDonald. It is a well-known fact that the average engineer pays too little attention to his office duties. Sir, with the author's kind permission, I shall endeavour to bring into force as great a portion of your well-organised system as can possibly fall within the scope of my available personnel. Thank you.

Mr. F. STEVENS, Ladysmith.

Through you, Mr. President, I would like to thank Mr. McDonald for ideas I have derived from his paper and for the amusement it has afforded me. As for the humour, I wondered, seeing there is no caption to the first sketch, whether it depicts the Assistant Electrical Engineer's office at Maritzburg. I could not help smiling in that Mr. McDonald's paper will be read by many engineers in charge of small undertakings, the majority of whom have neither typist, pay clerk, cost clerk, record clerk or ordinary clerk, nor anyone to do the filing, drawing, charts or answering the telephone. To those gentlemen it

certainly will have made their mouths water. The conscientious ones attend to the INs and OUTs statistics, storekeeping telephone and any drawing in their own time: as a form of recreation all due credit to them. I had a taste of it some years ago. Please do not think this is the position in Ladysmith. We have long passed that stage; in fact, we sometimes have reason to think we are a pace ahead of some bigger undertakings, although there is no battery of clerks.

I was interested in Mr. McDonald's comments on street lighting. We shall probably crib some of his ideas. The same may be said of our charts. Regarding the simplifying of electricity tariffs, I wondered whether Mr. McDonald considered a common minimum charge for all domestic consumers; this definitely makes supplies to private dwellings easier. My personal views are that there is no longer any justification for minimums being based on valuations, or number of rooms. I agree wholeheartedly on combining tariffs where possible to reduce the number of meters. Thank you, Sir.

Mr. A. R. SIBSON, Bulawayo:

Mr. President: We have this morning listened, I think, to one of the most valuable papers that have been presented to this Convention. In particular I would like to congratulate Mr. McDonald on the very able way he has handled the precis this morning. The subject matter of his paper is of very great interest to all of us and I do not think any of us need be ashamed of cribbing any of the ideas that have been put forward by one who is obviously a specialist in this line. I cannot offer any criticism of the points raised, but it is necessary to say that however well we may organse our administration there is always left, somewhere, the human factor, which is one of the things one has to try to reduce to a minimum. The human factor in the long run is the gentleman depicted in the first cartoon of the paper.

I can recollect one fairly well-known municipal official in our country who has a rather useful system of placing all correspondence in one tray and looking at it three months hence. He works on the assumption—and it is quite a reasonable one—that 90 per cent of the matters that have not been dealt with will have solved themselves by that time, and I think he is pretty nearly correct. This system saves a tremendous amount of work, but I would not, however, suggest that that is a method of procedure which should be followed by engineers.

It is on the subject of ensuring as rapid and immediate a reply as possible that I want to add just a few remarks. In the long run it is the Chief Engineer who takes the final blame for matters that are not attended to, and the rest of his staff may easily fall into the error of leaving things over. Once this has become a habit, it is like a snowball. I will just indicate one system which ensures that either the Chief or his deputy, who are in a position to take the final responsibility, can keep some sort of control over the situation. All incoming correspondence is received by one or other of these officials, who observes from its general nature how soon a reply would be justified and, in detailing on the correspondence the official to whom it should be referred, also notes the date by which a reply is expected. The letter then passes through the normal filing system and the filing clerk extracts that date and enters it on a card, every day noting the letters which should have been answered by that day. If t hey have not as yet been answered, he sends up a chit indicating the letters which were due for a reply but have not been replied to. This system I have fund to work reasonably well, the chits being retained until the letters have been finally answered.

That is all I have to add to this very excellent paper.

Mr. J. F. LATEGAN, Heidelberg:

Mr. President: It is a privilege to be here this morning and I may say that I am not mike-shy, being a radio operator myself. With regard to Mr. McDonald's paper, it is very interesting and I think my brother engineers who carry the same position as I do, both barrels of the same gun, are perhaps in a very indivious position. We have to study town engineering and electrical engineering combined and, where you have a shortage of staff, you will find it a major difficulty to attain what Mr. McDonald has attained here. If you gentle men consider it from the electricity point

of view, there is a large amount of figures that the Council want regarding electricity. There are major projects regarding town planning and all the figures have to be given of the Town Engineer's Department and, if you take into consideratio the fact that the only assistance he has is a clerk in his office, you can realise what amount of overtime is thrown on the Engineer's shoulders. Relating to the tariff question, I have been in Municipalities incorporating various tariffs — the average system, the room basis and the valuation system. In Heidelberg we have no fewer than twelve tariffs under the domestic system, and if you take into consideration that the clerk you have got has not much erperience, that the Town Engineer is responsible to the Treasury for correct accounts and all queries relating thereto every month, I think that you will agree that it is a major job for an Engineer to carry so many departments on his shoulders. Whilst I do not want to pass any remarks on the Council, I think the old saying of "the willing horse" may easily be applied!

Mr. V. E. O. BARRATT, Graaff-Reinet:

Unlike Mr. Lategan, I do not like the look of this microphone in front of me. I think that all the small towns — I do not mean the medium-sized towns, but those where the clerical staff consists of the Engineer in his capacity as engineer, filing clerk, typist and so on — will be shaken out of their tranquillity by the paper that Mr. McDonald has given us. Tranquillity is hardly the terms, because we have so much to do that we cannot find time to design the correct type of tools. I think the paper will have made us realise that by designing such tools we will be able to get more done and perhaps have a little more free time. So I thank you very much indeed for spurring us on to greater efforts. There is just one little error your artist made. She forgot to draw a typical example of my desk. She should have shown a pile of paper and a head showing over it. I think there are quite a number of us in the smaller towns who find our desks getting into that state and who have to make a valiant effort on a Sunday to reduce the pile of paper on our desks so that anyone coming in will be able to see us.

Mr. E. L. SMITH, Boksburg:

Mr. President: I would also like to add my congratulations to the author on a very good paper. This is certainly a paper which has touched on many subjects, each of which could form a paper in itself. With regard to his talk on records, it is my opinion that this can be overdone. It is certainly very interesting to have records. It becomes a very absorbing kind of work and apt to become like a crossword puzzle at times. It is very interesting but I don't think we should spend too much time on devising ways and means of keeping these records. As regards filing, we have found in Boksburg that a file for each stand in which records are kept of meter testing, installations, particulars of domestic appliances, reconnections and disconnections, and all correspodence relating to the stand is sufficient for internal work. Besides that we have the files of extrnal work. With regard to tariffs, I feel that electricity today is essential for the welfare of mankind. Therefore, I quite endorse the author's remarks that tariffs should be simplified. I also agree that the room basis system should be done away with, as it has become a nuisance in many ways. The same with a business tariff. This antiquated idea of having a two-rate supply to-day is, I think, no longer justified. It may be of interest to know that we on the Rand have formed a sub-committee to go into tariffs so as to get a degree of uniformity. As you know, many Municipalities have numerous tariffs, but we are trying to reduce them to three— domestic, business and industrial. So, Mr. Chairman, with those few remarks I would like to congratulate the author on a very fine paper and I would like to suggest that perhaps someone would be able to tackle a paper on tariffs for our next Convention.

PRESIDENT:

Thank you. Is there anybody else who would like to contribute? If I may speak from here I would like to say that Mr. McDonald's advent in this Department was rather like the skirl of the pipes because after a war-time staff we were tending to get into a muddle and when one irate contractor came and asked for £700 on his hire purchase account which had not been paid, and it was found that somebody had just put those orders in the drawer because

she didn't know where they went, and they had been lying there for months, it was nice to find that here was an Engineer who realised that there was engineering to do in the office. We have two troubles to overcome. The artisans handle mechanism and dislike paper. The clerical staff work with paper and for some reason they do it mechanically and very few of them take the trouble to know where it is going or what it's for. The Engineer dislikes to see a machine with pipes and wires hanging about and the machine not doing any work and when Mr. McDonald got down to it, we found that we were keeping records that really told us nothing. They had been kept for years and we thought we should go on keeping them. We found that things were going round in circles and that these pipes could be cut and made more efficient and so by the help of a man who realised that all these papers, files and so forth were pipes, wires and an essential part of the machinery, we feel that we are pulling our weight and eliminating waste. You can always see steam leaks and oil leaks but you can't always see the leaks that are going on in your office through bad paper work and I must say that I a very lucky to have an Engineer who took this view and I can tell you that even in the very small ways, if you keep an eye on the method, not just on the number of charts, but on this engineering method and you now translate that into your office work, then I think Mr. McDonald has done us a really great turn and I join with you in thanking him for the care and trouble he has taken in providing us with this fine paper.

Mr. H. J. GRIPPER, Port Elizabeth (communicated):

Mr. President and Gentlemen: Mr. McDonald is to be congratulated on introducing a subject which is of vital concern to all of us even though some may place more importance upon office administration than others. The value of office administration in any Electricity Undertaking is undoubtely considerable from the point of view of:

(a) the keeping of records;
(b) the preparation and production of statistics;
(c) service to the consumers.

Mr. McDonald does not do justice to smaller undertakings by suggesting that they might consider office organisation to be a matter for the Town Clerk or the City Treasurer. It is more frequently to be found that these small undertakings control their administration very completely even to the extent of preparing the minutes and proceedings of the Electricity Committee of of the Council and handling all administrative correspondence. It is in the larger centres that one finds the Town Clerks and City Treasurers are more prone to consider that matters of administration and policy of an Electricity Undertaking should fall within their jurisdiction.

It is perfectly true that office routine is liable to grow of its own accord and possibly become somewhat top-heavy if it is built up on tradition rather than being designed for present and future requirements. It is possibly typical of Municipal Administration in general to build on what you have and to be averse to putting it all into the melting pot and starting afresh.

I find much to applaud in Mr. McDonald's remarks regarding his system of filing and preparation of forms and would add the suggestion that all records should provide continuity in regard to:

(a) the consumer as such, and
(b) the installation as such.

The latter is required for records in the office and the former to assist in reminding the consumer of the personal service that is his due, while incidentally enabling the undertaking to keep track of transgressors.

The framing of bye-laws is undoubtedly an important work carried out by the office organisation and requires a continuous system whereby notes are kept of difficulties in regard to any particular regulation and constant planning is necessary, together with intimate local knowledge to keep these bye-laws up to date, convenient in form and enforcement.

I cannot agree too heartily with the author's comments on the need for a simple tariff structure and I trust that Councillors present at the Convention will appreciate his comments on the possibility of making changes in the tariff structure without necessarily upsetting the revenue position.

Mr. McDonald's comments on street lighting records are interesting and I share his surprise in regard to the shape of his

curves showing lamp-life against the number of lamps failing. I hope that there will be a representative of the lamp manufacturers present at the Convention to contribute to the discussion on this subject. I have always favoured the procedure of changing all lamps when they have burnt for their accepted "life" as this tends to reduce the cost of maintenance and to show up faults and any other causes of premature failure.

While on the subject of street lighting I should be interested to learn from Mr. McDonald and, indeed, from any other members attending the Convention, what their experience is in the matter of installation of street lighting and the method of tackling improvements and extensions. If the Council is given some specific data indicating the degree of lighting that can be provided at a stated cost, they should make their selection according to the importance of the roadway concerned and leave the rest, such as the siting of the standards and the mounting height, etc., to the Engineer to do his best within the financial limits indicated.

I am sure we are all indebted to Mr. McDonald for the valuable information given in his paper on the subject of charts and the use of logarithmic paper and his description of the "moving annual total." The latter is particularly helpful where annual figures are required and are usually submitted to the ruling authority only once a year.

PRESIDENT:

Mr. McDonald, you have ten to fifteen minutes to reply, or would you rather reply through the journal?

Mr. F. G. McDONALD, Pietermaritzburg:

Mr. President: I don't think there is very much in the discussion that calls for reply.

Mr. Downie's experience confirms my own — that improvements in efficiency and reductions in staff can be obtained by applying simple engineering principles to office work. There are specialists in this line—"Organization and Methods" Officers, and "Efficiency Experts," but I agree with Mr. Downie that Engineers should not need their help. This is not a separate science, it is only a technique which Engineers can easily acquire; it seems to me that unless we take an interest in this technique we will end up by paying outside business consultants for instruction in how to run our jobs.

Mr. Roode and some others remarked on domestic tariffs. My paper did not attempt to deal with good and bad tariffs, beyond trying to point out that simple tariffs are possible and have advantages, and that it is possible to streamline tariffs which are unnecessarily complicated. I did not intend to hold up our own tariffs as ideal.

However, my own impression is that the "room" tariff is as good as any. It is very much easier to administer than the rateable value tariff, which is subject to all sorts of changes quite outside the control of the Department. Between the two nobody seems to have thought of any other adequate method of allocating capital charges. The room tariff does work out reasonably and fairly in its broad effect. It does generally cost more to supply big houses than small ones. I don't think that a uniform minimum charge, which has been suggested, could suit the circumstances of many towns.

The main reason, of course, why Pietermaritzburg has a room tariff now is that we had one before. The thing that every Engineer is up against when changing tariffs is that there are existing tariffs. Our job here was to try to leave undisturbed as many accounts as possible — we could not have changed **every** consumer's account to a completely new basis.

It is worth mentioning that in Great Britain the nationalized industry is hoping to introduce standard tariffs. I have noted so far in the technical press only one hint at what is going to happen, and the hint is that the standard tariff for domestic premises is going to be a room tariff with two steps. They have no doubt considered all alternatives, and I think they have most likely made the best choice—in matters of this type, for a judgment based on solid conservative thinking, I don't think we can do better than follow the lead that is given to us by England.

Mr. Sibson introduced the human factor. This is the No. 1 difficulty in all problems of management. Anything you try to do is completely futile unless the human beings concerned will co-operate.

However, it is my opinion that nobody objects to having their work made easier for them; once people see that the changes you are making will do that, then, generally speaking, you get their co-operation. Another thing — once people see that it is possible to save work by revising methods, then they will set about doing it for themselves — we are getting ideas and suggestions from all sections of the Department to save work and improve our organization in various details.

Mr. Lategan and Mr. Barratt have my sympathy — certainly the man in the one-man office often has a hard life. But Mr. Hallé has put his finger on the point when he said it was the **method** that counts and there can be the same method, or lack of method, in a one-man office as in a big organization .

I am very glad to have had assurances from Engineers in small offices that my paper has been useful to them. You don't get textbooks on ho wto manage a department. You must learn how the hard way, and I am pleased that some people will be able to make their work easier by "cribbing' 'something from us. Many of our ideas, of course, were originally "cribbed" from somebody else.

I agree with Mr. Smith that record-keeping can be overdone. It is no good keeping records unless you are going to use the results. But it is worse to keep records (and we all keep records of all our routine work) in such a way that there are no results to be seen, and I am quite opposed to Mr. Smith when he suggests that time spent in considering methods of work can be time wasted.

I thank Mr. Gripper for his communicated remarks.

In his suggestion that by-laws should be kept under continuous review, by noting down snags and difficulties as they arise, so that amendments in detail can be made from time to time, Mr. Gripper provides an excellent example of what I think is the right approach. By-laws can assist or retard the progress of a Department ,and it is important to keep whittling away at them, one detail at a time, so that they may keep their usefulness while the Department develops in size and activity.

As regards Mr. Gripper's support of the idea that street lighting lamp changes should be made section by section, at intervals based on the economic life of the lamps, I am satisfied that under the average sort of conditions which we have in Pietermaritzburg, this scheme just would not work. I can imagine this procedure giving good results in, say, a sports field floodlighting installation, with all lamps at the same distance from the sub-stations, each burning in the same design of fitting, and where a few lamps out would not matter. I do not think that my curve suggests that the lamps we purchase are not of uniform quality; the lamps we buy may be as nearly as possible identical — it is the treatment we give them that results in their varying performance.

PRESIDENT:

Thank you very much indeed. Well, gentlemen, we now have some time to get on with our normal agenda and I will call on Mr. Downey to give his report on Safety Precautions.

SAFETY PRECAUTIONS COMMITTEE

Mr. J. C. Downey, Springs:

Mr. President, Gentlemen: Comments were received from sixteen different authorities, viz., Alberton, Cape Town, Chamber of Mines, Cradock, Durban, East London, Electricity Supply Commission, Institution of Electrical Engineers (London), Johannesburg, Krugersdorp, Master Builders' Association, Pietermaritzburg, Port Elizabeth, Port Shepstone, Pretoria and Robertson.

The sub-committee has met twice weekly under the chairmanship of Mr. H. P. Alexander since the beginning of September and wishes to record its appreciation of the helpful constructive criticism put forward by the commenting authorities.

The following are the main points from the comments received.

General

Several authorities have suggested that the regulations should be re-arranged along the lines of the recommendation put forward in the previous report of the sub-committee in October, 1948. It is, therefore, decided that the second edition should follow this form.

Another general recommendation that the sections dealing with luminous discharge tube installations should be replaced by

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sections dealing with electric discharge lamps has also been suggested in one form or another by several commenting authorities. Suitable regulations based upon the latest I.E.E. regulations have been prepared and are attached.

Suggestions have been made that an overruling regulation could be introduced, delegating to the Engineer the power to approve special wiring systems which do not comply with the regulations. The committee feels that this is a dangerous practice to establish, and has decided that the approval of any such new systems should be covered only by modification to the wiring regulations after the advice of the Safety Precautions Committee has been sought. For the time being, any such systems should comply with the applicable regulations in force at the time.

Members will be aware that at the time of publishing the first edition of the wiring regulations it was considered expedient to omit the notes as they were not compulsory in their application and served only as advice for the guidance of Engineers administering the regulations. In practice, the notes have not been useful as so many authorities have not availed themselves of them, and the Committee has decided that the notes to the regulations should now be published together with the regulations in the same document.

Sketches will also be inserted to clarify such pionts as earth-leakage circuit-breakers and earthing systems, ring-main sub-circuits, distribution board arrangements. These would be advisory and not mandatory.

Comments Received

101-01.

Definition of approved has been modified to mean approval in writing.

101-01. **"Earth Continuity Conductor"**

Doubt has been expressed as to the degree of reliance that can be placed on metal conduit as an earth continuity conductor on account of the possibility of joints developing high resistance. The suggestion has been made that regulations should be so worded as to permit of each Engineer being empowered to specify an earth continuity conductor additional to the conduit wherever he deems necessary. This was referred back to several of the larger Municipalities and, arising from the comments received, the Committee decided that reliance can safely be placed on screwed metal conduit for earth continuity, but not on flexible metallic conduit, and 201-13 has been modified accordingly.

101-01. **Standard Specification**

The South African Bureau of Standards has requested that the standard specification should be replaced by the term specification, as this is in accordance with the Standards Act No. 24 of 1945. The Committee has agreed and the definition will be suitably modified.

The Committee has also adopted the Bureau's recommendation that "flammable" should be used in place of "inflammable," "non combustible" in place of "incombustible," and the terms "self extinguishing" and "non egnitable" should not be used.

Definitions of flammable and combustible will make reference to the Bureau of Standards tests for these qualities.

104-07.

P.V.C. insulated cables are regarded in the revised regulations as an alternative in all respects to V.R.I. cables. The South African Bureau of Standards is publishing a specification for P.V.C. insulated cables shortly, and compliance with this specification in the Committee's opinion will ensure satisfactory performance of the cable, even when installed in conduit.

104-13.

The request was received to frame regulations for aluminium alloy-sheathed cables. The Committee feels that insufficient experience has been obtained with this type of cable to justify its inclusion in the regulations.

110-30 (c).

An addition has been made reading: "In industrial workshops and factories all plugs and socket-outlets shall be metal clad."

110-30 (g).

This clause permits 5 amp socket outlets under certain conditions and has been extended by the addition of: "and in any case, must be wired on a separate sub-circuit supplying not more than three 5-ampere socket-outlets."

This change is considered necessary in order to ensure adequate protection of lightly loaded sub-circuits which cannot be so protected if wired as part of a sub-circuit supplying apparatus with much larger loading.

201-03.

Side heading — "Earthing of Cookers." This is a new regulation reading: "Unless otherwise approved, every cooker shall be earthed by means of a copper or phosphor bronze connection direct from the earthing terminal of the cooker to a cold water supply main or an earthing lead.

201-04.

Side heading — "Electric Signs." This is a new regulation reading: "Every exterior electric sign shall be earthed by means of a copper or phosphor bronze connection direct frof the earthing terminal of the sign to a cold water supply main or an earthing lead.

201-10.

It has been suggested that bonding should be called for across any water meters or other fittings liable to be removed. It is felt that this is not a matter for the wiring regulations.

201-16.

It has been suggested that the requirement of metal roofs to be earthed should apply only to buildings to which electricity is supplied by overhead service mains. This change could be made only with the approval of the Chief Inspector of Factories as the exemption is not contained in the Factories Act Regulations.

204-22 (d).

It has been suggested that lighting sub-circuits should not be run in the same conduit as heating sub-circuits. The Committee considers that this is unnecessary, and that even the requirements of 204-22 (d) are unnecessary and, therefore, decided to delete it.

204-24.

Recognizing that it is often necessary in installations to use cables coloured other than red for the live conductor, the first paragraph of regulation 204-24 has been modified to read: "In all cables including fittings wire but excluding flexible cables and flexible cords, black shall distinguish the neutral or common conductor, and a distinctive colour other than green shall distinguish the live, positive, or switch conductor."

204-28.

A new paragraph has been added: "Under thatched roofs cables shall be protected by enclosure in screwed conduit."

204-30.

This has been modified to prohibit unarmoured cables without protection under floors, within partitions or wall cavities, by addition to 204-30 (ii) of: "nor under floors, within partitions or wall cavities" after the word "plaster."

204-31.

This is a new regulation as follows:

Installation of Overhead Cables

Where approved, overhead cables comprising hard-drawn solid or stranded copper conductors insulated with vulcanised rubber, PVC or varnished cambric may be used uncased and unarmoured in non-domestic installations, provided that:

(i) The cables are installed horizontally in buildings and are open to view from the floor throughout their length except where protected in accordance with clause (vii);

(ii) The cables are so installed that they are ordinarily inaccessible to unauthorised persons, and in no case are less than 10 feet above floor level;

(iii) The cables are supported on effective insulators which are so spaced as to prevent the conductors from coming into contact with each other or with any other conductor, or with earthed metal, gas pipes, water pipes, walls, or any other part of the structure of the building or with any fixture, or with the wires or cables of any other wiring system in th esame building.

(iv) The cables are free to expand and contract, as the temperature changes, without detriment to themselves or to any other part of the installation;

(v) At each straining position, efficient straining gear is provided with an insulation value equal at least to twice that required at intermediate supports;

(vi) In damp situations, the supports and fixings of the insulators are of non-rusting material;

(viii) In passing through wall or partitions, the cables are shackled off on each side of the wall or partition and the jumpers pass through directly and are protected by enclosure in non-absorbent, non-combustible insulating material, and space through which fire might spread is not left around the cables or insulating material;

(viii) All crossing cables cross at right angles and have a clear space of at least two inches between them;

(ix) Such circuits are distinct from all other circuits and are protected by separate fuses or circuit-breakers;

(x) Connections to the overhead cables are made with annealed copper conductors.

204-36.

The Committee has decided that mineral insulated metal sheathed cables should, except where specially approved, be run only on the surface and not buried in plaster, cement or concrete. The regulation has been modified accordingly and a note will be added as follows:

"The purpose of this regulation is generally to ensure that the installation is capable of being rewired without structural alterations or damage to wall, floors or ceilings. This type of cable has a relatively low insulation value, and is consequently subject to damage in areas where lightning is common.

"In addition, it is considered that the single strand conductor may be broken at accessories in the course of time, and repairs or replacement of accessories may involve replacement of the whole cable.

"In giving approval for buried installations, the Engineer should consider the question of reasonable access for replacements, and it is suggested that buried installations for short runs would be acceptable, such as for petrol pumps with underground cabling (suitably protected from damage) in a factory from starter to motor where the cable is buried in a concrete floor, and possibly in certain cases in the plaster bond of finished brickwork."

209-02.

A more definite ruling has been suggested on the proximity of gas mains or fittings to distribution boards or socket outlets. The committee has decided that the wording should not be altered as the matter is best decided by the Engineer in each particular case.

209-02.

A modification to this regulation has also been made prohibiting the installation of a distribution board more than eight feet above the floor, or within six feet of a drain or water tap, or in a bathroom.

210-13 (a).

In order to permit the use of shaving lights in bathrooms, this regulation has been modified to read: "Lampholders shall not be placed within 6 feet of a drain or bath unless the contacts are so shrouded with insulating material that contact cannot be made to live parts with the lamp removed with a test finger as defined in the standard specification."

210-27.

The prohibition of a socket outlet in a bathroom has been queried but the Committee has decided that the regulation be retained, in a modified form as follows: "*Prohibited positions* unless otherwise approved, a socket outlet shall not be installed: (a) in a bathroom; (b) within six feet of a water tap."

A note will be added making it clear that socket outlets in bathrooms should be permitted only *as exceptions,* and in any case out of reach of a person standing on or in or otherwise in contact with a bath or earthed metal.

Regarding the installation of the socket outlet within six feet of a water tap, the Committee recognises that in certain cases such as a hairdressing saloon this is impossible.

210-32.

This has been extended to cover electrical clocks and now reads: "Bell transformers and/or electric clocks directly connected to the fixed wiring of the installation shall be protected by fuses on a circuit separate from the other circuits of the installation. The fuses required may be incorporated in the same distribution boards as the lighting circuits. Bell transformers shall be controlled by single-pole switches."

210-38.

An addition has been made as in the first edition by the addition of: "(ii) In any domestic installation a maximum number of six socket-outlets installed in any one room may be carried on one sub-circuit."

210-39.

The sub-committee's suggestion to follow the I.E.E. in the use of ring mains for socket outlets in domestic installations has been met with mixed feelings, some authorities welcoming its inclusion, while others feel that it should be abolished and not even considered. The Committee has decided that ring mains will be permitted, but only when approved by the Engineer in writing.

307-03.

An additional sentence has been added reading: "Notwithstanding the requirements of regulation 210-37, the number of socket outlets on a sub-circuit supplying orchestra lights shall be limited only by the aggregated rating of the lamps not exceeding 15 amperes."

In conclusion I wish to say how much the Committee appreciates the excellent work done by the Amendment Sub-Committee of the Safety Precautions Committee, consisting of Messrs. Alexander, Kane, Hart and Gibson; a job of work which kept them to two meetings a week for some months.

The chairman, Mr. Perrow, is here today and perhaps he may wish to add anythat I may have omitted to convey to you.

112. REQUIREMENTS OF ELECTRIC DISCHARGE LAMPS

(Note.—Numbers are for reference purposes only.)

Scope

The requirements of sub-sections 112 and 212 apply to all electric discharge lamp installations whether in the form of interior or exterior illumination or signs. The requirements of these sub-sections are additional to those contained in the other subsections of the Wiring Regulations which apply to all electric discharge lamp installations except where modified or qualified in sub-sections 112 and 212.

The regulations in sub-sections 112 and 212 are divided into three groups:

A—Applicable to all discharge lamp installations.

B—Additional requirements for discharge lamp installations for which an open-circuit voltage is used exceeding 650 volts r.m.s.

C—Additional requirements for discharge lamp installations for which an open-circuit voltage is used exceeding 1200 volts r.m.s.

A—APPLICABLE TO ALL ELECTRIC DISCHARGE LAMP INSTALLATIONS

Switches.

Any switch not specifically designed to break an inductive load of its full rated capacity, shall, if used to control a discharge lighting circuit, have a current rating of not less than twice the total steady current, which it is required to carry, or if used to control tungsten filament lamps and discharge lamps, have a current rating of not less than the sum of the current flowing in the tungsten filament lamps and twice the total steady current flowing in the discharge lamps.

112-15. **Power Factor.**

In any electric discharge lamp installation the power factor shall be between 0.85 lagging and 0.98 lagging.

112-16. **Loading of final sub-circuit.**

In every final sub-circuit the sum of the normal steady currents shall not exceed the rating of the final sub-circuit in amperes, nor cause a voltage drop in excess of 1 volt plus 2 per cent of the voltage at the consumer's terminals.

112-17. **Loading with inductor-operated discharge lamps.**

In every final sub-circuit from which choke-coil-operated discharge lamps are exclusively supplied, the total steady current in such final sub-circuit multiplied by one and one-quarter shall not exceed the rating of the final sub-circuit, nor cause a voltage drop in excess of 1 volt plus 2 per cent the voltage at the consumer's terminals.

112-18. **Loading with discharge lamps and tungsten lamps.**

In every final sub-circuit from which choke-coil-operated discharge lamps and

tungsten filament lamps are both supplied, the sum of the total steady current taken by the tungsten filament lamps and one and one-quarter times the total steady current taken by the choke-coil-operated discharge lamps shall not exceed the rating of the final cub-circuit nor cause a voltage drop in excess of 1 volt plus 2 per cent of the voltage at the consumer's terminals.

Note.—The regulations under 112-17 and 118-18 are complied with if, when the number of lamps to be used on the final sub-circuit is being calculated, the rated lamp watts of the discharge lamps are multiplied by 2. Thus:

$$\frac{(2 \times \text{choke-coil-operated discharge lamp watts}) \text{ plus } (1 \times \text{tungsten filament lamp watts, if any})}{\text{main volts}}$$

must not exceed the rating of the final sub-circuit nor cause a voltage drop in excess of 1 volt plus 2 per cent of the voltage at the consumer's terminals. The factor 2 takes care of the power factor and the watts absorbed by the ballast and any other auxiliary apparatus.

112-25. **Transformers.**

The transformers shall comply with the requirements of the standard specification for high voltage transformers for X-ray purposes where these apply, except as modified as follows:

The transformer shall be capable of withstanding continuously a short-circuit on the H.V. side when the rated low voltage and frequency is maintained at the L.V. terminals of the transformer or at the terminals of the transformer and choking coil, if such is provided in the L.V. circuit. If a choking coil or coils is provided for use in series with the H.V. circuit, the short-circuit test shall include the choking coil or coils.

B—ADDITIONAL REQUIREMENTS FOR INSTALLATIONS EXCEEDING 650 VOLTS

112-31. **Transformers of input exceeding 500 watts.**

When the high-voltage circuit is supplied from a transformer having an input exceeding 500 watts the means provided for the automatic disconnection of the supply shall operate in the event of short circuit or when the earth-leakage current exceeds 20 per cent of the normal steady current in the . . .

112-32. **Installation of ancillary equipment.**

Ancillary equipment for high-voltage installations, including chokes, condensers, resistors and transformers, shall be either totally enclosed in a substantial earthed metal container (which may form part of a lighting fitting), or alternatively shall be placed in a suitably ventilated enclosure of non-combustible material or of fire-resisting construction which is reserved for high-voltage apparatus.

A danger notice shall be placed and maintained at points of access on every such container or enclosure as is accessible to unauthorised persons, and otherwise where necessary unless an interlock is provided so arranged that before access can be had to live parts the supply is automatically disconnected. The words shall be in block letters not less than one-quarter inch high in red letters on a white background.

112-35. **Shielding of live parts.**

(a) An interlock shall be provided on every self-contained fitting, so arranged that before access can be had to live parts, the supply is automatically disconnected.

(b) Effective means shall be provided in every self-contained fitting to prevent automatically access to live parts when a tube is removed.

C—ADDITIONAL REQUIREMENTS FOR INSTALLATIONS EXCEEDING 1200 VOLTS.

112-41. **Maximum voltage permissible.**

No discharge lighting circuit shall use an r.m.s. voltage exceeding 5,000 volts to earth measured on open circuit for interior installations or 7,500 volts to earth for exterior installations.

112-43. **Transformers.**

Every transformer shall be double-wound and insulated with Class A material. This does not prohibit the use of an auto-transformer in the H.V. circuit provided that the circuit is isolated from the main supply by means of a double-wound transformer. In such cases the auto-transformer circuit shall be earthed at its common point.

112-45. **Means of disconnection.**

One of the following alternative means shall be provided for the isolation from all poles of the supply of every circuit supplying a high-voltage discharge lamp installation, except that means need not be provided for the isolation of the neutral of a three-phase four-wire installation:

(i) An interlock on the self-contained fitting, so arranged that before access can be had to live parts the supply is automatically disconnected; or

(ii) Effective means on or adjacent to the lamps for the isolation of the circuit from the supply (e.g. an adjacent plug and socket-outlet conveniently placed for a transportable fitting), such means being provided in addition to the switch normally used for controlling the circuit; or

(iii) A switch or fuseboard which can be locked, arrangements being made to prevent the restoration of the supply by unauthorised persons. Where more than one locked switch or fuseboard is installed, the keys shall be non-interchangeable.

112-46. **Fireman's switch.**

An emergency (fireman's) switch shall be provided where stated in regulation 212-42.

Every such fireman's switch shall comply with the following:

(i) It shall be painted red. Its "on" and "off" positions shall be clearly indicated, and the "off" position shall be at the top. All lettering shall be legible by a person standing on the ground.

(ii) Where more than one fireman's switch is installed on any one building, every such switch shall be clearly marked to indicate the installation or section of the installation which it controls, and the local fire bridage authority shall be notified accordingly.

(iii) When suitably designed, the fireman's switch can be used as the means of isolation required by regulation 112-45.

112-48. **Cables.**

Conductors in the high-voltage circuits shall be metal-sheathed cables, armoured cables, or metal-sheathed and armoured cables except in the following instances:

(i) Bare or lightly-insulated conductors of tinned copper or nickel, having a cross-sectional area not less than 0.0006 square inch, may be used for high-voltage series connections where installed as described in regulation on 212-43.

(ii) Insulated and braided conductors may be used as specified in clause 212-44.

(iii) The return cable from an electrode to a transformer terminal which is earthed may be of 250-volt grade, provided that the cross-sectional area of the conductor is not less than 0.0045 square inch (7/.029 inch).

112-49. **Supports.**

All supports for cables in the high-voltage circuits shall satisfy the following conditions:

(i) They shall hold the cable securely and shall themselves be attached to a rigid mounting.

(ii) Supports for insulated and braided cables and bare conductors shall be of non-combustible non-hygroscopic insulating material, e.g. glass or glazed porcelain. They shall not be fibre, rubber, hot moulded shellac or phenolic composition.

(iii) The length in inches, measured along its centre line, of every support which serves to separate bare high-voltage metal, or cables which are neither metal-sheathed nor armoured, from earthed metalwork, woodwork or surfaces likely to become damp, shall be not less than the value obtained by dividing the voltage to earth in kilovolts (r.m.s.) of the transformer secondary, measured on open circuit, by 2.5.

112-50. **Distinguishing tabs or labels.**

Where otherwise not readily identifiable cables or their protective coverings shall be distinguished by tabs or labels, securely attached at intervals not greater than 5 feet. The tabs or labels shall be indelibly marked with danger notices and the letters shall be red on a white background, and shall be not less than one-quarter inch high.

212. INSTALLATION OF ELECTRIC DISCHARGE LAMPS.

212-01.

This sub-section is divided into A, B and C as described in 112-01."

A—APPLICABLE TO ALL ELECTRIC DISCHARGE LAMP INSTALLATIONS

212-11. **Installation of ancillary apparatus.**

Ancillary apparatus, including chokes, condensers, resistors and transformers, shall be so installed as to be adequately ventilated and protected from risk of mechanical damage, and shall be either:

(i) Enclosed in a lighting fitting assembly; or

(ii) Enclosed in a suitably designed non-combustible enclosure; or

(iii) Be so mounted that no wood (except hardwood) or other combustible material not protected by non-combustible material is within 12 inches measured vertically above, or 6 inches measured in any other direction, from the ancillary gear.

212-12. **Position of transformers and chokes.**

Every choke coil and transformer shall be installed as near as is practicable to its associated discharge lamp.

212-13. **Power factor correction.**

When power-factor correcting condensers are provided in discharge lighting circuits, each portion of a final sub-circuit which is controlled by separate switch shall have separate power-factor correction.

212-14. **Screening of live parts.**

All live parts of an installation (including all apparatus and conductors but excluding the lamps except in the neighbourhood of their terminals) shall be provided with effective screens of earthed metal or insulating material, of mechanical strength adequate to withstand the conditions of normal service. Insulating material used for this purpose must be non-ignitable, non-hygroscopic and non-tracking.

For installations on the exterior of a building, live parts, as defined above, shall alternatively be so situated as to be accessible only to authorised persons.

212-15. **Installation in closed market or arcade.**

A discharge lamp installation in a closed market or in an arcade shall be deemed to be an exterior installation, but an installation is a permanent building used for exhibitions is not so deemed.

212-16. **Protection from water.**

Where live parts would otherwise be exposed to rain, dripping water or condensed water, they shall be protected by weatherproof housing.

212-21. **Earthing of transformers**

Every transformer, other than an auto-transformer, shall have one point of its secondary winding earthed, except that a secondary winding on a high reactance transformer, serving solely to energise a tesla coil or the heating electrode of a discharge lamp, need not be earthed. If earth-leakage protection is provided, the earth connection may be made through the winding of a solenoid to the local earth. The core of every transformer shall be earthed.

212-22. **Auxiliary windings.**

A circuit which is supplied from an auxiliary winding on a high-reactance transformer to energise a tesla coil or the heating electrode of a discharge lamp need not be separately protected by a fuse.

212-23. **Motor-generators and convertors.**

Every discharge lighting circuit which is energised by a motor-generator or double-wound convertor shall be permanently earthed at a terminal of the motor-generator or convertor.

212-30. **Voltages of 300-650 volts.**

Discharge lighting equipment which operates under steady running conditions at an r.m.s. voltage exceeding 300 volts but does not fall within the scope of sections B and C, i.e. does not use a voltage exceeding 650 volts r.m.s. measured on open circuit, shall either be inaccessible to unauthorised persons or be so designed and installed that no live metal is exposed in such a manner that it may be touched, when a lamp is inserted or removed.

B—ADDITIONAL REQUIREMENTS FOR INSTALLATIONS EXCEEDING 650 VOLTS

212-31.

There are no regulations specific to installations of this class.

C—ADDITIONAL REQUIREMENTS FOR INSTALLATIONS EXCEEDING 1200 VOLTS

212-41. **Isolation from supply mains.**

No conductor which is in metallic connection with the terminals of a discharge lamp shall be in metallic connection with any conductor of the supply mains except as may be provided by a connection with earth.

212-42. **Fireman's switch.**

An emergency (fireman's) switch shall be provided for exterior installations (see regulation 212-15).

Every such fireman's switch shall comply with the following clauses as regards installations:

(i) It shall be arranged to isolate the discharge lamp installation from all poles of the supply, except that it need not be arranged to isolate the discharge lamp installation from the neutral of a three-phase four-wire supply. If isolation is effected by remote control, arrangements shall be made that the circuit is opened automatically by failure of the supply to the remote control equipment.

(ii) It shall be fixed to the building structure in a conspicuous position, reasonably accessible to firemen, and, except in the case of an agreement to the contrary with the local fire brigade authority, at not more than 9 feet from the ground.

(a) For exterior installations, it shall be as nearly as possible vertically below the discharge lamp or lamps, or, alternatively, a notice indicating the position of the switch shall be placed directly below the discharge lamp or lamps and a name-plate shall be fixed near the switch so as to render it clearly distinguishable.

(b) Wherever practicable, all the exterior installations on any one building shall be controlled by a single fireman's switch.

212-43. **Bare or lightly insulated conductors.**

Bare or lightly-insulated conductors complying with regulation 112-48 (i) may be used if:

(i) The conductor does not exceed 36 inches in length, is supported at intervals not greater than 18 inches, is not exposed to the likelihood of mechanical damage, and is completely protected by non-ignitable, non-hygroscopic insulating material, which if in the form of glass tubing, has a wall thickness, not less than 0.04 inch, and an overall diameter not less than 0.2 inch, and is so arranged as to be reasonably secure against being so displaced as to metal; or

(ii) The conductor is in an enclosure to the interior of which only authorised persons can have access.

212-44. **Insulated and braided conductors.**

Suitably insulated and braided conductors may be used:

(i) In exterior installations for series connections not exceeding 10 feet in length which are not exposed to the weather nor to the likelihood of mechanical damage, or which are installed in box signs.

(ii) In interior installations in self-contained fittings.

212-45. **Metal-sheathed, armoured, or metal-sheathed and armoured cables.**

Metal-sheathed, armoured, or metal-sheathed and armoured cables shall be installed in accordance with the following clauses (i) and (ii):

(i) They shall be supported at intervals not greater than the following:

Cable run.	Metal-sheathed.	Armoured or metal-sheathed and armoured.
Horizontal	30 inches	36 inches
Vertical	48 inches	60 inches

(ii) All metal sheathing and armouring shall be earthed.

212-46. **Insulated and braided conductors and bare conductors.**

Insulated and braided conductors and bare conductors shall be supported at intervals not greater than the following:

Cable run.	Insulated and braided cables.	Bare conductors.
Horizontal	18 inches	18 inches
Vertical	30 inches	18 inches

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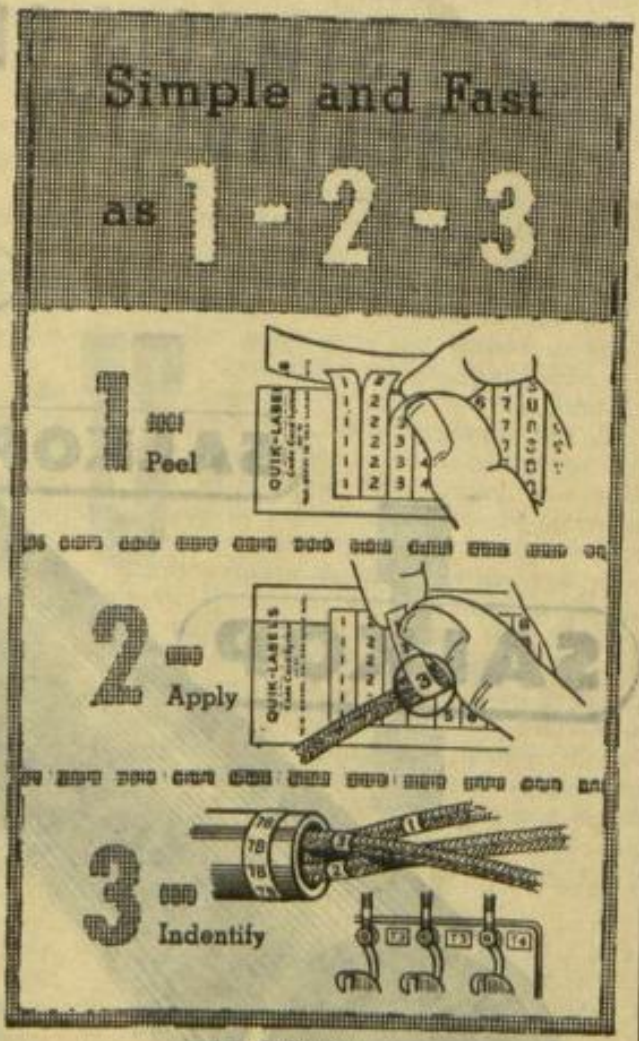

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212-48. **Clearances.**

The air gap in inches from high-voltage metal or cables which are neither metal-sheathed nor armoured to earthed metal, woodwork or surfaces likely to become damp, shall be not less than the value obtained by dividing the voltage to earth in kilovolts (r.m.s.) of the transformer secondary, measured on open circuit, by 7.

212-50. **The installing of cables.**

All cables in the high-voltage circuits shall be installed in accordance with the following:

(i) Each cable shall be supported close to each terminal connection and in no case at a distance greater than 6 inches, or 12 inches if a glazed porcelain electrode receptacle forming an adequate support for the cable is used.

(ii) The ends of the stranded conductors shall either be made solid by soldering, or the strands shall be twisted and clamped by an approved mechanical clamping device which prevents the spreading of the strands.

(iii) When a connection is made to a cable, the insulation exposed by stripping back the metal sheath or braiding shall be suitably protected from the effects of ozone.

(iv) When exposed to the likelihood of mechanical damage, cables shall be armoured or otherwise suitably protected. Unarmoured cables shall not be installed in metal conduits, except where they pass through walls or floors, where they may be installed in short lengths of metal conduit which shall be earthed.

212-51. **Earth return metalwork.**

The metalwork of a rotating device, e.g. the hands of a clock, may be used as a return conductor provided that uninsulated metalwork is permanently and effectively earthed.

PRESIDENT:

Thank you, Mr. Downey. Mr. Perrow, may we have your report?

Mr. E. VIVIAN PERROW, Chairman, Safety Precautions Committee:

Mr. President, Gentlemen: In view of the comprehensive report presented by Mr. Downey, I feel there is not much that I need say. The revision of the Standard Wiring Regulations has taken a considerable time and has been given a great deal of thought, and the suggestions put forward by members of your Association and others have been much appreciated. It is but natural that after nine years of operation with the present regulations, various improvements could be visualised and amendments suggested, not only in the light of experience with the existing regulations but also to keep pace with modern developments. The Amendments Sub-Committee under the chairmanship of Mr. H. P. Alexander not only had to deal with the complete revision of the regulations but subsequently with the various suggestions put forward and although most of the suggestions were adopted in one form or another some were not agreed to and the Main Committee which finally had a full day's session weighed very carefully all the arguments, for and against, before arriving at a decision. It is therefore hoped and anticipated that when the second edition is published it will be universally adopted and where local conditions necessarily require deviations from the printed text, these can be met by local by-laws or regulations, it being felt that the underlying principle of the regulations — that of safety — will not be departed from. The new edition will shortly be handed over to the South African Institute of Electrical Engineers for setting up in galley form and will then after final editing be submitted to the legal advisers and subsequently to the various authorities for promulgation.

It was hoped that the South African Bureau of Standards or the Electricity Control Board could have promulgated the regulations on a national basis but investigation has shown this to be impracticable and consequently promulgation will have to be proceeded with on similar lines to those adopted for the first edition. Before concluding I would like to express my personal appreciation as well as that of the Main Committee of the valuable services rendered by the representatives of your Association in the work of the Committee in general and the revision of the regulations in particular. Should any of your members, Mr. President, require any further information, Mr. Alexander and myself will endeavour to supply it.

PRESIDENT:

Thank you, Mr. Perrow. The next report is on the S.A. Standards Institution, given by Mr. Downey.

SOUTH AFRICAN STANDARDS INSTITUTION

Mr. J. C. DOWNEY, Springs:

Mr. President, Gentlemen: The work of the S.A. Standards Institution continued during the year and reports were received from the Mechanical Engineering, Electrical Engineering, Civil Engineering, Architectural and Building and Chemical Sectional Committee. Numerous specifications were received from overseas, scrutinised and comments offered.

The specification for creosoted wooden poles was issued and well received.

Out of the original issued only 44 copies were left unsold by the end of October when the specification was withdrawn, in order to incorporate additional and more up-to-date information.

The revision was necessitated by the difficulty of procuring the prescribed creosotes, substitutes for which are now being considered for incorporation in the revised specification to be published in 1950.

The work of the revision of this specification has been taken over by the Bureau of Standards, at the request of the S.A. Standards Institution.

The South African Standars Institution was at one time the only body endeavouring to establish standards in South Africa and, due to representations made by this Institution, the Standards Act No. 24 of 1945 was passed by Parliament. This permitted the establishment of the South African Bureau of Standards under the Standards Council.

The Bureau of Standards has progressed considerably during the past five years and has at its disposal full-time officials and technicians together with the necessary plant, machinery and equipment for carrying out tests for standardization, together with he necessary organization for dealing with all specifications.

It is the considered opinion of the main Committee of the South African Standards Institution that the functions of this Institution should no longer be continued as all the work done by this Institution can now be more adequately carried out by the South African Bureau of Standards.

The Standards Institution therefore recommended at its meeting held on 23rd February, 1950:

(a) That the South African Standards Institution cease to function as soon as possible, after the necessary amendments to the Standards Act No. 24 of 1945 have been effected.

(b) That the provision of paragraph (b) of sub-section (1) of section 5 of the Standards Act providing for members of the Standards Institution nominated for consideration for appointment to the Standards Council be transferred to the Associated Scientific and Technical Societies of South Africa.

From the foregoing it will be noted that the South African Standards Institution may cease to function during the coming twelve months, but in the meanwhile it will be necessary for the Institution to continue until such time as the Minister is able to introduce the necessary amendments to the Act.

All marks and representations of the South African Standards Institution and the British Standards Institution, together with the S.A.B.S. marks, will therefore be under one controlling body.

I have also to report that I represented your Association on the Sectional Electrical Engineering Committee of the Institution, the Committee to which all Electrical Specifications are sent for comment and consideration. This Committee will therefore also cease to function when the amendment to the Act is made. In the meantime the work here must also continue.

It will be seen from the foregoing that in all possibility a report at the next Convention on the South African Standards Institution will be the last one.

PRESIDENT:

Thank you, Mr. Downey.

Mr. D. A. BRADLEY, Port Elizabeth:

Mr. President, Gentlemen: The remarks which you have just heard from our worthy delegate brings to our notice that, for these past years, we have been members of this organisation together with the S.A. Institute of Electrical Engineers, and our delegates have un-

stintingly given their time and energy, perhaps at a cost, to the Standards Institution. We have heard that it has now completed its deliberations or, in other words, it has been taken in by the S.A. Bureau of Standards, but I just want to say how glad I am to have the opportunity to thank all our delegates whether members of ours or of other Institutions for their representation over the years and we record with pleasure that they are perhaps handing over now a fully-grown "person" who was a child when this work was commenced some years ago. I think we should record our thanks to all those gentlemen who were responsible for that work on our behalf.

Mr. C. MULLINS, Electricity Control Board:

Mr. President: As we have just heard the death knell of the South African Standards Institution, I would like to mention that Professor Orr was the father of the Institution which was started in South Africa as the British Engineering Standards Association, and later worked in close co-operation with the British Standards Institute and with the Standards Institutions of the other Dominions. Finance in those days was a very difficult problem and Professor Orr used to approach the Chamber of Mines and other large concerns for contributions to enable the Institution to carry on. He was also instrumental in getting the necessary typing done and, speaking generally, he carried on for many years under very difficult conditions. I would, therefore, suggest that before the Institution closes down, a letter of appreciation be sent to Professor Orr for the very fine and arduous work carried out by him over a considerable number of years.

PRESIDENT:

Can I take that as a proposition to the Conference? It is seconded and agreed that we show our appreciation from this Convention. I think that will conclude the business we can do this morning and we will adjourn until to-morrow at 9.30.

FRIDAY, 12th MAY, 1950

PRESIDENT:

There are one or two items before we start the paper. We have the Chairman of the Wiring Regulations Amendment Sub-Committee here and he wishes to say a word or two on this subject.

Mr. H. P. ALEXANDER, Electricity Supply Commission:

I just want to express a vote of thanks to all those Engineers who were kind enough to submit comments on the proposed draft second edition of the Wiring Regulations. These comments were all carefully gone through by the Amendment Sub-Committee and should anybody wish any information on details I have a complete schedule here of our deliberations. Naturally it was impossible to comment on every suggestion that was received, but the gist of our report was given in Mr. Downey's report. I would like to make it clear that the work of the Amendment's Sub-Committee has been very difficult in so far that in many cases very conflicting comments were received and as it has not been the desire of the Committee to leave everything to the discretion of the Engineer, in as few cases as possible have we resorted to the old phrase "if approved." I would like to make a plea for every Municipality to adopt the regulations as they stand, without the promulgation of any additional regulations in their by-laws. It is suggested that the by-laws should be used to set out in permanent form all the systems of wiring and types of equipment which are approved for use in that Municipality. It would be appreciated if any omissions from the regulations could be reported to the Safety Precautions Committee as soon as noted for possible inclusion at a later date.

I thank you, Mr. President, for affording me this opportunity of making my remarks on the Wiring Regulations and should like also to extend to you, Sir, on behalf of the Chief Engineer (Electrical) of the Electricity Supply Commission, congratulations on the conduct of your Convention and best wishes for a very successful year of office.

PRESIDENT:

Thank you. Mr. Ritchie has a few more words to add about the Meter Testing Code.

Mr. J. RITCHIE, S.A. Bureau of Standards:

Mr. President: I have been approached by a large number of members here and

they said they were very disappointed that they had no opportunity of discussing the Code. As I am leaving a little later this morning I would ask whether we can discuss it now. I have no further points to raise. We have dealt with the arguments of the Electricity Control Board about damage in transit. I think the members want to raise some points and I would be glad to assist with any additional information.

PRESIDENT:

I feel we must keep to the programme and we cannot bring this subject on until after the refreshments. I now have pleasure in calling on Mr. Theron, Vanderbijl Park, to present his paper on "The Use of Cut-off Lanterns for Street Lighting."

"THE USE OF CUT-OFF LANTERNS FOR STREET LIGHTING"

By

G. C. THERON, B.Sc., A.M.(SA)I.E.E., A.M.I.Cert.(SA), Electrical Engineer, Vanderbijl Park

1. INTRODUCTION

In South Africa we probably pay just as much if not more attention to streetlighting than any other country in the world. American visitors have commented on this with the remark that our streetlighting is unnecessarily extravagant, not realising our problems as a result of a mixed population. Enquiries proved that streetlighting installations in the U.S.A. fall far short of our standards. The result is that very little literature on streetlighting problems is available from the U.S.A. and we have to rely almost entirely on research carried out and standards set up in Britain.

In June, 1934, the Minister of Transport in Britain appointed a Departmental Committee on Streetlighting and the final report of this body was published in August, 1937. This report is probably the most authoritative document on streetlighting available to-day and its recommendations have been incorporated in a revised Standard Specification now in draft form.

The results attained with the lanterns under review will therefore be compared with the recommendations of this report, rather than with that of the now obsolete Standard Specification No. 307/1931. As copies of this report may not be available to all, it has been considered necessary to summarise the salient points from this report in so far as it affects the subject under review.

2. EXTRACTS FROM FINAL REPORT OF DEPARTMENTAL COMMITTEE ON STREET LIGHTING.

(a) Classification of Roads

A considerable portion of the report of the Departmental Committee on Streetlighting deals with the reasons for classifying streets into two groups as follows:

GROUP A—TRAFFIC ROUTES
Roads on which the standard of lighting should provide an ample margin of safety for *all road users*, without the use of headlights by motor vehicles.

GROUP B—OTHER ROADS
All other roads which the responsible authority considers should be lighted.

(b) The Lighting of Traffic Routes (Group A)

The minimum standard of lighting should be that which enables drivers to proceed with safety at 30 miles per hour without the use of headlights, and the following are recommended:

(i) Mounting height: of the order of 25 ft.
(ii) Spacing: not greater than 150 ft.
(iii) Overhang: about 6 ft. beyond the kerbs.
(iv) Number and power of sources: sufficient to provide per 100 ft. linear of road having a carriageway not more than 40 ft. in width between 3,000 and 8,000 lumens.
(v) Glare: the ratio of the maximum or peak candle-power to the amount of light sent downward from the fitting on to the road should in no case exceed 5 when the fittings are mounted as recommended above.

(c) Siting of Lamps

DUAL CARRIAGEWAYS: It is recommended that with the types of lighting

units at present in general use, each carriageway should be lighted independently as a separate traffic route, i.e. each traffic route should conform with the recommendations set out above.

We will now endeavour to show to what extent we have managed to meet the requirements of the above specifications by the use of the cutoff lanterns.

3. DESCRIPTION OF TOWN LAYOUT

The town of Vanderbijl Park as it is beginning to shape to-day was started in 1946. Situated at an altitude of approximately 4,800 feet above sea level, it lies on the slopes of a very flat hill where maize was cultivated in previous years.

The layout of the town is on the cart wheel principle with the hub formed by the future town centre and the main boulevards representing the spokes of the wheel, dividing the residential areas into separate neighbourhood units.

Drawing No. 1 illustrates the layout.

The town is planned for an ultimate population of 250,000 persons and it is estimated that when this population figure is reached, the boulevards will at peak hours carry a traffic density of 2,000 vehicles per hour.

4. CLASSIFICATION OF STREETS

From the abovementioned it will be seen that the classification of the streets at Vanderbijl Park into the groups mentioned before offered no great difficulty.

The boulevards, designed for fast through traffic, are, therefore, classed as TRAFFIC ROUTES belonging to Group A, while all the other roads within the residential areas and feeding on to the boulevards are classed as Group B streets.

The report referred to earlier is very definite that there should be clear differentiation between the lighting of traffic routes and Group B roads and that intermediate lighting levels should be avoided.

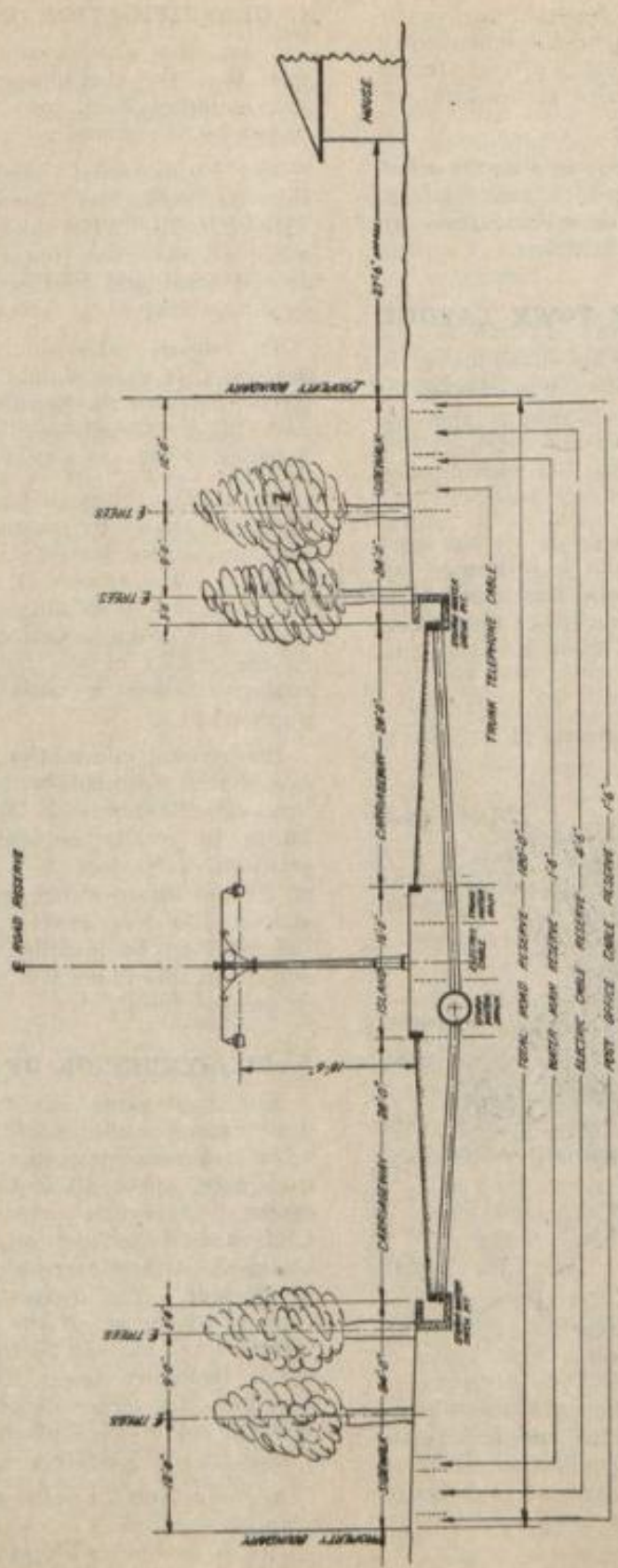
With this in mind it was decided to light all traffic routes by means of high pressure mercury vapour lamps and to use tungsten lamps for the Group B roads. There is, therefore, no possibility of confusion because both the standard of lighting as well as the colour of the light will warn the motorist when a main thoroughfare is approached.

For general information, it may be mentioned that the roads within the residential areas are lighted with 200 Watt tungsten lamps in totally enclosed lanterns with prismatic refractors at a mounting height of 18 feet above street level and generally spaced 150 feet apart. The installation lighting the boulevards and forming the subject of this Paper will now be considered in greater detail.

5. CONSTRUCTION OF BOULEVARDS

The boulevards of dual carriage-way design have a total width of 120 feet with a 24 feet pedestrian and cycle reserve on each side and a 16 feet island along the centre. A typical cross-section of the boulevards is shown on Drawing No. 2 attached. Each carriageway has a width of 28 feet. The houses, almost 100 per cent of which are of the single storey detached type, are set 20 feet back from the stand boundary line. The walls of the buildings are either of golden brown face brick or colour-wash plaster finish, and nowhere offer a good reflecting surface.

A double row of celtis sinensis trees are planted along each sidewalk and the centre island is covered with grass throughout.


HOUSE
TRUNK TELEPHONE CABLE
E ROAD RESERVE
DRAWING No 2

6. LIGHTING OF THE BOULEVARDS AND SITING OF POLES

The lighting of dual carriageways was of sufficient importance to warrant a special section in the report of the Departmental Committee of the Ministry of Transport and I therefore feel justified in again quoting from their recommendations as follows:

"The separation of dual carriageways should be effected by a reservation of the greatest width practicable. Endeavour should be made to secure a width of 26 feet between dual carriageways of 20 feet and not less than 6 feet between dual carriageways of 30 feet in order to provide a dimension of 66 feet between the outer kerbs . . . With the types of lighting units at present in general use it appears that satisfactory results can be obtained, if each carriageway is lighted independently as a separate traffic route . . . "

From the drawing referred to in the previous section, it will be seen that the traffic routes at Vanderbijl Park are 6 ft. wider between kerbs than that recommended above.

Furthermore, all services are underground so that no poles carrying overhead distribution conductors are available for supporting the streetlighting fittings. Poles have to be erected specially for streetlighting purposes. The advantage is that streetlighting can be designed quite independently of existing positions of standards, but on the other hand the capital expenditure is greatly increased.

By following the recommendation quoted above and treating each carriageway as a separate traffic route, the cost of the cable and labour would be increased and a larger number of poles would be necessary.

It is therefore clear that financial considerations militated against the acceptance of these recommendations right from the outset and no attempt was ever made to try them out.

The system adopted was to run along the traffic island a streetlighting cable to supply one line of standards erected on the centre line of the boulevard. By this means cable was saved and the number of standards reduced by 25 per cent.

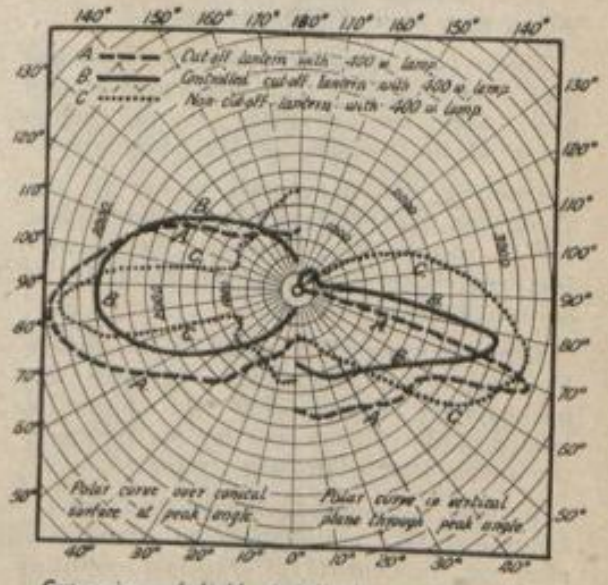
7. TYPES OF LIGHT DISTRIBUTION

There are only three normal types of light distribution, and it is convenient to refer to these as Non-cutoff, Controlled Cutoff and Cutoff.

There is of course no hard and fast division between these distributions, and some lanterns may have characteristics which lie between two types of distribution and are consequently difficult to classify. In general, however, Non-cutoff lanterns produce their peak intensity at about 82 degs. from vertical, and at 85 degs. there is still a considerable amount of light, and high values are maintained up to and even above the horizontal.

With controlled cutoff lanterns, the peak is also at about 82 degs. and at 85 degs. intensities are not less than 50 per cent of the peak, whilst above this angle intensities fall off as quickly as possible, so that there is very little light at or above the horizontal. In the case of Cutoff lanterns, arrangements can usually be made for peak intensities to be at 65 degs., 70 degs. or 75 degs. to suit different spacings. Above the peak as little light as possible is emitted.

Drawing No. 3 shows a comparison of light distribution from cutoff, controlled cutoff and non-cutoff lanterns.



Comparison of light distribution from Cut-off, controlled cutoff and non cut-off lanterns.

DRAWING No 3.

The characteristics of the non-cutoff installation are, of course, the long T-shaped "patches" of brightness which combine to form a mosaic, covering the whole road surface. Controlled cutoff is a refinement of the non-cutoff distribution, and the affect of the rapid decrease in illumination above the peak is to make the lantern appear less bright. The characteristic of a cutoff installation is that as light above a low angle is virtually "Cut Off," and for this reason the actual light source cannot normally be seen, the only indication of the presence is a glow under each lantern. The effect of this cutoff on the patches of brightness on the road is that they become all head and no tail, in other words, bright bands across the road. For this reason very close spacing is necessary in order to avoid dark bands across the road.

8. FIRST ATTEMPTS AND DIFFICULTIES ENCOUNTERED

The first section was lighted by means of top-entry difractor lanterns containing 400 watt high pressure mercury vapour lamps burning in a vertical position.

This lantern, of which thousands are installed in this country, has a non-cutoff light distribution.

Two fittings were mounted on poles which were spaced 150 feet apart.

These poles of spun reinforced concrete give a total height of 20 feet above ground level and the auxiliary equipment is mounted in the base of the standard.

Drawing No. 2 referred to earlier also illustrates one of these earlier assemblies, and it will be seen that the light source was not more than approximately 18' 6" above the road surface.

It is not proposed to consider the reasons for this design, but all engineers will immediately realise that the mounting height of the fittings was far too low, with the result that glare was excessive.

It was also clear, however, that the failure of this installation on account of glare was not entirely due to low mounting height, but was aggravated by a number of other factors, the importance of which was never realised until the lights were switched on.

This was convincingly proved by experiments carried out with the same light sources at a height of 25 feet above road level. Glare was reduced, but the results were by no means satisfactory.

It has been well established that the amount of glare experienced due to a source of light in the field of view increases as

(i) its distance from the observer decreases,

(ii) the intensity of the source increases,

(iii) it approaches closer to the direction in which the observer is looking, and

(iv) the general brightness of the field of view decreases.

With the town situated on a slight rise, practically every light on the boulevards is seen against the dark sky as background, which on most nights results in a very sharp contrast between a bright light source and a pitch black background.

As explained earlier reflection from the buildings is negligible and with the clear high veld atmosphere there is practically no diffusion from smoke and dust particles.

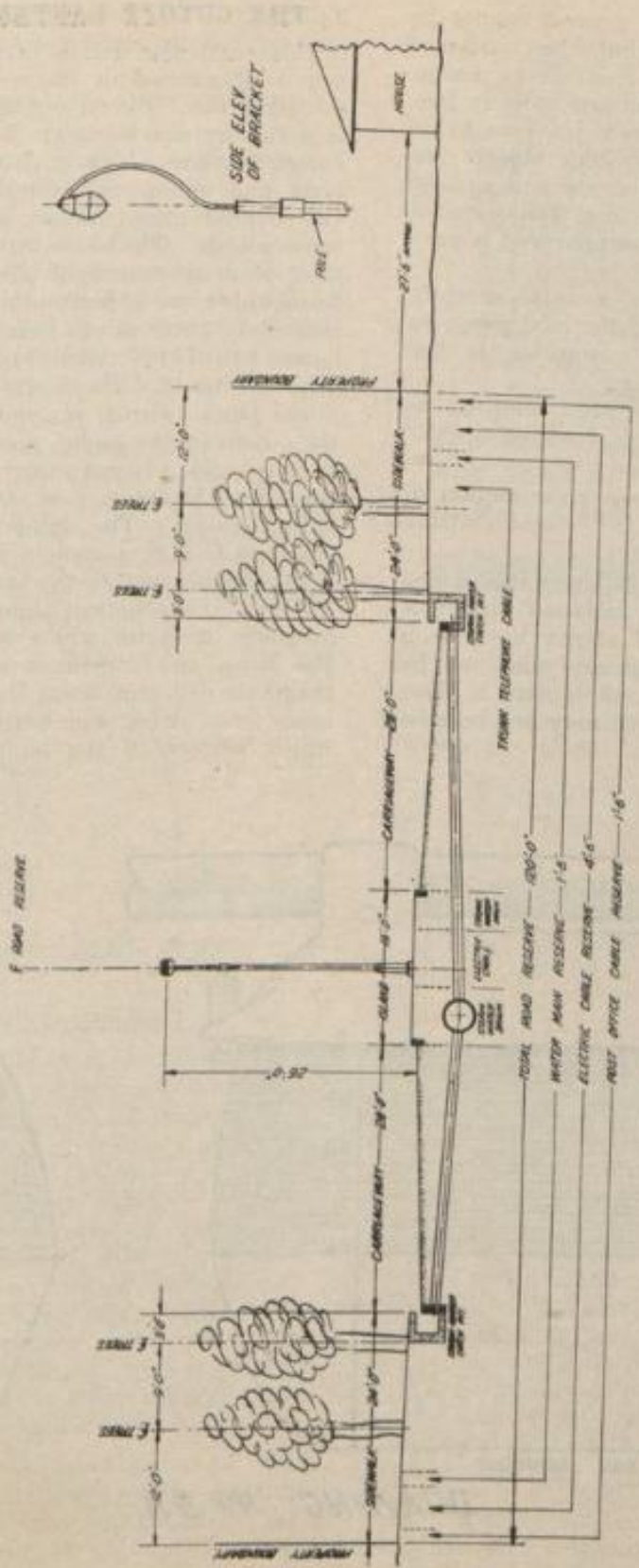
The conditions are, therefore, entirely different from those normally met in city streets where the same standard of lighting would be applied.

The use of smaller wattage lamps was also tried but made no appreciable difference to the glare experienced.

It was clear from tests carried out that, under our conditions, an entirely satisfactory result could not be obtained with the conventional type of non-cutoff street-lighting lantern, even if horizontally burning lamps were used.

It was suggested that a cutoff lantern may be the answer to the problem and additional weight was given to this argument by a report issued by the Illuminating Engineering Society from which the following extract is quoted:

"There are, however, other alternative methods of lighting a road satisfactorily. A very important alternative is known as the 'cutoff' system, in which the sources of light are mounted at somewhat closer spacings, and the lamp reflectors are so arranged that the very 'oblique' rays are eliminated.


SIDE ELEV OF BRACKET
HOUSE
POST
27'6"
PROPERTY BOUNDARY
SIDEWALK
12'0"
9'0"
3'0"
24'0"
TRAM
TRAM
TRAM TELEPHONE CABLE
CARRIAGEWAY
36'0"
6'0"
ISLAND
F ROAD RESERVE
TIDAL ROAD RESERVE — 120'0"
WATER MAIN RESERVE — 1'6"
ELECTRIC CABLE RESERVE — 4'6"
POST OFFICE CABLE RESERVE — 1'6"
DRAWING Nº 4.

"This arrangement in general results in lower road brightness, but the tendency to glare is diminished. In its extreme form such a system is almost entirely free from glare and is considered by some to be preferable. With this system objects are usually still seen in silhouette and against bright backgrounds, and in a well-designed installation, the silhouette produced is very effective."

Six cutoff fittings of a type recently developed were imported for trial purposes and soon proved that a solution to the problem had been found.

This fitting has now been adopted as standard for the lighting of all class "A" roads at Vanderbijl Park.

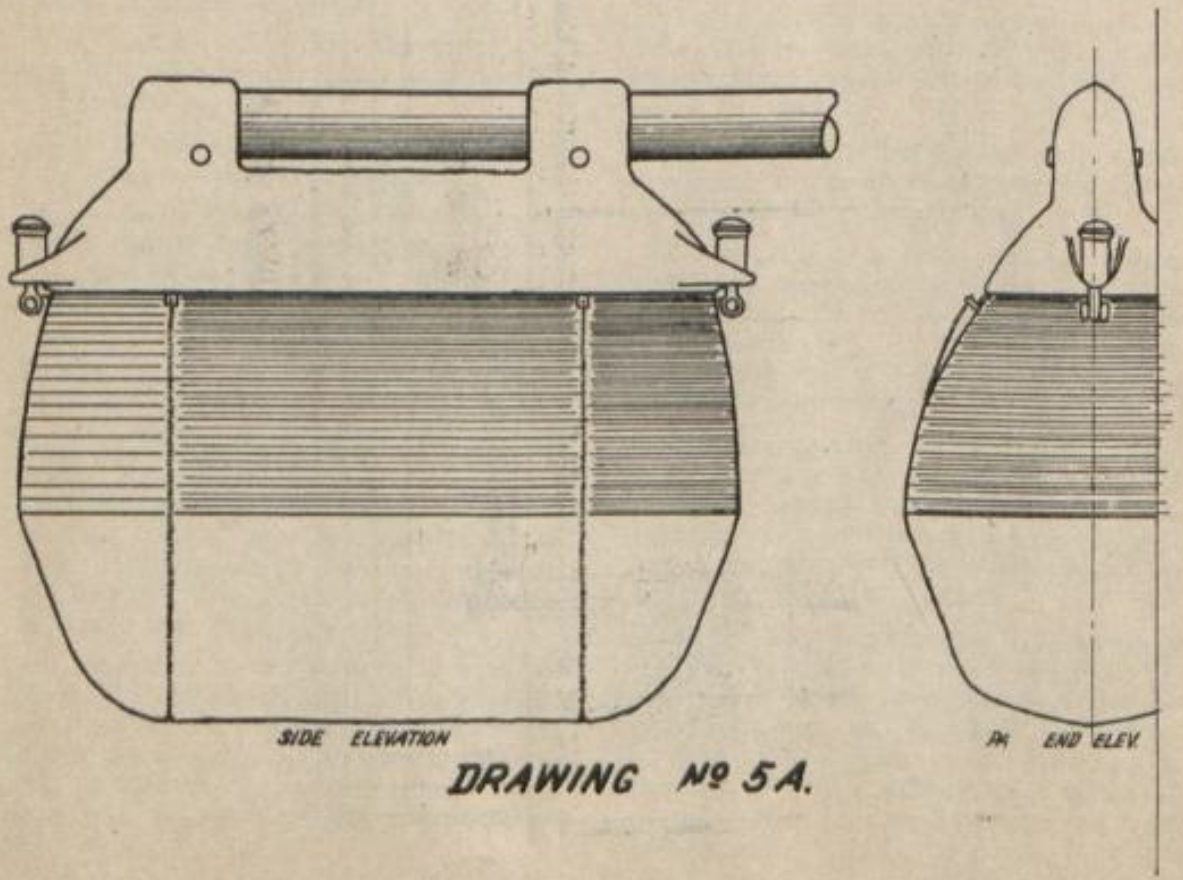
Drawing No. 4 shows a cross-section of the boulevard with the cutoff fitting mounted at 25 feet height.

As far as can be ascertained this is the first streetlighting installation in this country where cutoff lanterns have been used, and as most engineers may not be conversant with the cutoff lantern a short description of the lantern may not be misplaced.

9. THE CUTOFF LANTERN

This particular design of the cutoff lantern is illustrated in Drawing No. 5A and is called the "Blown cutoff lantern". It is a further development of the open type cutoff lantern which had a sheet metal body and an optical system consisting of two curved glass mirrors at each of the lantern ends. The blown cutoff lantern consists of a die-cast light alloy body which is mounted on a horizontal length of unthreaded 1¼ inches gas barrel. When fully home two 7/16" Allen type grub screws grip the barrel. The body carries the terminal block, wiring, magnetic deflector for the horizontal high pressure mercury vapour lamp, silvered mirror reflector above the lamp, focussing gear, lamp holder and lamp steady. The lamp holder is the standard G.E.S. porcelain type wired with heat resisting wire to the terminal block.

Above the reflector plate is mounted a magnetic deflector which is in series with the lamp and consumes one watt. The magnetic deflector keeps the arc inside the lamp from rising and burning against the upper surface of the lamp.

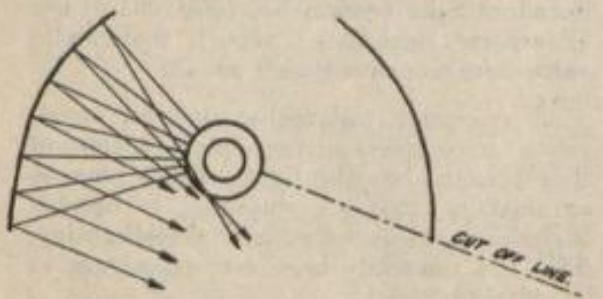


DRAWING Nº 5A.

Three focal positions of the lamp are provided, giving main beam at 60 degs. or 65 degs. or 70 degs.

The glassware, which forms the biggest bulk of the fitting is a one-piece blowing, the upper portion being silvered, copper and lead-backed, whilst the lower half has a slight rimpled surface which has the effect in daylight of concealing the interior of the lantern, and by night of providing a measure of diffusion. The contour of the silvered portion has been very carefully designed to make maximum use of the light from the lamp and is shown in drawing No. 5B.

Two stainless steel expanding springs act as an additional support for the glassware. The silvered portion of the glass acts as a concave mirror and the light is simply pushed down on to the road. No refractor prisms are provided in the glassware, thus facilitating cleaning.



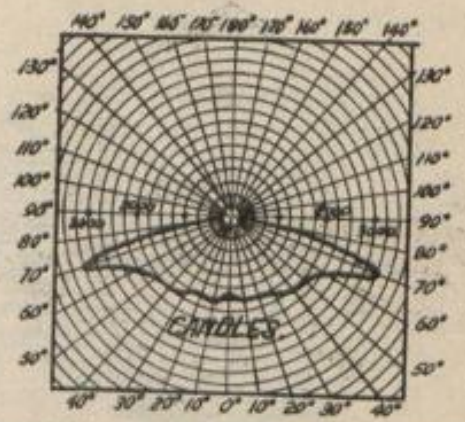
DRAWING Nº 5B.

10. LIGHT DISTRIBUTION

The polar and iso-candle curves for the blown glass cutoff lantern are illustrated on drawing Nos. 6A and 6B respectively.

The peak candle power is at about 70 degs. to the vertical and above this the intensities fall off very rapidly. Only 2 per cent of the light emitted goes above the horizontal compared with 15 per cent to 20 per cent in the case of the more conventional type of non-cutoff lanterns. This is of special importance under our conditions, because, due to the absence of high buildings, there are no reflecting walls and all light above the horizontal is lost.

The directional intensity ratio, i.e. the ratio of the peak candle-power to the amount of light sent downward from the fitting on to the road, for this cutoff fitting is only 2·2 which compares very favourably with the maximum value of 5 laid down in the report of the Ministry of Transport Committee on Streetlighting referred to earlier.



Curve indicates light distribution in a vertical plane through the maximum intensity.
Lamp:- 400 watt H.P.M.V.

DRAWING Nº 6A.

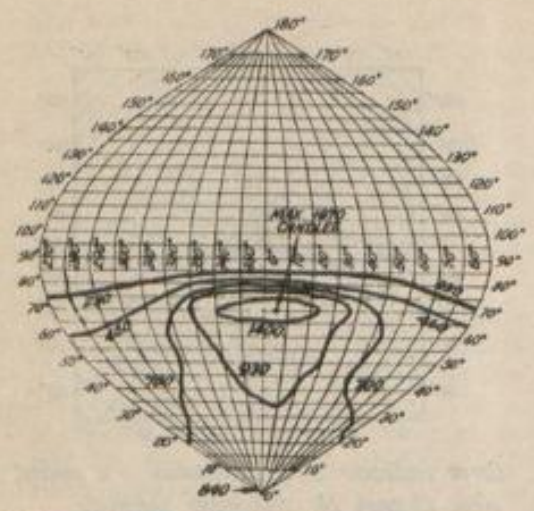
It will be seen from the light distribution curves referred to above, that the cutoff lantern has a very wide spread of light in the horizontal plane. This characteristic of the cutoff lantern is utilised in lighting the double carriageway boulevards by means of a single row of lanterns down the central reservation.

11. INSTALLATION OF LANTERNS

The lanterns are mounted on the same poles described earlier but spaced 100 feet apart. The light source is 25 feet above the road surface; the additional height being obtained by means of a swan-necked bracket illustrated on drawing No. 4. The lantern is mounted with its major axis at right angles to that of the roadway on straight sections, but at roundabouts and sharp curves special treatment is required.

It is customary to place the light sources on the outside of bends, but with the cutoff lantern we have found no necessity for this provided the bend is not too sharp.

By reducing the spacing between poles at bends to 90 feet most satisfactory results have been obtained.



The iso-candle is based on an average lamp light output through life from a 250 watt HPMV lamp. (7250 lumens).

	250 watt	400 watt
Directional intensity ratio	2·5	2·2
Light above horizontal	2%	2%
Light output ratio	60%	60%

DRAWING No 6B.

The light source itself is shielded from the view of any motorist travelling along the boulevards by the silvered portion of the glassware and glare is therefore virtually eliminated. Only by looking up into the lantern can the lamp be seen. Best results have been obtained by focussing the main beam at 65 degs. to the vertical, but focussing of these fittings is rather critical and in certain instances other focal positions of the lamp had to be used. This was dictated by variations in the spacing of the poles or slight differences in the mounting heights.

12. TREATMENT OF ROUNDABOUTS

As stated before traffic circles or roundabouts are treated in rather an unconventional manner.

A typical layout for an important intersection is shown on drawing No. 7.

Attention is directed to the positions in which certain lanterns are placed, in order to ensure the maximum cover of the roadway and best silhouette effect.

It is usual practice to place a lamp on the circle and directly in line with the approaching traffic, so that the crossing in front of the traffic circle can be well illuminated.

This principle has also been observed with the cutoff lanterns.

Those placed opposite the lanes of approaching traffic are given a 15 degree tilt in the direction of the traffic, to provide maximum back cutoff and reduce the number of light sources visible to drivers on other approach roads to the roundabouts.

This feature of the cutoff lantern is of great value, because the large number of light sources usually visible to traffic approaching a traffic circle can be very confusing.

13. COMPARISON OF ILLUMINATION VALUES

It will be noticed that so far foot-candle values have not been mentioned, the reason being that such readings are of very little value in comparing different installations.

Apart from the slight reference to the Standard Specification No. 307/1931 in the Transport Committee's report, foot-candle values are not mentioned at all.

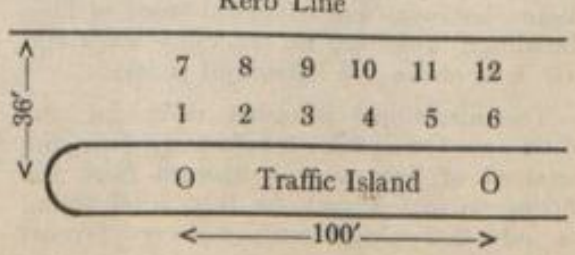
All engineers will realise that an installation may have a very high degree of illumination, but the light sources may be so dazzling that the motorist is blinded and would rather be without streetlighting. This has unluckily been our experience at Vanderbijl Park.

Illumination readings are of value in comparing a given installation over a period of years, in order to determine any degree of deterioration.

The readings taken at Vanderbijl Park are, however, given below, in order to illustrate the degree of evenness of lighting obtained with the cutoff lantern.

Positions of Foot-candle Meter

(Meter used: Weston Type Model 756 with viscor filter.)



Position of Meter (Middle of carriageway)	Illumination
1	0·4 foot-candles.
2	0·25 ,,
3	0·15 ,,
4	0·15 ,,
5	0·3 ,,
6	0·4 ,,
(On outer kerb)	
7	0·17 ,,
8	0·12 ,,
9	0·1 ,,
10	0·1 ,,
11	0·12 ,,
12	0·15 ,,

The only test of a successful streetlighting installation from the point of view of the engineer, as well as the man in the street is *visibility*, a factor which cannot be measured, but can only be judged on site.

One remarkable feature of the cutoff installation is that visibility is actually better when the road surface is wet, than under dry conditions. This is of course contrary to the usual experience with non-cutoff lanterns where, under wet conditions, the T-shaped light patches become very bright lines of light without heads and by contrast the rest of the road appears almost black.

14. COMPARISON COST

Unfortunately, engineers cannot consider a project only from the technical aspect but must also take the financial implications into account.

The cost of a streetlighting installation will differ from town to town. The figures quoted below are therefore given merely for the purpose of comparing the cutoff installation, with an equivalent installation using non-cutoff lanterns and erected in accordance with the recommendations of the M.O.T. report.

As mentioned before three supply cables would be necessary along each boulevard, instead of the one cable used with the present installation.

The three individual cables would however be of smaller cross-section than the single cable which is a four-core cable of 0·0225 sq. ins. cross-section.

By using a single pole on the traffic island with a double bracket to carry the non-cutoff lanterns, the number of poles will be similar for the two installations, but the number of fittings will be increased.

For comparative purposes the cost of lighting a 600 feet length of straight dual carriageway, Group A road, is set out below:

	Non-cutoff Installation			Cutoff installation		
Lumens *on road* per 100 ft. linear		5100			4000	
Poles	£46	4	0	£46	4	0
Cable	£180	0	0	£80	0	0
Brackets	£31	0	0	£24	0	0
Lanterns complete with auxiliary equipment ...	£139	4	0	£134	8	0
Total	£396	8	0	£284	12	0

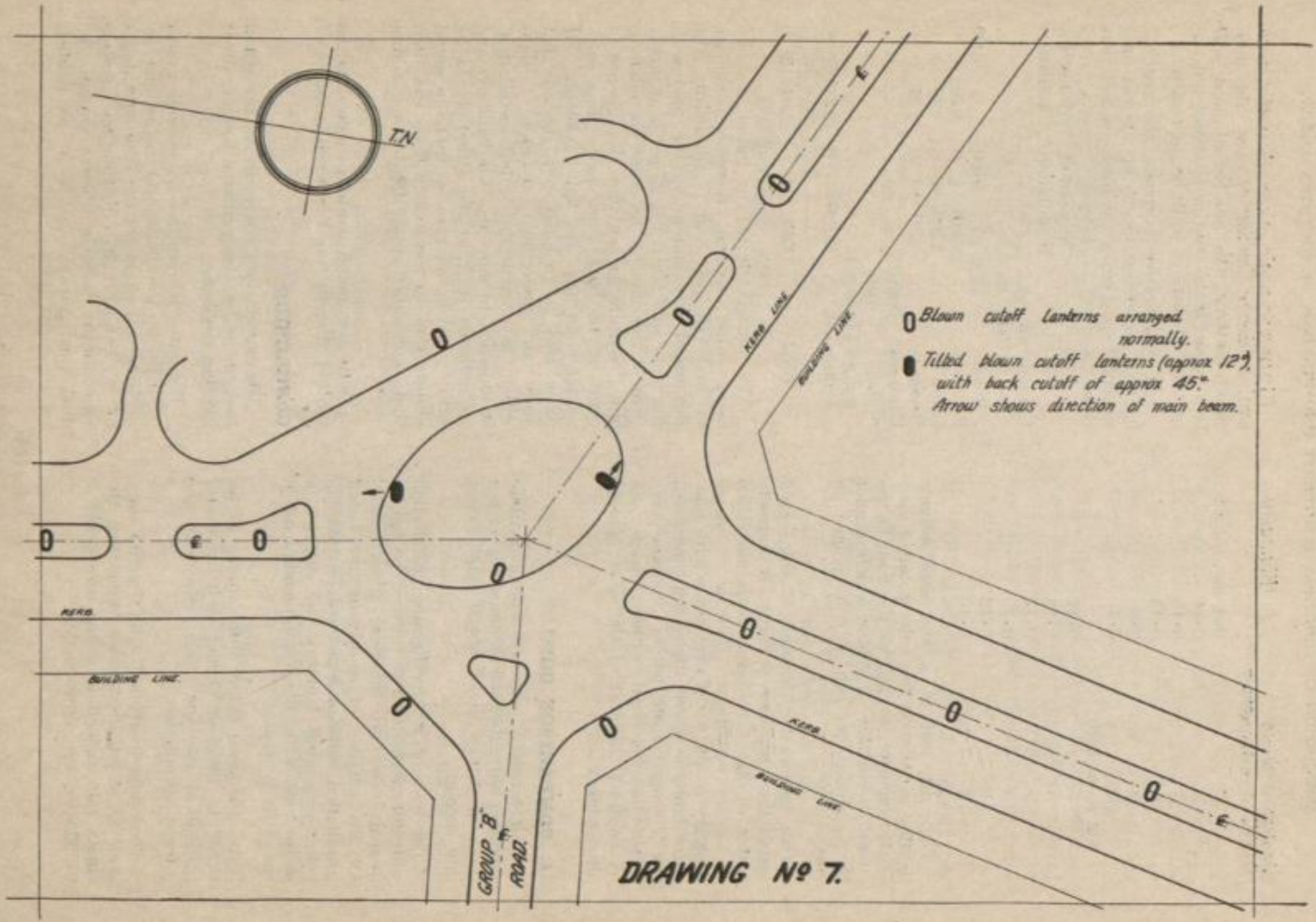
The saving effected in initial cost by using cutoff lanterns, therefore, amounts to over 25 per cent. Admittedly the theoretical illumination on the road with the non-cutoff lantern is 27 per cent higher than in the case of the cutoff installation, but I venture to say that the absence of glare in the latter case more than compensates for the less light available. It must also be pointed out though that quite an appreciable amount of light which, in a controlled cutoff installation, is supposed to fall on to the buildings and be reflected back to the street would be entirely lost in our case, so that the actual illumination on the road will be less than that represented by 5100 lumens stated above.

With the cutoff lantern more light is utilised directly on the road surface.

CONCLUSION

The writer does not consider the cutoff lantern to be the panacea for all street lighting problems.

The cutoff lantern has a very wide spread of light in the horizontal plane and by utilising this characteristic, the advantages of a cutoff light distribution become economically possible when a Group "A" dual carriageway road is to be lighted.


T.N
KERB LINE
BUILDING LINE
Blown cutoff lanterns arranged normally.
Tilted blown cutoff lanterns (approx 12°), with back cutoff of approx 45°. Arrow shows direction of main beam.
KERB
BUILDING LINE
KERB
BUILDING LINE
GROUP 'B' ROAD

DRAWING Nº 7.

A number of publications mention "tunnel effect" as a disadvantage of a cutoff streetlighting installation. The total cutting off of light above the horizontal with this lantern may possibly result in a dark ceiling and a sharp line on high buildings erected on the building line, as found in city shopping centres. Under such conditions a cutoff installation may have a depressing effect, but where the buildings are set well back, as in the case of Vanderbijl Park and most other South African towns, there is certainly no tunnel effect and the almost entire absence of glare gives an extremely pleasing result.

PRESIDENT:

Thank you, Mr. Theron. The paper is open for discussion and you have the usual five minutes to bring your points before the Convention. I may mention that three of the lanterns mentioned have been loaned to us and are on the Church Street side of the City Hall near the Publicity Office.

Mr. J. L. VAN DER WALT, Krugersdorp:

Mr. President, Ladies and Gentlemen: I wish to congratulate the author for his instructive paper on street lighting problems. It is a subject which gives many an Electrical Engineer grey hairs, especially at election times, when movements of Councillors may be accurately traced. What surprises me, however, is that Vanderbijl Park should take all this trouble, as they have no elections.

The author mentioned American visitors being surprised at our extravagant street lighting. I would have recommended them to Krugersdorp, where they would have felt very much at home.

The author states that they did not find it practicable to comply with the M.O.T. report. I hold, Sir, that by partially adopting the report at present they would have been in a position to fulfil it at a later date. It was mentioned that the design of the traffic routes is for a population of 250,000. It will be many moons before this figure is realised, and the traffic therefore must be a minute fraction of the figure estimated. Does the author not think they should have installed street lights along the outer kerbs first, as recommended by the M.O.T. report, and at a later stage, when the traffic warrants it, instal the island lights, thereby fully complying with the M.O.T. report.

It is a pity that experiments stopped at the cut-off lantern. Does the author not think that controlled cut-off lanterns would have been the better solution, both economically (due to larger spacing) as well as from the scientific point of view. Admittedly, an amount of glare would have been present, but as there would be a "reservoir" of glare, it would constitute no real handicap.

I would also like to know from the author whether repetitive glare is not present, or is it not due to this repetitive glare that the spacing had to be cut, making the installation expensive. It is known that with 150 ft. spacing, repetitive glare occurs 22 times per minute at 30 m.p.h. The author states that visibility is better on wet surfaces than on dry, contrary to general experience. What is the effect of the high contrast between dark and light spots upon the driver. It is also known that cut-off lanterns may give glare from extraneous sources such as parking lights. Has the author experienced this?

Has the author seriously considered sodium lighting or fluorescent lighting, for his particular installation? Sodium lighting seems to lend itself to this installation due to less glare from fitting against a dark sky. This would also have allowed greater spacing and greater economy. With the installation shown, it appears to me that the traffic islands, and the wrong kerbside, is well lit, forcing drivers to their wrong side of the road, making overtaking difficult and dangerous.

With the ever-increasing and fast-moving traffic, it is evident that the Roads Engineer and the Electrical Engineer should co-operate to a greater extent to obtain better street lighting, and not as mentioned by a partial observer in an accident case in London. He stated: "The road is lit with up-to-date and modern lighting, which makes visibility difficult."

I again wish to express my gratitude to the author, Sir, for is "illuminating" paper, and his valuable contribution in the field of experimenting and may he, Sir, as well as all of us, enter the era of better lighting.

PRESIDENT:

This is a very contentious subject. I hope we are going to get plenty of discussion.

Mr. W. M. ANDREW, King William's Town:

Mr. President: Mr. Theron, in putting forward this paper, has placed on record his difficulties in obtaining visibility when artificial lighting is applied to highways or streets.

I heartily endorse his emphasis on visibility which as he rightly says "is not measured but judged on site." It is the duty of all of us to note that in selecting the cut-off lantern installation, Mr. Theron is quite satisfied that while there is less lumen illumination at less cost, there is in fact better visibility in alternate arrangements with higher lumen illumination.

I am somewhat surprised that there is a tendency for the paper to indicate a scrutiny of costs by Vanderbijl Park. I for one have been led to believe that in the approach to various problems Vanderbijl Park has carried forward its schemes with more interest to final results than with immediate costs.

However, it is worthy of note to comment on and again emphasise that the final result of street lighting is visibility and any extra cost to attain visibility can surely be a secondary factor when compared to the possible unpredicted consequences of accidents on highways or streets, which, while well illumiuated, may and can promote bad visibility.

PRESIDENT:

Thank you, Mr. Andrew.

Mr. H. J. GRIPPER, Port Elizabeth (communicated):

Mr. President and Gentlemen: In congratulating Mr. Theron on the preparation of this most interesting and instructive paper, I would like to say that there is probably no one better suited to give experience in street lighting installation than one whose opportunities have been concerned with the starting of such an installation from scratch with a known town layout available and, I might add, with the assistance of a progressive estate company as opposed to the more usual scepticism which emanates from the average Finance Committee of a Municipal Council.

The traffic densities on our roads in this country are such that comparatively few roads would merit the application of Class A lighting as laid down in the British Ministry of Transport Committee's Report dated August, 1937. In this report the classification is given to roads where motor traffic can travel at 30 miles per hour without the use of headlights and where the degree of illumination comes within the range of 0.75 to 2.0 lumens per square foot. For practical purposes this would mean that the majority of roads in our towns would fall in Class B, which I consider to be far below the level of lighting required in all but the least important of our urban roads.

I would suggest that at least three grades of lighting are required in the streets of our towns on the following lines:

Grade A — Lumens per square foot of street surface: (average) 1.4 to 2.0:

Good lighting for roads used extensively by pedestrians and where drivers of vehicles would not require headlamps to see their way ahead.

Grade B — Lumens per square foot of street surface: (average) 0.8 to 1.3:

Medium lighting such that pedestrians can easily see their way about and be seen by others although vehicles travelling at 15 m.p.h. or over would require to use their headlights.

Grade C — Lumens per square foot of street surface: 0.3 to 0.7:

Weak lighting which would be sufficient only to indicate the confines and boundaries of the roadway and which would be acceptable as the minimum requirements for security purposes.

These grades refer only to the lighting of the actual roadway between kerbs, although in most cases the pavements would receive sufficient spilt or reflected lighting for their requirements. For the guidance of Councillors it is usually necessary to name certain local roads where the lighting has been ascertained to fit in each category. One might go further and inform one's Council of the approximate costs per mile per annum to cover capital charges, current and maintenance for specific road widths up to that width at which the road

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should be considered as consisting of two strips. In the latter case the costs would then be taken for the half width and multiplied by 2.

In other respects the Ministry of Transport's Report is most helpful to anyone entrusted with the provision of public street lighting, but in this connection Mr. Theron appears to have misquoted the section dealing with the question of glare. The ratio taken is that of the peak candle power to the average candle power (not the amount of light) in all directions downwards between 30° and 45° from the vertical.

On the subject of glare the "cut-off" lantern is inherently satisfactory, but so also, in my opinion, is the sodium lamp due to its size and monochromatic nature. The sodium lamp provides excellent visibility under all conditions and counters to a large extent the effect of glare from oncoming motor headlights. At this point I might also mention that it does not appear to attract insects to the same extent as do the mercury or incandescent lamps. This is of some importance in country towns and particularly in residential areas.

The cut-off lantern illuminates the object in the road and does not depend upon providing a silhouette of this object to the same extent as the non-cut-off lantern does. On the other hand the spacing must be reduced particularly on bends if dark patches on the road surface are to be avoided.

Mr. Theron's suggestion that main roads and secondary roads can be identified by the colour and the intensity of lighting is somewhat novel and interesting. I would suggest, however, that this might lead to trouble if adopted too rigidly. The failure of one or two lamps in the main road at an intersection with a secondary road might give motorists in the latter some grounds for assuming that there was no main thoroughfare ahead.

The layout in Vanderbijl Park with a single row of lighting standards on the island in dual carriageways runs counter to the best practice, particularly on bends, but I agree that the expense of treating each carriageway separately would prove too costly for most Municipal budgets. The objection, however, can be overcome to some extent by the use of sodium lighting for the reasons I have already stated or by the use of cut-off lanterns as described by Mr. Theron although, even with the close spacing required, I feel it might be preferable to provide two lighting fittings per standard.

The illumination values in footcandles which Mr. Theron mentions are very interesting, but I should like to know the corresponding values on the island along the centre line of the poles. These are likely to be quite considerable and might indicate that the distribution is not all it should be due to the installation of a single fitting in place of two per pole with short brackets.

On the subject of comparison of illumination values, paragraph 13, the author mentions the unlucky experience at Vanderbijl Park. Do I understand that this refers to some experience prior to the present installation?

Mention is made by Mr. Theron of the tunnel effect. I am under the impression that this usually applies to interior lighting where it is considered advisable to spill a small portion of the light on to the ceiling.

In adding my quota of thanks to Mr. Theron for his interesting paper, I feel sure that the discussion which ensues will be of very great value to all those who have street lighting problems on their hands, and I think this applies to each and every one of us to-day.

Mr. A. FODEN, East London:

I would also like to add my appreciation of the author's very interesting paper. There is one aspect which I think should be borne in mind. Although high illumination is very necessary and is often carried out in larger towns, there is one aspect which is often not taken care of, and that is the grading of lighting leaving the main streets into the roads leading out of the streets. People are accustomed to driving in well lighted streets and if they get out of those well lighted streets and immediately come into dark patches an accident might easily occur. There is also one aspect where the author said motorists may like badly lighted streets — i.e. low candle power lighted streets, but I may say that the incidence of accidents in well lighted streets has decreased. In coastal towns there is also the psychological effect of the type of lighting. Reference has been made to sodium lighting and I was a little con-

cerned when we put in the mercury vapour lighting in East London. We like to have visitors to the coast looking as if they benefitted by their visit but that fact is not very noticeable with sodium lighting. Dealing with cut-off lanterns the reaction of the ordinary man in the street is rather amazing. We have put up cut-off lanterns and they have had high candle power lamps installed and people have complained with regard to the poor illumination in these streets. We have taken that type of lighting down and put up open lamps, and they have come back and said that is very much improved illumination; we can now see the light. Thank you, Mr. President.

PRESIDENT:

Thank you, Mr. Foden. Mr. Theron, I think you have just time for your reply.

Mr. G. C. THERON, Vanderbijl Park.

Mr. President. I wish to thank all those who took part in the discussion but, as Mr. van der Walt has put forward such a long list of questions, I think I will be able to reply much better through the Proceedings.

Mr. G. C. Theron's Reply to Discussion on His Report (communicated)

Mr. van der Walt is of the opinion that the recommendations of the M.O.T. report should have been adopted even if only partially at this stage. As pointed out in section 14 of the paper, a saving of over 25 per cent is effected by the use of cut-off lanterns and even if a part of the capital expenditure was deferred until the street lighting was completed in accordance with the M.O.T. requirements, the result at the end would still have been the same.

At the time the M.O.T. report was published very little had been done on street lighting with cut-off lanterns and it was shown in the paper that virtually the same results can be obtained at reduced cost with cut-off lanterns placed on a centre island and without the objectionable glare which will always be present even with controlled cut-off fittings.

Mr. van der Walt raises the question of repetitive glare but it must be pointed out that there is no glare. The lantern is so focussed that the hood of the vehicle cuts off the light before the direct rays from the light source can catch the driver's eyes.

The dark and bright spots on a wet road surface referred to by Mr. van der Walt of course have reference to the results from non-cut-off lanterns and is entirely absent with cut-off lanterns.

Motorists should of course travel without headlights along streets lighted in accordance with Group A requirements, but parking lights are not strong enough to inconvenience approaching traffic.

Fluorescent lighting was never tried out on account of the expense and the colour rendering from sodium lanterns is not considered satisfactory in built-up areas, although it can be recommended for approach roads, especially where trees are present.

Mr. Andrew's remarks on visibility are certainly appreciated. It must be pointed out that street lighting at Vanderbijl Park, as in all other towns, is financed from rates and although every effort is made to obtain the best results, all schemes must be carried out in the most economical way possible.

Mr. Gripper also seems to favour sodium lighting and in this connection I must refer him to my reply to Mr. van der Walt. I agree that mercury light more than any other type attracts insects but the fittings in use are absolutely dust and insect-proof and we have experienced very little trouble.

The author cannot agree with Mr. Gripper's suggestion that there should be three grades of street lighting. I recommend improving the lighting to the standards set out in the M.O.T. report rather than lower the standard to suit existing levels of lighting.

Mr. Gripper stated that the factor of glare is the ratio of the peak candle power to the average candle power in all directions downward between 30 and 45 degrees from the vertical. This is correct and the figures quoted in the paper have been calculated on this basis.

The unlucky experience referred to in paragraph 13, when glare was excessive, resulted from the earlier trial installations with non-cut-off lanterns and has been completely rectified with the present installation described in the paper.

Mr. Foden's remarks regarding the use of sodium lighting confirm the writer's opinion as expressed above in reply to Mr. van der Walt.

Our experience at Vanderbijl Park is rather different from that related by Mr. Foden. When non-cut-off lanterns were used, it was almost impossible to approach the boulevards from unlighted country roads without being totally blinded by the glare. With the cut-off lanterns now in use this glare is entirely absent and no difficulty is experienced when driving from the lighted boulevard into a dark street. The headlights of the vehicle are brought into use and visibility is maintained.

I am inclined to agree with the East London public on the use of cut-off lanterns when metal shades are used for this purpose. We also experimented with large metal cut-off reflectors and the result is extremely depressing.

The blown glass cut-off lantern now in use at Vanderbijl Park has a rippled undersurface which disperses an appreciable amount of light and overcomes the difficulties experienced by Mr. Foden.

In conclusion I again wish to thank everyone who contributed to the discussion. I have found the points raised extremely interesting and I trust the replies will satisfactorily elucidate the paper.

PRESIDENT:

Have any members any further remarks to make on the Meter Testing Code?

Mr. E. L. SMITH, Boksburg:

Mr. President: I feel that this subject was dealt with rather hurriedly and we were not given a chance to discuss the matter thoroughly. We passed a motion at the previous Convention to go ahead with this Meter Testing Code. I feel that motions passed are sometimes not worth the breath they are uttered with. We don't know what goes on behind the scenes. The motion passed at that Convention would indicate that we desired this Meter Testing Code to be put into operation. I have had no correspondence asking me or the Council whether this is desired or not. The other point is that most of the Municipalities, when they heard of this Code, put their own houses in order and established small stations of their own to carry on. In the small country stations like Burghersdorp a small station was erected for testing meters. I don't see where the high cost comes in. We have found that very few meters indeed are inaccurate. They are well within the 2 per cent. I would say that propably 99.9 per cent are within the 2 per cent margin. But either due to surges or small cracks in the glass allowing dust to get in, or from other causes, many meters installed some years ago are inaccurate. We have found numerous meters under these conditions to be inaccurate. Some of them are very fast, so I do think we should press forward with the motion passed at the last Convention that we should ask the Electricity Control Board to introduce the Code. I think that is desirable.

PRESIDENT:

Thank you, Mr. Smith.

Mr. A. FODEN, East London:

Mr. President: Thank you, Mr. Smith, because you raised the very point I was going to raise. Many of you know the resolution that was passed. The result is that many Municipalities have gone to considerable expense, particularly so after replying to the questionnaire which was sent round to us and upon the result of which certain stations were selected. Many of these stations which had been selected then went forward and got themselves thoroughly equipped. The result is, what are we going to do? Are we going to rely on the goodwill of the smaller local authorities to send their meters to us or is that test apparatus perhaps just going to lie dormant and just used for local testing which could have been carried out with the existing equipment we may have had. That is the point I wanted to raise particularly.

Mr. J. C. DOWNEY, Springs:

Mr. President: The statement made yesterday in regard to the Meter Testing Code needs some clarification in regard to the damage to meters. As a member of the Committee, I wish to state that the question of transportation of meters was given very careful consideration by the Committee. Tests were carried out on the transporting of meters over a period of three months. Meters were placed in a van, on a hook allowed to rest on a plain wooden board and then taken down each month and tested for accuracy. The van in which

these meters were placed travelled all kinds of roads, and the drivers received no particular instructions to keep to good roads.

Various makes were included in the tests, and after three months it was found that the meters were still within the limits of accuracy. I do submit that if this question of transport was so difficult, we would have found it out under these conditions.

Mention was made of the Railways: which is surprising as all meters have at some time or other had to be transported by rail.

I submit that the Control Board has not the figures as to the accuracy of the meters now in use in most towns of the Union. If my meters were 15 or 20 per cent out, I would not admit that to any Control Board as it would be a reflection on the efficiency of the Undertaking and I think that applied to most Engineers present.

We do know that some meters have been installed for 20 or 30 years and have never been tested. That is not all. A number of Engineers have put their houses in order and installed the necessary equipment.

In our undertaking we have built a complete new testing board at a very minimum of cost. It has not cost us £100 to reconstruct our own test equipment to comply with the Code, and this includes a clock for the checking of the stop watches.

Most Undertakings would only require the minimum of equipment for a Class C testing station. Most Undertakings would only require a Class C station for which the minimum equipment is required.

Mr. G. J. MULLER, Bloemfontein:

Mr. President: I referred yesterday rather briefly to my disappointment that the Board didn't see fit to implement the recommendation of last year's Convention. Amplifying on that, I would like to say that as far as I know the Board has no figures on actual accuracies. I don't know how they have arrived at their conclusion that they are not satisfied that the accuracies are not so far out of bounds. The law does take precautions to check on weights and measures but apparently they are not satisfied that meters after 20 or 30 years' service cannot go below the standard. From my experience certain of the best British meters have a tendency to run slow with age. Cheaper Continental meters, of which at one time I had quite a number in service, have a tendency to speed up as the magnets go flat with age, and in one remarkable case we had one which was 50 per cent fast. After the tester brought this in and showed it to me, we took the magnets out and replaced them with new magnets, which reduced the error to quite a normal figure. That was an exceptional case but we have had as much as 10 to 15 per cent. I submit that 15 per cent is well beyond the limit allowed for weights and scales. Before I sit down I would appeal to small Municipalities who do feel that they would be hard hit to come forward and let us know their difficulties so that they can be dealt with before we go to the Control Board. If there have been submissions to the Board that we do not know of, it might be worth while knowing about them.

Mr. G. WILLIAMS, South African Railways and Harbours:

Mr .President: With your permission I would like to make a small contribution. I refer to the proposal now under discussion to establish a central testing authority for testing of meters. It may interest you all to know that the S.A.R. has been operating for many years a central station. Meters are continuously under test and continuously in transit. Wholesale destruction of meters in transit has been advanced as a reason against the establishmet of such a central laboratory but I am not aware that in all our years of experience we have had any real trouble in that direction. I would, of course, recommend that meters, if sent singly, be sent as parcels and not as goods. They can be damaged if they are sent individually as goods. I would strongly advocate that some intelligence be displayed in the packing. I would not recommend that they be put in a packing case with the lid closed down, rattling about like peas in a pod. Of course, it is a fact that every meter at present in use in the whole of the Union originally reached its destination by goods train and they were placed into service by the receiver without any prior test. They were taken out of their packing and put into service, the user expecting that the certificates issued by the manufacturers are still

good. We take new meters from overseas and put them into service. The simple and very effective packing used by the makers is quite adequate to ensure safe transport. On a technical point I would just like to say that old meters very often run slow and quite apart from the ethics of the case it would be a very interesting point to establish whether or not the cost of correcting meters in large numbers would not in fact result in increased revenue to the supplier, that amount being adequate to cover the cost of testing. To make such a test would not be difficult. It merely means the selection and testing of some old meters in service. In conclusion, I would like to thank you for your invitation which has enabled me to come here and attend your annual Convention.

PRESIDENT:

Does Mr. Mullins wish to say a few words?

Mr. C. MULLINS, Electricity Control Board:

Mr. President: I wasn't aware that I was going to raise a hornet's nest. Mr. Clutterbuck, who represented the Control Board last year, led the Board to understand that the Municipalities were not unanimously agreed upon the Meter Testing Code and, as a result, the Board did not feel justified in putting the smaller Municipalities to what it thought an unnecessary expense at the time. Also we had the opinion, and the opinion has been given to us by Mr. Ritchie himself, that the small Municipalities could very well get over the difficulty with much less expense by using a sub-standard or master meter. The objection to that was that the sub-standard meter would not be reliable after travel on the South African Railways or on a lorry. What the Board told the Bureau was by all means start your testing stations in the larger centres, perhaps three or four in the Union, and let the sub-standard be forwarded to the Bureau's laboratory for correction and that great care be taken to return it to the Municipality in good rder. That is a far cheaper way than sending all meters to testing stations. I am very sorry if I have caused any annoyance to anyone.

Convention adjourned.

PRESIDENT:

Well, getlemen, to resume, Mr. Alexander, of the Standards Bureau, has a few words to say in conculding this discussion on the Meter Testing Code.

Mr. O. J. ALEXANDER, S.A. Bureau of Standards:

Mr. President: I firstly wish to express Mr. Ritchie's regret that he had to leave the Convention this morning, as he had to attend another Conference in Durban. It is not my intention to go into technical details. This has been done over and over again both within and outside these Conventions. We are satisfied that technically as well as economically the Code is workable and we have sufficient proof of this by the fact the several Municipalities have adopted the Code and are working to it for the last two years. The Standards Council started this work on request of your Association. Perhaps due to no fault of any of us, two valuable years have been lost. In order not to waste any more time, the Standards Council has decided to publish the Code for adoption on a voluntary basis and you are at liberty to adopt the Code if you wish to do so. Due to this change in policy, certain amendments were necessary, but these have now been completed. Technical and administrative details can be discussed more effectively outside this Convention and we are always available for such discussions.

PRESIDENT:

In this connection, I feel it is just necessary to state that this Convention reaffirms its previous resolution on this matter. Now to get on. We still have a few items left on the agenda.

THE CODE OF PRACTICE FOR OVERHEAD LINES

Mr. J. C. FRASER, Johannesburg:

Mr. President and Gentlemen: As reported to the last Convention, held at Port Elizabeth, the Code of Practice for Overhead Lines has been completed. It remained only to so arrange for its publication as to bring it to the attention of, and make it available to, the greatest possible number of engineers concerned

with the construction of overhead lines in the most convenient manner. To this end, it was finally decided to present the Code at one of the monthly meetings of the South African Institute of Electrical Engineers, and this was put into effect at the meeting held on the 22nd December, 1949.

The complete Code of Practice was printed in the December, 1949, issue of the Transactions of the South African Institute of Electrical Engineers, copies of which are available from the Secretaries of the Institute at a charge of 5s. each.

The foregoing constitutes my final report in this connection and, in conclusion, I would like to express the opinion that a most useful document has been made available for all engaged on overhead line construction in this country.

PRESIDENT:

Thank you, Mr. Fraser for your report. The next item is coal supplies.

COAL SUPPLIES

Mr. H. A. EASTMAN, Cape Town:

At the last Conference a sub-committee was appointed with myself as convenor, to watch the Association's interests on the question of coal supplies. At that time our trouble was to get the coal regularly throughout the year in sufficient quantities for our requirements. Since then another matter has arisen of interest to the Association, namely, the increase in the cost of coal which has been brought about by a surcharge of 10 per cent which has been introduced on the tariff rates of all commodities. I will deal with these aspects separately and with the first one in the first place. Whilst your Committee has not met during the year as a Committee, it has interchanged views and information between its members and members have interviewed responsible authorities; that is to say, authorities responsible for the supply and transportation of coal, on many occasions, because of the difficulties repeating those which we have experienced for many years past. I might perhaps at this stage review what has been done in the interests of the Association over quite a long period in the past. For example, your Association made representations to the Government Commission which took evidence throughout the country to report on the various matters relative to the development of coal production in the Union and made representations that coal being so important a commodity for the continued supply of electricity in the country, its production and the regularity of its delivery to power stations should be made a subject of particular care by all concerned to see that no electricity power station was forced to shut down through lack of coal. Just in passing, at least one power station has shut down because of lack of coal since these representations were made. Also, with a view to impressing upon all concerned the importance of coal for electricity supplies, and that is to say for continuity of supplies of electricity your Association took a leading part in convening a Conference of which the then Minister of Economic Development was chairman, attended by representatives of the Coal Owners' Association, representatives from your Association, of Price Control and of other bodies, and we were very glad at that Conference to receive an assurance on behalf of the Government that they recognised fully the importance of electricity supply and that everything would be done to see that there was never any shortage of supplies of electricity through lack of coal. We have had other interviews and other conferences and I have personally seen responsible Ministers since then. In every instance the same assurances were given on behalf of the Government. Some days ago when I wrote to the Minister of Economic Affairs, letting him know that the Cape Town power station was in a parlous condition in regard to stocks of coal because supplies were not coming in in sufficient quantities, and asked for an interview so that we could present our case in association with the Commission, with which body we act very closely in the generation of electricity, we received a reply: "Immediately upon receipt of your letter we contacted the Railways Administration but the Minister does not think it necessary to arrange an interview." I had hoped when the Honourable Minister would not hear us that we could perhaps have arranged an informal interview with him during this Conference but he has had to cancel his visit. I mention these matters to let the Conference know that we have left no stone unturned to try and get practical application of the assurances that electricity is regarded as being

important and that coal will be supplied in such quantities as to prevent power stations shutting down for lack of it. In addition, as a result of a discussion at this Conference, we wrote a letter on behalf of the Association to the Railway Administration pointing out to them that the consumption of coal for electricity purposes was on such a large scale as to be worthy of the coal traffic being organised as a particular branch of the activities of its service and pointed out that the regularity of requirements of coal throughout the year were such that should be readily possible. A reply was received to the effect that that was already being done. Notwithstanding all this, only two weeks ago in Cape Town we were down to 1½ days' supply. Port Elizabeth ran without any coal at all for two days, and other power stations were in just as serious a predicament. Mr. President, as one of the Electrical Engineers in charge of a public service of such great importance to the community, I suggest that the present state of affairs is intolerable. It is not sufficient to be told time again by both the colleries and the Railway Administration there is no need to worry, "we won't let you down." That is what I and others have been told many times. We will be let down sooner or later for some cause which is outside the control of these bodies and it is WE who will get the blame for not having ensured the supply and security of that supply. It is a tradition in electricity supply matters that the supply does not fail except through some wholly unexpected cause such as a breakdown of plant and that any interruption of supply is remedied immediately or within a few minutes. But that a breakdown of supplies should take place for hours on end because of lack of the raw material from which that supply is obtained and particularly when we know that this is due to a failure of organisation, is wholly foreign to our upbringing as electricity supply engineers. We would incur not only blame but shame even though entirely undeserved. The regularity of demand for coal is such that it varies only a few per cent month by month. The quantity transported to the Cape Province alone is nearly 1,000,000 tons per year. I suggest therefore that there should be no insuperable difficulty in arranging for the production and delivery of coal without introducing risks of failure of electricity supply. How we shall induce those concerned to so arrange things, I do not know. Even the Coal Owners' Association has admitted to me that there is no coal truck shortage. But now they blame some other Government organisation. I don't know wherewe will get to, but I do know (we all know as we are all organisers of some sort) that it is possible to organise this matter on a proper basis.

Price control looks after our interests rigidly on the question of the price at which coal is sold at the pithead. The Railway Administration however is not subject to price control and has arbitrarily increased their tariff charges on the transportation of coal recently by 10 per cent.

The following are the railage charges per ton (2,000 lbs.) on coal for local consumption in Cape Town from 1918 to the present time:

Data re Railage Rates on Transport of Coal to Cape Town.
Railage on Coal for Local Consumption (excluding Siding Charges)

Date	Pence per 2000 lbs.
8.10.15—10. 5.18	171
11. 5.18—31.12.18	177
1. 1.19— 3.11.19	195
4.11.19—21. 4.20	221
22. 4.20—30. 9.20	236
1.10.20—10. 9.22	283
11. 9.22— 8.11.31	240
9.11.31— 9.11.34	250
9.11.34— 1. 4.37	240
1. 4.37— 6.43	230
6.43— 1.10.44	215
1.10.44— 1. 9.46	236.5
1. 9.46— 1. 4.49	258
1. 4.49— 1. 4.50	278
1. 4.50—Date	305

I have no doubt but that railage costs have increased to such an extent as to make it necessary to increase the charges, but when we made representations on this matter to the Minister, he made it clear that he had to find additional revenue and he could not grant our request without raising other charges still more. You will see, therefore, that this matter has not been overlooked, although the Committee was constituted mainly for the purpose of dealing with regularity of supplies.

Mr. D. A. BRADLEY, Port Elizabeth:

Mr. President: Anything that I might say at the moment would just be a repetition of what Mr. Eastman has laid before the Convention. He told us that some two or three weeks ago Port Elizabeth operated on no coal. That is rather remarkable, but it is what happened as far as the books are concerned. We scratched around the yard over the week-end some three weeks ago for coal. The difficulty has also been brought to your notice concerning regular coal supplies and it has been suggested that a resolution be telegraphed to the Government requesting assistance to ensure regularity of supplies. That is our disturbing feature. Mr. Eastman and myself, who are geographically situated on the west and east corners of the southern coast of Africa, find that it is very difficult to get regular supplies. Some five weeks ago we had no coal coming in whatsoever. We had to clear our reserve stock piles, and one week previous to my leaving to come here we had over 100 trucks standing outside our power station to be offloaded immediately so that the Railways may get the trucks without delay. Now such conditions are impossible and frustration is perhaps our greatest headache to-day. Frustration due to irregularity of coal supply. We do claim that the revenue brought to the Government through the Railway earnings on coal should at least warrant to us a substantial and fairly regular daily delivery of coal. We have, as I have said, debated this matter at length over past years and we did think that the coal position was now one that we might leave to carry on in its own way, but the debacle of a month ago has again revived this trying question. The matter, as you know, was discussed in Executive Council and we request permission to again make representations to the Government, to the Minister of Economic Affairs, and to press for a further investigation by the Railways to see what can be accomplished in the way of regular supplies. We recommend, therefore, that Mr. Eastman be asked to endeavour to again have the matter placed before the Minister with a view to asking him to receive a deputation consisting of himself and probably Councillor Erasmus if it is thought desirable. I personally think it is. Sir, if you so desire, I will put that forward as a resolution from the Executive to this meeting, or after further speagers have expressed their views.

PRESIDENT:

After further discussion we will formulate a proper resolution.

Mr. E. L. DAMANT, Electricity Supply Commission:

Mr. President: I would like to congratulate you on selecting such a sincere and efficient man as Mr. Eastman as your representative in dealing with this particular difficult and trying problem. You will observe the sincerity with which he spoke. You will notice that he put the case almost in despair, so clearly that you must have felt exactly what he has gone throguh, what Mr. Bradley has experienced, and I might add what I have gone through. I am the unfortunate man who suffered the indignity and disgrace of having to shut down one of the Commission's power stations because there was no coal. It is a thing that should never happen to any Engineer. It was not through lack of making constant representations to the Natal Collieries and to the Railway Administration. Before that event we were running for weeks with one day's supply of coal only in stock and that was all the coal we could receive. In point of fact, we continue to suffer from this irregular delivery of coal.

It is not for lack of offering facilities. We have increased our storage at Congella. It was increased from 3,000 tons to 10,000 tons, but that new storage has never been filled. These additional facilities have not improved the position. The Commission pays heavily in respect of high storage capital charges, increased costs for large coal and the crushing of it, much overtime for labour and inefficient operation of plant. All these charges must be, and are, passed on to the Commission's consumers. You can know, therefore, that you will have every support from the Commission in any action that you may take in obtaining better conditions of supply of coal to our power stations. We owe it to the public and to the reputations of our Engineers, that we should bring about a big improvement in this very vital business. I thank you, Mr. Chairman, for allowing me to give you my views and to express something of

the despair I have felt in trying to negotiate this problem. I would also like to take this opportunity of thanking you very sincerely indeed for the privilege of being present. I have benefitted very considerably by my contacts here and by listening to your discussions. I have also enjoyed my social contacts with you all outside the Convention Room. I do hope that I shall have the privilege of attending further Conventions.

Mr. W. H. MILTON, Electricity Supply Commission, Johannesburg:

Mr. President, Gentlemen: I hope this is not going to look rather like a Commission discussion, but I would like to confirm the remarks passed by Mr. Damant and also the report of Mr. Eastman. It is unfortunately the lot of my Department to take the ultimate steps in connection with coal supplies. In other words, we have the direct approach to the Railway Administration Head Offices and also direct access to the Transvaal Coal Owners' Association. The problem is one not only of transport but of mining. The quantity of coal output has been subject recently to very considerable variation. I say recently because it is in more recent periods that the irregularity has become most pronounced. We have had difficulty during the heavy traffic season on the Railways for many years. Mr. Eastman has been in touch with me by telephone and by telegram continuously during the difficult periods and we have made representations to both the Administration and the coal suppliers to endeavour to overcome the problem. Mr. Damant has remarked on the question of storage. We have been advised by the parties concerned that we should increase our storage and that by so doing we would get over our diffities. That is almost tantamount to a false statement by the parties concerned because no matter what storage we provide it seems very evident that that storage will be used as a reservoir and that with an adequate supply of coal in storage at one time or another during a year we still find that, having facilitated the transport of other goods or the diversion of coal to other users, our storage pile is dangerously depleted. One is inclined to feel that we are regarded as the "easy mark" to enable other people to maintain their supplies.

One must also remember that coal held in storage represents the tying up of a large amount of money. On the Cape Town Undertakings, for example, it means we tie up some £70,000 seemingly for the purpose of enabling someone else to get a regular supply!

Storage is necessary, but should only be required to take care of particular contingencies, such as accidents at the pits supplying us or on the intervening transport system. Our present storage is clearly not for that purpose but is being used, by others, for a totally different reason.

In so far as the regularity of our coal supplies is concerned, we have been advised by the coal producers that it is to some extent the type of coal that we require that has given rise to much of our present trouble. On the more distant stations we are using pea coal. We are told by the coal producers that a particular proportion of peas is a natural output from mining, i.e. it represents a certain percentage of total output. If they cannot market the balance of coal there is a shortage of peas and we suffer.

I think your approach is not only to the Minister of Economic Affairs but should probably also be made to the Coal Producers.

I think you will realise from what I have said that no one could have done more than Mr. Eastman in representing the case of this Association.

I would suggest that if this Association passes a resolution such as that which has been drafted, they should extend an invitation to the Electricity Supply Commission to support them in their approaches on this problem to whatever parties are expected to produce effective results in an improvement of the position.

I would like to take this opportunity of thanking you and your Association for inviting the E.S.C. to be represented at this Conference because we do learn much to assist us in dealing with your various problems at Head Office from time to time.

PRESIDENT:

Thank you, Mr. Milton. Now about this resolution. Is there anybody else who wishes to contribute:

Mr. G. J. MULLER, Bloemfontein:

Mr. President: I would also like to add my thanks to Mr. Eastman. With regard to the increases in railway tariffs, it is perhaps not realised by Councillors, gentlemen, that for the more distant stations coal constitutes about three-quarters of the cost of the product of a power station, so that the tariff increase is almost a direct increase in the cost of coal. In connection with irregularity of supplies, we have stressed so far the zero side of it. We have also run officially without coal for a day. I might add that the Railways were very disgusted that we had made a mistake in our daily tally! I would like to stress another angle and that is the case of Mr. Bradley. He was loaded with 100 trucks on one day. If the Railways had organised properly his handling cost would have been considerably reduced. Power stations are forced to keep their labour force at a higher level and to provide more elaborate plant than is really required. Do the Councils realise that the cost of current would be increased by the additional costs of coal handling and storage?

PRESIDENT:

I think this has been fairly well debated. The point is what action we are to take. Mr. Bradley, will you try to frame your resolution.

Mr. D. A. BRADLEY, Port Elizabeth:

I move that a deputation consisting of Mr. Eastman, a representative of the Electricity Supply Commission, together with a Councillor representative of Cape Town and Councillor Erasmus of Port Elizabeth be asked to interview the responsible Minister with a view to placing before him the position now having come to our notice regarding coal supplies, particularly the question of regular supplies and to include in their deliberations the matter of increased freightage. I might say the freightage has been brought to our notice by some of the other members of this Association who are not situated so far from the coal fields, and I am sure that Mr. Eastman will emphasise this fact in the discussion.

Mr. W. H. MILTON, Electricity Supply Commission:

I don't think it is competent for this body to include the Commission in such a deputation. May I also suggest that, knowing Mr. Eastman's position, that he should be appointed as a permanent member representing this Association. Over the years to come, when he has ceased to be an Engineer Member his services will still be available.

Mr. A. FODEN, East London:

I would like to bring to the notice of this Convention that there are two points in the resolution. One is the approach to the Minister to get regular supplies. The other is the question of increased freightage on transport of coal. I consider that the increased charges as pointed out by one of our members is so important that the Convention may feel it advisable to send a wire to the Minister that the Convention is alarmed at these increased charges and that a Sub-Committee be appointed to deal with irregularity of coal supplies and freight charges, too. I think a wire should be sent to the Minister on these lines.

PRESIDENT:

Can we have this resolution about the deputation; that is, inviting the Commission and composed of Mr. Eastman representing Cape Town, and Councillor Erasmus? The suggestion is that a telegram be sent to the Minister responsible saying that this Convention views with alarm the increase in the cost of coal freightage for power station supplies and that this be included in the resolution passed in connection with irregular coal supplies.

That is carried unanimously. Our next subject is—

IMPORT CONTROL

Mr. J. C. FRASER, Johannesburg:

Mr. President: I will be as brief as I possibly can. The retiring President in his valedictory address pointed out to the Convention that arrangements had been made with Import Control to establish a Committee. You were also advised in Bulletin No. 7 of the discussion that we had at our mid-year executive meeting and the procedure you should adopt in applying for permits. The first meeting with the Controller took place on the 19th of last month. At that meeting the Deputy Controller was appointed Chairman, Mr. Downey, Mr.

Hugo and myself representing this Association, and Mr. E. T. Price, Jnr., representing the Electricity Supply Commission were present. The Committee feels that they will be of some service to the import and export control personnel. The agenda which was submitted to the meeting included a number of projects which had been held in abeyance by the Import and Export Control. These were discussed and finally approved. I would suggest that this Association records its thanks to the Director of Import and Export Control for his assistance and his gesture in inviting us to form a sub-committee which he has constituted for the smooth running and advice to his Department on Municipal requirements.

PRESIDENT:

Thank you, Mr. Fraser. I think you all agree that a letter be sent to the Import Controller thanking him for inviting the Association to be represented on the sub-committee.

Mr. E. L. SMITH, Boksburg:

Mr. President: I will be very brief, but I would like to thank the Executive for the work they have done, especially for this method of procedure in regard to import control, which has certainly solved my difficulties, but there is one objection I have and that is the concluding paragraph which states that we have to get the necessary permission from the Municipal Advisory Committee. I thought that Committee was dead long ago. Arising out of Import Control there is one point I would like to bring up. Recently we accepted a tender from an overseas firm for the importation of switch gear. Import Control refused us a permit, stating that similar switch gear was manufactured in this country at competitive prices. When I pointed out to the Import Control that the competitive price was 40 per cent higher they reconsidered the question and granted a licence. We should make it quite clear to local manufacturers that we are not prepared to support them so long as they take advantage of Import Control restrictions. In conclusion, as an Engineer Member, I would like to congratulate you on this most interesting and successful Covention. It has been a very happy one and most interesting to all Engineers present.

Mr. D. W. RITSON, Stellenbosch:

Mr. President: With regard to Import Control, I have had some trouble in getting a permit for three 250 kVA transformers. These transformers were on order before Import Control came into being. Considerable correspondence has passed between myself and the Import Control authorities, but we don't seem to get any further. I have also pointed out to the authorities that there is no spare transformer available and in the event of a transformer failing it would place the Stellenbosch Electricity Supply in a precarious position. I would like to ask through you, Mr. Chairman, whether Mr. Fraser could assist Stellenbosch by speeding up Control to issue the necessary import permits.

Mr. W. H. MILTON, Electricity Supply Commission:

Mr. President: I want to place on record that the Commission has also been asked to accept representation on that Committee and we have undertaken to look after the Municipal interests in so far as we have usually the most up-to-date knowledge of your intentions. For example, at the first meeting we found that the Committee was dealing with out-of-date papers and proceedings.

PRESIDENT:

I didn't think it would be necessary to debate this very much locally because if you have difficulties and see Mr. Fraser he can contact this Sub-Committee. Our interests are being looked after.

APPOINTMENT OF AUDITORS

The next item is the appointment of Auditors. The present Auditors are Savory and Co., and it has been proposed by the Executive that this Convention reappoints them. Agreed.

CONDITIONS OF CONTRACT

We now come to General, under which heading we have one or two items. The first is a draft memorandum about the Conditions of Contract. I would like Mr. Sibson to speak on this.

Mr. A. R. SIBSON, Bulawayo:

Mr. President: During the last year or so a number of British manufacturers have

introduced into Clauses of Contract a clause which requires the purchaser to pay an amount up to 100 per cent of the f.o.b. value of the goods to be delivered, in the event of certain circumstances arising beyond the control of the manufacturer which make it impossible for these goods to be shipped. This clause has been introduced by several of the leading British manufacturers. It is, I think you will agree, a little unfair that the whole risk of unexpected contingencies should be borne by the purchasers. Most of us have already agreed to terms of payment up to figures of 90 per cent of the value of the goods and it is felt by myself that any further risks that arise should be shared by both the manufacturers and purchasers, and that it is distinctly unfair that purchasers be expected to pay the full value. The Executive has given consideration to this matter and we had an opportunity of discussing it with the local representative of BEAMA. A letter has now been drafted which will be sent to the local representative, putting the point of view which I have just expressed. It is desired that you should be aware that the Executive has taken this matter up and is adopting the procedure that I have outlined.

AMENDMENT TO RULES AND CONSTITUTION

PRESIDENT:

Now there is a further matter which we wish brought to the full Convention. We have, as you know, amended the Constitution and changed the number of Councillor representatives, and the question now comes about the quorum. We wish to change the quorum from from 3 to 5, but it is necessary that it be passed by the Convention. Is that agreed? Agreed.

There are just one or two further items: I have been requested to bring to the notice of all of you that the "S.A. Electrical Review" is our official organ and it is felt that we should take full advantage of it and the Editor requests that items of a personal nature should be reported to him so that we can all keep in touch with everything that is going on in this Association. The reports from Electricity Departments would also be of interest to us and perhaps some member of your staff could act as a liaison officer or reporter to keep the "Review" in constant contact with your Undertaking. Please bear that in mind.

The other item in which you will all be interested is that our good friend, Mr. H. O. Smith, Chief Inspector of Factories for many years and Chairman of the Wiremen's Licensing Board, will be retiring shortly and will not be attending future Conventions in his present capacity. I think we all know the difficulties of Mr. Smith's position and I think we have all been treated with fairness, humanity and consideration, and all those things that change a Government inspector from a gestapo agent to a human being, so I am certain I am speaking on behalf of everyone when I say we have appreciated his fairness, reasonableness and care for the safety and betterment of the engineering industry. On your behalf, therefore, I wish him happiness in the years to come and our thanks for his work on our behalf in the years past.

Mr. H. O. SMITH, Pretoria:

I don't think it would be in order at this stage to prolong the Proceedings of the Convention by a speech. I would just say, therefore, how much I appreciate your remarks. It has always been a pleasure to deal with you and the co-operation I have had from you all has made my duties very much lighter and I do thank you very much for all that has happened in the past. I hope that until my term of office terminates we shall continue in that happy spirit that has prevailed in the past, and that you will continue to extend it to my successor.

STANDARDISATION OF CONDITIONS OF TENDER AND PURCHASE

Mr. H. A. EASTMAN, Cape Town:

Mr. President: You will remember that at the last Conference it was left to a Sub-Committee to consider the question of putting forward recommendations for the standardisations of conditions of tender and purchase because we heard that the City Treasurers were going into this matter and we felt that as the largest purchasers of goods in many Municipalities we should have our voice heard. I am glad to be able to tell you that as a result of discussions with representatives of the Treasurers' Association an agreement has been come to and the documents will very soon be available to all Municipalities.

PRESIDENT:

We now proceed to the closing of the Convention.

Mr. J. A. F. MITCHELL, Chief Engineer, Department of Posts and Telegraphs:

Mr. President: Firstly, I would like to convey to you the greetings of the S.A. Institute of Electrical Engineers. The Institute and your Association have very much in common and it has been, for me, most interesting to meet your delegates, particularly as so many of them are members of the Institute of Electrical Engineers. I need hardly say that this Convention has been a great success and I have admired the most able way in which you, Mr. President, and your Executive have conducted it. I am sure that as a non-member delegate I am voicing the feelings of all in thanking you for inviting us to be present at this Convention. Secondly, may I also add my thanks as Chief Engineer of the Post Office. My Department has many contacts with Municipal Electrical Engineers and I wish to record my appreciation of the help we receive from you in all our problems. Without this help our difficulties would be very greatly magnified. The co-operation of the Municipal Engineers is wholehearted and always welcome. This Convention has afforded me an opportunity of meeting many Municipal Engineers which is of great value to my Department. Mr. President, I wish you and your Executive a most successful year of office from the Institute of Electrical Engineers.

Councillor G. HAYWARD, Durban:

Mr. President: It has fallen to my lot, and a very pleasing one, to propose a vote of thanks to the various people who have made this Convention such a success. First of all our thanks are due to the Pietermaritzburg City Council for the privilege they have given us of holding this Convention in Pietermaritzburg, the City of Blooms. There is no doubt that the delegates have admired this City at various times and they are very thankful for the privilege of holding the Convention here. Apart from that, the hospitality that has been given to delegates (and I do not only speak for the delegates, but I speak also for thir wives) is something that towns in future will have a long way to go to live up to. In particular I would like to mention the various factories we have visited—Eddels', Nestle's, the Aluminium Factory and last but not least Rhodesian Cables—the magnificent luncheon the last-named gave us yesterday, and the hospitality that they also gave us at the factory itself. I feel that delegates are beginning to feel the strain of not only attending the Convention but also of the hospitality. It is a good job that some of the wives are present to look after the members, otherwise we might have seen a greater depletion of members than we have seen this morning. I want now to allude to one portion of the Convention and that is the excellent papers that have been delivered. This is my first Convention of Electrical Engineers and I must say that it has afforded me the greatest pleasure in listening to the papers and one of the most illustrative, Sir, is that which was delivered this morning on coal supplies. I want to congratulate Mr. Eastman for the amount of work he has put in and I only hope the deputation, when it meets the Minister concerned, will have something to say and gain something from the interview that they are going to get. Apart from that, there have been most excellent papers, but I do feel that a word of thanks is due to two young South Africans; the first one is Mr. Burger, for the excellent paper that he delivered on the law side of things. It is very interesting to know that you have men who are able to undertake other aspects of Municipal life and are able to bring it to a Conference of this description. The other one, Sir, who though not born in this country, I understand came out here at a very tender age. I refer to Mr. McDonald. I think the paper he gave us is an excellent one, something that the members will be able to take away, especially the Councillor members. They are two young South Africans and I feel that those on the older side, who are on the point of retiring, must view with gratification the fact that we have got young South Africans growing up who are capable of taking the place of those who have built this Convention to the size it is. I am only sorry that other Councillor members have seen fit to criticise the attendance not only of Councillors but also officials in attending various Conferences. I feel that if they had been present they would realise that their criti-

cism is due to be put into the waste paper basket. I am sorry, also, to see the depletion in attendance at this stage and the number who, owing to business, have had to go away, and I feel that it is due to you and your Executive that delegates should remain at a Conference until the close of it. It only remains for me to thank you for the excellent manner in which you have conducted this Convention. It has been a pleasure to see the able manner in which you have conducted it. I have had experience of you, Sir, in Cape Town and I know your ability to run an organisation such as this, and I speak on behalf of the delegates present in wishing that your term of office will be a most successful one, not only to the members, but to the Association. itself.

PRESIDENT:

Thank you, gentlemen.

Mr. D. A. BRADLEY, Port Elizabeth:

Mr. President, Ladies and Gentlemen: The duty falls to me to convey to you my personal thanks and to compliment you on the very able manner in which you have assumed the office of President as from Tuesday morning up to the present time, always bearing in mind that toleration had to be given by you in large measure in order to cope with such people as myself. Sir, I thank you for your kindness in occupying the Chair and the manner in which you have conducted the business of the Convention. Perhaps I should say a word of thanks on a broader scale. Unfortunately, this morning — due to the hospitality of your Council — our lady members are away on a bus tour, and it would have been fitting had the "full house" been available to you this morning, but that of course will not remove any expression of thanks that will come from all parts of the hall in due course. I want to read a letter that has been directed to our President by Councillor Hughes, of Dundee, which is illustrative of the happy and instructive few days we have had at this Convention. He says:

"When asked to attend this Conference I felt it was rather a waste of time and ratepayers' money to send a non-technical person to a Conference of Electrical Engineers. I came reluctantly. I did not look forward to having to listen to the reading of papers and reports with any pleasure. They all seemed to deal with matters far away and beyond the scope of my limited knowledge. Having this reluctance on my conscience I feel that the only way to achieve peace of mind is to make an open confession of my mistake and write you a word of thanks for I've had really the time of my life. The papers and reports, while being technical, have been understandable to all of us and what I've garnered will, I feel sure, be of some benefit to my Council and be of help to solve some of the problems that my town will have to face in the future."

That, I think, covers the thoughts of many of our delegates here to-day. I thank you very much for all you have done towards the success of this Convention. We sincerely appreciate the hospitality your Council has meted out to us and thank you very much indeed.

PRESIDENT:

Thank you, Mr. Bradley.

Mr. E. VIVIAN PERROW:

Mr. President: In my capacity as Chairman of the Safety Precautions Committee, I wish to thank you for the invitation to be present at this Convention and to say how much I have been interested in your discussions. I have also been deputed to represent the President of the Institution of Certificated Engineers and to express his regrets at his inability to be with you on this occasion.

We congratulate you, Mr. Hallé, a Member of the Institution, on your election as President of your Association and on the success of the present Convention.

We extend to you and your members fraternal greetings and hope you will enjoy a year full of useful work in the interests of your Association and its membership.

Mr. R. W. LORD, Henley's S.A. Telegraph Works Co. Ltd.:

May I express, on behalf of the delegates of the Engineering Firms present here, our sincere thanks for the hospitality extended to us and also the most interesting discussions which took place.

Mr. R. W. RITSON, Stellenbosch:

Mr. President: Just now you handed out a bouquet to Mr. Smith who is on the point of retiring. You have done very well in regard to the way you have conducted this meeting and we all appreciate what you have done. There is a member present who is going on retirement in the near future and I would like you to thank him for his work on our behalf. I refer to Mr. Eastman, who has done more, I think, for this Association than any other member present.

PRESIDENT:

Thank you, Mr. Ritson. One of the most difficult jobs your Executive has had is to know how to hang on to Mr. Eastman. We have struggled with the matter of Vice-President and we have also debated the question of Honorary Membership and so forth, and at this morning's meeting it was said that we would not bring up the subject because we would run out of superlatives. At the next meeting in Cape Town we are going to practically make him swoon when he knows what we think of him. He is now a full member and we are going to hang on to him as long as we can. Well, Gentlemen, I thank you for the kind things you have said and I now call on Councillor Young, Chairman of the Pietermaritzburg Electricity and Transport Committee, who has certainly borne his share of this Convention and has added in heaps of ways to its success.

Councillor C. E. (SAX) YOUNG, Pietermaritzburg:

When asked to close this Convention I was sorry and yet pleased that this most important Convention of the Association of Municipal Undertakings of Southern Africa is over; sorry that the visitors are leaving us, but indeed pleased to hear the remarkable appreciation of the effort we have made to make your visit one that will be remembered. At the last Convention in a moment of frivolity I put myself in a position that might have been serious. I said that we had some fine rest homes here in case anybody should find the strain too much. However, the delegates have been reported fit and able to make their journey back home and the rest homes have been found to be quite unnecessary, particularly, I think, for our retiring President, Mr. Bradley. He has got through the very hard work and he has not accepted my invitation to remain a few days to recuperate in one of these very fine institutes. I feel that my invitation on behalf of the City Council of Pietermaritzburg to hold the Convention in the capital of Natal has proved to you that "Sleepy Hollow" is a misnomer and it might be properly called the City of Flowers, the City of Goodwill, and you have certainly not seen the City at its best. Conventions are of immense value to the Union, not only when in session but also when you get together with gatherings of a personal nature. I have learnt quite a lot. I have to acknowledge that some Councillors seem to think that the Engineers and Councillors are on a glorified picnic when they attend a Convention. I have got to admit more often than not I have come back from a Conference very tired. I go to these Conventions to make every effort to gain knowledge for the good of the City. There is one pleasing and outstanding feature of this Convention and that is we have had close unity between Afrikaans and English-speaking engineers and visitors. This feeling must bring about a lasting good in respect of electricity. I now formally close this memorable Convention.

Tot siens, good thinking until you meet for the 1951 Convention.

PRESIDENT:

Thank you, Councillor Young. We say good-bye to those of you who will not be coming back to Pietermaritzburg. I confirm what Councillor Young said: "Alles van die beste en tot siens."

SOCIAL FUNCTIONS

To judge by their reception the social functions arranged were very successful and afforded the delegates considerable enjoyment if not relaxation. At the close of the first day of the Convention some 190 people were conducted on a tour of the City Parks terminating at the Bird Sanctuary, where the congregation of the returning "residents" provided an interesting spectacle.

During the morning of Wednesday, 10th May, about 70 of our lady visitors were received by the Mayoress for morning tea in the very pleasant surroundings of the Country Club, after which the party pro-

ceeded to World's View to enjoy an "aerial" view of Pietermaritzburg and the surrounding countryside.

In the afternoon, by the courtesy of the Aluminium Co. of S.A., approximately 160 delegates and their wives were conducted over the newly-built factory. Owing to the number of people the party was divided and during the visit delegates were entertained by an instructive and interesting film on aluminium fabrication and later saw some of the processes in action in the factory.

For those delegates who did not visit the Aluminium Factory, two other factories kindly offered to entertain and some 45 delegates and their wives were conducted over Nestle's Confectionery Works and Eddels and Co. Shoe Factory. Unfortunately, time was short, but in spite of this the visitors spent an enjoyable afternoon and had opportunities of seeing many interesting processes at the two factories.

Wednesday proved a full day and returning to the City the delegates were received by the Mayor and Mayoress in the City Hall where a Civic Reception in the form of a Cocktail Party was held. The guests were given a cordial welcome and the evening proved a highlight in the social events of the week.

Thursday, 11th May, provided yet another enjoyable day when, to mark the official opening of their factory, Messrs. Rhodesian Cables Ltd. extended a special invitation to all the Convention to a grand luncheon party held in the Imperial Hotel, followed by a tour of their recently constructed cable factory. The luncheon party proved an enjoyable interlude, and when the party had adjourned to the factory, His Worship the Mayor, Councillor G. C. Jolliffe, performed the opening ceremony on behalf of Mr. Eric Louw, Minister of Economic Affairs, who was prevented from attending by Government business. The party of some 250 delegates was then dispersed through the factory where the various processes of cable manufacture were studied with interest and apparently much discussion.

In the evening an Informal Civic Function was provided in the form of a Cinema Party, where a large number of delegates and their wives were able to enjoy entertainment that on this occasion permitted complete relaxation. Coffee was served in the foyer after the show.

On the closing day of the Convention, Friday, 12th May, a party of 45 ladies was taken on a tour of the Native Beer Hall and Sobantu Village, where the Weaving School and the hygienic living conditions provided for the native population proved of great interest.

Finally, by the kindness of Sir George and Lady Usher, who had already contributed to the gaiety of proceedings by a large private party at Hilton Road, the last afternoon of the Convention was made a success by a lovely car trip to their delightful farm at Nottingham Road.

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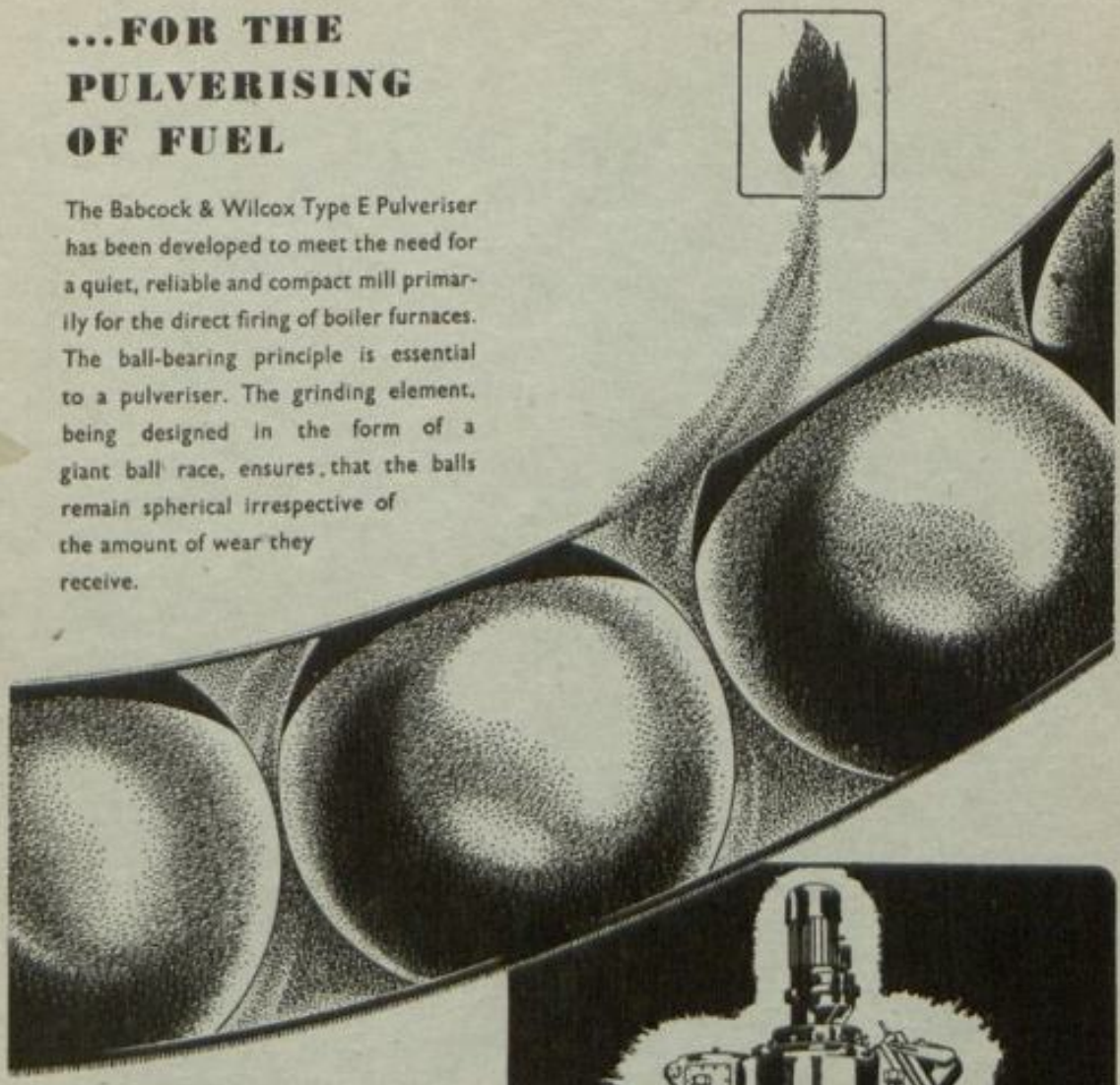

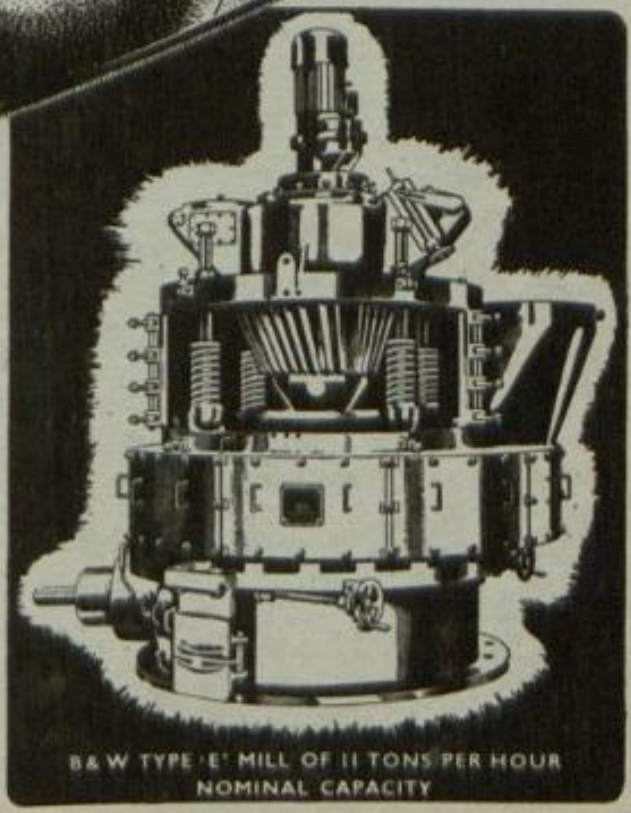

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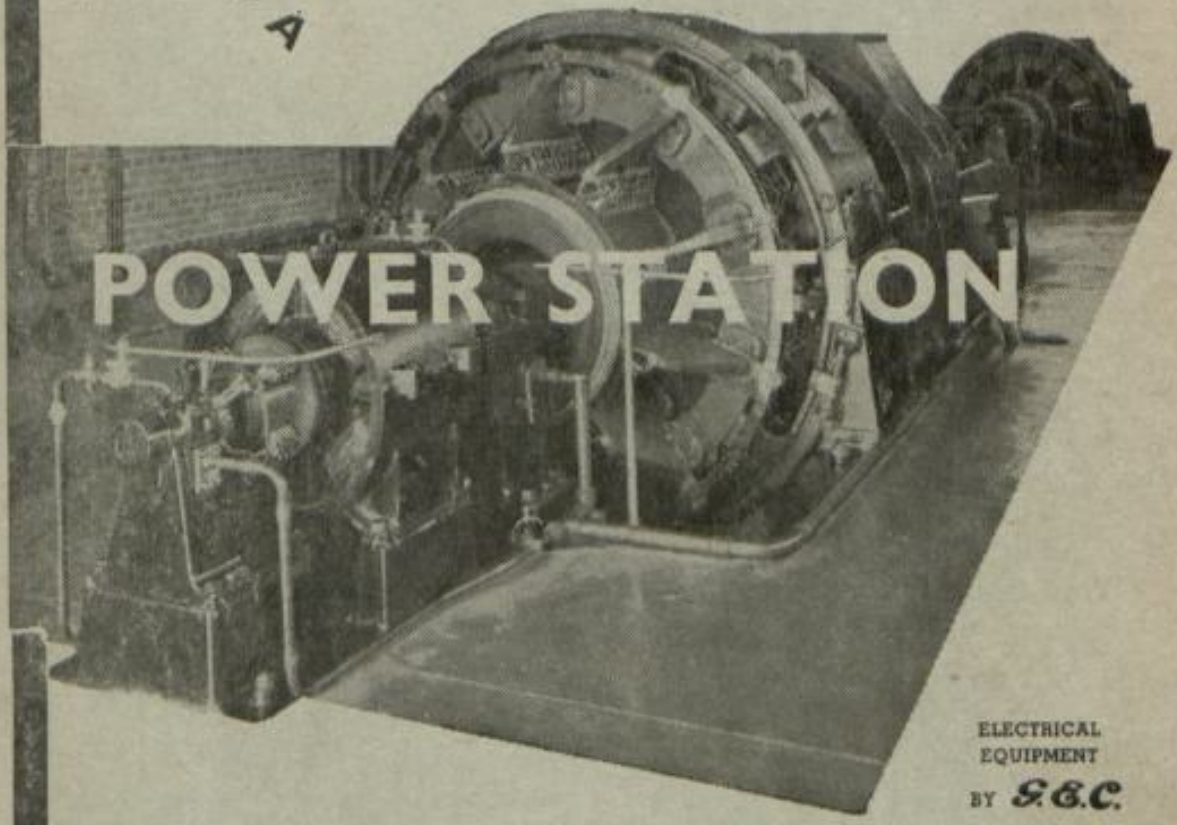

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THE GENERAL ELECTRIC CO. LTD. OF ENGLAND