

PROCEEDINGS

of the

THIRTY-FIRST CONVENTION

of the

ASSOCIATION OF MUNICIPAL ELECTRICITY UNDERTAKINGS

OF SOUTHERN AFRICA

(FOUNDED 1915)



held at

MARGATE

from Tuesday, May 7th to

Friday, May 10th

1957

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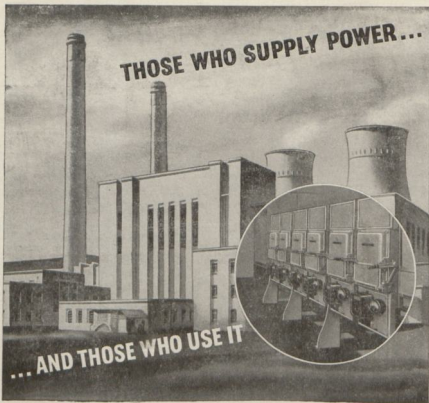
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EXECUTIVE COUNCIL 1957-58



Front Row (L. to R.): Cr. P. G. C. Blianaut (Pretoria), J. Wilson (Pretoria), Cr. P. D. Santilhana (Cape Town), C. G. Downie (Cape Town), J. L. van der Walt (Krugersdorp) President, Cr. P. W. Marais (Krugersdorp), J. E. Mitchell (Salisbury), Alderman Morton Jaffray, R. G. Ewing (Secretary).

Back Row (L. to R.): Cr. L. P. D. Davies (Springs), Cr. R. L. de Lange (East London), A. P. Burger (Hon. Legal Adviser), P. A. Giles (East London), Cr. D. J. Marais (Johannesburg), G. J. Muller (Bloemfontein), A. R. Sihson (Bulawayo), R. W. Kane (Johannesburg), Cr. J. W. Phillips (Bulawayo), Cr. F. J. C. Castelyn (Bloemfontein), R. M. O. Simpson (Durban).

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ASSOCIATION OF MUNICIPAL ELECTRICITY UNDERTAKINGS OF SOUTHERN AFRICA

EXECUTIVE COUNCIL 1956/57

President :

J. L. van der Walt (Krugersdorp)

Vice-President :

C. G. Downie (Cape Town)

Immediate Past Presidents :

J. E. Mitchell (Salisbury)

D. J. Hugo (Pretoria)

Engineer Members :

R. W. Kane (Johannesburg)

R. M. O. Simpson (Durban)

C. J. Muller (Bloemfontein)

A. R. Sibson (Bulawayo)

J. C. Downey (Springs)

P. A. Giles (East London)

Cities or Towns Represented :

Krugersdorp

Salisbury

Johannesburg

Bloemfontein

Cape Town

Pretoria

Bulawayo

East London

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

Secretaries :

Davidson & Ewing (Pty.), Ltd.

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SUB-COMMITTEES :

<i>Papers</i> — — — — —	J. L. van der Walt (President); C. J. Downie (Vice-President); J. E. Mitchell (Past President).
<i>Tariffs Survey</i> — — — — —	R. W. Kane (Convener), C. G. Downie, A. R. Sibson, J. C. Downey.
<i>Finance</i> — — — — —	R. W. Kane (Convener), J. C. Downey.
<i>Recommendations Committee for new Electrical Commodities</i> — — — — —	J. C. Downey, D. J. Hugo (Alternate)
<i>Technical Staff and Man Power</i> — — — — —	J. L. van der Walt (Convener), R. M. O. Simpson, A. R. Sibson, P. A. Giles, J. C. Downey, H. T. Aspinall (Co-opted).
<i>Rights of Supply—Reef Industrial Consumers</i> — — — — —	C. Lombard (Convener), D. J. Hugo, J. C. Downey, P. A. Giles.

Representatives :

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

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

ASSOCIATION OF MUNICIPAL ELECTRICITY UNDERTAKINGS OF SOUTHERN AFRICA

PAST OFFICERS AND MEMBERS OF COUNCIL :

<i>Past Presidents :</i>		<i>Secretary and Treasurer :</i>
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	L. J. Nicholas, Umtata	E. Poole until Dec., 1940
1944-45	A. Rodwell, Johannesburg	L. L. Horrell, Jan., 1941
1945-46	J. S. Clinton, Salisbury	L. L. Horrell
	J. W. Phillips, Bulawayo	L. L. Horrell to Nov., 1945
1946-47	G. I. Muller, Bloemfontein	A. T. Taylor, Dec., 1945
1947-48	C. Kinsman, Durban	A. T. Taylor
1948-49	A. Foden, East London	A. T. Taylor
1949-50	D. A. Bradley, Port Elizabeth	A. T. Taylor
1950-51	C. R. Hallé, Pietermaritzburg	A. T. Taylor
1951-52	J. C. Downey, Springs	A. T. Taylor
1952-53	A. R. Sibson, Bulawayo	A. T. Taylor
1953-54	J. C. Fraser, Johannesburg	A. T. Taylor
1954-55	G. J. Muller, Bloemfontein	A. T. Taylor
1955-56	D. I. Hugo, Pretoria	A. T. Taylor to 30th June, 1955
1956-57	J. E. Mitchell, Salisbury	Arthur Tingey, Ewing & Co., 1st July, 1955, Davidson & Ewing (Pty.) Ltd. 1st July, 1956.

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.
1934-34	T. Millar, J. H. Gyles, G. H. Swingler, A. Rodwell.
1934-35	T. Millar, J. H. Gyles, G. H. Swingler, A. Rodwell.

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

<i>Councillor :</i>	<i>Alternate Councillors :</i>	<i>Engineers :</i>
	1935-36 :	G. H. Swingler, Cape Town
T. P. Gray, Johannesburg	H. W. Dely, Pretoria	I. H. Cyles, Durban
I. McLean, Port Elizabeth		T. Millar, Harrismith
	1936-37 :	E. A. Behrens, Port Elizabeth
H. Middlebrook, Durban	F. Morrell, Cape Town	G. H. Swingler, Cape Town
T. P. Gray, Johannesburg	I. McLean, Port Elizabeth	T. Jagger, Ladysmith
	1937-38 :	E. A. Behrens, Port Elizabeth
H. G. Capell, Durban	H. Middlebrook, Durban	G. M. Pirie, Bloemfontein
W. James, Cape Town	L. Hofmeyr, Stellenbosch	L. L. Horrell, Pretoria
		J. S. Clinton, Salisbury
		A. O. Harvey, Springs
		G. M. Pirie, Bloemfontein

ASSOCIATION OF MUNICIPAL ELECTRICITY UNDERTAKINGS OF SOUTHERN AFRICA

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

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

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

<i>Councils : 1950-51 :</i>				<i>Engineers :</i>			
Pietermaritzburg	---	---	Councillor C. E. Young	---	---	C. R. Hallé	
Springs	---	---	Councillor L. P. Davies	---	---	J. C. Downey	
Bulawayo	---	---	Councillor I. J. Wrathall	---	---	A. R. Sibson	
Bloemfontein	---	---	Councillor W. F. du Plessis	---	---	G. I. Muller	
Cape Town	---	---	Councillor I. Muller	---	---	H. A. Eastman	
Durban	---	---	Councillor G. Hayward	---	---	C. Kinsman	
Krugersdorp	---	---	Councillor E. B. Neill	---	---	I. L. van der Walt	
Johannesburg	---	---	Councillor L. M. Weiner	---	---	J. C. Fraser	
						D. A. Bradley	
						A. Foden	
<i>Councils : 1951-52 :</i>				<i>Engineers :</i>			
Springs	---	---	Councillor L. P. Davies	---	---	J. C. Downey	
Bulawayo	---	---	Councillor C. M. Newman	---	---	A. R. Sibson	
East London	---	---	Councillor F. T. Fox	---	---	A. Foden	
Johannesburg	---	---	Councillor L. M. Weiner	---	---	I. C. Fraser	
Pretoria	---	---	Councillor C. W. Sinclair	---	---	D. J. Hugo	
Cape Town	---	---	Councillor I. W. O. Billingham	---	---	C. G. Downie	
Durban	---	---	Councillor E. E. Cheek	---	---	C. Kinsman	
Krugersdorp	---	---	Councillor H. Pannall	---	---	I. L. van der Walt	
						C. R. Hallé	
						D. A. Bradley	

ASSOCIATION OF MUNICIPAL ELECTRICITY UNDERTAKINGS OF SOUTHERN AFRICA

<i>Councils : 1952-53 :</i>				<i>Engineers :</i>			
Bulawayo	---	---	---	Councillor T. W. Gubb	---	---	A. R. Sibson
Bloemfontein	---	---	---	Councillor E. B. Altona	---	---	G. J. Muller
Cape Town	---	---	---	Councillor A. E. Keen	---	---	C. G. Downie
Durban	---	---	---	Councillor H. L. Richardson	---	---	C. Kinsman
Johannesburg	---	---	---	Councillor H. W. Harrison	---	---	J. C. Fraser
Krugersdorp	---	---	---	Councillor M. C. Dames	---	---	J. L. van der Walt
Port Elizabeth	---	---	---	Councillor L. Dubb	---	---	D. A. Bradley
Salisbury	---	---	---	Alderman Morton Jaffray	---	---	J. E. Mitchell
							C. R. Hallé
							J. C. Downey

<i>Councils : 1953-54 :</i>				<i>Engineers :</i>			
Johannesburg	---	---	---	Councillor H. W. Harrison	---	---	J. C. Fraser
Bloemfontein	---	---	---	Councillor G. A. Fichardt	---	---	G. J. Muller
Port Elizabeth	---	---	---	Councillor A. Markman	---	---	D. A. Bradley
Cape Town	---	---	---	Councillor A. F. Keen	---	---	C. G. Downie
Durban	---	---	---	Councillor H. L. Richardson	---	---	C. Kinsman
Salisbury	---	---	---	Alderman A. Morton Jaffray	---	---	J. E. Mitchell
Krugersdorp	---	---	---	Councillor M. C. Dames	---	---	J. L. van der Walt
Pretoria	---	---	---	Councillor C. E. Acton	---	---	D. J. Hugo
							J. C. Downey
							A. R. Sibson

<i>Councils : 1954-55 :</i>				<i>Engineers :</i>			
Bloemfontein	---	---	---	Councillor F. J. C. Castelyn	---	---	G. J. Muller
Cape Town	---	---	---	Councillor P. D. Santilhano	---	---	C. G. Downie
Krugersdorp	---	---	---	Councillor M. C. Dames	---	---	J. L. van der Walt
Port Elizabeth	---	---	---	Councillor A. Markman	---	---	D. A. Bradley
Pretoria	---	---	---	Councillor C. E. Acton	---	---	D. J. Hugo
Pietermaritzburg	---	---	---	Councillor C. E. K. Young	---	---	C. R. Hallé
Salisbury	---	---	---	Alderman A. Morton Jaffray	---	---	J. E. Mitchell
Springs	---	---	---	Councillor L. P. Davies	---	---	J. C. Downie
							A. R. Sibson
							J. C. Fraser

<i>Councils : 1955-56 :</i>				<i>Engineers :</i>			
Pretoria	---	---	---	Councillor P. G. E. Bignaut	---	---	D. J. Hugo
Salisbury	---	---	---	Alderman A. Morton Jaffray	---	---	J. E. Mitchell
Johannesburg	---	---	---	Councillor D. J. Marais	---	---	R. W. Kane
Cape Town	---	---	---	Councillor P. D. Santilhano	---	---	C. G. Downie
Pietermaritzburg	---	---	---	Councillor C. E. K. Young	---	---	C. R. Hallé
Germiston	---	---	---	Councillor H. Boneschans	---	---	C. Lombard
Krugersdorp	---	---	---	Councillor P. J. Jonker	---	---	J. L. van der Walt
Springs	---	---	---	Councillor L. P. Davies	---	---	J. C. Downey
Bloemfontein (Co-opted)	---	---	---	Councillor F. J. C. Castelyn	---	---	G. J. Muller
							A. R. Sibson

<i>Councils : 1956-57</i>				<i>Engineers :</i>			
Salisbury	---	---	---	Alderman A. Morton Jaffray	---	---	J. E. Mitchell
Krugersdorp	---	---	---	Councillor P. W. Marais	---	---	J. L. van der Walt
Johannesburg	---	---	---	Councillor D. J. Marais	---	---	R. W. Kane
Cape Town	---	---	---	Councillor P. D. Santilhano	---	---	C. G. Downie
Bulawayo	---	---	---	Councillor S. H. Millar	---	---	A. R. Sibson
Germiston	---	---	---	Councillor de Bruyn	---	---	C. Lombard
Durban	---	---	---	Councillor J. McIntyre	---	---	R. M. O. Simpson
Springs	---	---	---	Councillor L. P. Davies	---	---	I. C. Downey
							D. J. Hugo

MEMBERS AND DELEGATES ATTENDING THE 31st CONVENTION

OFFICIAL DELEGATES:

- ALBERTON :
Fick, Cr. P. J.
Oclendaal, M. W.
- BENONI :
Korsman, Cr. N. C.
Lees, D.
- BETHAL :
Kirberger, M. N.
- BETHLEHEM :
Smuts, Cr. B.
Fisher, K. M.
- BLOEMFONTEIN :
Castelyn, Cr. F. J. C.
Muller, G. J.
- BOKSBURG :
Chambers, Cr. C. J.
Smith, E. L.
- BRAKPAN :
Weinberg, Cr. N. J.
Vergottini, P. L.
- BULAWAYO :
Phillips, Cr. J. W.
Sibson, A. R.
- CAPE TOWN :
Santilhana, Cr. P. D.
Downie, C. G.
- CRADOCK :
Rossler, A.
- DE AAR :
Macques, J. A.
- DURBAN :
Kinsman, Cr. C.
Simpson, R. M. O.
- EAST LONDON :
De Lange, Cr. R. L.
Giles, P. A.
- EDENVALE :
Jones, Cr. R. H.
Bailey, R. V.
- ESTCOURT :
Bulman, Cr. G. V.
Eriksen, J. G. F.
- ESHOWE :
Fohren, H.
- GATOOMA :
Grandin, P. C.
- GEORGE :
Dreyer, H. C.
- GERMISTON :
De Bruyn, Cr. P.
Lombard, C.
- GRAHAMSTOWN :
Iverach, J.
- GREYTOWN :
Newmarch, Cr. W. L.
Craig, J. S.
- HARRISMITH :
Hellman, Cr.
Pompe van Meerdervoort, J. L. K.
- HEIDELBERG :
Morris, Cr. H.
Rautenbach, Cr. P. H. R.
- JOHANNESBURG :
Marais, Cr. D. J.
Kane, R. W.
- KEMPTON PARK :
Mance, Cr. R. T.
Futcher, L.
- KIMBERLEY :
Fullard, Cr. D. S. W.
Mathews, J. A.
- KLERKSDORP :
Swanepoel, Cr. J. W.
Gericke, J. M.
- KOKSTAD :
Dillon, Cr. D.
Thackwray, W. G.
- KROONSTAD :
Rossler, W.
- KRUGERSDORP :
Marais, Cr. P. W.
Du Plessis, Cr. J.
Van der Walt, J. L.
- LADYSMITH :
Gailey, Cr. Mrs. R.
Stevens, F.
- LOUIS TRICHARDT :
Van de Berg, Cr. C. J.
Lotter, G. A.
- MAFEKING :
Cronje, Cr. Dr. S. C.
Jones, G. E. H.
- MIDDELBURG, Cape :
Haig-Smith, D.
- MIDDELBURG, Transvaal :
Potgieter, N. A.
- MOSEL BAY :
Lewis, L.
- NEWCASTLE :
Wade, Cr. J. W.
Bechler, P.
- NDOLA :
McGibbon, J.
- ODENDAALSRUS :
Brown, D. C.
- PARYS :
Pretorius, D. R.
- PIETERMARITZBURG :
Pierce, Cr. R. L.
Hallé, C. R.
- PIETERSBURG :
Erasmus, Cr. R. G. E.
Inglis, J. I.
- PIET RETIEF :
Mocke, T. M.
- PORT ELIZABETH :
Markman, Cr. A.
Murray Nobbs, D.

ASSOCIATION OF MUNICIPAL ELECTRICITY UNDERTAKINGS OF SOUTHERN AFRICA

PORT ALFRED :	STANDERTON :
Kruger, M. J. C.	Van der Merwe, Cr. L. J.
PORT SHEPSTONE :	Heunis, G. B.
Lowe, Cr.	STANGER :
Halliday, K. W. J.	Lavoipierre, Cr. L.
POTCHEFSTROOM :	McNeil, I. L.
De Kock, Cr. C.	STELLENBOSCH :
Kramer, T.	Lategan, J. F.
PRETORIA :	UTTENHAGE :
Bhignaut, Cr. P. G. C.	Gradwell, Cr.
Wilson, J.	Dawson, J. D.
Boyack, I. F.	UMTATA :
QUEENSTOWN :	Sissons, Cr. H. R.
Chemaly, Cr. J. H.	Paull, R. A.
Barratt, V. E. O.	UMTALI :
RANDFONTEIN :	Chace, Alderman G. W.
Pretorius, Cr. P.	Turner, H. T.
Cherry, J. R.	VEREENIGING :
ROBERTSON :	Chatterton, Cr. H. W.
Malherbe, Cr. A. P.	Turnbull, A. F.
De Villiers, S.	VIRGINIA :
ROODEPOORT-MARAISBURG :	Hobbs, I. L.
Hugo, Cr. H. J.	VRYHEID :
Brown, D. D.	Rush, W.
RUSTENBURG :	WALMER :
Van der Merwe, Cr. F. D.	Simpson, A. C.
Meinties, P. A.	WELKOM :
SALISBURY :	Wilcocks, Cr. P. J.
Jaffray, Alderman M.	Barton, R. W.
Campbell, Cr. D. M.	WITBANK :
Mitchell, I. E.	De Villiers, E. E.
SOMERSET EAST :	WINBURG :
Clarke, M. P. P.	Reyneke, G. M.
SOMERSET WEST :	Venter, Cr. H. P.
Solomon, Cr. E.	WORCESTER :
Hall, F. P. W.	Rabie, Cr. P.
SPRINGS :	Theron, W.
Davies, Cr. L. P.	WESTONARIA :
Meyer, Cr. D. R.	Fouchee, Cr. T. N.
Downey, J. C.	Dreyer, L.

OTHER MEMBERS :

D. A. Bradley (Hon. Member)	B. Marchand (Associate Member)
A. R. Campbell (Associate Member)	W. H. Milton (Hon. Member)
I. S. Clinton (Associate Member)	H. M. S. Muller (Associate Member)
D. B. J. Conradie (Associate Member)	I. W. Phillips (Associate Member)
C. Dawson (Associate Member)	Major S. G. Redman (Hon. Member)
G. A. Dalton (Associate Member)	A. T. Rodwell (Hon. Member)
Col. G. G. Ewer (Associate Member)	G. C. Theron (Associate Member)
J. C. Fraser (Hon. Member)	I. A. West (Associate Member)
A. Foden (Associate Member)	I. T. Williams (Associate Member)
C. Kinsman (Hon. Member)	C. E. K. Young (Hon. Member)

A.M.E.U. OFFICIALS :

R. G. Ewing (Representing the Secretaries)	Mrs. H. G. Simms (Convention Proceedings Clerk)
A. P. Burger (Hon. Legal Adviser)	Mrs. C. Kurland (Hon. Assistant)

DELEGATES :

GOVERNMENT DEPARTMENTS AND PUBLIC UTILITIES

- H. P. Alexander, Electricity Supply Commission, Natal Undertaking.
- C. R. Burton, Electricity Supply Commission, Cape Northern Undertaking.
- E. Dalton, South West African Administration (Inspector of Factories, Engineering).
- C. W. H. du Toit, Council for Scientific and Industrial Research.
- R. K. Frost, Chief Inspector of Factories, Department of Labour.

ASSOCIATION OF MUNICIPAL ELECTRICITY UNDERTAKINGS OF SOUTHERN AFRICA

A. Jackson, Cape Provincial Administration.
 W. L. King, South African Railways.
 A. W. Lineker, Rand Water Board.
 A. A. Middlecote, Council for Scientific Industrial Research.
 W. H. Milton, Electricity Supply Commission, Rand Undertaking.
 G. C. Molyneux, Rhodesia Railways.
 F. O. Pearce, Electricity Supply Commission, Natal Undertaking.
 Dr. J. Pienaar, Electricity Control Board.
 A. E. Raw, Electricity Supply Commission, Natal Undertaking.
 C. R. Shewry, Posts and Telegraphs Department.
 S. du P. van Eeden, Electricity Control Board.

OTHER REPRESENTATIVES :

C. G. Downie, Institute of Electrical Engineers (Overseas Representative of the Council for the Cape).
 J. C. Fraser, The Institute of Certificated Engineers, S.A. (Safety Precautions Committee) and The South African Institute of Electrical Engineers, South African Electrical Review.
 R. W. Kane, South African Institute of Certificated Engineers.
 R. W. Lineker, Institute of Electrical Engineers (Overseas Representative of the Council for the Transvaal).
 W. L. Morrison, South African Institute of Mechanical Engineers.
 R. M. O. Simpson, Institute of Electrical Engineers (Overseas Representative of the Council for Natal).

VISITORS :

The Hon. D. G. Shepstone, Administrator of Natal.
 H. T. Aspinall, Witwatersrand Technical College.
 Cr. R. L. Baker, Margate.
 Cr. R. H. Barton, Margate.
 R. Bellad-Ellis, Pietermaritzburg.
 G. Bradford, Salisbury.
 C. Buckley, Margate Chamber of Commerce.
 H. C. Chandler, Vice-President, Margate Chamber of Commerce.
 Cr. J. S. Clark, Margate.
 Cr. P. J. Dowdle, Margate.
 Dr. S. M. Feinberg, Medical Officer of Health, Margate.
 L. O. Foster, S. A. National Committee on Illumination.
 Cr. G. L. Freeman, Margate.
 I. S. Garden, Margate Chamber of Commerce.
 S. A. W. Herbert, Mayor of Margate.
 E. I. Holt-Biddle, S.A. National Committee on Illumination.
 J. D. Holdcroft, President, Margate Chamber of Commerce.
 E. Johns, Margate.
 Cr. A. M. Kelly, Margate.
 M. Kirkel, Margate Chamber of Commerce.
 C. Kurland, Margate.
 D. N. Levitt, Margate Chamber of Commerce.
 G. C. Mourant, Town Clerk, Margate.
 K. W. Murgatroyd, Bedfordview.
 Miss M. Nicol, Private Secretary to the Administrator of Natal.
 W. Rennhackkamp, S.A. National Committee on Illumination.
 Cr. W. A. Rees, Margate.
 S. J. Richards, S.A. National Committee on Illumination.
 F. J. Sheffield, Margate Chamber of Commerce.
 Cr. I. B. Smith, Margate.
 A. D. Smith, S.A. National Committee on Illumination.
 A. T. Taylor, Johannesburg.
 W. B. Topham, Margate Chamber of Commerce.

AFFILIATES :

Aberdare Cables (Africa) Ltd.	— — — — —	J. C. Sutherland, G. McL. Yuill.
Aberdare Construction Co. of S.A. (Pty.) Ltd.	— — — — —	W. I. Louw.
Adams, Symes & Partners	— — — — —	K. Adams.
African Cables, Ltd.	— — — — —	V. H. Woods, G. Yates.
The Aluminium Co. of S.A. (Pty.) Ltd.	— — — — —	E. B. Martin.
Arthur Trevor Williams (Pty.) Ltd.	— — — — —	J. T. Williams, J. A. Barnett.
Aycliffe Cables Ltd.	— — — — —	R. E. Wilson, C. A. Rist.
Babeck & Wilcox of Africa Ltd.	— — — — —	I. C. Callie, H. M. Carlin.

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British General Electric Co. of C.A. (Pvt.) Ltd.	---	K. D. Starr, J. B. Robinson.
British General Electric Co. Ltd.	---	W. J. Hill, J. C. Weir.
British Insulated Cables S.A. (Pty.) Ltd.	---	A. L. Sanders, L. L. Langton.
British Thomson-Houston Co. S.A. (Pty.) Ltd.	---	L. G. Axe, H. G. Val Davies.
British Thomson-Houston Co. C.A. (Pvt.) Ltd.	---	W. A. Ives.
Brush Group (S.A.) Ltd.	---	P. N. Vickerman.
Caltex (Africa) Ltd.	---	E. F. Partridge.
Chloride Electrical Storage Co. S.A. (Pty.) Ltd.	---	A. C. Tilley.
C. M. B. Engineering Co. (Pty.) Ltd.	---	F. W. de Zeeuw.
Cooper & de Beer (Pty.) Ltd.	---	C. L. de Beer.
Crompton Parkinson (S.A.) (Pty.) Ltd.	---	H. Doughty, F. S. Haigh.
Dowson & Dobson, Ltd.	---	R. Phelps, C. W. Cook, P. F. Morgan.
Enfield Cables (S.A.) (Pty.) Ltd.	---	A. E. Torrance, P. P. Miles.
English Electric Co. (S.A.) Ltd.	---	N. Jackson, W. G. H. Jarvis.
Falks Electrical Supplies (S.A.) (Pty.) Ltd.	---	R. C. Viviers.
First Electric Corporation of S.A. Ltd.	---	G. B. Wood, A. McArthur.
F. W. J. Electrical Industries	---	M. R. Marot.
W. T. Glover & Co., Ltd.	---	W. J. G. Emery.
E. K. Green & Son S.A. (Pty.) Ltd.	---	A. W. Bullus.
Henleys S.A. Telegraph Works Co. Ltd.	---	R. W. Lord.
Hopkinsons S.A. (Pty.) Ltd.	---	E. C. Enfield.
James Howden & Co. Africa (Pty.) Ltd.	---	R. J. Cunningham, E. P. Rodger.
Hubert Davies & Co. Ltd.	---	J. T. Pyott, F. Cator, R. G. Hulley.
International Combustion Africa Ltd.	---	O. R. Nothard.
John Brown Land Boilers (Africa) (Pty.) Ltd.	---	W. H. Wilson, G. Richardson, G. E. Chambers.
Johnson & Phillips (S.A.) (Pty.) Ltd.	---	E. W. Dixon.
John Thompson (S.A.) (Pty.) Ltd.	---	J. B. Maxwell.
George Kent (S.A.) (Pty.) Ltd.	---	G. H. Troop.
G. H. Marais.		
Dr. J. K. Marais.		
Harold Marthinussen & Co. (Pty.) Ltd.	---	Harold Marthinussen, George Roeske.
Metropolitan Vickers (S.A.) (Pty.) Ltd.	---	D. W. Stanley, J. Monks.
Metropolitan Vickers C.A. (Pty.) Ltd.	---	C. R. Deglon.
Merz & McLellan	---	T. R. J. Bishop, C. E. R. Langford.
Mine-Elect (Pvt.) Ltd.	---	E. V. Hawgood.
C. A. Parsons & Co. S.A. (Pty.) Ltd.	---	T. R. Strawson.
C. A. Parsons (Rhodesia) Ltd.	---	I. S. L. Chunnas.
Pretoria Metal Industries (Pty.) Ltd.	---	O. H. Hodgkin.
Reumert & Lenz, Ltd.	---	I. A. Mondal, J. H. Todd.
A. Reyrolle & Co., Ltd.	---	W. J. Gibbons, D. A. Anderson.
S. A. General Electric Co. Ltd.	---	J. W. Allen, E. Crole.
S. A. Phillips (Pty.) Ltd.	---	H. V. Raymond.
Samuel Osborn (S.A.) Ltd.	---	H. Snow, R. E. Harden.
Scottish Cables (S.A.) Ltd.	---	D. G. Sutherland, A. C. Grant, W. E. L. Tonkinson.
Shell Co. of S.A. Ltd.	---	I. J. Leong, D. M. Clark.
Simplex Electric Co. (S.A.) Ltd.	---	I. A. Morrison, C. B. Wilson.
Siemens Bros. British (Pty.) Ltd.	---	I. P. Thomas, R. S. Yates.
Stamcor (Pty.) Ltd.	---	J. M. Taylor.
Standard Telephones & Cables, Ltd.	---	F. C. Deakin.
Steel Sales Co. of Africa (Pty.) Ltd.	---	T. N. D. Griffin.
Stewarts & Lloyds of S.A. Ltd.	---	W. G. van Aswegen, T. A. Robinson.
Superconcrete Pipes S.A. Ltd.	---	P. H. Levick.
Switchcraft (Pty.) Ltd.	---	G. Ludwig.
Union Steel Corporation S.A. Ltd.	---	N. G. Beveridge.
Wilson & Herd (Pty.) Ltd.	---	H. N. Hancox.
Yarrow Africa (Pty.) Ltd.	---	H. D. T. Harris.

LADIES :

Alexander, Mrs. H. P., Durban.	Blignaut, Mrs. P. G. C., Pretoria.
Anderson, Mrs. D. A., Johannesburg.	Bradley, Mrs. D. A., Port Elizabeth.
Aspinall, Mrs. H. T., Johannesburg.	Bradford, Mrs. G., Salisbury.
Axe, Mrs. L. G., Johannesburg.	Buckley, Mrs. C., Margate.
Bailey, Mrs. R. V., Edenvale.	Burton, Mrs. C. R., Kimberley.
Baker, Mrs. R. L., Margate.	Carlin, Mrs. H. M., Vereeniging.
Barnett, Mrs. J. A., Johannesburg.	Callie, Mrs. J. C., Johannesburg.
Barton, Mrs. R. H., Margate.	Campbell, Mrs. A. R., Johannesburg.
Bechler, Mrs. P., Newcastle.	Campbell, Mrs. D. M., Salisbury.
Bishop, Mrs. T. R. J., Johannesburg.	Cator, Mrs. F., Johannesburg.

ASSOCIATION OF MUNICIPAL ELECTRICITY UNDERTAKINGS OF SOUTHERN AFRICA

- Chatterton, Mrs. H. W., Vereeniging.
 Cherry, Mrs. J. R., Randfontein.
 Chandler, Mrs. H. C., Margate.
 Clark, Mrs. J. S., Margate.
 Clarke, Mrs. M. P. P., Somerset East.
 Clinton, Mrs. J. S., Johannesburg.
 Clunas, Mrs. I. S. L., Bulawayo.
 Conradie, Mrs. D. J. R., Bloemfontein.
 Cook, Mrs. C. W., Johannesburg.
 Craig, Mrs. J. S., Greytown.
 Chambers, Mrs. G. E., Johannesburg.
 Davies, Mrs. L. P., Springs.
 Dawson, Mrs. J. D., Uitenhage.
 Deakin, Mrs. F. C., Johannesburg.
 De Beer, Mrs. C. L., Johannesburg.
 Deglon, Mrs. C. R., Salisbury.
 Dillon, Mrs. D., Kokstad.
 De Villiers, Mrs. S., Robertson.
 Dixon, Mrs. E. W., Germiston.
 Dowdle, Mrs. P. J., Margate.
 Downey, Mrs. J. C., Springs.
 Downie, Mrs. C. G., Cape Town.
 Doughty, Mrs. H., Springs.
 Dreyer, Mrs. L., Westonaria.
 Du Plessis, Mrs. J., Krugersdorp.
 Du Toit, Mrs. C. W. H., Pretoria.
 Emery, Mrs. W. I. G., Salisbury.
 Enfield, Mrs. E. C., Johannesburg.
 Erikson, Mrs. J. G. F., Estcourt.
 Ewer, Mrs. G. C., Durban.
 Fick, Mrs. P. J., Alberton.
 Fisher, Mrs. K. M., Bethlehem.
 Fohren, Mrs. H., Eshowe.
 Foster, Mrs. L. O., Johannesburg.
 Freeman, Mrs. G. L., Margate.
 Fraser, Mrs. J. C., Johannesburg.
 Feinberg, Mrs. S. M., Margate.
 Futeher, Mrs. L., Kempton Park.
 Garden, Mrs. I. S., Margate.
 Gericke, Mrs. I. M., Klerksdorp.
 Gibbons, Mrs. W. J., Johannesburg.
 Grant, Mrs. A. C., Johannesburg.
 Griffiths, Mrs. W. F., Johannesburg.
 Halliday, Mrs. K. W. J., Port Shepstone.
 Haigh, Mrs. F. S., Springs.
 Haig-smith, Mrs. D., Middelburg, Cape.
 Hallé, Mrs. C. R., Pietermaritzburg.
 Hancox, Mrs. H. N., Johannesburg.
 Harris, Mrs. H. D. T., Johannesburg.
 Herbert, Mrs. S. A. W., Margate.
 Heunis, Mrs. G. B., Standerton.
 Hobbs, Mrs. I. L., Virginia.
 Holderoft, Mrs. J. D., Margate.
 Hodgkin, Mrs. C. H., Pretoria.
 Hodgkin, Miss J. M., Pretoria.
 Inglis, Mrs. J. I., Pietersburg.
 Iverach, Mrs. J., Grahamstown.
 Ives, Mrs. W. A., Salisbury.
 Jackson, Mrs. A., Cape Town.
 Jackson, Mrs. N., Johannesburg.
 Jaffray, Mrs. Merton, Salisbury.
 Jarvis, Mrs. W. G. H., Johannesburg.
 Jones, Mrs. G. E. H., Mafeking.
 Jones, Mrs. R. H., Edenvale.
 Kane, Mrs. R. W., Johannesburg.
 Kelly, Mrs. A. M., Margate.
 Kinsman, Mrs. C., Durban.
 Kramer, Mrs. T., Potchefstroom.
 Kruger, Mrs. M. J. G., Port Alfred.
 King, Mrs. W. L., Johannesburg.
 Korsman, Mrs. N. C., Benoni.
 Langford, Mrs. C. E. R., Johannesburg.
 Langton, Mrs. L. L., Salisbury.
 Lategan, Mrs. J. F., Stellenbosch.
 Lavoipierre, Mrs. L., Stanger.
 Lees, Mrs. D., Benoni.
 Levick, Mrs. P. H., Roodepoort.
 Levitt, Mrs. D. N., Margate.
 Lombard, Mrs. C., Germiston.
 Lord, Mrs. R. W., Johannesburg.
 Lotter, Mrs. G. A., Louis Trichardt.
 Louw, Mrs. W. I.
 Lowe, Mrs., Port Shepstone.
 Ludwig, Mrs. G., Johannesburg.
 McArthur, Mrs. A., Knights.
 McNeil, Mrs. I. L., Stanger.
 McGibbin, Mrs. J., Ndola.
 Malherbe, Mrs. A. P., Robertson.
 Mance, Mrs. R. T., Kempton Park.
 Marais, Mrs. D. J., Johannesburg.
 Marais, Mrs. P. J., Krugersdorp.
 Marais, Mrs. G. H., Pretoria.
 Marot, Mrs. M. R., Alberton.
 Mathews, Mrs. J. A., Kimberley.
 Maxwell, Mrs. J. D., Johannesburg.
 Meintjies, Mrs. P. A., Buxtenburg.
 Meyer, Mrs. D. R., Springs.
 Martin, Mrs. E. B., Johannesburg.
 Milton, Mrs. W. H., Johannesburg.
 Mitchell, Mrs. J. E., Salisbury.
 Mocke, Mrs. T. M., Piet Retief.
 Monks, Mrs. J., Johannesburg.
 Molyneux, Mrs. G. C., Bulawayo.
 Muller, Mrs. G. J., Bloemfontein.
 Muller, Mrs. H. M. S., Uppington.
 Morrison, Mrs. J. A., Springs.
 Morrison, Mrs. W. L., Durban.
 Mourant, Mrs. G. C., Margate.
 Murgatroyd, Mrs. K. W., Bedfordview.
 Newmarch, Mrs. W. L., Greytown.
 Nothard, Mrs. O. R., Johannesburg.
 Odendaal, Mrs. M. W., Alberton.
 Paull, Mrs. R. A., Umtata.
 Pearce, Mrs. F. O., Durban.
 Phelps, Mrs. R., Durban.
 Pompe van Meerdevoort, Mrs. I. K. L., Harrismith.
 Potgieter, Mrs. N. A., Middelburg, Transvaal.
 Pretorius, Mrs. D. R., Parys.
 Phillips, Mrs. I. W., Bulawayo.
 Rautenbach, Mrs. P. H. R., Heidelberg.
 Raw, Mrs. A. E., Durban.
 Rees, Mrs. W. A., Margate.
 Reyneke, Mrs. G. M., Winburg.
 Richardson, Mrs. G., Johannesburg.
 Rist, Mrs. C. A. A., Johannesburg.
 Robinson, Mrs. J. G., Salisbury.
 Rodwell, Mrs. A. T., Johannesburg.
 Rossler, Mrs. A., Cradock.
 Rossler, Mrs. W., Kroonstad.
 Rush, Mrs. W., Vryheid.
 Sheffield, Mrs. F. J., Margate.
 Shepstone, Mrs. D. G., Pietermaritzburg.
 Sibson, Miss S. D., Bulawayo.
 Simpson, Mrs. R. M. O., Durban.
 Smith, Mrs. J. B., Margate.
 Smuts, Mrs. B., Bethlehem.

Solomon, Mrs. E., Somerset West.
 Stanley, Mrs. D. W., Johannesburg.
 Starr, Mrs. K. D., Salisbury.
 Strawson, Mrs. T. R., Johannesburg.
 Sutherland, Mrs. D. G., Johannesburg.
 Sutherland, Mrs. J. C., Port Elizabeth.
 Taylor, Mrs. A. T., Johannesburg.
 Taylor, Mrs. J. M., Johannesburg.
 Thackwray, Mrs. W. C., Kokstad.
 Theron, Mrs. G. C. T., Vanderbijlpark.
 Theron, Mrs. W., Worcester.
 Thomas, Mrs. J. P., Durban.
 Tonkinson, Mrs. W. E. L., Johannesburg.
 Toop, Mrs. G. H., Johannesburg.
 Topham, Mrs. W. B., Margate.
 Val Davies, Mrs. H. G., Johannesburg.
 Van de Berg, Mrs. C. J., Louis Trichardt.

Van der Walt, Mrs. J. L., Krugersdorp.
 Van der Merwe, Mrs. L. J., Standerton.
 Van Eeden, Mrs. S. du P., Pretoria.
 Vergottini, Mrs. P. L., Brakpan.
 Vickerman, Mrs. P. N., Johannesburg.
 Viviers, Mrs. R. C., Johannesburg.
 Weinberg, Mrs. N. J., Brakpan.
 West, Mrs. J. A., St. Michael's.
 Williams, Mrs. J. T., Pretoria.
 Wilson, Mrs. J., Pretoria.
 Wilson, Mrs. R. E., Johannesburg.
 Wilson, Mrs. C. B., Durban.
 Woods, Mrs. V. H., Vereeniging.
 Williams, Mrs. J. T., Johannesburg.
 Wilcocks, Mrs. P. J., Welkom.
 Yates, Mrs. G., Vereeniging.

LIST OF MEMBERS AS AT 31st MAY, 1956

HONORARY MEMBERS

Bradley, D.A., 9, Target Kloof Road, Port Elizabeth.
 Eastman, H. A., Torwood, Parel Vallei, Somerset West, C.P.
 Fraser, J. C., 26, Grace Road, Mountain View, Johannesburg.
 Kinsman, C., 7, Highgate Place, Durban North.
 Milton, W. H., c/o. Electricity Supply Commission, P.O. Box 1091,
 Johannesburg.
 Jaffray, A. Morton (Alderman), 8, Fairbridge Avenue, Salisbury.
 Poole, E., 3, Musgrave Mansions, 690, Musgrave Road, Durban.
 Rodwell, A. T., "Miranda", Oxford Road, Parktown, Johannesburg.
 Redman, Major S. G., C/o. Merz & McLellan, Escom House,
 Rissik Street, Johannesburg.
 Young, C. E. K., 6, Lexdon Circle, Pietermaritzburg.

COUNCIL MEMBERS

Adelaide, C.P., Municipality, P.O. Box 38.
 Aliwal North, C.P., Municipality, P.O. Box 46.
 Alberton, Tvl., Municipality, P.O. Box 4.
 Barberton, Tvl., Municipality, P.O. Box 33.
 Beaufort West, C.P., Municipality, P.O. Box 9.
 Benoni, Tvl., Municipality, P.O. Box 45.
 Bethal, Tvl., Municipality, P.O. Box 3.
 Bethlehem, O.F.S., Municipality, P.O. Box 130.
 Bloemfontein, O.F.S., City Council, P.O. Box 258.
 Boksburg, Tvl., Town Council, P.O. Box 215.
 Brandfort, O.F.S., Municipality, P.O. Box 13.
 Bulawayo, S.R., City Council, P.O. Box 591.
 Butterworth, Transkei, Municipality, P.O. Box 36.
 Brakpan, Tvl., Town Council, P.O. Box 15.
 Brits, Tvl., Town Council, P.O. Box 106.
 Bothaville, O.F.S., Municipality, P.O. Box 12.
 Cape Town, C.P., City Council, P.O. Box 298.
 Cradock, C.P., Municipality, P.O. Box 24.
 Ceres, C.P., Municipality, P.O. Box 44.
 De Aar, C.P., Municipality, P.O. Box 42.
 Delmas, Tvl., Village Council, P.O. Box 6.
 Durban, Natal, City Council, P.O. Box 147.
 Dewetsdorp, O.F.S., Municipality, P.O. Box 13.
 East London, C.P., City Council, P.O. Box 134.
 Elliot, C.P., Municipality, P.O. Box 21.
 Ermelo, Tvl., Municipality, P.O. Box 48.
 Eshowe, Zululand, Town Board, P.O. Box 37.
 Edenvale, Tvl., Town Council, P.O. Box 25.
 Estcourt, Natal, Borough, P.O. Box 15.
 Fort Beaufort, C.P., Municipality, P.O. Box 36.
 Ficksburg, O.F.S., Municipality, P.O. Box 116.
 Gatooma, S.R., Municipality, P.O. Box 114.
 Grahamstown, C.P., City Council, P.O. Box 176.
 George, C.P., Municipality, P.O. Box 28.
 Greytown, Natal, Borough, P.O. Box 71.
 Gwelo, S.R., Municipality, P.O. Box 278.
 Graff-Reinet, C.P., Municipality, P.O. Box 71.
 Germiston, Tvl., City Council, P.O. Box 145.
 Harrismith, O.F.S., Municipality, P.O. Box 43.
 Heidelberg, Tvl., Municipality, P.O. Box 201.
 Johannesburg, Tvl., City Council, P.O. Box 1049.
 Kempton Park, Tvl., Municipality, P.O. Box 13.
 Kimberley, C.P., City Council, P.O. Box 194.
 Klerksdorp, Tvl., Municipality, P.O. Box 160.
 Kokstad, E.G., Municipality, P.O. Box 8.
 Komgha, C.P., Municipality, P.O. Box 21.
 Kroonstad, O.F.S., Municipality, P.O. Box 302.
 Krugersdorp, Tvl., Town Council, P.O. Box 94.
 Ladysmith, Natal, Borough, P.O. Box 29.
 Louis Trichardt, Tvl., Municipality, P.O. Box 96.
 Livingstone, N.R., Municipality, P.O. Box 29.
 Ladybrand, O.F.S., P.O. Box 64.
 Mafeking, Bech'd., Municipality, P.O. Box 42.
 Matiele, E.G., Municipality, P.O. Box 35.
 Middelburg, C.P., Municipality, P.O. Box 55.

ASSOCIATION OF MUNICIPAL ELECTRICITY UNDERTAKINGS OF SOUTHERN AFRICA

- Middelburg, Tvl., Municipality, P.O. Box 14.
 Mossel Bay, Municipality, P.O. Box 25.
- Nelspruit, Tvl., Municipality, P.O. Box 45.
 Newcastle, Natal, Borough, P.O. Box 21.
 N'Dola, N.R., Municipality, P.O. Box 197.
 Nigel, Tvl., Municipality, P.O. Box 23.
- Oudtshoorn, C.P., Municipality, P.O. Box 132.
 Odendaalsrus, O.F.S., Municipality, P.O. Box 21.
- Paarl, C.P., Municipality, P.O. Box 12.
 Pietersburg, Tvl., Municipality, P.O. Box 111.
 Pietermaritzburg, Natal, City Council, P.O. Box 321.
- Piet Retief, Tvl., Municipality, P.O. Box 23.
 Port Alfred, C.P., Municipality, P.O. Box 13.
 Port Elizabeth, C.P., City Council, P.O. Box 116.
 Port Shepstone, Natal, Borough, P.O. Box 5.
 Potchefstroom, Tvl., Municipality, P.O. Box 113.
 Potgietersrus, Tvl., Municipality, P.O. Box 34.
 Pretoria, Tvl., City Council, P.O. Box 440.
 Parys, O.F.S., Municipality, P.O. Box 39.
 Postmasburg, C.P., Municipality, P.O. Box 5.
- Queenstown, C.P., Municipality, P.O. Box 113.
 Que Que, S.R., Municipality, P.O. Box 15.
- Randfontein, Tvl., Municipality, P.O. Box 139.
 Robertson, C.P., Municipality, P.O. Box 52.
 Roodepoort-Maraiburg, Tvl., Municipality, P.O. Box 217, Roodepoort.
- Rustenburg, Tvl., Municipality, P.O. Box 16.
 Riversdale, C.P., Municipality, P.O. Box 29.
- Salisbury, S.R., City Council, P.O. Box 990.
- Somerset East, C.P., Municipality, P.O. Box 21.
 Springs, Tvl., Town Council, P.O. Box 45.
 Springfontein, O.F.S., Municipality, P.O. Box 10.
 Stanger, Natal, Borough, P.O. Box 72.
 Stellenbosch, C.P. Municipality, P.O. Box 17.
 Somerset West, C.P., Municipality, P.O. Box 19.
 Standerton, Tvl., Municipality, P.O. Box 66.
- The Strand, C.P., Municipality, P.O. Box 3.
 Theunissen, O.F.S., Municipality, P.O. Box 8.
- Uitenhage, C.P., Municipality, P.O. Box 45.
 Umtata, Tembuland, Municipality, P.O. Box 57.
 Umtali, S.R., Municipality, P.O. Box 121.
 Upington, C.P., Municipality, P.O. Box 17.
- Vereeniging, Tvl., Municipality, P.O. Box 35.
 Ventersdorp, Tvl., Municipality, P.O. Box 15.
 Virginia, O.F.S., Village Board of Management, P.O. Box 156.
 Vrede, O.F.S., Municipality, P.O. Box 155.
 Vryburg, C.P., Municipality, P.O. Box 35.
 Vryheid, Natal, Borough, P.O. Box 57.
- Walmer, C.P. Municipality, P.O. Box 5010, Walmer.
- Warmbaths, Tvl., Municipality, Warmbaths.
 Wellington, C.P., Municipality, P.O. Box 12.
 Welkom, O.F.S., Village Board, P.O. Box 708.
 Wepener, O.F.S., Municipality, P.O. Box 31.
 Westonaria, Tvl., Municipality, P.O. Box 19.
 Willowmore, C.P., Municipality, P.O. Box 15.
 Winburg, O.F.S., Municipality, P.O. Box 26.
 Windhoek, S.W.A., Municipality, P.O. Box 59.
 Witbank, Tvl., Municipality, P.O. Box 3, Witbank.
 Worcester, C.P., Municipality, P.O. Box 37.

ENGINEER MEMBERS :

- Aalbers, G., Municipal Electrical Engineer, P.O. Box 12, Wellington, C.P.
 Adams, C. H., Municipal Electrical Engineer, P.O. Box 29, Riversdale, C.P.
- Bailey, R. V., Town and Electrical Engineer, P.O. Box 25, Edenvale, Tvl.
 Barratt, V. E. O., Municipal Electrical Engineer, P.O. Box 113, Queenstown, C.P.
 Barton, R. W., Electrical Engineer, P.O. Box 708, Welkom, O.F.S.
 Bechler, P., Town Electrical Engineer, P.O. Box 21, Newcastle, Natal.
 Benson, T., Town Electrical Engineer, P.O. Box 35, Matatiele, E.G.
 Brown, D. D., Municipal Electrical Engineer, P.O. Box 217, Roodepoort, Tvl.
 Brown, D.C., Town Electrical Engineer, P.O. Box 21, Odendaalsrus, O.F.S.
- Clarke, M. P. P., Municipal Electrical Engineer, P.O. Box 21, Somerset East, C.P.
 Cherry, J. R., Municipal Electrical Engineer, P. O. Box 139, Randfontein, Tvl.
 Coetzee, F. J., Electrical Engineer, P.O. Box 21, Evarton, Tvl.
 Cowley, B. W., Municipal Electrical Engineer, P.O. Box 83, Barberton, Tvl.
 Craig, J. S., Borough Electrical Engineer, P.O. Box 71, Greytown, Natal.
- Dawson, J. D., Municipal Electrical Engineer, P.O. Box 45, Uitenhage.
 De Villiers, E. E., Municipal Electrical Engineer, P.O. Box 3., Witbank, Tvl.
 De Villiers, S. de V., Municipal Electrical Engineer, P.O. Box 52, Robertson, C.P.
 De Wet, D. P., Municipal Electrical Engineer, P.O. Box 15, Willowmore, C.P.
 Downey, J. C. Town Electrical Engineer, P.O. Box 45, Springs, Tvl.
 Downie, C. G., City Electrical Engineer, P.O. Box 82, Cape Town, C.P.
 Dreyer, L., Municipal Electrical Engineer, P.O. Box 19, Westonaria, Tvl.
 Dreyer, D. V. S., Town Electrical Engineer, P.O. Box 106, Brits.
- Erikson, J. G. F., Borough Electrical Engineer, P.O. Box 15, Estcourt, Natal.
- Fisher, K. M., Municipal Electrical Engineer, P.O. Box 551, Bethlehem, O.F.S.
 Fletcher, L., Municipal Electrical Engineer, P.O. Box 13, Kempton Park, Tvl.

- Gericke, J. M., Municipal Electrical Engineer, P.O. Box 99, Klerksdorp.
 Giles, P. A., City Electrical Engineer, P. O. Box 529, East London, C.P.
 Grandin, F. C., Municipal Electrical Engineer, P.O. Box 114, Gatooma, S.R.
- Hadfield, A. W. K., Town and Electrical Engineer, P.O. Box 278, Gwelo, S.R.
 Hafele, C. F., Deputy City Electrical Engineer, P.O. Box 288, Bloemfontein, O.F.S.
 Haig-Smith, Municipal Electrical Engineer, P.O. Box 55, Middelburg, C.P.
 Halliday, K. W. J., Municipal Electrical Engineer, P.O. Box 5, Port Shepstone, Natal.
 Hallé, C. R., P.O. Box 399, Pietermaritzburg, Natal.
 Hall, F. P. W., Municipal Electrical Engineer, P.O. Box 19, Somerset West, C.P.
 Harvey, A. O., Town Electrical Engineer, Warmbaths, Tvl.
 Hattingh, J. D., Municipal Electrical Engineer, P.O. Box 8, Rouxville, O.F.S.
 Hatwich, A. H. J., Town and Electrical Engineer, P.O. Box 13, Dewetsdorp, O.F.S.
 Heese, J. F., Assistant Electrical Engineer, P.O. Box 94, Krugersdorp, Tvl.
 Heunis, G. B., Town and Electrical Engineer, P.O. Box 66, Standerton, Tvl.
 Hobbs, I. L., Town Electrical Engineer, P.O. Box 156, Virginia, O.F.S.
 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.
 Iverach, J., City Electrical Engineer, P.O. Box 176, Grahamstown, C.P.
- Jones, G. E. H., Municipal Electrical Engineer, P.O. Box 42, Mafeking, Bechuanaland.
- Kane, R. W., General Manager, Electricity Department, P.O. Box 699, Johannesburg.
 Kirberger, M. N., Town Engineer, P.O. Box 3, Bethal, Tvl.
 Kruger, M. J. C., Municipal Electrical Engineer, P.O. Box 13, Port Alfred, C.P.
- Lategan, J. F., Town Electrical Engineer, P.O. Box 201, Heidelberg, Tvl.
 Lees, D., Town Electrical Engineer, P.O. Box 45, Benoni, Tvl.
 Leishman, R., Deputy General Manager, Electricity Department, P.O. Box 699, Johannesburg.
 Lewis, L., Town Electrical Engineer, P.O. Box 25, Mossel Bay, C.P.
 Lombard, C., City Electrical Engineer, P.O. Box 145, Germiston, Tvl.
 Lotter, G. A., Town Electrical Engineer, P.O. Box 96, Louis Trichardt, Tvl.
 Lynch, E. C., Assistant City Electrical Engineer, P.O. Box 73, Salisbury, S.R.
- Macques, J. A., Municipal Electrical Engineer, P.O. Box 42, De Aar, C.P.
 Martinson, W. A., Municipal Electrical Engineer, P.O. Box 45, Nelspruit, Tvl.
 Mathews, J. A., City Electrical Engineer, P.O. Box 194, Kimberley, C.P.
 Meintjies, P. A., Municipal Electrical Engineer, P.O. Box 16, Rustenburg, Tvl.
 McGibbon, J., Municipal Electrical Engineer, P.O. Box 197, N'Dola, N.R.
 Miln, D. R., Town Engineer, P.O. Box 46, Fort Jameson, N.R.
 Mitchell, J. E., City Electrical Engineer, P.O. Box 73, Salisbury, S.R.
 Mocke, T. M., Town and Electrical Engineer, P.O. Box 23, Piet Retief, Tvl.
 Muller, G. J., City Electrical Engineer, P.O. Box 288, Bloemfontein, O.F.S.
 McNeil, J. L., Borough Electrical Engineer, P.O. Box 72, Stanger, Natal.
- Newcombe, P. H., Municipal Electrical Engineer, P.O. Box 28, George, C.P.
 Nobbs, D. M., City Electrical Engineer, P.O. Box 369, Port Elizabeth.
 Odendaal, M. W., Town Electrical Engineer, P.O. Box 4, Alberton, Tvl.
- Paul, R. A., Municipal Electrical Engineer, P.O. Box 57, Umtata, Tembuland.
 Potgieter, N. A., Municipal Electrical Engineer, P.O. Box 14, Middelburg, Tvl.
 Pretorius, D. R., Town Electrical Engineer, P.O. Box 39, Parys, O.F.S.
- Redman, R. H., Deputy City Electrical Engineer, P.O. Box 1803, Bulawayo.
 Relihan, H. J., Municipal Electrical Engineer, P.O. Box 12, Paarl, C.P.
 Reyneke, G. M., Town Electrical Engineer, P.O. Box 26, Winburg, O.F.S.
 Rogers, J., Municipal Electrical Engineer, P.O. Box 36, Fort Beaufort, C.P.
 Ross, J. W., Municipal Electrical Engineer, P.O. Box 206, Aliwal North, C.P.
 Rossler, A., Municipal Electrical Engineer, P.O. Box 24, Cradock, C.P.
 Rossler, W., Town Electrical Engineer, P.O. Box 302, Kroonstad, O.F.S.
 Rush, W., Borough Electrical Engineer, P.O. Box 57, Vryheid, Natal.
- Sibson, A. R., City Electrical Engineer, P.O. Box 1803, Bulawayo, S.R.
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 Simpson, R. M. O., City Electrical Engineer, P.O. Box 147, Durban, Natal.
 Sims, C. N., Municipal Electrical Engineer, P.O. Box 3, The Strand, C.P.
 Smith, E. L., Municipal Electrical Engineer, P.O. Box 215, Boksburg, Tvl.

ASSOCIATION OF MUNICIPAL ELECTRICITY UNDERTAKINGS OF SOUTHERN AFRICA

- Stevens, F., Borough Electrical Engineer, P.O. Box 29, Ladysmith, Natal.
 Schreuder, T. P., Municipal Electrical Engineer, P.O. Box 38, Adelaide, C.P.
 Sulter, F. J., Assistant Electrical Engineer, P.O. Box 145, Germiston, Tvl.
 Thackwray, W. G., Town Electrical Engineer, P.O. Box 8, Kokstad, E.G.
 Theron, W. C., Municipal Electrical Engineer, P.O. Box 37, Worcester, C.P.
 Turner, H. T., Town and Electrical Engineer, P.O. Box 121, Umfali, S.R.
 Turnbull, A. F., Town and Electrical Engineer, P.O. Box 35, Vereeniging, Tvl.
 Van Meerdervoort, J. K. L., Pompe, Town Electrical Engineer, P.O. Box 43, Harrismith, O.F.S.
 Van der Walt, J. L., Town Electrical Engineer, P.O. Box 94, Krugersdorp, Tvl.
 Vergottini, P. L., Municipal Electrical Engineer, P.O. Box 15, Brakpan, Tvl.
 Verschoor, D. R., Town and Electrical Engineer, P.O. Box 36, Butterworth, C.P.
 Vorster, P. J., Deputy Town and Electrical Engineer, P.O. Box 15, Brakpan, Tvl.
 Wilson, J., Assistant City Electrical Engineer, P.O. Box 423, Pretoria, Tvl.
 Woolridge, W. E. L., Town Electrical Engineer, P.O. Box 24, Harding, Natal.
 Williams, A. H., Assistant Electrical Engineer, P. O. Box 45, Springs, Tvl.
 Waddy, J. C., City Electrical Engineer, P.O. Box 399, Pietermaritzburg, Natal.

ASSOCIATES :

- Andrew, W. M., c/o. E.S.C., P.O. Box 667, East London, C.P.
 Burton, C. R., 54, Memorial Road, Kimberley, C.P.
 Campbell, A. R., P.O. Box 584, Johannesburg.
 Clinton, J. S., P. O. Box 4648, Johannesburg.
 Coulthard, R. D., P.O. Box 4453, Johannesburg.
 Conradie, D. J. R., P.O. Box 1009, Bloemfontein, O.F.S.
 Dalton, G. A., 111, Eckstein Street, East, Observatory Extension, Johannesburg, Tvl.
 Dawson, C., Electricity Supply Commission, P.O. Box 2408, Durban.
 De Wit, T., P.O. Box 44, Brits, Tvl.
 Ewer, Col. G. G., 174, Edmonds Road, Durban, Natal.
 Ferreira, N. Town Engineer, P.O. Box 21, Sasolburg, O.F.S.
 Foden, A., Manager, E.S.C. (Border Undertaking), P.O. Box 637, East London.
 Gripper, H. Jasper, c/o., Electricity Authority, P.O. Box 449, Nicosia, Cyprus.
 Gyles, J. H., "Bodrigg", Moyeni Road, Gilletts, Natal.
 Heasman, G. G., P.O. Box 77, Fort Victoria, S.R.
 Lutsch, W. J. F. S., c/o. Faculty of Engineering, University of Stellenbosch, C.P.
 Marchand, B., P.O. Box 223, Witbank, Tvl.
 Mercier, G., c/o., Kafue Management Board, Kafue, N. Rhodesia.
 Mole, E. W., P.O. Box 106, Saxonwold, Johannesburg.
 Muller, H. M. S., P. O. Box 112, Uppington, C.P.
 Nicholas, I. J., 74a, Ebdon Street, Queenstown, C.P.
 Powell, W. N., 104, Marlene Mansions, Abel Road, Berea, Johannesburg.
 Phillips, J. W., P.O. Box 1731, Bulawayo, S.R.
 Rothman, J. L., P.O. Box 606, Kimberley.
 Simpson, H. G., Engineering Department, Searles, Ltd., Great Brak River, C.P.
 Theron, G. C., P.O. Box 1, Vanderbijl Park, Tvl.
 Tubb, B. H. J., P.O. Box 1699, Salisbury, S.R.
 West, J. A., "Edgerton", P.O. Box 24, St. Michael's, South Coast, Natal.
 Wright, G. R. E., P.O. Box 465, Benoni, Tvl.
 Williams, J. T., P.O. Box 1617, Pretoria, Tvl.
 Williams, V. E., c/o., Lusaka Electricity Supply Corp., Ltd., P.O. Box 40, Lusaka, N.R.
 Wylie, R. J. S., c/o. E.S.C., Rand Undertaking, P.O. Box 103, Germiston, Tvl.

TECHNICAL ASSOCIATES :

McNamara, A. B., Electrical Engineer, P.O. Box 21, Komgha.
 Potta, K. U., Town Electrical Engineer, P.O. Box 17, Uppington, C.P.

AFFILIATES :

Aberdare Cables (Africa) Ltd., P.O. Box 494, Port Elizabeth.
 Aberdare Construction Co., (Pty.), Ltd., P.O. Box 8514, Johannesburg.
 Adams, Symes & Partners, P.O. Box 1498, Johannesburg.
 African Cables Ltd., P.O. Box 9909, Johannesburg.
 Allenwest S.A., (Pty.), Ltd., P.O. Box 6168, Johannesburg.
 The Aluminium Co., of S.A., (Pty.) Ltd., P.O. Box 2430, Johannesburg.
 Arthur Trevor Williams (Pty.) Ltd., P.O. Box 2873, Johannesburg.
 Aycliffe Cables Ltd., Hargreaves Works, Main Road, Eastleigh, Edenvale, Johannesburg.
 Babcock & Wilcox of Africa Ltd., P.O. Box 545, Vereeniging, Tvl.
 Brian Colquhoun & Partners (Rhodesia), Floor Five, Century House, Baker Ave., Salisbury, S. R.
 British General Electric Co., of C.A., (Pvt.), Ltd., P.O. Box 845, Salisbury, S.R.
 British General Electric Co., Ltd., P.O. Box 2406, Johannesburg.
 British Insulated Cables, S.A., Ltd., P.O. Box 2827, Johannesburg.
 British Thomson-Houston Co., S.A., (Pty.), Ltd., P.O. Box 482, Johannesburg.
 British Thomson-Houston Co., C.A., (Pvt.), Ltd., Shepperton House, 90, Cameron Street, Salisbury, S.R.
 Brush Group S.A., Ltd., P.O. Box 7995, Johannesburg.
 Caltex (Africa) Ltd., P.O. Box 4907, Johannesburg.
 Chloride Electrical Storage Co., S.A., (Pty.), Ltd., P.O. Box 7508, Johannesburg.
 C.M.B. Engineering Co., (Pty.), Ltd., P.O. Box 55, Denver, Johannesburg.
 Contactor (Pty.), Ltd., Zuider Paarl, C.P.
 Cooper & de Beer (Pty.), Ltd., P.O. Box 2583, Johannesburg.
 Crompton Parkinson S.A. (Pty.) Ltd., P.O. Box 4236, Johannesburg.
 Davidson & Co., (Africa) (Pty.), Ltd., P.O. Box 180, Springs, Tvl.
 Dowson & Dobson, Ltd., P.O. Box 7764, Johannesburg.
 Enfield Cables (S.A.), (Pty.), Ltd., P.O. Box 5289, Johannesburg.
 English Electric Co., S.A., Ltd., P.O. Box 2387, Johannesburg.
 Falks Electrical Supplies S.A., (Pty.), Ltd., P.O. Box 3068, Johannesburg.
 First Electric Corp. of S.A., Ltd., P.O. Box 24, Knights, Tvl.
 F. W. J. Electrical Industries, Ltd., P.O. Box 58, Alberton, Tvl.
 General Motors South African (Pty.), Ltd., P.O. Box 1137, Port Elizabeth.
 W. T. Glover & Co., Ltd., P.O. Box 34, Salisbury, S.R.
 E. Green & Son S.A. (Pty.), Ltd., 68, Standard Bank Chambers, Commissioner Street, Johannesburg.
 Henleys S.A. Telegraph Works Co., Ltd., P.O. Box 100, Jeppe, Johannesburg.
 Heinemann Electric (S.A.), Ltd., 1, Long Street, Booyens, Johannesburg.
 Hopkinsons S.A. (Pty.), Ltd., P.O. Box 11029, Johannesburg.
 James Howden & Co., Africa (Pty.), Ltd., P.O. Box 11139, Johannesburg.
 Hubert Davies & Co., Ltd., P.O. Box 1386, Johannesburg.
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 International Combustion Africa Ltd., P.O. Box 5981, Johannesburg.
 John Brown Land Boilers Africa Ltd., P.O. Box 11295, Johannesburg.
 John Thompson (S.A.), (Pty.), Ltd., P.O. Box 3570, Johannesburg.
 Johnson & Phillips S.A. (Pty.), Ltd., P.O. Box 552, Germiston.
 R. T. Jones, Esq., 43, The Avenue, Orchards, Johannesburg.
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 Messrs. George Kent S.A. (Pty.), Ltd., P.O. Box 7396, Johannesburg.
 Dr. J. K. Marais, P.O. Box 8006, Johannesburg.
 Mr. G. H. Marais, P.O. Box 1789, Pretoria.
 Harold Marthinussen & Co., (Pty.), Ltd., P.O. Box 469, Johannesburg.
 L. H. Marthinussen Ltd., P.O. Box 64, Denver, Tvl.
 Merz & McLellan, 14th Floor, Escom House, Rissik Street, Johannesburg.
 Metropolitan Vickers S.A., (Pty.), Ltd., P.O. Box 3633, Johannesburg.
 Metropolitan-Vickers Central Africa (Pvt.), Ltd., P.O. Box 1821, Salisbury, S.R.
 Mine Elect. (Pvt.), Ltd., P.O. Box 2356, Salisbury, S.R.
 C. A. Parsons (Rhodesia) Ltd., P.O. Box 550, Bulawayo, S.R.
 C. A. Parsons & Co., S.A., (Pty.), Ltd., P.O. Box 3425, Johannesburg.
 Patrick Murray (Pty.), Ltd., P.O. Box 1541, Durban.
 Pretoria Metal Industries Ltd., P.O. Box 1396, Pretoria.
 Reunert & Lenz Ltd., P.O. Box 92, Johannesburg.
 A. Reyrolle & Co., Ltd., P.O. Box 9677, Johannesburg.

Rice & Diethelm Ltd., P.O. Box 930, Johannesburg.
 Samuel Osborn S.A. (Pty.), Ltd., P.O. Box 3162, Johannesburg.
 Scottish Cables (S.A.), Ltd., P.O. Box 2882, Johannesburg.
 Shell Co., of S.A., Ltd., P.O. Box 2231, Cape Town.
 Simplex Electric Co., S.A. (Pty.), Ltd., P.O. Box 751, Springs, Tvl.
 Siemens Bros., British (Pty.), Ltd., P.O. Box 7404, Johannesburg.
 Standard Telephones & Cables Ltd., P.O. Box 4687, Johannesburg.
 Stamcor (Pty.), Ltd., P.O. Box 6107, Johannesburg.
 Stewarts & Lloyds of S.A. Ltd., P.O. Box 1195, Johannesburg.
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 S. A. Philips (Pty.), Ltd., P.O. Box 7703, Johannesburg.
 Superconcrete Pipes (Pty.), Ltd., P.O. Box 92, Roodepoort, Tvl.
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CONTRIBUTIONS

The more important Contributions payable annually to the Association are as follows:—

COUNCILLOR MEMBERS:

AFFILIATES:

Up to	½ million kWh. sold	—	—	6 guineas	Basic Contribution	—	—	—	£10 10 0
Over	½ to 1	..	..	8 "	Contribution per Representative	—	—	—	£3 0 0
Over	1 to 5	..	..	10 "	Attending Convention	—	—	—	£3 0 0
Over	5 to 25	..	..	12 "	Contribution per Accompanying	—	—	—	—
Over	25 to 125	14 "	Lady	—	—	—	£1 0 0
Over	125 to 500	16 "					
Over	500 to 1000	20 "					
Over	1000 million kWh. sold	—	—	25 "					
				30 "					



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The current expansion programmes of Britain's Central Electricity authorities have resulted in the placing with John Brown Land Boilers Ltd. of orders for no fewer than 19 steam generators. Some, with capacities of 860,000 lb/hr are amongst the largest ever built in the United Kingdom. In South Africa too, immediate confidence has been placed in the newly formed boiler making company John Brown Land Boilers (Africa) (Pty) Ltd. John Brown in their turn are proving their own confidence in South Africa's future and South African skill, for it is their company policy that "what can be made in South Africa will be made in South Africa".

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THE ASSOCIATION OF MUNICIPAL
ELECTRICITY UNDERTAKINGS
OF SOUTHERN AFRICA

DIE VERENIGING VAN MUNISIPALE
ELEKTRISITEITSONDERNEMINGS
VIR SUIDELIKE AFRIKA

AGENDA AND PROGRAMME

31ST ANNUAL CONVENTION

TO BE HELD IN THE
"THE PALM GROVE"
MARGATE

FROM THE
7TH TO 10TH MAY, 1957.

(EXECUTIVE COUNCIL MEETINGS WILL BE HELD AT THE
KING'S VIEW HOTEL.)

AGENDA EN PROGRAM

VIR DIE
31STE JAARLIKSE KONVENSIË

WAT GEHOU SAL WORD IN DIE
"THE PALM GROVE"
MARGATE

VANAF
7 TOT 10 MEI 1957.

(VERGADERINGS VAN DIE UITVOERENDE RAAD SAL IN DIE
KING'S VIEW HOTEL GEHOU WORD.)

AGENDA FOR THE ANNUAL GENERAL MEETING

1. Election of President.
2. Venue of next Convention.
3. Election of Vice-President.
4. Adoption of Constitution as drafted by the Hon. Legal Adviser.
5. Election of Executive Council, Sub-Committees and Representatives.
6. Retiring President's Valedictory Address.
7. Annual Report of Secretaries.
8. Appointment of Auditors.
9. Presidential Address.
10. Reports of Sub-Committees and Representatives.
 - (i) Electrical Wiremen's Registration Board.
 - (ii) South African Bureau of Standards.
 - (iii) Coal Allocation Committee.
 - (iv) Safety Precautions Committee.
 - (v) Tariffs Survey Committee.
 - (vi) Recommendations Committee for New Electrical Commodities.
 - (vii) Papers.
 - (viii) Technical Staff and Man Power.
 - (ix) Rights of Supply — Reef Industrial Consumers.
 - (x) S.A.I.E.E. Committee—Code of Practice for Sub-Stations.
11. General.

AGENDA VIR DIE ALGEMENE JAARVERGADERING

1. Verkiesing van President.
2. Vergaderplek vir volgende Konvensie.
3. Verkiesing van Onder-President.
4. Aanneming van die Konstitusie soos deur die Erewetlikkeraadgewer ontwerp.
5. Verkiesing van die Uitvoerende Raad, Onder-Komitees en Verteenwoordigers.
6. Afskeidsrede van die Aftredende President.
7. Jaarverslag van die Sekretaris.
8. Aanstelling van die Ouditeure.
9. Presidentsrede.
10. Verslae van Onder-komitees en Verteenwoordigers.
 - (i) Raad vir Registrasie van Lraadwerkers.
 - (ii) Suid Afrikaanse Buro vir Standaard.
 - (iii) Komitee vir die Toekenning van Steenkool.
 - (iv) Komitee vir Veiligheidsmaatreëls.
 - (v) Komitee van Ondersoek na Elektriesiteitsariewe.
 - (vi) Komitee vir die Aanbevelings oor Nuwe Elektriese Toerusting.
 - (vii) Verhandeling.
 - (viii) Tegniess Personeel en Mannekrag.
 - (ix) Regte van Voorsiening—Rendse Industriële Verbruikers.
 - (x) S.A.I.E.I. Komitee—Kode van Gebruik by Sub-Stasies.
11. Algemeen.

RETIRING OFFICERS

President : J. E. MITCHELL, Salisbury.

Vice-President : J. L. VAN DER WALT, Krugersdorp.

Immediate Past Presidents : D. J. HUGO, Pretoria; G. J. MULLER, Bloemfontein.

Engineer Members : R. W. KANE, Johannesburg; C. G. DOWNIE, Cape Town; A. R. SIBSON, Bulawayo; C. LOMBARD, Germiston; R. M. O. SIMPSON, Durban; J. C. DOWNEY, Springs.

Cities or Towns represented : Salisbury, Krugersdorp, Johannesburg, Cape Town, Bulawayo, Germiston, Springs, Durban, Bloemfontein (Co-opted).

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

AFTREDEENDE AMPSDRAERS

President : J. E. MITCHELL, Salisbury.

Onder-president : J. L. VAN DER WALT, Krugersdorp.

Oud-presidente : D. J. HUGO, Pretoria; G. J. MULJER, Bloemfontein.

Ingenieurslede : R. W. KANE, Johannesburg; C. G. DOWNIE, Kaapstad; A. R. SIBSON, Bulawayo; C. LOMBARD, Germiston; R. M. O. SIMPSON, Durban; J. C. DOWNEY, Springs.

Stede of Dorpe Verteenwoordig : Salisbury, Krugersdorp, Johannesburg, Kaapstad, Bulawayo, Germiston, Springs, Durban, Bloemfontein (gekoöpteerde).

L.W.—Die Stad of Dorp word verkies en nie individuele Raadslede nie.

MEMBERS OF SUB-COMMITTEES AND REPRESENTATIVES

SUB-COMMITTEES :

Papers :

J. E. MITCHELL (President), J. L. VAN DER WALT (Vice-President), D. J. HUGO (Past President).

Tariffs Survey :

R. W. KANE (Convenor), C. G. DOWNIE, A. R. SIBSON, J. C. DOWNEY (with co-opted members).

Finance :

R. W. KANE, J. C. DOWNEY.

Recommendations Committee for New Electrical Commodities :

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

Technical Staff and Man Power :

J. L. VAN DER WALT (Convenor), J. C. DOWNEY, R. M. O. SIMPSON, H. T. ASPINALL (co-opted).

Rights of Supply — Reef Industrial Consumers :

C. LOMBARD (Convenor), D. J. HUGO, J. C. DOWNEY, J. C. FRASER.

REPRESENTATIVES :

Electrical Wiremen's Registration Board : R. W. Kane.

Coal Allocation Committee : D. J. Hugo; R. W. Kane, Alternate.

Safety Precautions Committee : J. C. Fraser; J. C. Downey, Alternate.

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

S.A.I.E.E. Committee — Code of Practice for Sub-Stations : C. Lombard.

LEDE VAN ONDER-KOMITEES EN VERTEENWOORDIGERS.

ONDER-KOMITEES :

Referate :

J. E. MITCHELL, President; J. L. VAN DER WALT, Onder-president; D. J. HUGO, Oud-president.

Komitee van Ondersoek na Elektrisiteitstariewe :

R. W. KANE, Belêër; C. G. DOWNIE, A. R. SIBSON, J. C. DOWNEY met gekoöpteerde lede.

Finansiële Komitee :

R. W. KANE; J. C. DOWNEY.

Komitee vir Aanbevelings oor Nuwe Elektriese Toerusting :

J. C. DOWNEY, Belêër, J. L. VAN DER WALT.

Tegniese Personeel en Mannekrag :

J. L. VAN DER WALT, Belêër; J. C. DOWNEY, R. M. O. SIMPSON, H. T. ASPINALL gekoöpteer.

Regte van Voorsiening—Randse Industriële Verbruikers :

C. LOMBARD, Belêër; D. J. HUGO, J. C. DOWNEY, J. C. FRASER.

VERTEENWOORDIGERS :

Registrasieraad vir Elektriese Draadwerkers : R. W. Kane.

Komitee vir die Toekenning van Steenkool : D. J. Hugo; R. W. Kane, Alt.

Komitee vir Veiligheidsmaatreëls : J. C. Fraser; J. C. Downey, Alt.

Suid Afrikaanse Buro vir Standaarde : J. C. Downey, J. L. van der Walt Alt. (met mag om lede te koöpteer).

S.A.I.E.I. Komitee — Kode van Gebruik by Sub-Stasies : C. Lombard.

PROGRAMME :

MONDAY, 6th MAY, 1957 :

- 9.30 a.m. — 4.30 p.m. : Meeting of Executive Council.
 6.00 p.m. — 10.00 p.m. : Cocktail Party and Braai/veis at Faerie Glen (Informal Dancing)

TUESDAY, 7th MAY, 1957 :

- 8.45 a.m. : Registration and issue of folders.
 9.30 a.m. : Welcome to Margate by His Worship the Mayor of Margate.
 Welcome to Convention by the Dupty Mayor of Krugersdorp.
 Official opening of the Convention by the Administrator of Natal, the Hon. D. G. Shepstone.
 Election of President.
 Venue of next Convention.
 Election of Vice-President.
 10.30 a.m. : Refreshment interval.
 11.00 a.m. : Official Photograph.
 11.30 a.m. : Presentation of Past Presidents' and Honorary Members' Medals and Certificates.
 12.00 a.m. : Adoption of Draft Constitution.
 12.15 p.m. : Election of Office Bearers.
 12.30 p.m. : Retiring President's Valedictory Address.
 1.00 p.m. : Luncheon adjournment.
 2.30 p.m. : Members' Forum.
 4.00 p.m. : Refreshment interval.
 4.30 p.m. : Members' Forum resumed.
 5.30 p.m. : Adjournment.

WEDNESDAY, 8th MAY, 1957 :

- 8.30 a.m. : Meeting of Executive Council.
 9.30 a.m. : Convention resumes.
 Communications from Council.
 Annual Report of Secretaries.
 Appointment of Auditors.
 Presidential Address.
 10.30 a.m. : Refreshment interval.
 11.00 a.m. : Paper by A. A. Middlecote on "Earth Leakage."
 12.00 p.m. : Luncheon adjournment.
 Free afternoon.

THURSDAY, 9th MAY, 1957 :

- 8.30 a.m. : Meeting of Executive Council.
 9.30 a.m. : Convention resumes.
 Communications from Council.
 Discussion on A. A. Middlecote's Paper.

PROGRAM

MAANDAG, 6 MEI, 1957 :

- 9.30 vm. — 4.30 um. : Vergadering van die Uitvoerende Raad.
 6.00 nm. — 10.00 nm. : Skemerpartytjie en Braai/veis te Faerie Glen (informeledans).

DINSDAG 7 MEI, 1957 :

- 8.45 vm. : Registrasie en Uitreiking van Referate.
 9.30 vm. : Verwelkoming aan Margate deur Sy Edelagbare die Burgemeester van Margate.
 Verwelkoming aan Konvensie deur die Onder-Burgemeester van Krugersdorp.
 Amptelike Opening van die Konvensie deur die Administrateur van Natal, Ere D. G. Shepstone.
 Verkiesing van President.
 Vergaderplek vir die volgende Konvensie.
 Verkiesing van Onder-President.
 10.30 vm. : Pouse. Verversings.
 11.00 vm. : Amptelike Foto.
 11.30 vm. : Presentasie van Erepennings en Serifikate aan Oud-Presidente en Ere-Lede.
 12.00 vm. : Aanneming van Konsopkonstitusie.
 12.15 nm. : Verkiesing van Ampsdraers.
 12.30 nm. : Afskiedsrede van Aftredende President.
 1.00 nm. : Verdagting vir Middagete.
 2.30 nm. : Ledeforum.
 4.00 nm. : Pouse. Verversings.
 4.30 nm. : Ledeforum vervolg.
 5.30 nm. : Verdagting van Konvensie.

WOENSDAG 8 MEI, 1957 :

- 8.30 vm. : Vergadering van die Uitvoerende Raad.
 9.30 vm. : Konvensie-werksaamhede word hervat. Aankondigings van die Uitvoerende Raad.
 Jaarverslag van die Sekretaris.
 Aanstelling van Ouditore.
 Presidentsrede.
 10.30 vm. : Pouse. Verversings.
 11.00 vm. : Referaat deur A. A. Middlecote oor "Aardsluiting."
 12.00 vm. : Verdagting vir Middagete.
 Vry Namiddag.

DONDERDAG 9 MEI, 1957 :

- 8.30 vm. : Vergadering van die Uitvoerende Raad.

ASSOCIATION OF MUNICIPAL ELECTRICITY UNDERTAKINGS OF SOUTHERN AFRICA

- 10.30 a.m. : Refreshment interval.
 11.00 a.m. : A summary by J. C. Downey (with Demonstrations, Diagrams and Photographs) of his paper, "Street Lighting" which was presented to the South African Institute of Electrical Engineers on 6th July, 1956.
 Discussion on J. C. Downey's Paper.
 12.45 p.m. : Luncheon adjournment.
 2.30 p.m. : Convention resumes.
 Reports of Sub-Committees (Circulated) and discussion thereon.
 4.00 p.m. : Adjournment.
 9.00 p.m. : Convention Ball at King's View Hotel.

FRIDAY, 10th MAY, 1957 :

- 8.30 a.m. : Meeting of Executive Council.
 9.30 a.m. : Convention resumes.
 Communications from Council.
 General.
 10.30 a.m. : Refreshment interval.
 11.00 a.m. : Closing Session.

LADIES' PROGRAMME :

MONDAY, 6th MAY, 1957 :

- 6.00 p.m. to 10.00 p.m. : Cocktail Party and Braai-veis at Faerie Glen (Informal Dancing).

TUESDAY, 7th MAY, 1957 :

- 9.30 a.m. : Assemble for Official Opening of Convention.
 10.30 a.m. : Refreshments.
 11.00 a.m. : Official Photograph.
 11.30 a.m. : Presentation of Past Presidents' and Honorary Members' Medals and Certificates.

WEDNESDAY, 8th MAY, 1957 :

- 11.00 a.m. : Tea with the Mayoress of Margate at Regent Hotel.

THURSDAY, 9th MAY, 1957 :

- 9.00 p.m. : Convention Ball at King's View Hotel.

FRIDAY, 10th MAY, 1957 :

- 10.30 a.m. : Assemble for refreshments and closing session of Convention.

- 9.30 vm. : Konvensie-werksaamhede word hervat. Aankondigings van die Uitvoerende Raad.
 Bespreking van A. A. Middlecote se Referaat.
 10.30 vm. : Pouse. Verversings.
 11.00 vm. : Opsomming (met demonstrasies, diagramme en fotos) deur J. C. Downey van sy Referaat „Straatbeligting", wat voor die Suid Afrikaanse Instituut van Elektriese Ingenieurs op 6 Jul'e 1956, gelees was.
 Bespreking van J. C. Downey se Referaat.
 12.00 vm. : Verdaging vir Middagete.
 2.30 nm. : Konvensie-werksaamhede word hervat. Verslae van Onder-Komitees en bespreking daaroor.
 4.00 nm. : Verdaging van Konvensie.
 9.00 nm. : Konvensie-dans te King's View Hotel.

VRYDAG 10 MEI, 1957 :

- 8.30 vm. : Vergadering van die Uitvoerende Raad.
 9.30 vm. : Konvensie-werksaamhede word hervat. Aankondigings van die Uitvoerende Raad.
 Algemeen.
 10.30 vm. : Pouse. Verversings.
 11.00 vm. : Konvensie word afgesluit.

PROGRAM VIR DAMES :

MAANDAG 6 MEI, 1957 :

- 6.00 nm. — 10.00 nm. : Skemerpartytjie en Braai-veis te Faerie Glen (informeeldans).

DINSDAG 7 MEI, 1957 :

- 9.30 vm. : Vergader vir die Amptelike Opening van die Konvensie.
 10.30 vm. : Verversings.
 11.00 vm. : Amptelike Foto.
 11.30 vm. : Presentasie van Erepenninge en Serifikate aan Oud-Presidente en Ere-Lede.

WOENSDAG 9 MEI, 1957 :

- 11.00 vm. : Tee saam met die Burgemeestersvrou van Margate te Regent Hotel.

DONDERDAG 9 MEI, 1957 :

- 9.00 nm. : Konvensie-dans te King's View Hotel.

VRYDAG 10 MEI, 1957 :

- 10.30 vm. : Vergader vir verversings en die Sluitingsessie van die Konvensie.

PRESIDENT, 1957-1958



J. L. VAN DER WALT (KRUGERSDORP)



Front Row (L. to R.): C. Kinsman (Durban); P. Santilano (Cape Town); C. G. Downie (Cape Town); A. R. Sibson (Bulawayo); J. W. Phillips (Bulawayo); R. G. Ewing (Johannesburg); R. W. Kane (Johannesburg); D. J. Marais (Johannesburg); Morton Jaffray (Salisbury); J. E. Mitchell (Salisbury); P. W. Marais (Krugersdorp); His Honour the Administrator of Natal, the Hon. D. G. Shepstone; J. L. van der Walt (Krugersdorp); S. A. W. Herbert (Mayor of Margate); Mrs. S. A. W. Herbert; J. C. Downie (Springs); L. P. Davies (Springs); C. Lombard (Germiston); A. P. Malherbe (Robertson); P. S. de Bruyn (Germiston); F. J. C. Castelyn (Bloemfontein); R. M. O. Simpson (Durban); Mrs. R. M. O. Simpson; A. Foden (East London); P. J. M. du Plessis (Krugersdorp); C. J. Chambers (Boksburg); E. L. Smith (Boksburg).

Second Row (L. to R.): Mrs. L. Dreyer; L. Dreyer (Westonaria); Mrs. J. L. van der Walt; T. N. Fouché (Westonaria); Miss S. Sibson; Mrs. J. Phillips; P. J. Wilcocks (Welkom); Mrs. Wilcocks; R. W. Burton (Welkom); Mrs. D. J. Marais; Mrs. R. W. Kane; Mrs. L. G. Axe; Mrs. M. Solomon; Mrs. D. M. Campbell; D. M. Campbell (Salisbury); R. L. de Lange (East London); Mrs. J. E. Mitchell; Mrs. W. H. Milton; Mrs. J. Monks; Mrs. R. Bellad-Ellis; R. Bellad-Ellis; Mrs. C. L. de Beer; Miss S. Williams; Mrs. A. Foden; Mrs. J. C. Fraser; Mrs. D. Lees; Mrs. F. D. Williams; H. N. Hancox (Johannesburg); Mrs. J. C. Callie.

Third Row (L. to R.): Mrs. L. Fitcher; Mrs. A. C. Mance; Mrs. K. W. Murgatroyd; K. W. Murgatroyd (Bedford View); Mrs. I. Clunas; Mrs. T. R. Strawson; G. H. Toop (Johannesburg); Mrs. G. Toop; W. J. Gibbons (Johannesburg); J. G. Val Davies (Johannesburg); Mrs. Val Davies; Mrs. L. O. Foster; Mrs. J. L. McNeil; Mrs. L. Lavoipierre; F. P. W. Hall (Somerset West); I. Mellman (Harrismith); A. Markman (Port Elizabeth); Mrs. C. R. Deglon; C. R. Deglon (Salisbury); P. A. Giles (East London); Mrs. D. W. Stanley; D. W. Stanley (Johannesburg); W. H. Milton (Johannesburg); P. S. Deacon (Johannesburg).

G. Monks (Johannesburg); Mrs. A. R. Meyer; A. T. Rodwell (Johannesburg); Mrs. A. T. Rodwell; J. C. Fraser (Johannesburg); D. Lees (Benoni); Mrs. J. G. Erikson; J. G. F. Erikson (Estcourt); Mrs. H. M. Carlin.

Fourth Row (L. to R.): L. Fitcher (Kempton Park); R. T. Mance (Kempton Park); T. R. Strawson (Johannesburg); H. P. Alexander (Durban); — ; Mrs. N. G. Beveridge; — ; R. B. Price (Johannesburg); L. O. Foster (Johannesburg); L. G. Axe (Johannesburg); Major S. G. Redman (Johannesburg); J. L. McNeil (Stanger); Mrs. H. D. T. Harris; Mrs. A. R. Campbell; A. R. Campbell (Johannesburg); D. Haig-Smith (Middleburg, Cape); Mrs. D. Haig-Smith; Mrs. S. Davies; E. C. Enfield (Johannesburg); Mrs. E. C. Enfield; Mrs. G. M. Reyneke; P. G. van der Merwe (Standerton); Mrs. P. G. van der Merwe; F. C. Deacon (Johannesburg); P. G. C. Blynnatt (Pretoria); Mrs. D. R. Meyer; Mrs. P. G. C. Blynnatt; Mrs. L. L. Hobbs; Mrs. J. C. Downey; I. L. Hobbs (Virginia); Mrs. A. C. Davidson; J. A. Barnett (Johannesburg); Mrs. J. A. Barnett; Mrs. Q. R. Nothard; G. V. Bulman (Estcourt); J. A. Morrison (Springs); Col. G. G. Ewer (Durban); Mrs. G. G. Ewer.

Fifth Row (L. to R.): C. W. Cook (Johannesburg); Mrs. C. W. Cook; M. J. C. Kruger (Port Alfred); D. Dillon (Kokstad); Mrs. R. B. Price; Mrs. N. Jackson; J. Jackson (Johannesburg); Mrs. P. H. Levick; A. Jackson (Cape Town); Mrs. A. Jackson; H. T. Aspinall (Johannesburg); Mrs. H. T. Aspinall; Mrs. R. Gailey (Ladysmith); H. C. Gailey; Mrs. F. Stevens; F. Stevens (Ladysmith); Mrs. D. J. R. Conradie; G. M. Reyneke (Winburg); H. P. Venter (Winburg); R. H. Jones (Edenvale); Mrs. R. H. Jones; Mrs. L. P. Davies; R. V. Bailey (Edenvale); Mrs. R. V. Bailey; A. G. Davidson (Johannesburg); D. A. Bradley (Port Elizabeth); — ; Mrs. D. A. Bradley; Mrs. A. C. Grant; Mrs. H. N. Hancock; J. K. L. Pompe van Meerdevoort (Harrismith); — ; Mrs. W. E. L. Tonkinson; Mrs. J. K. L. Pompe van Meerdevoort;

Sixth Row (L. to R.): J. J. Schoeman (Alberton); Mrs. J. Iverach; Mrs. M. J. C. Kruger; Mrs. C. E. Odendaal; E. F. Partridge (Johannesburg); W. G. Thackwray (Kokstad); Mrs. S. de Villiers; P. H. Lovick (Roodepoort); G. A. Dalton (Johannesburg); J. A. Mathews (Kimberley); Mrs. J. A. Mathews; Mrs. T. G. Thompson; Mrs. J. D. Maxwell; I. D. Maxwell (Johannesburg); E. J. Holt-Biddle (Pretoria); G. J. Muller (Bloemfontein); Mrs. J. G. Muller; H. M. S. Muller (Uppington); Mrs. H. M. S. Muller; C. R. Burton (Kimberley); D. J. R. Conradie (Bloemfontein); C. Dawson (Durban); Mrs. G. H. Marais; P. J. Rabie (Worcester); Mrs. W. L. Louw (Johannesburg); Mrs. R. C. Viviers; W. I. Louw (Johannesburg); E. P. Rodger (Johannesburg); Mrs. E. W. Dixon (Germiston); G. Roeske (Johannesburg); J. C. Sutherland (Port Elizabeth); Mrs. I. C. Sutherland; — ; L. Lewis (Mossel Bay); J. F. Lategan (Stellenbosch).

Seventh Row (L. to R.): Mrs. J. J. Schoeman; J. Iverach (Grahamstown); Mrs. K. D. Starr; D. Murray-Nobbs (Port Elizabeth); R. E. Wilson (Johannesburg); S. de Villiers (Robertson); V. Innes (Umtali); H. T. Turner (Umtali); Mrs. J. McGibbon; J. McGibbon (N'dola); T. G. Thompson (Uitenhage); A. A. Middlecote (Pretoria); C. du Toit (Pretoria); Mrs. C. Kinsman; Mr. J. Wilson; J. Wilson (Pretoria); Mrs. E. M. Feinberg; R. H. Barton (Margate); Mrs. F. T. Chilton; I. F. Boyack (Pretoria); E. B. Martin (Johannesburg); M. R. Marot (Alberton); G. H. Marais (Pretoria); Mrs. E. B. Martin; Mrs. M. R. Marot; Mrs. F. H. Barton; — ; Mrs. G. C. T. Theron; — ; G. C. T. Theron (Vanderbijlpark); H. Morris (Heidelberg); Mrs. A. Rossler; J. S. Craig (Greytown); Mrs. J. S. Craig; Mrs. G. Weinberg; F. O. Pearce (Durban); V. H. Woods (Vereeniging); W. G. van Aswegen (Johannesburg); E. Yates (Vereeniging); Mrs. E. Yates; Mrs. W. L. Morrison; Mrs. V. H. Woods.

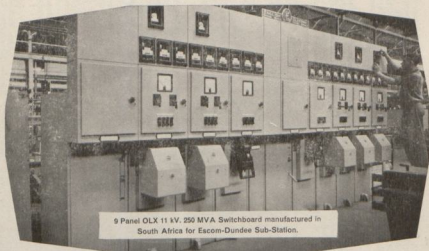
Eighth Row (L. to R.): K. D. Starr (Salisbury); T. A. Robinson (Johannesburg); J. W. Swanepoel (Klerksdorp); I. M. Gericks (Klerksdorp); R. E. Wilson (Johannesburg); Mrs. R. E. Wilson; Mrs. C. A. A. Rist; Dr. S. C. Cronje (Mafeking); Mrs. W. F. Griffiths (Johannesburg); Dr. J. K. Marais (Johannesburg); Mrs. D. E. Dillon; Mrs. D. W. Thackwray; I. J. Leng (Cape Town); D. M. Clark (Cape Town); W. H. Wilson (Johannesburg); Mrs. T. R. J. Bishop; C. R. Hallé (Pietermaritzburg); Mrs. C. R. Hallé; I. B. Bright (Rustenburg); P. A. Meintjes (Rustenburg); A. L. Saunders (Johannesburg); A. F. Turnbull (Vereeniging); J. Scott-Clark (Margate); Mrs. J. Scott-Clark; — ; J. I. Inglis (Pietersburg); N. J. Weinberg (Brakpan); Mrs. I. J. Inglis; Mrs. A. Rossler; I. S. Craig (Greytown); D. R. Verschoor (Butterworth); Mrs. G. A. Lotter; G. A. Lotter (Louis Trichardt); Mrs. C. J. van de Berg; C. J. van de Berg (Louis Trichardt).

Ninth Row (L. to R.): A. T. Taylor (Johannesburg); Mrs. A. T. Taylor; N. G. Beveridge (Vereeniging); O. H. Hodgkin (Pretoria); D. D. Brown (Roodepoort); T. N. D. Griffin (Johannesburg); H. I. Hugo (Roodepoort); Mrs. H. R. Sissons; A. W. Lineker (Johannesburg); G. E. H. Jones (Mafeking); R. A. Paull (Umtata); Mrs. G. E. H. Jones; R. W. Lord (Johannesburg); N. A. Potgieter (Middleburg, Tvl.); J. P. Thomas (Durban); — ; A. S. J. van Rensburg (Vryheid); — ; — ; R. G. Holley (Durban); H. M. Carlin (Johannesburg); W. F. Griffiths (Johannesburg); R. B. Phelo (Durban); P. C. Grandin (Gatooma); H. Doughty (Springs); — ; K. Adams (Johannesburg); A. D. Smith (Pretoria); A. W. Bullus (Johannesburg); C. L. de Beer (Johannesburg); Mrs. W. Rossler; — ; R. W. Rossler (Kroonstad); A. C. Grant (Johannesburg); Mrs. C. Lombard; H. W. Chatterton (Vereeniging); R. L. Baker (Margate); T. R. J. Bishop (Johannesburg); R. E. Harden (Johannesburg); B. Marchand (B. Witbank); J. R. Cherry (Randfontein); P. N. Vickerman (Johannesburg); Mrs. J. R. Cherry; — ; — ; J. S. Clinton (Johannesburg); — ; P. Pretorius (Randfontein); — ; F. W. de Zeeuw (Johannesburg); R. G. E. Erasmus (Pietersburg); A. E. Torrance (Johannesburg); — ; A. Rossler Cradock; B. V. Hawgood (Salisbury); C. E. R. Langford (Johannesburg); Mrs. W. L. Morrison; W. L. Morrison (Durban); D. A. Anderson (Johannesburg); M. W. Odendaal (Alberton); Mrs. D. A. Anderson; — ; B. Smuts (Bethlehem); H. V. Raymond (Durban); G. B. Heunis (Standerton); J. T. Williams (Pretoria).

Tenth Row (L. to R.): M. P. P. Clarke (Somerset East); J. T. Williams (Johannesburg); Mrs. M. P. P. Clarke; F. Cator (Johannesburg); V. E. O. Barratt (Queenstown); M. Todd (Johannesburg); Mrs. H. Doughty; G. Richardson (Johannesburg); — ; Mrs. F. S. Haigh; E. E. de Villiers (Witbank); C. B. Wood (Durban); W. Rush (Vryheid); D. C. Brown (Odendaalsrus); J. W. Wade (Newcastle); P. Bechler (Newcastle); T. M. Mocke (Pieter Retief); C. R. Shewry (Pretoria); W. J. Hill (Johannesburg); K. W. I. Halliday (Port Shepstone); J. C. Weir (Durban); S. H. Lowe (Port Shepstone); G. C. Molyneux (Bullaway); Mrs. K. Fisher; Mrs. W. L. King; L. L. Langton (Salisbury); Mrs. L. L. Langton; Q. R. Nothard (Johannesburg); H. D. Harris (Johannesburg); J. C. Callie (Johannesburg).



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The Thirty-first Convention of the Association was opened in the Palm Grove, Margate, by The Hon. D. C. Shepstone, Administrator of Natal, at 9.30 a.m. on Tuesday, 7th May, 1957.

Attendance at the Convention was as follows: 72 Councils represented by 53 Councillors and 71 Engineers; One other Engineer Representative; Seven Hon. Members (not representing Councils); 13 Associates; 17 other Representatives of Government Departments, Public Utilities and other bodies; 97 Affiliates' Representatives; 33 Visitors; 189 Ladies; Four A.M.E.U. Officials;—a total of 485 persons.

PROCEEDINGS

THE PRESIDENT (Mr. J. E. Mitchell, Salisbury): Good morning, Ladies and Gentlemen. After giving you twelve months in order to recoup from the Salisbury Convention and one night's rest after the kipping you got last night, it is my very pleasant duty to welcome you to this Convention and also to welcome His Worship the Mayor of Margate, Councillor Herbert, and the Deputy Mayor of Krugersdorp, Councillor Marais who will jointly introduce to you His Honour the Administrator of Natal, Mr. Shepstone, who has very kindly consented to come down here this morning and give us of his very valuable time to open this Convention. I will therefore introduce you now to His Worship the Mayor of Margate.

HIS WORSHIP THE MAYOR OF MARGATE: Your Honour, Mr. President, Ladies and Gentlemen. I have very much pleasure in welcoming you all here on the occasion of your Annual Convention. Margate was very pleased to receive your enquiry and the suggestion regarding this Conference, and we welcomed the opportunity of acting as your hosts on this occasion, and also sharing with the Municipality of Krugersdorp the responsibility during your stay here.

In connection therewith I would like to express our deep thanks to the Krugersdorp Municipality and for the attendance here of the Deputy Mayor of Krugersdorp.

I would also like to express our apologies that the hall where we were going to hold the Convention, owing to a technical hitch, was not completed, but I do hope that the arrangements we have made here are to your entire satisfaction.

Particularly would I like to welcome, on behalf of Margate, His Honour the Administrator, a figure held in very high esteem in the Province, and for whom there is a great affection. Margate is greatly honoured by his presence here today and we are indeed very, very pleased to have him with us.

There are quite a few other speakers, and I feel that you have not come here to listen to me on a long speech of welcome. I think our hospitality will be all that you desire; if it is not, I am the man to tell. I do hope that you enjoy your stay here in Margate. We are very, very pleased to see you and we hope that in the future we will see you again here, on a holiday or enjoying, probably, another Convention that we hope from year to year will take place in our town.

I will not detain you any longer. Once again many thanks, and we bid you a most hearty welcome.

THE PRESIDENT: Thank you Mr. Mayor. I will now call upon the Deputy Mayor of Krugersdorp to address you.



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THE DEPUTY MAYOR OF KRUGERSDORP (Clr. P. J. Marais): Geagte Mnr. die President, sy edele, die Administrateur met sy gade, dames en here. Vanmôre is dit Krugersdorp se aangename vooreg en my besondere eer om al die afgevaardigdes met hulle gades, sowel as al die ander instansies hier teenwoordig, hartlik welkom te heet by die 31ste Konvensie van die Vereniging van Munisipale Elektrisiteits-ondernemings van Suidelike Afrika.

Iemand vra my nou die dag „Maar wanneer het Krugersdorp sy grense so ver suid geskuif dat julle nou tot by die see grens?" Surely Mr. President that was very ignorant on his part and behind the times. With all due respect to the Mayor of Margate, everybody knows, and it's the talk of the town, that Margate has recently become the official seaside suburb of Krugersdorp and we are greatly indebted to the Council of Margate for their co-operation in this respect.

Dames en here, dit was nou nie 'n geval dat u nie uiters welkom was in die vreesstad van Transvaal nie; ook nie 'n geval dat daar nie genoeg akkomodasie was vir u in ons tuindorp nie, maar u sal almal weet dat elektrotegniese ingenieurs baie hardwerkende mense is en daarom gun ons hulle, met hulle gades, 'n vakansietjie by die see.

Ons het u uitgenooi hier na die ruising van die see, waar die enkeling by die aanhoor van die ewige klopslag van die skuimwitte branders—simbolies van die deining van ons mensegeslagte wat ook so kom en gaan—kan besef dat ons ook maar net een polsslag is in die ritme van die groot heelaal.

Hier is vanmôre vergader, 'n groot deel van ons land se elektriese breinkrag en as Margate, in die loop van die konferensie 'n skok gaan opdoen soos nog nooit in sy heugenis nie, sal ons weet dat dit toe te skrywe is aan u goeie elektriese geleiding! Ek het reeds nou die aand die skok van my liewe behad toe ek saam met al die elektriese mense aan tafel gaan sit en toe al die ligte van Margate skielik verdoof is, maar ek is darem gou gerugstelt toe die President my verseker het dat dit maar net Margate se agtuurtydsein was.

Mnr. die President, ons ken almal die waarde van so 'n Konferensie, waar

gedagtes vrugbaar oor-en-weer gewissel word en waar waardevolle menslike kontakte opgehou word en ons wil die hoop uitspreek dat u hier 'n baie geslaagde Konferensie sal hê. Ons wens ook dat u 'n aangename verblyf sal hê, sodat u volgelaaie met statiese krag, dit tuis weer kan gaan uitstraal in die vorm van elektriese distribusie aan u belastingbetalers.

Hartelik welkom aan u almal! Ongelukkig het die weer nie te goed begin nie, maar Margate se Burgemeester en ek het besluit om vir beter te gaan vra en u merk al klaar die verbeterde resultaat.

Nou is dit ook my desondere eer om welkom te heet in ons midde, Sy Edele, Die Administrateur, Mnr. Shepstone. Hy staan in noue verband met plaaslike elektriese aangeleenthede en daarom kon ons ook nie aan 'n geskikter persoon dink om ons met sy teenwoordigheid te vereer nie.

Mr. President, Ladies and Gentlemen, it now gives me great pleasure in introducing to you His Honour the Administrator of Natal, Mr. Shepstone, and I call upon him to address this Conference.

THE HON. THE ADMINISTRATOR OF NATAL: Mr. President, Mr. Mayor of Margate, Mr. Deputy Mayor of Krugersdorp — Krugersdorp the Mother City of Margate! — Ladies and Gentlemen. In opening this, your 31st Annual Convention, I must thank you for the honour you have accorded me and say how welcome you are to our Province of Natal and in particular to this progressive and beautiful town of Margate. I trust that your visit will be both profitable and enjoyable, and that you will return home with a desire to return to our Province and to Margate to continue your further deliberations in the years to come.

It is indeed with some diffidence that I address you this morning on a subject which is the acknowledged field of experts and which offers so much mystery to the layman. There are, however, some aspects of your duties which encourage me to feel that I am not entirely a stranger among you. One of the duties placed on Provincial Councils and Provincial Administrations by the South Africa Act is the control and regulation of local government in which I and my Executive Committee are very

closely involved. Before establishing or acquiring works, and providing necessary machinery for supplying heat, light, and power, it is necessary for a local authority to obtain the statutory approval of the in Executive Committee. In this way, although we use the Electricity Supply Commission as our technical advisers, we have to satisfy ourselves that matters of policy and finance are sound. One of the objects of your Association is to bring together Municipal Electrical Engineers and the Chairmen and Members of the Municipal Electricity Undertakings' Committees. I notice that Manufacturers' Representatives and other interested persons are also present by invitation. This seems an eminently sane and rational approach, where all groups meet together and discuss the problems peculiar to each, and must surely lead to a better mutual understanding, and render the solution of many difficulties easier of achievement.

Electricity can be said to be the life-blood of our National Economy, and of the activities of any community. It is a very real measure of our national productivity. Figures based on international experience indicate that the demand for electricity more or less doubles itself every ten years. One very interesting fact, which was recently brought to my notice is the case of Durban, where, in the 60 years between 1897 and 1957 the annual output of electricity rose from zero to 800,000,000 units. In the next ten years it will have to double the output which it took 60 years to achieve. This illustration of the working of the law of compound interest brings in its train a host of inter-related problems, all exerting pressure with increasing urgency. The problem of transporting coal is a very real one, which is imposing a heavy demand on our transport system at a time when it is having difficulty in meeting the needs of many varied interests, such as industry, commerce, and agriculture.

In a young and developing country such as South Africa, and the Federation, the capital funds needed to meet the tempo of development are hard to find, and it is often difficult to keep services in the forefront of development.

Another real problem that is facing all developers is the great shortage of professional and technical personnel. The generation and distribution of electricity must require a class of labour of high order of proficiency. I understand that, while the shortage is not serious in the artisan groups, it is of serious proportions in those groups essential to proper planning. These comprise technicians and professional engineers. To me the only answer appears to be to relieve the professional engineer of some of his duties which are of a routine nature, and to introduce a new class of employee, the technician or engineering aid, which, under general professional engineering direction can carry out the simpler and more routine duties at present being undertaken by the highly trained professional engineer. This solution is being very closely investigated by the Government in order to overcome the severe shortage of engineers in Public Service.

And Mr. President, may I just say, not only in the Government, but in our own sphere of Provincial Administration where we render services to persons we have found it necessary to introduce what we regard as a subsidiary of the professional nurse, Nursing Aids, who work under the direction of professional nurses.

Attendant upon your activities is the question of smog, which has been very much in the public eye of recent years, particularly in the city of Durban. There is little doubt that the use of electricity, by industry for its power requirements, and by the individual for domestic lighting and heating, can reduce the intensity of the smog problem shall I say to negligible proportions.

A substantial number of householders still persist in using wood and coal for some of their heating requirements, and it is this domestic fire that is often the main contributor in closely built-up areas. This is no doubt due to the relative cheapness of coal and wood and the inability of the lower income groups and the non-Europeans to afford electrical equipment. I understand electricity is nearly six times more expensive per therm than coal. The reduction of smog is a challenge to everyone and to your Association, which I am confident it will endeavour to meet.

While I have said the increasing tempo in development is raising corresponding problems, it does seem that Southern Africa is not so heavily pressed as are other countries in the Northern Hemisphere. With the truly remarkable development in the use of nuclear power and its application to the generation of electricity, we in the sub-Continent of Africa can congratulate ourselves that we have not yet tapped the full resources of nature in the way of coal and water, and have at least some breathing space.

That the use in this hemisphere of nuclear power will eventually be made there can be little doubt, but when that time comes we will be able to benefit from the experience and results obtained overseas. I do not suggest for a moment that we should consequently view the production of electricity with complacency. We should not neglect any means of using our existing natural resources to the fullest extent including the development of water power, of which little use has been made in the past. I am well aware of the magnificent efforts and projects which are being undertaken by the Federation. The proportions of the Kariba Gorge Hydro-Electric Scheme are such that it can only be undertaken on a national scale, and in allowing it to grip our imagination, sight must not be lost of the important role—I shall go so far as to say the most important role—played by Municipal Undertakings in the development of Southern Africa. They are the pioneers of electricity supply, and to them may be attributed the credit in the fostering of industrial expansion and the improvement in the country's all-round standard of living. Not only have they benefited the townsmen but also the surrounding rural areas. In these days of labour shortage the use of electricity on farms is not merely a pleasant and modern refinement as in the past, but a commodity essential to the economy of agriculture. A short while ago, a Municipality's proposals to extend its power supply to an intensely developed sugar cane area under irrigation in its district received my statutory approval. As a policy I regard this distribution of electricity to surrounding rural areas eminently sound. The division between town and country is

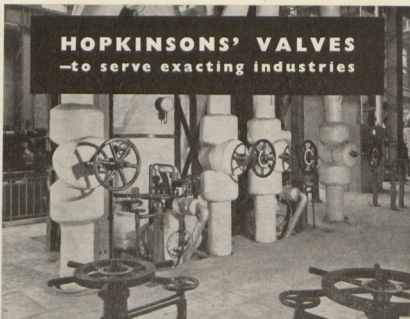
becoming less pronounced and it is often difficult to divorce the one from the other. The rural areas especially in the immediate vicinity of the town serve the needs of the town in the way of providing dairy and market produce. It is in the interest of the towns people that these provisions should be adequate and of high quality. In addition a prosperous rural area benefits the urban business houses and the town by giving them a wider and more stable market in which to dispose of their goods.

There is another factor which in many cases benefits the townsmen, and that is an improved load factor on the power station, which I understand makes for economical generation and consequently lower tariffs.

Mr. President and members of your Association, you have an important task ahead of you—the task of meeting the fast-growing needs of industry and town for electricity and to maintain the impetus of development. As in other matters, such as water supply, the isolated local supplier is rapidly moving out of the field, and the co-ordination of undertakings and the distribution through regional networks is becoming a necessity. It is therefore encouraging to know that an Association such as this, in which the many interests in the field of electricity supply are brought together, is so active, for from it will spring the co-operation required to co-ordinate the work of the various Undertakings, and give more power to South Africa's progress.

Mr. President and Gentlemen, I now have much pleasure in declaring this Convention duly open and wish you success in your most important deliberations.

THE PRESIDENT: Your Honour, His Worship the Mayor of Margate, the Deputy Mayor of Krugersdorp, Ladies and Gentlemen, I am sure I have the support of all the delegates and visitors to this Convention when I say how deeply we appreciate the presence of His Honour the Administrator of Natal at the opening of this Convention. In his speech he commenced by saying that the subject matter to be discussed at this Convention was for experts, and he implied that he was not such an expert himself. I feel, after listening to him speak that really he ought to stay for the whole of our proceedings,



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because I am sure we could benefit very greatly, at least from his administrative knowledge of the Electricity Supply Industry. I doubt if I have ever heard, if I may say a "pseudo layman" sir, discourse with such knowledge of the subject as we have heard today.

I would also like to thank His Worship the Mayor of Margate for the wonderful arrangements they have made for us here, and the right royal welcome that Margate has given us. I should also be failing in my duty if I did not refer to the Deputy Mayor of Krugersdorp and his Town Council for all that they have done in the way of organising the Convention outside their own town, which, as you realise, was of some great difficulty. Margate and Krugersdorp have had to bear the brunt of the whole of that organisation.

Now, if His Honour will bear with us for a short while before our refreshments, I will turn to the first item on the Agenda, which is the election of the President for the ensuing year.

I now call for nominations.

Mr. R. W. KANE (Johannesburg): Mr. President, Ladies and Gentlemen, last year in Salisbury Mr. Jack Downey had the very pleasant task of proposing as Vice-President of the Association one whom he referred to as "a shining schoolboy creeping unwillingly to school". A year has past, and our schoolboy from the Uranium City of the Transvaal has completed his qualifying period, with distinction, and has continued in many unrecorded ways to work hard for your Association.

May I state at this stage that however unwilling our Vice-President was in the past to assume executive duties, it certainly cannot be said that he was in any way reluctant in his unflinching endeavours in the many chores that he has performed for the Association. Van was born in Wolmaransstad about 40 years ago, and passing over the schoolboy period, he graduated at the Witwatersrand University in 1938 and then went mining, being associated for nearly a decade with electrical engineering activities in the gold mines, and also the coal mines. I wondered if our coal troubles of recent years could be associated with Van's activities in the

coal fields, but I must admit that I have not found any evidence or proof to sustain this thought. He tells me that he was very keen to try municipal work, and may I say to our gain and advantage, he left the mines in 1947 to spend a brief period at Wynberg and then Pretoria, before taking over the position of Town Electrical Engineer of Krugersdorp early in 1948. He was co-opted to our Executive in 1949 and for his sins has continued since that date as a capable and very enthusiastic representative of the Association in numerous activities. We are honoured in that we have as a Vice-President one whose ability, good will and experience makes him eminently suitable for the greatest honour we in the Association can afford a member, and I have great pleasure in proposing that Mr. J. L. van der Walt be President for the year 1957/58.

THE PRESIDENT: Can I have a secondor please?

Cr. P. DE BRUYN (Germiston): I have great pleasure in seconding this.

THE PRESIDENT: Are there any other nominations?

(None)

In that case I declare Mr. J. L. van der Walt of Krugersdorp duly elected President for the ensuing year, and he has my very sincere congratulations.

May I ask His Honour the Administrator of Natal to invest him with the chain.

INCOMING PRESIDENT: Your Honour the Administrator, Your Worship the Mayor, Mr. Deputy Mayor, Ladies and Gentlemen. I cannot sufficiently express the gratitude I feel to this Convention for electing me President. I can assure you it is a great honour which I will try and live up to. I can only at this stage say "Thank you all", I will endeavour, with the assistance of all members, and in particular the assistance of the Executive, to carry out the task and maintain the high standards set by our past Presidents. It is not often that this Convention elects a President other than the electrical engineer of the home town, and I therefore appreciate this honour more than would usually be the case.

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Thank you very much.

THE PRESIDENT: The next item on our Agenda is the venue of the next Convention, and I believe Councillor Santilhano from Cape Town has something to say on that matter. I will ask him to speak now.

Cr. P. D. SANTILHANO: Mr. President, on behalf of the Council of the City of Cape Town, it gives me very great pleasure to invite the Association of Municipal Electricity Undertakings of Southern Africa to hold their next Convention in our City, the City of Cape Town. (Applause).

I have been connected with the Electricity Undertaking of Cape Town (at the present moment I am Chairman of the Electricity Committee) for some years and I only hope that I shall be there to welcome you personally when you come to Cape Town next year.

I must tell you that we have an election—the whole Council goes out in August of the present year—and a new Council will be elected, so I cannot guarantee to be there. (Laughter). That is in the hands of the electorate, and the electorate very often is fickle. So one has to be prepared for any eventuality and I can only express the hope that I shall be with you. Whatever the result, Mr. Downie may be able to arrange, if I am no longer a Councillor, to find room for me to attend. Whoever it be, I am confident that our Council will try to make your stay in Cape Town as pleasant for you as Margate is doing. The date is of some importance, for if it can be arranged that you come to Cape Town before the rains set in, then the City itself has many attractions to offer you.

I don't think it is necessary for me to say any more, except that we shall be very glad to have you with us, and we hope to arrange everything so that when your Convention is over you will leave us completely satisfied.

Thank you.

THE PRESIDENT: Thank you very much Cr. Santilhano. We accept that invitation very gladly, and I think it will be a

pleasure for all of us to visit our Mother City of South Africa once again.

I am very glad that you mention the point that your electorate is fickle; but if you are not returned I can assure you that Electrical Engineers have learnt that Councillors are unpredictable, and you will have our sympathy because we are such understanding men.

The next item on our Agenda is the election of our Vice-President. Are there any nominations?

Cr. C. KINSMAN (Durban): Mr. Chairman there seems to have been some misunderstanding, particularly yesterday, and a misunderstanding I think which was laid at the door of our retiring President. He referred to me on several occasions as an Honorary Member, as a Councillor, and as an Electrical Engineer, but I think I will intrude on your time for a moment or two to make that position perfectly clear.

Four years ago, I was an engineer, pure and simple. Now that I am a Councillor there are people who may say that I am not so pure. I am also associated with a certain commercial interest whose principals, with the exception of myself, are wholly Scottish, there are others who will say I am now not so simple. Having now made that position perfectly clear, sir, it is with great pleasure that I rise to propose that Mr. Chris Downie be elected Vice-President for the ensuing year.

We have received, and are very pleased to accept, an invitation from Cape Town. Even if it were not our normal custom, with notable exceptions, such as on this occasion when we have elected as our President an engineer from a town other than that in which we are holding our Conference, to appoint as the Vice-President or President Elect the Engineer of the town to which we are going, I think we would still be very happy in our choice and it is with very great confidence that I propose Chris Downie. He is following a great tradition that Cape Town has set in its Electrical Engineers, George Swingler, Horace Eastman, and now we would like, and I am suggesting you would like, to accord that honour to Chris. In the time that he has been associated with us he has shown outstanding qualities, qualities

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which have already served his City well, and will serve this Association well.

I therefore have much pleasure in proposing Mr. Chris Downie of Cape Town as Vice-President.

THE PRESIDENT: Thank you Mr. Councillor Engineer Kinsman! Is there a seconder?

Mr. G. J. MULLER (Bloemfontein): I second the proposal.

THE PRESIDENT: Any further nominations? (None).

I am very pleased to announce that Mr. Downie has been duly elected Vice-President, and I am glad to say that another coal merchant is joining us on the platform.

Mr. C. DOWNIE (Cape Town): Mr. President, Ladies and Gentlemen, I appreciate the honour you have done me in having elected me Vice-President, very much indeed. I feel, however, that you have done so not so much because of any special qualification I may possess for this honour, as the fact that I happen to represent Cape Town, the Mother City of South Africa.

You have heard that we have invited you to hold your Convention in Cape Town next year and I can assure you that we will try to make it as successful and fruitful an occasion as the previous one when my Irish brother, Jack Downey, was the President.

Mr. President, I shall try to assist you in every way possible. You have been a wonderful assistant to our retiring President, and have set a fine example as a Vice-President. I shall endeavour, therefore, to the best of my ability, to be as good an assistant to you, as you have been to Jimmy Mitchell. Thank you very much.

THE PRESIDENT: Thank you.

I have two telegrams here I would like to read. One is from Mr. Powell, "Best wishes for conference which I know will be a success in your capable hands. Also congratulations in attracting 162 wives—or did they see the Margate advertisement? Sorry chaps. Better luck next time. Powell". (Laughter).

Telegram van Mnr. Dreyer. Hy is baie jammer dat hy nie kan kom nie. "Beste

groete en beste wense aan u self en al u lede vir 'n aangename konvensie."

I think we have a bit of time now, and I will ask the Secretary to read the apologies.

Mr. R. G. EWING (Johannesburg): Mr. President, I have the following apologies:

Mr. H. C. Dreyer, Mr. W. N. Powell, Mr. I. J. Nicholas, Transvaal and Orange Free State Chamber of Mines, Parys Municipality, Mr. E. Poole, Mr. and Mrs. T. K. A. Douglas, The Director of Public Works, (Union of S.A.), Mr. J. H. Gyles, The Secretary for Transport (Union of S.A.), Municipality of Bethal, Dr. H. J. van Eck, Mr. D. J. Hugo, Town Council of Nigel, Potgietersrust Municipality, The Representative Orange Free State Provincial Administration, The Representative Natal Provincial Administration, Messrs. F. G. Kanthack & Partners, The Representative of the Transvaal Provincial Administration, The Chairman, Fuel Research Institute of South Africa, The President, South African Federated Chamber of Industries, The Chairman of the Federal Power Board, The Secretary for Power, Federation of Rhodesia and Nyasaland, The Chairman of Escom, Southern Rhodesia.

There followed Convention announcements by the President.

ADJOURNMENT FOR TEA

On Resuming:

THE PRESIDENT: I hope you all enjoyed your refreshments. I think we will now go on to the sad business of recording the death of those of our members who have passed on. First of all, since the last meeting in Salisbury, I regret to say that we have heard of the death of Mr. Bellad-Ellis, a Foundation Member of the Executive. It is a great loss to this Association. Mr. Bellad-Ellis attended many of our Conventions, even after he had retired. We have also heard of the death of Mr. T. P. Ashley and Mr. C. B. Foley, and as a mark of respect I would ask the Convention to stand for a few moments in silence.

There will now be an opportunity for delegates and visitors attending the Convention who wish to convey good wishes and messages from other organisations and associated bodies, to do so.

Mr. J. C. FRASER (Johannesburg): I was asked by the President of the South African Institute of Electrical Engineers, Mr. de Villiers, to personally convey to you his regrets that he would be unable to attend your Conference, and he asked me to convey the good wishes of his Council and members of the S.A. Institute and his own for your year of office and a very successful Convention.

Also, while I am on my feet, Mr. President, may I convey the good wishes of all members of the Safety Precautions Committee to you sir, and to the Association, for a happy year of office and a very good Convention.

THE PRESIDENT: Thank you, Mr. Fraser.

Mr. R. W. KANE (Johannesburg): Mr. President, the Institute of Certificated Engineers send their good greetings and wish you a very successful year of office and a very successful Convention.

THE PRESIDENT: Thank you, Mr. Kane.

Mr. W. LINEKER (Johannesburg): Mr. President, I have been asked to convey to you sincere wishes for a successful Convention from the President and Council of the Institute of Electrical Engineers, Great Britain.

THE PRESIDENT: Thank you, Mr. Lineker.

Mr. W. L. KING (Johannesburg): From the Manager of the South African Railways and Harbours, I bring to you, sir, our very good wishes for a very successful year of office. Mention was made earlier of the improved position regarding coal supplies, and I have to thank you on behalf of the management for the co-operation and forbearance which has been evidenced amongst members. We hope that the forbearance will no longer be required!

Mr. A. D. SMITH (Johannesburg): Mr. President, on behalf of the Electrical Contractors Association of South Africa, they have asked me to extend to you their greetings, and also to thank you for the courtesy extended to the Association being represented here today during your Annual Convention. This is the first occasion that it has happened, and we are grateful for it,

and wish you a very successful year of office. Also your Executive and all your members. Thank you Mr. President.

THE PRESIDENT: Thank you, Mr. Smith.

Mr. W. L. MORRISON (Durban): On behalf of the South African Institute of Mechanical Engineers, I have been asked to convey to you, Mr. President, and your Convention, their very best wishes for a successful meeting, and we trust that you will go from strength to strength in the future.

THE PRESIDENT: Thank you, Mr. Morrison.

Mr. J. E. MITCHELL (Salisbury): Mr. President, there are two electrical engineers vitally concerned with Railways in both South Africa and in the Federation, both of whom are very sick men. I refer to George Williams, Chief Electrical Engineer of the South African Railways, who would have liked to have been here, but found it impossible due to ill health. I take it that the Convention will ask the Secretary to send the usual letter offering our sympathies in his ill health and wishing him a speedy recovery and hope that he can attend further Conventions in the future.

We also have Mr. Rettie who was for a considerable time Chief Electrical Engineer of the Federation Railways, and he, as you know, has been ill for some considerable time, completely paralysed. He now lives at Fish Hook. I take it you will agree that we can send a letter of sympathy to him and hope that he will have many pleasurable years ahead.

THE PRESIDENT: That will be done, Mr. Mitchell. Are there any further messages?

Dr. PIENAAR (Pretoria): I have one here, gentlemen, from Dr. Geigher, Chairman of the Electricity Control Board, regretting that he is not able to be with us, but he expresses his very sincere good wishes for a most successful and enjoyable Convention.

THE PRESIDENT: Thank you, Dr. Pienaar.

Now, Mr. Chris Downie has something to say.

Mr. CHRIS DOWNIE (Cape Town): Mr. President, Ladies and Gentlemen, the Constitution of this Association provides for the election of Honorary Members. According to it an Honorary Member "shall be a distinguished person who is, or has been, intimately connected with Municipal Electricity Undertakings, and whom the Association especially desires to honour for exceptionally important services in connection herewith".

We are to nominate for this honour today somebody who has been intimately connected with Electricity Supply in South Africa for many years. I refer to none other than Mr. Dave Bradley. He will join the ranks of the other Honorary Members, and I am going to name them.

Mr. Eastman, Mr. Fraser, Mr. Kinsman, Mr. Milton of Escom, Cr. Morton Jaffery of Salisbury, Mr. Poole, Mr. Rodwell, Major Redman of Merz & McLellan, Cr. Young of Pietermaritzburg.

I have known Mr. Bradley for over 20 years. I met him first as the Assistant City Electrical Engineer of Port Elizabeth, where he held that position from 1935 to 1943. He became City Electrical Engineer in 1943 and held that position until the year 1955. He was President of the Association in 1949, and he was on the Executive of this Association from 1945 to 1955. Mr. President, I think Mr. Dave Bradley is so well known to all of us that there is nothing much I can say about his personal qualities, his charm, and his popularity amongst all of us who have had the pleasure of meeting him at least once a year for many years.

Mr. Dave Bradley is still hale and hearty and from what I have noticed since meeting him again at this Convention, has many more years to go yet. We look forward to his being an Honorary Member for a considerable number of years.

Mr. President, I have very great pleasure in proposing that Mr. Bradley joins the ranks of those whom I have already named, as Honorary Member of this Association.

Mr. J. C. FRASER (Johannesburg): Mr. President, Ladies and Gentlemen, it is my privilege and particular pleasure to second the proposal which was given to you by Mr. Chris Downie of Cape Town. Mr.

Downie has told you that he has known Mr. Bradley for over 20 years. Well, I am not going to tell you how long I have known him, Mr. Bradley and I have worked as colleagues at the Johannesburg Electricity Department, and I think that in itself is a recommendation for an Honorary Member. Since Mr. Bradley left that famous organisation, and became City Electrical Engineer of Port Elizabeth he has always had the interests at heart not only of electrical engineers, but of the understrappers, the tradesmen who do our work, and he has always been closely connected with the social life of the community wherever he has gone. Ladies and gentlemen, I could not recommend a better Electrical Engineer to be an Honorary Member of this Association than Mr. Bradley, and I have very, very much pleasure in seconding Mr. Downie's proposition that Mr. Bradley be made an Honorary Member and in welcoming him into the ranks of Honorary Members.

Here they are, all in a row here, and look at them! I think Mr. Chris Downie's estimation of a few years to go is underestimated.

Members, I ask you to accept Mr. Bradley as one of your Honorary Members, and to welcome him into the fold.

THE PRESIDENT: Mr. Bradley, the Convention's sincerest congratulations for joining the ranks of those very distinguished men. Would you care to reply to that?

Mr. D. A. BRADLEY (Port Elizabeth): Mr. President, Mr. Downie, Mr. Fraser—I feel a little embarrassed with the remarks of my record which have been put forward by Mr. Downie, and Mr. Fraser, and to have been so cordially received here at this Convention for, until this moment, I was just a visitor. I am reminded, on looking back over the years, of the story about the two buddies who used to frequent the local pub nightly, and decided that they would return home via the railway line. They started off and very soon one said to the other, "It's a long ladder; these steps seem to be very far apart." When they'd gone a few more yards, the other one said, "I wouldn't mind the steps so much if the handrail wasn't so low down". Well, they got home all right, and apparently I have got home, too.



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Sir it is an honour which I do appreciate very sincerely, and although I may not be an active member of your Executive, or your Association possibly, I will, to the best of my ability, do all I can to foster the very good works for which the Association is responsible.

My proposer and seconder have gone a bit far afield I think, in their praise of my activities and responsibilities, but that is all part of the Engineer's job. With those few words, I thank you.

Finally I wish you, sir, a man whom I have admired ever since I first met you, apparently in 1947, (I had forgotten the year), for your generous and active work on behalf of the Association. I am so pleased to see you sitting in that Chair today, and I congratulate you and thank you most sincerely for the honour now conferred on me.

THE PRESIDENT: Thank you Mr. Bradley, and for those few kind remarks too.

Ladies and gentlemen, we are now going to proceed to a very pleasant item on the Agenda, and that is the presentation of Past Presidents' and Honorary Members' Medals and Certificates. Your Executive have thought fit to recognise the services of your Past Presidents and the Honorary Members in presenting them with these Medals and Certificates. I will ask your immediate Past President, Mr. Mitchell to present the Medals and Certificates of Past Presidents and Honorary Members up to his year of office.

Mr. J. E. MITCHELL (Salisbury): Mr. President, to me has fallen a task for which I feel very unworthy, but in the language which is used to address heads of states, "with humble duty" I will carry on. As you well know, this Association started in 1915. The first President was Dr. Dobson, and the first Council comprised Mr. Roberts, Mr. Bellad-Ellis, and Mr. Sankey.

The next President was Mr. Roberts of Durban. Then followed Mr. Sankey of Port Elizabeth, Mr. Dodd of Pretoria, and Mr. Swingler of Cape Town. In 1924/26, for two years, Mr. Roberts came back again in the Chair, and in 1927 Mr. Sankey, who had then moved to Johannesburg, was elected to the Chair again. Then followed

Mr. Lambe of East London, Mr. Macaulay of Bloemfontein, Mr. Horrel of Pretoria, Mr. Bickell of Port Elizabeth, and Mr. Metelerkamp of Bulawayo, all of whom have passed over.

In 1934/35 Mr. Ewer of Pietermaritzburg was the President, and as such he is now the doyen of all Past Presidents. He is here with us today to receive his certificate and his Badge of Office, and I will ask him to come forward on to the platform to receive it.

(Mr. EWER received his token).

After Mr. Ewer relinquished his office in 1934/35, we had as President a gentleman who makes up in energy what he lacks in stature. I never think of our good friend Mr. Rodwell without being reminded of that wonderful brand of mineral water which shows the effervescence going off. I think he is a marvel, the way his energy never flags, and as he retired from Johannesburg somewhere about 1944/45, which is 13 or 14 years ago, you can make a rough guess at his age. I don't think he is the type who would have retired at 55.

We are, of course, not only presenting certificates to Past Presidents, but also to Honorary Members, and Mr. Rodwell, as one of our Honorary Members, will not only get two certificates, but he'll get a bar to his medal as well.

(Mr. RODWELL received his tokens).

The President who followed Mr. Rodwell was Mr. Gyles of Durban. Now Mr. Gyles cannot be with us today, but he asked Mr. Ewer to accept his Certificate and Medal for him, so that is the reason why I have asked Mr. Ewer to stay on and accept these for Mr. Gyles.

(Mr. Ewer received Mr. GLYES' tokens).

Our next Presidents were Mr. Eastman of Cape Town and Mr. Nicholas of Umtata, who, unfortunately, cannot be with us today. Then the ever-energetic Mr. Rodwell came back and did another job of work as President for another year.

Following him then we had a gentleman who it is very easy for me to say quite a lot about, but I shall have to be very careful, although less careful now than I need have been at one time. I refer to the next Past President, Mr. Clinton. Now possibly it is

as well that Mr. Clinton in no longer a Municipal Electrical Engineer. He is an Associate. He left Municipal Engineering to find something a little more lucrative I think, but obviously it was a good thing for me that he left Salisbury, otherwise I might not be speaking to you at this moment. I ask Mr. Clinton to come up and receive his Certificate and Medal.

(Mr. CLINTON received his tokens).

Now at the Convention where Mr. Clinton was President they decided that, being in Rhodesia, they ought to have two Conventions, and as Mr. Clinton was leaving, another very well-known gentleman, very well-known to me, was made President for the ensuing year.

I think I am right in saying that this Past President is the first of two members, or two Past Presidents, who eventually became Councillors. I refer to Jack Phillips. Again it was very fortunate that Jack Phillips retired from being City Electrical Engineer of Bulawayo, or perhaps Mr. Sibson might not have been here either!

As you know (or perhaps you don't) Mr. Phillips is the Mayor of Bulawayo. I don't recollect any other Municipal Electrical Engineer rising to such heights as the Mayor of a city. If anybody can tell me of another I'd be very pleased to hear of it. I think Jack is one on his own in that field, and I would ask him to come up and receive his Certificate and Medal.

(Mr. PHILLIPS received his tokens.)

Now, of course, we are getting to the younger end of the Past Presidents — in seniority of course, not age!

The next President we had was our old friend Mr. Muller, who was not only President in 1946/47 but also in 1954/55, and he has done noble work. I don't think he has been off the Executive during the whole of that period, and I'm sure he has been a wonderful representative for the Free State during the last 10 to 15 years. I ask Mr. Muller to come forward.

(Mr. MULLER received his tokens).

The next in the field of Electrical Engineers who change their coats and become Councillors, is one who is extraordinarily well-known to you, viz. Clarence Kinsman. Clarence Kinsman has always

been, to my mind, the perfect President for the AMEU. He always had just the right words to say at the right time, and he had us under wonderful control. I am sure there has never been a President like him. Now I hope he will be following in Jack Phillips' footsteps, and one of these days, he will be Mayor of Durban, and then I am sure that Ronald Simpson will have a marvellous time! I'm sure he'll get all the money he wants and the bus service won't get any! Will you come up Clarence, please?

(Mr. KINSMAN received his tokens).

The next Past President was Arthur Foden of East London. Arthur is more of a quiet type, and did a tremendous amount of work behind the scenes. He is an old Lancashire man, and therefore holds quite a substantial corner of my heart, and I have always a warm welcome for him, although I don't know why he never comes up to Salisbury. He must come one of these days and see what a real city looks like.

(Mr. FODEN received his tokens).

All that has to be said about the next Past President has been well and truly said by Mr. Downie and Mr. Fraser. I have always associated Mr. Bradley with one of the most generous, warm-hearted, and sincere electrical engineers I have ever come across. One of Nature's gentlemen. I feel that Dave is in the Dickens category. He is now also about to receive his Honorary Member's Certificate and a Bar to his Medal.

(Mr. BRADLEY received his tokens).

The next Past President is the one to whom one attributes the word "inimitable". There is only one inimitable in this gathering, and you all know who that is. He is the gentleman who told us that his mother knew, right from early days, that he was going to be an electrical engineer because he was so full of electricity that he had to be kept on a rubber blanket! Charles Hallé.

(Mr. HALLE received his tokens).

The next Past President is Mr. Jack Downey. Now Jack, of course, has always been a rival of mine. He has one of those smiles which, I'm told, tends to get away with murder. Of course, mine doesn't shine

on the top quite as well as Jack's does, and he has had it really polished up specially for this presentation! I must say though, that Jack is one of our real workers. There is nothing that he won't tackle, and he has always been a willing horse and never refused any tasks given to him. There is nobody better meriting a Certificate such as this.

(Mr. DOWNEY received his tokens).

Our next Past President was Mr. Sibson of Bulawayo. I have to be very careful what I say about Bulawayo, but Robert and I have always been fast friends. We serve on many committees together, and when we team up we reckon we're unbeatable. When we get out with each other of course divide and rule comes in and we have to be very careful, but Robert has done some wonderful work for this organisation. He has been on the Executive since 1948, which is 9 years, and I think that was only two years after he took the Chair at Bulawayo, so he has been almost full time. Mr. Sibson, as you know, has all sorts of other interests. He is a master musician, he conducts the orchestra at Bulawayo, and I think he is something of a philosopher too. I have found at times his philosophy very helpful to me, and I say that very sincerely. I am very pleased to be able to be in the position of making the presentation to Mr. Sibson.

(Mr. SIBSON received his tokens).

The next Past President was somebody who needs no introduction at all. I refer, of course, to (and I am going to give him his full name this time), John Cameron Fraser. The "Cameron" gives you a very good idea of what we have to put up with in the Executive! Very dour, sticks to his point—and usually makes it. Mr. Fraser has often been referred to as the most distinguished looking electrical engineer that has ever graced our conventions. What he gets away with with his silver hair is about the same as Jack Downey gets away with with his smile. Mr. Fraser has done very noble work for the Association and is still doing it. He is also an Honorary Member, so he receives the two Certificates at the same time and a Bar to his Medal.

(Mr. FRASER received his tokens).

I regret to say that Mr. Hugo is not with us, so we will have to send his certificate on, or possibly present it to him at the next Convention.

We now come to the Honorary Members who are not, at the same time, Past Presidents.

The first Honorary Member, and doyen of them all, was Mr. Bellad-Ellis who, unfortunately, as you have just heard, passed on quite recently.

We have, however, asked his eldest son to come and accept his Certificate and Medal for him, and that he has kindly consented to do. We are very sorry that his late father was not spared to be with us, because I always remember the letter that I got from him in Salisbury. He had made all arrangements to come to Salisbury, but just at the last minute, found that he could not make it, and I felt that he was really disappointed and was therefore looking forward to this next Convention. However, he has passed over. He had a wonderful innings I feel, and I am sure that you will wish me to convey your sympathies—which I already have done—to his eldest son, and I ask Mr. Bellad-Ellis to come up now and receive his father's Certificate and Medal.

(Mr. R. BELLAD-ELLIS received his late father's tokens).

Another Honorary Member is unfortunately too sick to be with us. He is Mr. Poole, our original secretary. Mr. Poole had long years of service as the Secretary of this Association in its early days, and I am going to ask Mr. Kinsman to come forward and take his Certificate and Medal so that he can take it to him at his home.

Thank you, Mr. Kinsman.

(Mr. Kinsman received Mr. POOLE'S tokens).

We now come to another Honorary Member—a grand old Councillor. I refer to Mr. Sax Young. Mr. Young, I think, has been to at least 12 or more Conventions. I can't remember the exact number. I notice that he is here with us today, although, according to the list he is here in his own right as an Honorary Member and not as a Councillor Representative of Pietermaritzburg. He is very quiet, but he has a

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very keen sense of humour when you get to know him. Of course he has had to associate with Charles Hallé for so long that you don't get a chance to hear Mr. Young; but he has picked up quite a lot of points from Charles, and if you get him on his own you'd be surprised what you get out of him!

(Mr. YOUNG received his tokens).

The next presentation gives me lots of scope. This is the one time when I get a chance to tell you what I think about my own Chairman! Peculiarly enough, and quite sincerely, I think quite a lot of my Chairman. I've had him for a long while, too. In fact, I think I have had him ever since I took the Chair at Salisbury. Alderman Jaffray—yes, he is an Alderman, which fact puts him one up on every Councillor in South Africa—is known to every one at this Convention. He is always around, not always listening to every paper I've noticed, but he is always at things that matter—you know sundowners and things like that, but I would say that he has to me been a tower of strength in my Council. He has helped me over many a stile, and I have never been to him with a problem that he would not listen to me and help me out. You are very unlucky all you others who haven't got Morton Jaffray as your Chairman, believe me . . . He has been to 11 or 12 Conventions now. The only one he missed I think was in Pietermaritzburg which was when I was overseas and he had to run the show, so it was a bit difficult for him to get down there. I now call upon Alderman Jaffray to come up and receive his Certificate.

(Alderman MORTON JAFFRAY received his tokens).

And now our last two Honorary Members were members who have attended this Convention for many, many years, but are only indirectly concerned with Municipal Electricity Undertakings. The indirectness of one of these Honorary Members is so tight that in fact I heard the Honourable Administrator this morning say that he used him (I'm sure it was him) to give him advice on what tariffs should be charged in Municipal Electrical Undertakings. Well, you know, anybody who can get across with something like that is really a mar-

vellous fellow! I wanted to jump up and say, "Well, it's about time the Administrator learnt that the AMEU was much more competent to advise on tariffs that should be charged by Municipal Undertakings, and to steer clear of the ESC."

However, our Walter has been father confessor and very, very good friend—although on the other side of the fence—of all municipal electrical engineers and their Councils. The AMEU can count itself fortunate that it has for so many years had to deal with a man who, despite his obvious loyalty to his employers, has nevertheless had such a sympathetic approach to our members. I am sure that you will agree with me that nobody could be more worthy of receiving this Certificate and Badge.

(Mr. MILTON received his tokens).

Our old friend Major Redman. I don't quite know how many Conventions Major Redman has been to; certainly a long while before I ever heard that there was such a thing as the AMEU. As you know, he came out for Mertz & McLellan in the very early days, and I think he was concerned with traction then, but I don't think the Major, despite his age, has ever missed one of our Conventions. What is more, he really enjoys these Conventions, especially the dancing. Oh yes, I've seen him dancing till one o'clock in the morning, and has often had to be told that it is time he went to bed but he takes no notice.

He is really, I think, *the* doyen of these Conventions. There may be somebody older coming to these affairs, but I don't think so, and certainly not as regularly, and I call upon Major Redman to come up and receive his Certificate and Medal.

(Major REDMAN received his tokens).

THE PRESIDENT: Thank you very much Mr. Mitchell, for performing that task so very well. (Applause).

Mr. Mitchell said that that was the last of the Medals and Certificates to be handed out this morning, but I think his arithmetic is a bit out. You will remember at a certain stage, there was a certain gentleman in this Convention, who was apt to gain himself the nick name of "Waistcoat Jim". Fortunately the Executive got the Convention out of that, and we only know

him today as "Our Jim". He has endeared himself to all of us by his heartiness, that radiation of confidence that is around him, and the pleasantness which is his. He has made every Conference pleasant whenever he has been present, especially during his year of office. He has done, although over the borders of the Union of South Africa, a lot on our Executive, even on matters affecting the Union of South Africa. We will always be grateful to him for the yeoman service he has rendered to us, and on behalf of the Association I would like to present him with his Medal and his Certificate. Mr. Mitchell. (Applause).

(Mr. Mitchell received his tokens).

Now Ladies and Gentlemen, we come to the adoption of our Draft Constitution.

You had this Constitution circulated to you about a fortnight ago. We trust all of you have examined it carefully. The Executive now asks you to accept the draft, subject to the amendments your Executive has placed before you this morning.

There is an amendment to an amendment, ladies and gentlemen. It is very small—a typing error. Page 1, paragraph 1(iii), should read, "Insert between the words 'the' and 'member' the word 'voting'."

You will remember at the last Convention, we promised you that we would have an amended Constitution for you to accept, incorporating all the amendments that have been made during the last few years, as well as catering for our new venture in making our commercial friends affiliates to this Association.

We have a few moments for a discussion on this Draft Constitution with its amendments, but the Executive asks you to accept it as they have put it to you, because they have made a thorough study of the position, and we are sincere when we say that we think the Constitution is now as we should have it. Any major alterations can be made at later Conventions. We would like this Constitution to be adopted before we go to the next item on the Agenda, which is the Election of Members of Executive Council.

(The President then repeated his remarks in Afrikaans).

The subject is now open for a short discussion, if anybody has any remarks or proposals to make regarding the Constitution.

Mr. W. H. MILTON (Escom, Head Office): Mr. President, there is just one point in connection with the Constitution. I raised it many years ago, and as a result of raising it secured the right to become an Associate myself. As the Constitution has now been drafted, I would like a statement from the Executive that it will be possible for members of the Electricity Supply Commission, if they so desire, and are acceptable to your Executive, to become what will now be companions. As the Constitution now reads, you will find that you deal rather with an engineer in charge of the distribution of electricity in the Municipal area. Now do you regard the manager, say, of Escom's Undertakings, as falling in that category?

THE PRESIDENT: Mr. Milton, you will note in the amendments that the companion membership has fallen away, and is replaced by the term "Associate Members", under which category you will fall.

Mr. W. H. MILTON (Escom, Head Office): I'm sorry to rise again, Mr. President. I am dealing with my potential successor. I personally remain an Associate Member. Would it be possible for future members of the Electricity Supply Commission who desire to join to do so?

THE PRESIDENT: It is possible for future members of the Electricity Supply Commission to become members—Associate Members under Clause 7. (2) (iii). Associate Members. (This is the amendments to the draft). (a) and then (b) which refers to the membership in your category. "The engineer in charge of an authorised electricity undertaking other than an undertaking as defined in Clause (1) . . ." (and an undertaking in Clause (1) is defined as a "municipal electricity undertaking") . . . engaged in the supply of electricity in the area of jurisdiction of a local authority may also be admitted to the status of Associate Member". All right, Mr. Milton?

No further discussion on the Draft Constitution with Amendments?

Cr. R. L. DE LANGE (East London): Mr. President and Gentlemen. I raised the question of the Constitution at Salisbury last year, and I am going to say, sir, that I can't say that I am very much taken up with the alteration in the Constitution. I feel that this Constitution was put before the members only about a fortnight ago. I don't know why that was not done earlier. The Executive should have considered this matter earlier in the year. I am not going to criticise now, but the object in my putting forward this matter last year was, and I say it without any prejudice to the Transvaal, your whole Executive, Mr. President and gentlemen, consists of five members from the Transvaal, one from the Free State, one from Natal, and one from the Cape. Now I feel that there are engineers from some of the smaller centres who should be represented on this Executive. I feel, and I say it with all due respect to our engineers coming from a small town like East London, that the engineers in larger cities do have their troubles and difficulties, and I feel sure that you, in that large city of Krugersdorp, have the same trouble, but the men in the smaller towns are men who should be represented on the Executive. I feel, sir, that an engineer in a smaller town has not the privilege and other experience behind him, and he has to work out all his difficulties, and I feel that, at a Convention such as this, you have predominantly the larger cities who do the work of the Convention, and that is why I feel in all fairness some of the smaller towns should have been given some representation on this Executive.

THE PRESIDENT: Thank you Mr. de Lange. Your point was borne in mind, but there is nothing the Executive can do about it, because the smaller municipalities are in the majority, and they elect the members, so it is up to them to see that they elect who they want on the Executive. Those points were fully discussed.

Is there any further discussion on the Constitution?

Cr. ALFRED MARKMAN (Port Elizabeth): In reply to my colleague and friend Mr. de Lange, I think that you, as President, have perhaps overlooked emphasising the fact that we had discussed this aspect

on the Executive when I served on it, viz. to meet the very point raised by Mr. de Lange, and that you have now in your new Constitution provided for Regional Branches. The effect of that would be that, say Port Elizabeth, East London, Humansdorp, Uitenhage, Graaff Reinet, could, if they deemed it fit, form their own regional branch and thus secure additional representation through the Branch Chairman.

To take the example further, Mr. Giles will also then be able to serve on the Executive. In other words, you have extended it. That, I think, arose out of the discussion which Mr. de Lange correctly raised last time, and it was discussed in the Executive, and I think it is only fair to you, who serve on the Executive, that I should emphasise this. In other words, there is nothing to prevent that Regional Branch from appointing an electrical engineer, say of Walmer or Uitenhage, as its Chairman, because of his activity in that region, and that Chairman will then, irrespective of the viewpoint of the Conference, be automatically on the Executive, and without having to be voted for at Conference. I think, if we bear this in mind, and if we develop our regional branches throughout the Union and Rhodesia, wherever necessary, we will then automatically have representation on the Executive, irrespective of whether, again for example only, the whole of the Rand got together and put their Transvaal members on.

THE PRESIDENT: Thank you, Mr. Markman, for drawing our attention to that point. That is quite correct.

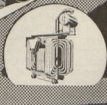
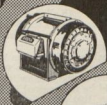
Is there any further discussion? If not, can I get a proposer that the Draft Constitution, with the Amendments, as submitted by your Executive, be adopted?

Mr. G. J. MULLER (Bloemfontein): I propose the adoption of the Draft Constitution with Amendments, as submitted by the Executive.

Mr. A. R. SIBSON (Bulawayo): I second the proposal.

THE PRESIDENT: It is therefore RESOLVED:

(a) That this Convention adopt the Constitution drafted by the Honorary Legal Adviser as circulated and as amended



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in terms of the amendments proposed by the Executive Council at its meeting held on 6th May, 1957, and tabled at this Convention today;

(b) That the said Draft Constitution, as thus amended, be the Constitution of the Association of Municipal Electricity Undertakings of Southern Africa immediately upon the passing of this Resolution by this Convention.

Is that unanimous gentlemen? No amendments, I accept that the proposal is accepted unanimously. Thank you.

Now we can carry on with the next business on the Agenda, and that is the election of your office bearers in accordance with the Constitution you have just accepted.

You will note that you have to elect engineer members; their Councillor representatives automatically become members of the Executive. You only have to elect six engineer members, and their Councillor members will join them on the Executive.

Before we go to that, we want to give effect to the Clause giving representation in each Province. The Provinces already represented on your Executive are the Federation of the Rhodesias and Nyasaland, (your immediate past president); Transvaal (we have Mr. Hugo and myself); Cape Province (Mr. Downie is already on the Executive). That is all. In your nominations see that you give effect to every Province being represented. After that you can nominate as you wish.

The following were duly proposed and seconded:

- G. J. Muller, Bloemfontein.
- F. Stevens, Ladysmith.
- P. A. Giles, East London.
- E. L. Smith, Boksburg.
- A. R. Sibson, Bulawayo.
- Murray Nobbs, Port Elizabeth.
- R. M. O. Simpson, Durban.
- C. Lombard, Germiston.
- J. C. Downey, Springs.
- W. Rossler, Kroonstad.

THE PRESIDENT: Gentlemen, we have had Mr. Downey so long on the Executive

that he asks his Proposer and Seconder to withdraw their nomination. They may if they feel like it. I wouldn't if I were them. But if this is Mr. Downey's sincere wish, I put it to the Proposer and Seconder.

Cr. L. P. DAVIES (Springs): Mr. President, before forcing the hand of the Proposer and Seconder, I, as Mr. Downey's Chairman in Springs, am going to ask him to reconsider the matter. I have a feeling that he thinks he is doing the right thing for everyone when he asks to allow his name to be withdrawn, but I feel the opposite would be the result. I feel that he should allow his name to go forward. His services are very, very necessary.

Cr. A. MARKMAN (Port Elizabeth): I would recommend Mr. Downey not to be so grossly insulted by the remarks of Mr. Mitchell about his bald head and he should accept the nomination!

THE PRESIDENT: Agreed, Mr. Downey? Thank you. The name remains. (Applause).

If there are no further nominations, gentlemen, I think you have a fair representation of all Provinces. Nominations now cease.

Gentlemen you have to vote for six members, taking into consideration that the Free State and Natal have to come on. Cross out those you do not want.

I must point out to you that the member in Natal receiving the most votes, and the member in the Free State with the most votes, will go on the Executive, the others will go on in order of the number of votes received.

While you are doing that, may I ask for volunteer scrutineers please?

Mr. Milton, thank you. Mr. Wilson, Pretoria. Thank you very much gentlemen.

Mr. P. BECHLER (Newcastle): Mr. President, we do not know where these colleagues belong.

THE PRESIDENT: I'll run through them for you.

Mr. Muller, Free State.

Mr. Stevens, Natal.

Mr. Giles, Cape Province.

Mr. Smith, Transvaal.

Mr. Sibson, Federation.
 Mr. Nobbs, Cape.
 Mr. Simpson, Natal.
 Mr. Lombard, Transvaal.
 Mr. Downey, Transvaal.
 Mr. Kane, Transvaal.
 Mr. Jones, Cape Province.
 Mr. Rossler, Free State.

I ask the volunteer scrutineers to collect the papers. It is getting late, and we will now hand over to Mr. Mitchell who will give his Valedictory Address.

Mrs. R. GAILEY (Cr., Ladysmith): Mr. President, does everyone have a vote?

THE PRESIDENT: Madam, according to your Constitution, every Member Undertaking has two votes. Whether you make it your two councillors, or one councillor and an engineer member, it does not matter, but not more than two votes.

The scrutineers can now carry on with the business of counting the votes.

Ladies and gentlemen, it is a great pleasure to hand over to Mr. Mitchell, our immediate Past President, to give you his Valedictory Address.

Valedictory Address

by the Retiring President

J. E. MITCHELL

When, as most other Presidents must have done before me, I was searching my brain for a suitable subject on which to address you on retiring from the position of your President, it occurred to me that as I was relinquishing quite serious responsibilities in one direction, I might discourse on the responsibilities of the Municipal Electrical Engineer in other directions.

But first of all, what are his responsibilities? I would put as his major responsibilities that of giving the best electricity service to the public at the lowest possible cost, and the Engineer who strikes the right balance between these two functions is the most eminent in his profession.

I would put, however, as almost parallel in importance, the responsibility for selling electricity, and for increasing sales at the most rapid rate possible.

No Councillor will, I feel sure, cavil at my first major responsibility, but many may cavil at my second, and I want, therefore, to state my reasons for giving increasing sales so high a priority in the duties of the Municipal Electrical Engineer.

All parts of the world are continually striving for a higher and higher standard of living, with more leisure time and more money to spend in that leisure time when gained. When I speak of a higher standard of living, I mean a higher standard for all, and not just one selected class, because it is only when all men of a country are earning, and I repeat earning, a reasonably high standard that country becomes really prosperous.

Now it is a basic fact of life, although not generally realised, that everyone cannot have a larger slice of the cake unless there is a larger cake to cut at, and the only way to have a larger cake is to produce one by the greater output per man-year of every member of the community. And I suggest to you that the only way to increase this output is by the greater use of electricity. If the annual consumption per head of population in a dozen countries is tabulated and compared with the standard of living in those countries, it will be found to agree, except in a few cases where a particular country has some special advantage in natural resources. Electricity consumption per head of population is a measure of the living standards, not only between countries, but between individual families in any country.

I actually touched on this subject in the preamble to my presidential address last year, on electricity in the Federation, and illustrated that without the extended use of electricity in the factory, the mass production of so many items which improve the standard of living, could not have been made cheaply enough to have been available to the average man, and it is, of course, this extended use of electricity that has made mass production possible. Handling charges add nothing to the value of a product, but may add considerably to

its cost, hence automatic movement between operations and during assembly can be important in the eliminating or reducing an item of cost which is of no value to the product. Individual electric motor drives to presses, machine tools, winding machines and other tools which replace hand work have speeded up production by building much more power into each operation, whether for material removing as in machining, for multiple instead of individual stamping, and in textile and paper making for higher speeds. Primarily, the change from belt to motor drive, with its faster production, demanded and enabled conveyor movement of raw materials, component parts, swarf and finally the finished and tested products. These first reductions in manufacturing costs stimulated sales, increased the demand, and enabled further economies to be made by the bigger output, justifying more extensive pooling of plant, the introduction of automatic, or special-purpose machines, leading eventually to automation. Very large numbers of a particular component or product are required before the high capital cost of a special installation can be justified, and the design of the product must have been fully developed and established. When those conditions hold, it is possible so to design and plan the production of a complicated component, or even complete article, that practically no human hands touch the product, other than to feed from raw material stores to the beginning of the production flow line, and from the end of it to the despatch vehicles.

Programmed factory control, or automation, will be an inevitable and essential development in many industries consequent upon an ever increasing standard of living, and this, of course, cannot be carried out without a considerable increase in the use of electricity.

I think it is generally recognised that the United States of America has the highest standard of living in the world, and the units of electricity used per head of population in that country is 3,400 per annum. In Salisbury, the units used per head of population is 4,200 per annum, that is higher than the United States of America, but the units used per head of the whole

population of the Federation, and that includes the Copperbelt, which has a natural resource in copper which requires a considerable quantity of electricity to produce it, is only 134.

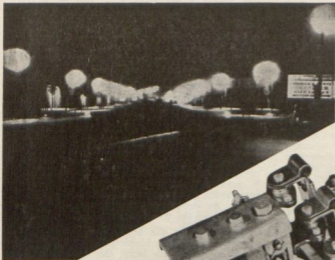
In the Union of South Africa I find that the units used per head of the total population is just short of 1,000, but of course a very considerable quantity is used on the mines for, as I have stated, a very special natural resource. Even with this, it lags a long way behind the North American continent, and here you have the answer to the overall prosperity of Southern Africa. By putting more electric power into the operation of the Africans in the factory, it is possible to increase their use to the community, and increase their standard of living. In doing so one increases the prosperity of the whole country.

I would now like to deal with the responsibility of the Municipal Electrical Engineer due to his being the manager of a monopoly.

I have found in my experience that it is one of the hardest tasks of the Municipal Electrical Engineer to keep ever before the minds of his staff that they must always remember that they are the servants of the public, and because the customer cannot, if he doesn't like the service required, go somewhere else, adopt a beaurocratic or take-it-or-leave-it attitude. The tendency to this attitude throughout the staff, from enquiry clerk to inspector to engineer, must continually be watched if relations between the Department and the consumer are to remain cordial and friendly, without which relationship the work of the Municipal Electrical Engineer becomes more than unusually difficult. This means that the choice of enquiries clerks, inspectors and faultsmen must often be on an appreciation of his tact and personality rather than of his capabilities as an inspector or a faultsmen, although I am not saying that the latter aren't, of course, important.

Another and very important responsibility of the Town, or City, Electrical Engineer as the manager of an electricity undertaking is that of the direction and guidance of his Council on policy and finance. As the managing director of a large industry, usually one of, it not the largest,

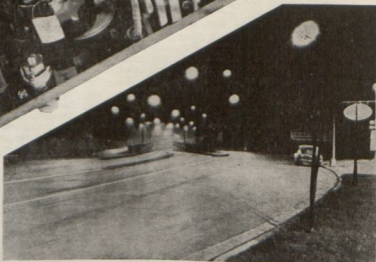
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in his particular Municipality, he should most definitely act in the role of such an official. He will find that in the great majority of cases he will have to fight hard to convince his Council that he is running a business, and that he is not in the same category as those of other services where the rate is levied to fit the bill, and where there is no sales incentive. He must see that his is the guiding hand in regard to financial policy for the electricity undertaking, and that it does not lose its identity among the rather conservative financial policy of the Treasury, which usually is much more concerned, and rightly so, with balancing the whole Municipal budget rather than, for instance, a sales campaign to increase the use of electricity.

Up to now I have only mentioned the responsibilities of the Municipal Electrical Engineer as a manager of an electricity undertaking, but he has other responsibilities as the Head of a Municipal Department.

All local authorities, especially as they grow in size, are faced with the problem of administrative cohesion, and the problem of providing machinery which will unify the several departments into which each is divided, that is to co-ordinate by some means :

- (a) The advice tendered to Council by Heads of Departments on matters of policy, and
- (b) the administration of the Department in execution of the Council's policies.

Local authorities on the British pattern seek to achieve this administrative cohesion through the appointment of one head of a Department, by common consent and tradition the Town Clerk, as chief administrative officer. That office is foremost in responsibility to the Council as leader and as co-ordinator of all departments. However, in some authorities this is no more than a precarious formula, and in few are the duties and responsibilities in higher administration satisfactorily defined. To a degree the system has been supported by the contribution made by such measures as financial control, and by the centralisation of the functions such as buying, costing, accounting and staff work. Nevertheless, I think it is a fair criticism of local

authorities in general, and the larger ones in particular, that they do not have an effective centre of initiative and drive, and frequently lack in co-ordination of the work of committees and departments. The problem lies in the growing number, size and complexity of local services and activities. The necessity for specialists in different branches of local authorities' work has led to professionalism and to further fragmentation into departments.

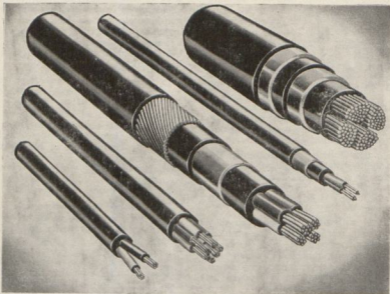
It has really nowhere been solved entirely. Elsewhere some success is claimed for Commissions, City Managers and Mayoral administrations. However, what success has been achieved in those ways is attended by disadvantages which are unlikely to be tolerable in British institutions. They mainly lean towards large central co-ordinating departments which in co-ordinating are duplicating and substituting for control of leadership.

In Salisbury, the problem has been approached by reinforcing the chief administrator office system through a committee of Heads of Departments. This committee can, and does, provide the centre of initiative and drive which is lacking in other administrations, and has done much to forestall the development of undesirable practices which have evolved elsewhere, for example, the growth of large central departments to co-ordinate, by policing, and the tendency for technical specialists to operate independently before Council, requiring elected representatives, that is the Councillors themselves, to grapple with technical complexities, to arbitrate on departmental and professional differences, and bear the burden of achieving administrative cohesion.

While I was at a university taking the degree in a faculty of technology, a survey was made of the positions gained by electrical engineers who had been out of the university for ten years or more, and it was found that a considerable proportion were in what could be called managerial capacities. Because of that, it was decided to add to the curriculum such subjects as workshop administration, fundamentals of industrial administration and a certain amount of economics. And I think it is reasonable to say that all City or Town

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Electrical Engineers are reasonably good administrators otherwise they wouldn't be what they are in effect, managing directors of large businesses, and therefore they can contribute very greatly to a system such as I have suggested by being one of the administrative officers, being part of the team of Heads of Departments' Committee reinforcing the whole administrative system.

Let not other than the engineer members of this convention think that I have covered the whole of a Municipal Electrical Engineer's work, for I have only covered his main duties. If he only carried out his duties he would be a much happier man. If I were to discourse on his worries, this convention would have to be extended by another day at least if I were to give even a resumé of these.

I must now conclude this valedictory address by repeating what I said when I was elected President a year ago, that I have very much appreciated the action of the members of the Association in according me the highest honour that can be bestowed on a Municipal Electrical Engineer in Southern Africa.

I would also like to thank the Executive Committee for their very loyal support and assistance throughout the year, and a special word of thanks to Mr. Ewing, who in true A.M.E.U. fashion has dropped the "Mr." to become Dick.

To you, Mr. President, I must add my own congratulations, and wish you a successful and happy year of office.

THE PRESIDENT: Thank you very much Mr. Mitchell.

To do justice to such a Valedictory Address, I cannot ask the proposer for a vote of thanks and his seconder to do that now, at this late hour, so I think we shall ask the proposer and seconder to do their job of work after the luncheon adjournment.

Before we adjourn for lunch, I have a few announcements to make.

I trust that everybody has filled in their Oribi Gorge Tour forms. If not, please do so. The tour leaves at 1 p.m. sharp tomorrow.

The "Gay Nineties", a show in Margate, and specially kept going for the sake of the

Convention, is on at the Town Hall. Tickets are available from the King's View Hotel, at the Reception Office. There is a block of seats reserved specially for Convention Members. If you intend going tonight, please obtain your tickets from the Reception Office at the King's View Hotel. I believe it is worthwhile seeing.

We will now adjourn for lunch, and Convention will resume at 2.30 p.m.

LUNCHEON ADJOURNMENT

ON RESUMING:

THE PRESIDENT: Good afternoon, gentlemen. I think it is time that we proceeded. We are a little behind schedule.

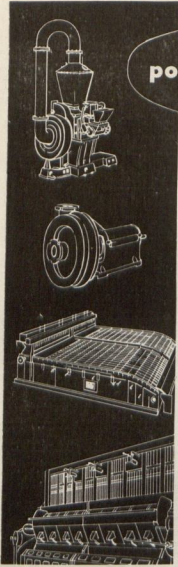
The next business on our Agenda is the vote of thanks to our Retiring President for his Valedictory Address.

I now call upon Mr. Simpson, of Durban, to propose a vote of thanks to Mr. Mitchell's Valedictory Address.

Mr. R. M. O. SIMPSON (Durban): Mr. President, Mr. Mitchell, Gentlemen. It gives me very great pleasure indeed to propose a vote of thanks to Mr. Mitchell for his interesting and well-chosen Valedictory Address. We all know and appreciate Mr. Mitchell's inimitable style, and the address just given is no exception. He covered a particularly wide range of subjects, and it is very difficult in a relatively short time to really cover the points that he has made, all of which give us much food for thought. I was particularly interested in his two choices of the main responsibilities of an Electrical Engineer, and I will comment on these in passing.

I will repeat them. The first was giving the best electricity service at the lowest possible cost; the second was to increase the sales of electricity as rapidly as possible.

You will also note that the first main function is described as a "service". He has chosen that word very well. It is in my opinion the only way to describe the main functions of any Electricity Undertaking. He also points out in his address, that the spirit of service must be kept to the fore if we are to truly discharge our responsibilities to the public in the administration of what is a monopoly service. He made



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an extremely good point of the fact and quite clearly indicates the necessity of regarding a monopoly and Electricity Supply Undertaking as "service" due to its being a monopoly.

It also gives us the main foundation on which an efficient department can be built, particularly where incentives such as those given by competitive trading companies don't exist in municipal monopolies of this type.

He also points out the necessity of including in the term "service", "courtesy to the public" by the staff of an Undertaking. I very strongly support him in this outlook and we must all regard it as one of our duties to ensure that this policy is carried out.

Referring to the second responsibility, "increasing sales of electricity", he stated that some may wonder why he advocates this policy, when we have heard criticism of a policy of promoting sales, particularly with the present day cost of and the shortage of capital money. Mr. Mitchell gives his reasons, and gives them very clearly, by reminding us that the unit consumption per head of population is a direct measure of both the productivity of a country and also the standard of living of its people.

If we are to compete economically against the competition from overseas industry, we must use more electricity per head of our workers, and also to follow that further, if we are to compete with social unrest then we have to ensure that the living conditions of our workers also are improved, this also calls for an increase in units per head of our population.

Mr. Mitchell makes those points very clearly, and has given us all a lead in a direct approach to our policies of administration and management.

There are many other points in Mr. Mitchell's paper particularly in respect of Council procedure, but as I shall probably be followed by a Councillor member, in seconding the vote of thanks I will leave him a clean field to deal with this aspect of the address.

I was, however, particularly interested in the point that he made about a Depart-

ment Committee. We have something similar to this in Durban, but it appears that this may have taken a little further in Salisbury, probably to very good advantage.

With those words I would like to thank Mr. Mitchell for an extremely interesting and well-thought out address, on subjects that, as Engineer Administrators, gives us much food for thought, and I am sure that when we read it over again, it will make us think hard, in quite a number of directions, particularly in respect of "monopoly's" and "service" including courtesy to the public. This latter aspect is always a source of worry to municipal engineers, because unfortunately when some individuals are protected by ordinances and by-laws, and you have no competition from another supplier, there is a tendency, on the part of some members of one's staff, to hide behind them and also to use them to the detriment of the public, which is not conducive to happy relations with one's consumers.

With those few words I would like to thank Mr. Mitchell once again very much indeed for his most interesting address, and also for the manner in which he gave it.

In conclusion I would also like to take the opportunity of thanking him for the very pleasant and efficient manner in which he has carried out his duties during his year of office. It gives me very great pleasure to propose a hearty vote of thanks to him. (Applause).

THE PRESIDENT: Thank you, Mr. Simpson.

I now ask Councillor Phillips from Bulawayo to second that vote of thanks.

Cr. J. W. PHILLIPS (Bulawayo): Mr. President, Gentlemen. Although Mr. Mitchell inferred this morning that I was like Clarence Kinsman, an engineer gone bad, I do feel very grateful for having this opportunity of seconding this vote of thanks to Mr. Mitchell for his Valedictory Address. It does fittingly wind up the excellent year in which he has served this Association, and the address that he has given us will be a very valuable contribution to the proceedings of this Association.

There are several items that one could discuss in the paper, but I am told that I must not be long, so I shall just deal with one point only. That is the question of the need for increased sales, or rather I would say increased production of electricity.

This is a subject that I have discussed on several occasions recently, and it is quite obvious that with the world population increasing at the rapid rate that it is, and the higher standard of living which is demanded by all classes of people in the world, there must be an increase in the production of electricity to provide the comforts and amenities that go with that higher standard of living.

We in Rhodesia, as you probably know, have decided on a very huge hydro-electric undertaking which sounds fantastic for such a small European population in the Federation. We believe, however, that that undertaking is necessary in order to cater for the requirements of the development of the natural resources of the Federation, the increase in population, and the increase in the standard of living of the Federation.

To my mind there is another problem that goes with the increased production of electricity, and that is the bigger and bigger demand for engineers. The Honourable Administrator of Natal, who spoke this morning, mentioned that there was already a serious shortage of engineers. That is true, but also young men are not coming forward in the numbers required to fulfil the requirements of the engineering profession. I think probably that is due to us to some extent, those of us who have forsaken the profession by finding other more lucrative forms of employment, but I have also heard engineers say, perhaps rather jokingly, that they wouldn't encourage their sons to go into the engineering profession, because the services to the community are not sufficiently recompensed. I do think that this Association, and other institutions of engineers, have a responsibility in encouraging other young and promising people to enter the engineering profession, to see that the standard of the engineering profession is kept up, and (I say this as a Councillor) to see that the rewards are sufficiently attractive to keep the men in the profession.

Now Mr. Simpson has invited me to say something about the administrative side, which I had not intended to do, but I will say that in Bulawayo we also have a Heads of Departments Committee, which meets regularly and advises the Council on certain aspects. This arrangement works extremely well, but I would sound a note of warning to Councillors in that they should not just sit back and accept everything that the Heads of Departments produce, because they must realise that they must take the ultimate responsibility, and not, if a policy as propounded by the Heads of Departments is wrong, blame the Heads of Departments for it. It is the Councillors that must take the responsibility. But I do suggest that this is a very excellent system to adopt in any Council.

Mr. President, with those few words, I formally second the vote of thanks to Mr. Mitchell for his very fine address.
(Applause.)

THE PRESIDENT: Thank you, Mr. Phillips. I can now see why Mr. Phillips started his remarks by saying that he is an engineer gone bad. It seems to me that he has now gone worse. He wants the councils not to accept the recommendations of the Heads of Departments!

Gentlemen, that completes the proposed vote of thanks and the seconding, and I would like you to show in the usual manner your appreciation of Mr. Mitchell's Valedictory Address, as well as the yeomen service which he has given this Association.
(Applause.)

(There followed a Convention announcement.)

I have a very important announcement to make. I have in front of me the results of the election of our Executive Committee.

For the Free State—Mr. Muller, Bloemfontein.

For Natal—Mr. Simpson, Durban.

The other four members are:

Mr. Sibson, Bulawayo.

Mr. Downey, Springs.

Mr. Kane, Johannesburg.

Mr. Giles, East London.

That completes the six members you had to elect. (Applause.)

Now gentlemen, with the new Executive coming in, I think it is our duty to say "Thank you" to the old Executives who have retired. Many of them have been returned, but to those who have not, we say "Thank you very much for your time, the spare time you have sacrificed, and the service you have done this Association". I can assure you it is appreciated.

The next business on our Agenda is the Engineers' Forum. I have great pleasure in handing over to Mr. Downey, of Springs.

Mr. Downey, will you come forward and take over your Engineers' Forum, please?

Mr. J. C. DOWNEY (Springs): Thank you Mr. President.

First of all, may I correct you, sir. This is not an Engineers' Forum any longer, it is a Members' Forum. Secondly, I want to tell you (you see I have a yellow rosette up), this is a job that Mr. Mitchell wished on me some years ago. I can't wear that little waistcoat he used to wear, but I am still wearing the rosette!

The boys were not appreciative of being an art gallery last year, so it has been agreed by your Executive, and as a matter of fact your Executive instructed me that the Beauty Parlour would remain on the floor.

First of all, let me just tell you the rules. The green is go, the red is stop, and if you don't stop, you'll get blown out by the sounding of the cymbal.

We have made out a list of the boys who are going to help us get this Forum started. You all have the questions before you.

Question 1:

In view of the rising costs of meter reading and the difficulty in obtaining suitable reliable staff: What are the objections of taking meter readings every two or three months, even if assessed accounts be sent in the intervening periods of the meter readings?

I will ask Mr. Sibson to open the discussion.

Mr. A. R. SIBSON (Bulawayo): Mr. Downey, Gentlemen. You said, Mr. Downey, that the job had been wished on you, but yours is no comparison to the

job you have wished on me of answering this question, which was presented to me a few minutes ago.

In the question I am a bit puzzled about the words "even if"; I am inclined to the view that it would be almost essential to send out some sort of accounts every month. It certainly would in Bulawayo, because it would surprise you perhaps to know that although I have only about nine to ten thousand domestic consumers some 600 move every month. I don't quite know why, but it is a fact, and that means that in three months, something like 12% to 15% of my consumers would have departed from one house to another, and this would introduce serious difficulties. One would have to send out proper monthly accounts in a case like that.

On the subject of assessed readings there are some Undertakings that adopt the policy of sending out to each consumer a printed card, with a facsimile of the meter upon it, with an invitation to the consumer to make a mark on each dial showing where the pointers of their meters are at a particular date. This, of course, is returned to the Meter Reading Office, and the meters are read out of situ, so to speak.

Every three months or so a meter reader is sent out to verify and bring up to date any errors which may result from the consumer's own readings. That is probably the best way of providing intervening accounts between the official visits of the meter reader, and I think there is something to be said for that procedure where you haven't got the rather serious problem of a moving population.

Of course the best system of all, and one that I hope we shall some day adopt in Rhodesia, is to have no meter readers at all, and that is brought about by the use of current limiting switches, which operate on varying loads, the consumers paying varying amounts according to the size of their switch, and that is the end of it. You simply send them out a monthly account, and no meter readers ever go near the premises at all. That is of course the ideal which is quite easy to accommodate to any supplies associated with hydro-electric. It is not quite so easy when you are dealing with thermal generation.



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Well, the answer then as far as I can see is that there are no objections to organising meter reading every three months, provided monthly accounts are sent in some form or other, and the best way of arriving at them is to invite the consumer to read his own meter on the card that I have described, although the method suggested here of assessing is also reasonably practical. The proposal would, however, have serious disadvantages if you had a very wildly moving population, such as we have in Bulawayo.

Mr. J. C. DOWNEY (Springs): Thank you, Mr. Sibson. Does anybody else wish to discuss this matter? You all seem to be shy. I'll give you the names of those on the Forum opening the discussions: Mr. Sibson, Mr. Mitchell (I have him where I want him this time!) Mr. Kane, Mr. Kinsman, (Councillor Kinsman, by the way; I beg your pardon!) Mr. Burger, Mr. Simpson.

This question is now open for discussion.

Mr. J. E. MITCHELL (Salisbury): Mr. Quizmaster, my Councillor representative here suggested that there was a definite reason why Bulawayo had 600 changes in consumers every month, and that was that they emigrated to Salisbury. In effect, of course, I cannot sustain that, because the number of movements in Salisbury is 1,000 a month! My experience is that there are very strong objections from consumers when they receive averaged accounts. We have used the cards suggested by Mr. Sibson for rural consumers, but not for the more-local consumers because of this great movement every month. I also feel that even if you did send accounts every month, the number of unauthorised connections which could take place within three months, and the numbers of meters which might be damaged, our statistics show, would be quite considerable. Although we would like very much from the Electricity Department's point of view to have readings once every three months, the City Treasurer on the points which I have raised now, usually convinces even me that monthly accounts must still prevail. Thank you.

Mr. DOWNEY (Springs): Thank you Mr. Mitchell.

Mr. W. H. MILTON (Escom Head Office): Unfortunately I was interrupted while the last speaker was speaking and I don't know quite what he has spoken on, so therefore if I duplicate this, I hope you will forgive me.

From the consumer's point of view it is usual to find that monthly accounts are preferred because most consumer's incomes are on a monthly basis. I have experienced the opinion from weekly paid personnel that they prefer to pay accounts weekly. This may mean considering from this point of view the interim accounts would probably be desired by consumers if the three-monthly meter reading basis is adopted. The quarterly account is then becoming an adjusting account. This may mean considerably more work for the Accounting Department, as intervening accounts paid would be required to be carried forward and balanced against the amount due in respect of the actual quantity supplied.

To offset these difficulties it must be admitted that the cost of reading meters would be considerably reduced. This is of particular importance in the case of static communities, and rural networks.

Wherever charges are raised against the consumers on the basis of measured maximum demands on a monthly basis, it would be necessary to change to quarterly maximum demand, and such a change might be difficult to justify as the benefit from normal monthly variation of the requirements of the consumer would be reduced considerably, that is on the quarterly basis. Admittedly many supply authorities hold the view that maximum demand charges should be based on an annual figure, and there is a group who consider it more desirable to differentiate as between the demand occurring between the potential peak months in a year and those occurring during the off-peak months of the year.

It would therefore be very valuable to those present to have the views of as many responsible persons as possible on this particular question.

Thank you, Mr. Quizmaster.

Mr. DOWNEY (Springs): Thank you, Mr. Milton.

I want to advise you gentlemen that the Forum is not confined to engineers and delegates. Affiliates may join into this discussion. We welcome it.

Mr. C. R. HALLE (Pietermaritzburg): Personally I think this will be settled by the Institute of City Treasurers, not by us. They handle the accounts, and the Post Office tried a three monthly account system on their telephones, and there has been such a riot in Martizburg that they have gone back to the monthly system.

We also find that every time we assess anybody's account, he happens to have been on leave that month, with the house locked up, and he is furious at getting his normal account at the end of it. Further, the lower-paid income group cannot stand this sort of thing, because they do occasionally have to economise and they get furious if their account doesn't come down accordingly. I do again suggest that we leave this to the City Treasurers.

Mr. J. C. DOWNEY (Springs): Thank you, Mr. Hallé. Is there any further discussion?

Cr. P. D. SANTILHANO (Cape Town): There is one aspect of this question which has so far not been mentioned, but which may be worth considering. While there may be some advantage in sending out accounts based on estimated consumption, it seems to me improbable that payment could be enforced. The success of such an experiment would therefore depend on the co-operation of consumers and it seems necessary that this be first obtained. Otherwise Electricity Undertakings would have additional work and therefore expense in their Accounts Departments without compensating advantages.

Mr. J. C. DOWNEY (Springs): Thank you.

Mr. L. LEWIS (Mossel Bay): I wish to refer to the suggestion made earlier that the consumer be required to read his own meter. This method would be very difficult to apply in the case where the tariff of charges consists of two parts, namely, a unit charge and a maximum demand charge, registered say, by means of a maximum demand ammeter. Since in this case it would be necessary for the consumer himself to reset this ammeter to zero after

taking the reading, it would be quite impossible to check the reading and it would have to be assumed that all consumers are honest and have read the meter correctly.

If, on the other hand, the meters were read only once in three months, it would presumably be necessary, in the case of a tariff which included a charge for maximum demand, to charge three times the amount for each ampere. This means that a domestic consumer who now pays say 2/- per amp. per month, would then be required to pay 6/- per amp. per three months.

I feel that such a charge would not be acceptable to most domestic consumers and they would become alarmed each time the meter registered an additional amp.

Mr. J. C. DOWNEY (Springs): Thank you Mr. Lewis. We shall continue now with the next question.

Question No. 2:

"What procedure would be recommended in the case of an electrical installation in an old block of apartments which, on test, was found to give unsatisfactory values on earth continuity resistance tests, as required in terms of the Standard Regulations for the Wiring of Premises. The installation generally was in a very sound condition, but no earth continuity path existed, due to the fact that split conduit with slip connections had been used set in the walls and concrete floors of the building?"

Mr. R. W. KANE (Johannesburg): Mr. Downey, Gentlemen. First of all assume that the unsatisfactory results obtained are much more than the one ohm or the new value of .2 ohm that is required in the Wiring Regulations, and is in addition also high enough in resistance to prevent the largest fuse blowing at the rated voltage.

I am rather surprised to hear that split conduit has been used in concrete. Does this mean that an adequate installation inspection by the supply authority has taken place, or alternatively the building has just come on the supply — in other words, some of these rural installations? Obviously an earth wire should be installed; and the very sound condition of

the installation would no doubt suffer owing to this interference. Probably an earth leakage breaker should be installed, but I may get shot for this further suggestion. I don't know where the question came from or what the system is, but if the multiple earth neutral system is in vogue, why not treat this as a special case and use all your neutrals as your earthing wire, or in other words extend the multiple earthed neutral. It may be policy, of course, to insist on a complete re-wirement, but the question doesn't give us enough to make a definite decision, but assuming that you don't want to re-wire, then the multiple earthed neutral system seems to be the only thing.

Mr. J. C. DOWNEY (Springs): Thank you, Mr. Kane. The matter is now open for discussion, gentlemen.

Mr. J. K. L. POMPE VAN MEERDER-VOORT (Harrismith): What about running an extra bare copper earth wire through the conduit—just a wire to each point? It would be more difficult in the case of lights, but this wire could be connected to the ends of the existing conduit with earthing clips; in the case of power plugs it is very easy to arrange. The fact of inserting this extra wire with the existing wiring might upset things—it might damage the insulation, but probably if the installation is not too old it would be possible to do this.

Mr. J. C. DOWNEY (Springs): Thank you. Is there any further discussion?

Mr. G. J. MULLER (Bloemfontein): Mr. Downey, this is rather a difficult question to answer. It depends largely on the age of this installation. If the wiring is so old but it still gives a good insulation resistance undisturbed, the chances are that even pulling a wire through, or any disturbance whatsoever, may upset that condition. On the other hand, pulling a wire through is still no guarantee that you have picked up every length of conduit in the circuit, and it is quite feasible to imagine if discontinuity exists that any one length of conduit may be isolated from its adjoining lengths, and it may be just that length which picks up a fault.

I have known a case where a floor was apparently alive, or the tap. Well the tap

couldn't very well be alive seeing it was connected to the water system, so it had to be the floor. It was extremely difficult to find out how this arrived, and actually this is what occurred. It was not split tubing, but in screwing this tubing either the paint used, or for some other reason, this length of tubing was discontinuous, and had picked a fault, and this conduit made the area around it alive, and standing on this floor, and contacting the tap gave a violent shock. How this can be overcome is beyond me except for a re-wire.

Mr. DOWNEY (Springs): Thank you, Mr. Muller. Any further discussion?

Mr. DE BEER (Johannesburg): Mr. Downey, the answer to the question depends on whether the Supply Authority have to comply with the wiring regulations or merely desire to make the installation safe.

If they have to comply with the wiring regulations they have no alternative but to re-wire the premises. However, if they merely desire to make the installation safe, so that there will be no loss of life in the event of any of the unearthed conduit becoming alive, there are on the market today very sensitive earth leakage devices which work down to currents as low as 10 to 15 milli-amps. If one of these was installed the installation would be perfectly safe without any further modification.

Mr. J. C. DOWNEY (Springs): Thank you, Mr. de Beer.

Any further discussion?

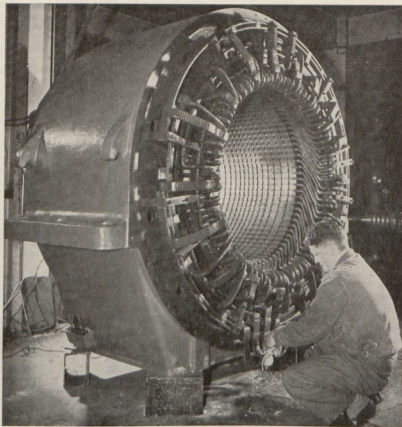
We will go on, then, to Question No. 3.

Question No. 3:

"What procedure would Supply Authorities adopt to satisfy themselves that all their consumers' electrical installations are maintained in a safe state of repair? Is it sufficient to work to a basis that on the average every installation will have some repairs or additions carried out that will necessitate an inspection and test over a period of years, say 10, and at that time to carry out an inspection of the rest of the installation? Or should periodic inspections be carried out? If periodic inspections are carried out, what is a reasonable period between such inspections?"

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Mr. J. E. MITCHELL (Salisbury): Mr. Quizmaster, I thought I'd stop sitting examinations about 30 years ago, but it would appear one sits down, has a series of questions put in front of one, and one is expected to answer them immediately. That is exactly what has happened to me!

In regard to the re-inspection of existing installations, there is quite a lot to be said for periodical inspections on the grounds of public safety, and I should think that a reasonable interval between such inspections in South Africa would be about ten years. However, the organisational problems involved in dealing with installations individually in this regard are considerable, and the only real way it could be carried out would be by re-inspection on a geographical basis covering all installations both old and new in turn in one area, because I think you all know, you can inspect a new installation one day — the family moves in — and within three or four weeks there are all kinds of things hooked up to that installation which you will not see, which the age of the installation does not govern.

The major trouble is cost. We did think about the re-inspection of installations in Salisbury to co-incide with the meter changing, which we do every ten years in accordance with the meter code, but when we took out the cost we found that it would increase our installation inspection costs by 75%. Consequently economics again come in. I think it can be said that all you can do is spend a certain amount of money keeping installations reasonably safe, protecting the public as far as it is possible at a reasonable cost. But it is rather like putting a lightning arrester on a transformer—you get a 10 kVA. transformer which has only cost about £60 or something like that, and it would be ridiculous to put on it lightning arrestors costing £120. It is just a question of economical insurance, and how far you can go in protecting the public against themselves. I think a reasonable amount of inspection can be done.

What we do do, and this helps quite considerably, is that wherever we get a complaint where the faultsmen has to go out and replace the main fuse, then that

house is inspected, or put on the list for inspection by the installation inspectors, and we do pick up quite a lot of unsafe installations that way. But to go through the whole of a place like, for instance, Johannesburg, every 10 years I feel would be very, very costly indeed, and what is more, you not only have to know where every installation is, but where every extension is round the back door.

Mr. DOWNEY (Springs): Thank you, Mr. Mitchell.

Mr. MATHEWS (Kimberley): Is it a function of the Supply Authority to act as the custodian of installations? I personally don't think so. Section 19 of the Wiremen's Act requires that any "wiring work done shall be inspected, tested and approved before being connected to a source of supply." This is generally done in the case of an installation of a new house. Assuming that this house is sold within a month of completion to a new owner, who does not like the arrangement of the plugs in the kitchen, these he will re-arrange for himself to suit his own convenience, because he is perhaps a "Do-it-yourself" fan. The re-arrangement is perhaps very dangerous, and contrary to the regulations. So that, until the next inspection, say 10 years hence, the potential danger exists. I see no logic in carrying out regular inspections as similar occurrences are possible immediately after any inspection. Further, if the Supply Authority decides to adopt a new set of wiring regulations which are more stringent than those presently applicable, is it right to condemn an installation on the ground that it does not comply with the current set of regulations? Again I do not think so. I believe that only by a campaign of publicity, pointing out the dangers of bad wiring, can unsafe installations be minimised. I would advocate such a policy before attempting to legislate for the conditions which are almost impossible to carry out, and could place the supply authority in a very embarrassing position in the future.

Mr. DOWNEY (Springs): Thank you, Mr. Mathews.

Mr. MIDDLECOTE (Pretoria): A small point. I think if the Local Authorities went to the extent of the regularly checking up

installations they would admit liability. I think that is a point they would have to bear in mind. There would be a sort of moral obligation, and I hate to think what would happen to the Local Authority should an accident occur in an installation in an area where such is the practice.

This point incidentally was noted overseas where certain authorities supplied links whereby the neutrals could be earthed on the supply side of the installation. The local authorities became aware that such practice could admit of a sort of moral obligation. It is a point that would have to be borne in mind.

Mr. J. C. DOWNEY (Springs): Thank you Mr. Middlecote.

Mr. W. H. MILTON (Escom, Head Office): Mr. Questionmaster, I think the crux of the question lies in the first paragraph as set out in the printed document. We are talking at the moment of periodic re-inspection from the aspect as to whether or not we should do so, and condemn an installation as unsafe after some period of time. The question that really arises is, if you do find an installation is in bad condition, what can you do about it?

At the present time, so far as I am aware, there is no legislation which would enable you to disconnect such premises. The only legislation which exists at the present time, requires that you must satisfy yourself that an installation is safe before you connect it to the supply. Once having done so, there is no question of disconnection on this count that I know of, and whether or not Municipal By-Laws, if passed, would be declared "ultra vires" is a matter for our Legal Adviser to consider.

As regards the obligation which is imposed upon the Supply Authority, it has been made perfectly clear that no legal obligations whatsoever fall upon the Supply Authority arising from having tested and approved an installation. In the event of a fatal accident, say happening after an installation has been so approved, they could not claim against the Supply Authority for having said that, in its opinion, it was safe. I think that is an answer to some of the remarks already passed.

Mr. J. C. DOWNEY (Springs): Would Mr. Burger like to clear up Mr. Milton's point about the right of disconnection?

Mr. A. P. BURGER (Parow): Mr. Quizmaster, the answer there is that you need special legislation to enable you to do so.

Mr. J. C. DOWNEY (Springs): Thank you Mr. Burger. Are there any further discussions on this point, gentlemen?

Mr. P. BECHLER (Newcastle): Mr. Questionmaster, I am very surprised to hear that when I find out an old installation is not safe, that I have not the right to disconnect it. For instance, if an accident occurs in that house, I understand from my training that the engineer in charge would be responsible for it, because he did not disconnect the consumer.

Mr. J. C. DOWNEY (Springs): Thank you, Mr. Bechler.

Mr. G. J. MULLER (Bloemfontein): Mr. Downey, the previous speaker made the point that I wanted to make myself. I feel that it is a legal responsibility once you know of a dangerous condition existing which you do nothing about. Not knowing about a condition, I do not think that the Council would have any legal responsibility at this stage to inspect every installation and ensure that it is safe after it has been officially passed, but if, for any reason whatever you become officially aware of a defect, and you do nothing, I think you are legally responsible for any accident that may occur.

Mr. J. C. DOWNEY (Springs): Thank you, Mr. Muller. Gentlemen, I must warn not to get off the point of the question. You are veering away. I asked Mr. Burger to answer the question. Be sure that you keep to the question in hand.

Any further discussion?

Mr. P. L. VERGOTTINI (Brakpan): Mr. Quizmaster, whenever you have a serious electrical accident, you can rest assured that the Department of Labour will institute a thorough investigation to ascertain whether or not you have taken proper steps to prevent the possibility of such accidents as far as is reasonably practicable. Whether you have inspected and approved the installation when it was installed doesn't seem to carry much weight.

You have, according to the requirements of the Factories Act, to cause all electrical apparatus and conductors to be so selected, arranged, installed, protected and maintained as to prevent danger to persons as far as is practicable. This seems to be the deciding factor of all these investigations.

We do the same as is done in Salisbury, i.e. when a faultsman replaces main municipal fuses, he makes a rough inspection of the installation and if he thinks an inspection by the installation inspector is necessary he reports back and an inspection is arranged.

Mr. J. C. DOWNEY (Springs): Thank you.

Any further discussion, gentlemen? Then we shall proceed to Item 4.

Question No. 4:

"In this country it is common practice for 11kV. cable end box glands to be plumbed on to the lead sheathing of cables. The armouring is similarly secured to the sheath a few inches further down, leaving a vulnerable section.

I have in use both this and the Rand Mines type of make-off and find the latter safer from experience.

Are there any special advantages attaching to the former type?"

Mr. A. R. SIBSON (Bulawayo): Mr. Quizmaster, if by the expression "former type" is meant exactly what is written here, then I can see very few advantages, but I am amazed to learn that it is common practice in this country to cut the armouring back several inches below the wipe. It certainly is not the practice in Rhodesia. We always carry the armouring up and it is clamped on to the gland above the wipe, giving a certain amount of mechanical protection. Unquestionably where wire armouring is used, I'm sure this is the practice, and it may be that the question has been put by one who uses tape armoured cable, and I know that on occasions it has been treated in the way suggested. But even with tape armoured cable it is quite possible, and preferable, to carry the armouring right up over the wipe and on to the gland.

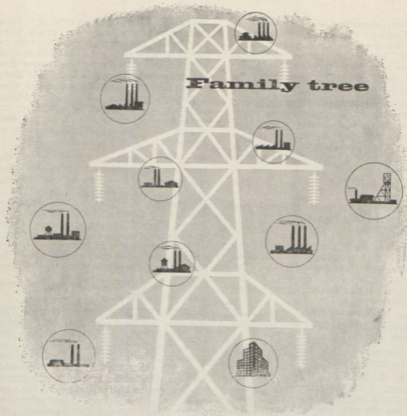
The use of the Rand Mines type of joint on 11 kV. cable, I would deprecate myself

very much. 11kV. cable, as most of us have learned, is a very tender and gentle plant that needs the greatest possible care in handling, and with the Rand Mines type of joint there is always the danger that the person installing it will be less likely to be aware of the problems involved, than a properly qualified cable joiner. Almost certainly on occasions he will pour his metal too hot, which will do a good deal of damage to an already delicate piece of equipment.

So the advantages attaching to the former, using my meaning of the word, that is a properly made-off wiped joint with the armouring carried over, and clamped on to the brass gland, the advantages are that it has to be installed by a proper cable joiner, who will have been trained (I hope) in all implications of the work he is doing, and the work should therefore be very much better done than usually would be the case with the Rand Mines type of joint.

Mr. J. C. DOWNEY (Springs): Thank you, Mr. Sibson.

Mr. W. I. LOUW (Johannesburg): This question has been debatable for quite a considerable time, and I feel the only real advantage that the Rand Mines type joint has over the wiped joint is the time factor, as well as that it lends more mechanical support. The whole crux of the matter is the longitudinal strain taken by the tape or wire. In a very large municipal undertaking, they invariably terminate the armouring in the trench, put a copper sleeve over the armour and lead to secure bonding, and then bring the lead up and terminate it with a proper wipe on to the gland. This installation, if it is properly supported by means of wooden cleats, looks very much neater, and the longitudinal strain on the wipe is overcome by virtue of the supports. I must agree with Mr. Sibson that the ideal cable installation today is to bring the armouring up all the way, and plumb your sheath to the gland with a proper wipe, and then bring the armouring up over the wipe and clamp it with an armour clamp on to the top of the gland. To summarise briefly I would say that the wiped gland is a much neater installation than the Rand Mines type and equally safe, if properly supported, and



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the only advantage I can see is that the Rand Mines type joint saves a lot of time.

Mr. J. C. DOWNEY (Springs): Any further discussion?

Mr. R. W. KANE (Johannesburg): Mr. Quizmaster, I rather feel that one of the reasons for this, shall we call the armoured gap type, could be explained by at least two of our honorary members, but I don't think they are here this afternoon. Frankly I don't know why this particular type is used, but I'd hazard a guess. In the first place the complete protection of the cable is more necessary in the mines because of working conditions.

But I think you will find that the stripping of the armour and jute was first of all introduced because of bitter experiences in cable tunnels during fires. In other words, in the normal sub-station installation you strip your armour and jute back and merely leave the lead in the trench and in the sub-station, and probably that habit has developed into the standard type of practice, even though there is only a few inches of gap left in certain installations.

Mr. J. E. MITCHELL (Salisbury): Mr. Quizmaster, I was also surprised to learn that this type of make-off of armoured was generally in use in South Africa. As far as I myself am concerned, I have always advocated the use of wire armouring, and wire armouring is used throughout in Salisbury, so that we can actually cover the actual wipe. One of the features which I feel should be brought out in connection with the Rand Mines type is not that it takes less time. I am willing to bet that if you get a very good plumber pointer he will do a wipe joint faster than he'll do a Rand Mines type of joint, and when it's finished you can see whether it is a workmanlike job. On the Rand Mines type you can't see. It actually covers up the workmanship and you can't see whether it's a really good job. That is one of the very dangerous features of that type. I do, however, say that in what we might call a picture job in a sub-station, there it might be possible to finish off your armouring well below the gland in order to make a very fine-looking piece of work, but there of course you can carry on your bonding without using the armouring on to the lead at all.

Mr. J. C. DOWNEY (Springs): Thank you Mr. Mitchell.

Mr. P. L. VERGOTTINI (Brakpan): Mr. Quizmaster, I really don't see why the armouring, if secured to the sheath a few inches lower down than the wipe, will be the cause of any trouble on 11 kV. I personally feel that all the trouble we are having with 11 kV. cables in this country is primarily due to the latest specification that we have been following on 11 kV. systems. We are inclined to handle 11 kV. today like a person handling hot bricks. I think the answer to the question is that the specification is really due for revision, especially in South Africa where we have severe lightning conditions.

Mr. J. C. DOWNEY (Springs): Thank you.

Mr. A. F. TURNBULL (Vereeniging): Regarding the Rand Mines type of make-off for cables, there is no doubt about it that on the mines themselves, and for mining conditions, this is a more robust and substantial way of terminating the cable. On an 11 kV. distribution network, however, there is an aspect which makes this rather impracticable. The manufacturers of switchgear usually provide an extremely large gland for terminating cables, ranging in size, and if you use the Rand Mines method, you have to use a tremendous amount of metal, and in using this quantity of metal you have a tendency to overheat the cable. I think generally the better way of doing it is to have the lead sheath plumbed to the gland and bring the armour (wire or tape) up, and clamp it to the gland.

Mr. J. C. DOWNEY (Springs): Thank you.

No further discussion on this point? We will go on to Question 5, gentlemen.

Question No. 5:

"It is accepted today by most Electrical Engineers and Councils that the electricity supply undertaking should be operated as a sound business concern and that tariffs should not be manipulated arbitrarily for the sole purpose of obtaining additional revenue to balance the budget of the Local Authority.

"What then can the ratepayers, or whoever put up the capital for the Undertaking, expect as a reasonable percentage annual return after adequate provision of redemption, maintenance, etc., had been made, keeping in mind that electricity is today an essential commodity?"

This one is for Councillors, so I'll call on Councillor Kinsman to open the discussion.

Cr. C. KINSMAN (Durban): Mr. Quizmaster, I am almost in the position of telling you that I need notice of this question. I haven't had that notice, but for all that I'll dive in!

I have always held the view that within certain reasonable limits the Council, as representing the ratepayers, is entitled to some profit from the Undertaking.

In Natal this aspect has been very wisely regulated over a number of years by a provision in the Ordinance which says that Local Authorities may appropriate in relief of rates an amount not less than two and not more than four percent of the gross loan debt in any one year. This operated, to my mind, quite satisfactorily, and it didn't lend itself to specious tariff making so as to make a big profit, when there was probably likely to be a deficit in the Borough Fund. The minimum was two and the maximum was four. But unfortunately we had a very interesting experience in Durban. I say "unfortunately" because it was detrimental to the electricity revenue, and the experience was this. Durban, right from the year 1902 to the present day, has run its own telephone system. Some years ago the Government established its legal right to take over that telephone system at some future date, and after protracted negotiations the City Council entered into an agreement with the Government, an agreement which has been renewed from time to time, in which the Council recognised the ultimate right of the Government, but in the meantime retained the right to run the telephone undertaking for a period of ten years at a time. But tied up with that the Council accepts the moral obligation of treating its staff and charging the same tariffs as the Government does. Now the result of that is this: that operating a telephone system in a closely

developed area, naturally the cost is much less per consumer than the Government is faced with in operating in country and sparsely populated districts. Charging the same tariff as the Government does, the Council is making great profits out of its telephones. The Government takes 25% of those profits, but the Council still makes good profits that it doesn't know what to do with, and they got the Provincial Council to amend that Ordinance that, in respect of trading undertakings—and the telephone is one and electricity another—that percentages may be exceeded in any particular year with the consent of the Administrator and Executive Council. Now I think the telephone percentage went up to 17% on one occasion. The council took this opportunity when it needed money for the Borough Fund to take from the electricity up to six percent. It had to get the Administrator's consent, which was obtained. The point I am coming to is this: I have always held the view, before I became a Councillor, that almost as a licence for the monopoly for the use of the Borough streets, and things like that, the ratepayers are entitled to some contribution to the rate fund and I still think that something in the region of 4% of the loan debt of the Undertaking is not an unreasonable amount.

Mr. J. C. DOWNEY (Springs): Would any other Councillors like to discuss this matter?

Cr. P. D. SANTILHANO (Cape Town): Mr. Quizmaster, like the previous speaker this question of from Electricity to Rates has also caused me considerable anxiety. As chairman of our Electricity Committee, my purpose is to further a policy that will give consumers an efficient service at a cost which in our circumstances is reasonable. By such means we should be encouraging growth, attracting industry and indirectly contributing to the well being of our City. I, however, always have to remember that while appreciating the trust my colleagues have placed in me by appointing me to the Electricity Committee, I also am a City Councillor and have some responsibility for keeping the City's finances on an even keel. In that capacity, I have to give sympathetic understanding to the requirements of our ever needy Finance Minister. To

balance his budget is a far from easy task. He has to rely mainly on his Rate income to meet the ever growing demands for services the City has to give. Now the Rate is a far from satisfactory tax for its incidence falls far too heavily on the poorer sections of the community. We have no power to alter this but it explains the reluctance on the part of our finance chairman, and with this I agree, to raise the rate. If, therefore, electricity can make some contribution to alleviate the general position, there seems to me no valid reason why it should not do so, subject to one proviso—the demand must not be such as to become a hindrance to the healthy development of the Undertaking. And it should be borne in mind that such payment is not just a gift. The Electricity Undertaking receives privileges and services from the city which are valuable and for which no charge is made. We occupy a substantial area of land for Power Station and Sub-Station use, on which Rates are not levied, our distributive network is dotted all over the city, also without charge to us. Finally all our capital requirements are met from loans raised by the City, for which we are charged the same interest rate as the city has to pay. This means that we obtain the money at a lower rate than we would be likely to secure in the market if we went as independent borrowers, for the security of the entire community is far superior to that of a single Undertaking. The Ratepayers, in fact, act as our guarantors, and for this are, in my view, entitled to a fee. I have spent the greater part of my life in banking activities, and have frequently been called upon to give guarantees but never without payment.

Careful consideration of all the circumstances brings me to the conclusion that a proper assessment of the value of services received would form a just charge to the Electricity Undertaking.

Mr. J. C. DOWNEY (Springs): Thank you. Any further discussion?

Mr. W. H. MILTON (Escom, Head Office): Mr. Quizmaster, there is one point that I can't allow to pass, and that is the manner in which the question has been put.

As the question is put, one is asked what the ratepayer is entitled to, in addition to

redemption of a loan and reasonable interest rates. After all, if you are dealing with capital on that basis, I should say the lender is entitled to nothing, because, on the guaranteed re-payment basis, he will lend the money if the interest rate is attractive, and he will therefore be satisfied to lend, at a fixed rate of interest, on the guarantee that he gets his money back after a given period of time.

From that point of view, therefore, the answer is that the ratepayer is entitled to nothing, even if the ratepayer happens to be the lender of the money. If you are dealing with risk capital, then you have got to study the risks which are involved. The risks arise from possible bankruptcy, or from, shall we say, deficits. If those deficits are allowed to build up, as an amount due for redemption by the electricity department, once again the ratepayer is hardly entitled to anything. If you are dealing with bankruptcy, then the risk is very, very small because, as far as I am aware, there have been only one or two cases in this history of the Union where a local authority has virtually gone bankrupt.

From that point of view, therefore, if this is a question of the accumulation of money against risks and contingencies, then, to my way of thinking, any surpluses which are made by the electricity department should accrue to that department, as providing a pool of money against such risks, so that if bad times come, the electricity department can still stand on its own feet without calling for outside relief.

From the point of view of the utilisation of streets and roads for the running of poles and wires, if you are dealing with a commercial organisation and not an electricity department, you would probably raise some charge for servitudes. From that point of view, therefore, a reasonable charge could justifiably be raised against an electricity department.

If you utilise the monies from an electricity department towards relief of rates, you are in effect taxing by one medium for a different purpose, and the method of taxation for that other purpose is definitely laid down by Provincial Ordinances, which provide the means of raising money for purposes other than, *inter alia*, the supply of electricity.

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If you can say that the relief on ratepayers is similar in every respect to the amount that is contributed to surpluses from the electricity department, when you are at the same time limited by having applied maximum rates, perhaps the easiest way out would be—instead of charging for electricity—to raise an additional rate and supply electricity free, just as water is done in many instances.

Mr. J. C. DOWNEY (Springs): Thank you Mr. Milton. Any further discussion?

Cr. N. C. KORSMAN (Benoni): Mr. Downey, the only thing I would like to know from the "Brains Trust" is what would be called a reasonable profit on electricity? Also, what would be the amount, and where should the surplus go? Should it go to paintings; or to sporting bodies, so that they have free bowls; or should it be put in a reserve for the times that electricity may become more expensive and so enable tariffs to be left as they are?

Mr. J. C. DOWNEY (Springs): Thank you, Cr. Korsman.

Mr. J. E. MITCHELL (Salisbury): Mr. Quizmaster, throughout the discussion so far, it would appear that ratepayers are different people from electricity consumers. But surely, in these days, every ratepayer is an electricity consumer. It is merely a question of out of one pocket and into the other. You need a certain amount of money to run the town. In one way it is easy to raise it—that is from the electricity department. In another way, to put up the rates, is difficult, especially politically, and therefore councillors are liable, most times, to use the easy way out, of allowing the tariffs to be increased for electricity in order to foster some of their schemes, which they obtain authority for on the political floor when they asked for an increase in rates.

In fact, there is a certain amount of money required for running the electricity department and a certain amount of money required for running the town itself. It all comes out of one pocket, and that is the ratepayer's. As I see it, the electricity consumers are the ratepayers, and therefore, I feel with Cr. Santilhana, undertakings should be run just as a business, and should pay a fair charge for use of

land, use of roads, and use of streets, but should endeavour again, as I said in my valedictory address, to give the best possible service at the least possible cost.

Mr. J. C. DOWNEY (Springs): Thank you. No further discussion?

Mr. A. R. SIBSON (Bulawayo): Mr. Quizmaster, it is quite a long time since we had a good rip-roaring argument about the relief of rates, and although I see the time for tea has arrived, I hope you will forgive me for making a few short remarks.

It seems to me that Mr. Mitchell is not quite right when he equates ratepayers with electricity consumers. I am surprised that he, of all people, should have made that statement after the trouble he has had with his consumers that are not ratepayers, but are in his licensed area of supply. If he is confirming his remarks to consumers within the rateable area, then there is a good deal to be said for his point of view, and my own feeling is this, that every town or city should sit down at some stage and consider what it's there for, what its main function is. To give you an example of what I mean.

In Bulawayo, we decided, long ago, that the only possible reason for the city's existence was its development as an industrial centre. We can never hope to do very much else than be an industrial centre. If that is so, then the important thing is to see that industry is attracted, and one of the most powerful incentives to industry is a low price for its essential commodities. Of those, electricity and water are both things which are supplied by the municipality, and are used to a large extent by industry. It would therefore be plainly stupid for Bulawayo, if it wishes to encourage industry, to take money from either water or electricity in order to improve its parks, or swimming baths, or anything else of that sort which is not directly associated with industry.

There is, however, a case for extracting money from electricity to support water, because water happens to be very expensive in our part of the world; and electricity, due to geographical reasons, is a little bit cheaper than it is elsewhere. Therefore, there is a reason for subsidising water by electricity, if it is agreed from the

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start that the main function of the town is to encourage industry.

There are other towns where quite different considerations might apply. It may be that parks and amusements and other cultural amenities may be more important than the cost of electricity and water, in which case a very different approach would be necessary. I feel that every town has to consider these fundamental matters, and design its policies to match its requirements.

Mr. J. C. DOWNEY (Springs): The time is now up, gentlemen, and we shall adjourn for tea. We will resume our proceedings of the Forum afterwards.

TEA ADJOURNMENT

On Resuming:

Mr. J. C. DOWNEY (Springs): We were dealing, as you know, with Question 5. Are there any other members who wish to discuss item 5?

Mr. C. R. HALLE (Pietermaritzburg): I would like to say that as a Manager of Public Transport we have no difficulty in deciding what to do with our profits! (Laughter.) In fact, I'd like to tell you that at the conference in East London, Mr. Gates, the Manager of Johannesburg, said that the size of a city's deficit on transport was an indication of that city's prosperity. So I really think in these days of prefabricated finance, where electricity has to pay the cost, the full cost, and everything plus the cost, that the day may come when we will not have these big surpluses, or the worry of what to do with them. In fact, I can say that our city treasurer is charging so much to revenue because he can't raise the capital, that I don't know if there are going to be any profits. I think that this is a case where we ought to have a few city treasurers here to enjoy themselves!

Mr. J. C. DOWNEY (Springs): Thank you, Mr. Hallé. Any further contributors?

Mr. J. F. LATEGAN (Stellenbosch): Mr. President, you no doubt know that Stellenbosch has the most peculiar set-up in the Union. It has a valuation of nearly £4,000,000 non-rateable, being University and other Provincial and Government buildings.

Mr. J. C. DOWNEY (Springs): Thank you, Mr. Lategan.

No further contributors?

We shall proceed to the next question. I have asked you to skip No. 6 for the moment.

Question No. 7:

"Can a satisfactory scale for Engineers be evolved taking into consideration the following factors:

- (a) Units generated.
- (b) Units bought.
- (c) Units sold.
- (d) Savings effected by skillful control of the distribution system.
- (e) Extensions and improvements when the work is done by the Department and the consulting work is done by the Engineer.
- (f) Contribution to relief of Rates, subsidised street lights, Town Clerks' and Town Treasurers' Departments.
- (g) Privileges, such as free house, telephone, water, electricity, health services, subsidised transport.
- (h) Continuity of supply.
- (i) Savings on Staff."

Mr. R. W. KANE (Johannesburg): Mr. Quizmaster, I would suggest that a satisfactory scale could not be produced. I doubt the value of any such scale. In fact the minimum value scales produced by the Association some years ago I think did a fair amount of harm.

All the factors mentioned in the question could only be consistent if these were investigated by one permanent group or commission operating throughout the country, and I suggest that the personality, the qualifications, and such factors could also influence their decisions.

Dr. G. M. MARAIS (Pretoria): Mr. Quizmaster, I'd like to support Mr. Kane and generally point out that there are three basic systems on which to pay employees for their services. The first is the straight pay in which productivity takes no part in the emoluments received by the person. The second system is a straight incentive system, where pay is directly proportional to the productivity of the person, and the

third is a combination of the two, known as the Roan system, Healthy system, and a couple of other systems.

Now these systems are applicable to persons performing routine tasks. The engineer by virtue of his being an engineer does not perform a routine task. The engineer must decide whether he is a professional person or a routine worker. If his emoluments are to be based on an incentive system, then he must consider his status to be that of a repetitive productive worker. In any case, if the salary scales for engineers are to be based on an incentive system, then as is quite general with all incentive systems, the basis scale would be reduced to such an extent after the course of a year or two, that his total emoluments, basic plus incentive, would be virtually the same as now, with the basic forming approximately 80% of the total take-home pay.

The solution to this question lies not in an incentive system, but in an improvement of the general status of an engineer, whether it be a generally recognised status in society.

Mr. J. E. MITCHELL (Salisbury): I think if we had to work out a scale of salaries for electrical engineers, taking into account all the factors mentioned in the question, every Council would have to purchase an electronic computer! All I wanted to say, Mr. Quizmaster, was this: a paper was given on this subject at the 1945 Convention by Mr. Powell who was then at Bloemfontein, and if anybody wishes to look back under their proceedings they will find full details of how a scale of salaries can be worked out for municipal electrical engineers.

Mr. P. L. VERGOTTINI (Brakpan): Mr. Chairman, I think that on this question the least said is the better. We shouldn't discuss this matter at all. You don't find Town Clerks, Town Treasurers, etc., wishing to discuss their merits and scales they should be paid. They are not journeymen, they are professional men. We should leave this matter alone.

Mr. J. L. VAN DER WALT (Krugersdorp): I would like to add to what Mr. Mitchell said. The original schedule referred to by him was amended subse-

quently. I'm not sure, but I think it was in 1952/53. The Convention should be careful about members adopting the old scale as a recommendation to their Councils. There is a later amended one, and it may even be desirable now to amend it again. Either that, or fall in line with the market values of today.

Mr. H. M. S. MULLER (Upington): Mr. Quizmaster, Mr. van der Walt had just forestalled me in reminding you that there was something of the sort during the year mentioned by him. That scale has given sufficient guide, I should say so far, but what intrigues me here is Item (e) "Extensions and improvements . . ." It raises the question whether the engineer should do consulting work or not. I should say that a lot of them are loath to take work which is a local matter, and that they should take as consulting work. I can assure them they will never get any thanks from the public or the Council. I know that from bitter experience. After all, they have the satisfaction of knowing that they have arranged things as they want them, and fruitful years will certainly follow. But I should say this should be tackled with great discretion.

The next is Item (g) "Privileges as such." Emphatically I have always said, do not give them any privileges which are not extended to the public. Give them what they are worth in salary.

Item (h) "Continuity of supply." Does that pre-suppose that if you don't get a higher salary you are going to have a few blackouts? (Laughter.)

Then Item (i) "Saving on Staff." Well, it is the duty of all of us to try to do with a limited staff. We always expect sensible Councillors to support our paying our men what they are worth. I have never asked for overtime, though I did years of it, but I want it for my men. If I couldn't get it, there was trouble, but I have never regretted the hard work I put in. I think all of us would recognise that duty.

Apart from all this, if you work for a private company they will realise your value. A municipality unfortunately does not do that. It is all a question of a man's worth and his value. It is not necessarily a question of status either; it is a question

of what he has done and how he is managing.

Mr. J. C. DOWNEY (Springs): Thank you, Mr. Muller. Any further contributions?

We'll go on to Item 8, then.

Question No. 8:

"What is the scope, limitation and duty of a Municipal Council as regards the Electricity Department and Staff, and similarly the Electricity Committee?"

Cr. C. KINSMAN (Durban): Mr. Quizmaster, when I was told that I would have to open the discussion on this subject, I hoped that it had finished at the words "Municipal Council". That would have been quite an easy matter on which to speak for half an hour; but the question goes on to say "as regards the Electricity Department and staff". I would say that denotes that there is or should be a distinction between the two. I cannot accept that. The address given to us by Mr. Mitchell I think very largely answers what the duty of the Council is in respect of its Electricity Department.

Having said that, I can see no specific answer to the question "What is the scope, limitation and duty of a municipal council as regards the electricity department and staff" other than to say this: recognising their duty to the public particularly the heavy responsibility because it is a monopoly; and to do all those things for the good of the community—the community whom they serve—both the elected Councillors, and the appointed staff should operate on the best managerial principles—assuming the Council is the Board of directors, its committee is an advisory committee under that board, and the engineer is the manager. Then if those things are recognised, I see no possibility of laying down what the scope of a board is in regard to its manager. Well, of course, its scope is hiring a man and firing him, for that matter. And the limitation? I can see no limitation. Whether it is the intention to differentiate between the manager (the engineer) and his Council, then I'm afraid I can't give an answer to that. I can only suggest that in my view the two are complementary to one another; the one cannot operate without the other, and

assuming they are both actuated with a desire to serve their public, whom they do in fact purport to serve, then they must only adopt the best working arrangement between Board and Manager. Whether it is suggested that the Chairman must not go and tell a jointer what he has to do—I am not prepared to discuss that, because I cannot conceive any Councillor trying to do his duty properly, would attempt to usurp the functions of an engineer whom the Council must have confidence in, otherwise I cannot understand them continuing to employ him.

So I'm afraid it is a very poor introduction to it sir, but that is as I see it. It is a most difficult question to answer.

If it were a question—I would be quite happy, and I think quite a lot of my colleagues would join me—of suggesting that there might be some limitation in the scope of the City Treasurer in regard to the engineer, but when it is between the employer, the Council, representing the burgesses, and the Engineer himself, then I'm afraid I can't give any specific answer to that, other than what I have attempted to do.

Mr. J. C. DOWNEY (Springs): Thank you, Mr. Kinsman.

Any other contributors to this question?

Mr. W. H. MILTON (Escom, Head Office): Mr. Quizmaster, I have entered the field of discussion again. I feel I must speak on this particular point, because I have probably a wider general experience of the attitude of Council towards engineers, and vice versa, than anybody present in this hall today, in that I get the troubles and the complaints and requests for advice from a large number of municipal authorities, and not only on the engineering side but sometimes from the Council's side.

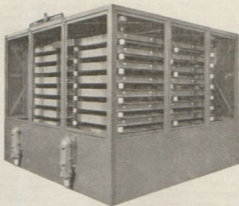
I think that Mr. Kinsman has put the case very well from both Council and engineering point of view. I think he spoke in his dual capacity when he did speak! But I think Cr. Kinsman is dealing with this problem from his own experience, which must have been a very fortunate one.

There have been quite a number of cases where the engineers employed by the Council (and these include consulting

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engineers also), from time to time have put forward very sound advice on technical matters. That advice, however, is some times overlooked, or rejected in many instances, by Councillors who know virtually nothing of the subject with which they are dealing. One may wonder why Councillors adopt this particular attitude. In many instances it is quite a reasonable one, and it seems to arise from the fact that, when furnished with explanations by their technical staff, they fail to understand those explanations, and having raised a point of disagreement with their technical staff, and having failed to obtain an explanation which they can understand, they tend to form the opinion that their objection must have very sound grounds.

They are, however, in most instances, entirely at fault. If we were the medical profession and we started talking in medical terms to our Councils, the Councilors would accept anything we said, although they completely fail to understand the technical jargon used, and when demanding an explanation of those technical terms, would still be completely in the dark, having received an expert's explanation in further technical terms. But when it comes to a question of electricity generation and electricity supply, unless you are talking in terms of money, there is at times a complete misunderstanding on the part of the Council, and probably a natural human reaction towards anything they don't understand, which is that they won't have anything to do with it.

With this aspect in view, I think there should be some recognised limit of Council interference on the technical side. When it comes to the financial side, they must, of course, have full control, because they take that full responsibility from the financial aspect. But even then, if, for example, an engineer comes forward with a reasonable request for approval of expenditure on his network, or expenditure in connection with an extension of his generating plant capacity, and explains how much it will cost, the Council must be made to realise that any curtailment of that expenditure means reduced effectiveness of the service rendered, even to the extent of forcing the engineer to say to certain consumers requiring additional supplies that they can't have those additional supplies. It is no

use the Council turning round later and saying, "This is not our fault", nor to claim that they should have been properly advised.

From that point of view, I would sound a note of warning that, when interfering with provisions for development, Councils should be fully satisfied that they are justified in taking such steps and they should also take the full responsibility for the repercussions of those steps.

Mr. J. C. DOWNEY (Springs): Thank you, Mr. Milton.

If there are no further discussions, we will go on to No. 9.

Question No. 9:

"What are the 'Regulations' of the Electricity Act 1922 and where are:—

- (a) they obtainable?
- (b) can a supply authority disclaim responsibility for all fluctuations in pressure (V) including temporary absence of pressure (V) of electricity?"

Mr. A. P. BURGER (Parow): Mr. Quizmaster, the regulations are regulations made by the Minister and published in the Government Gazette. They are obtainable today from the Electricity Control Board. Unfortunately I have no copy available, but Mr. Milton has kindly come to my assistance here, and he has organised it so that copies of these pamphlets will be available here tomorrow so they can be seen and inspected. (b) My answer is: in my opinion, no.

Mr. J. C. DOWNEY (Springs): Thank you, Mr. Burger.

Mr. A. F. TURNBULL (Vereeniging): Regarding (b) of the question, "Can a supply authority disclaim responsibility?" In terms of the regulations under the Electricity Act, the supply authority must maintain voltage within + or - 5% over a period of any ten consecutive minutes, I am not sure if that is absolutely correct, but that is how I understand it. Therefore the onus is on the supply authority to maintain the voltage as close to those limits as possible. And in doing so I feel that it would reflect to an extent on Question 5, surpluses from electricity and trading. If we are to maintain voltage to the consumer

within the limits set, the capital outlay would be such that I don't think we need worry whether we have any surplus or not; there will not be any, unless we increase electricity tariffs considerably. We have, as part of our annual budget, been allowing each year a considerable sum of money, not only for normal extensions, but purely to improve the voltage to the consumer. Any undue variation in voltage has a detrimental effect on most electrical apparatus, and I feel it is, therefore, the duty of all suppliers to maintain that voltage, as close as it is practicable to the stipulated requirements.

Regarding the temporary absence of pressure (V) of electricity through failures, that I feel is something beyond our control, especially when we have problems regarding 11 kV. cables which have caused us considerable concern. There again I feel the supplier should take all steps by providing suitable protection on feeders to isolate failures, so that the consumer is put to as little inconvenience as possible.

Mr. R. W. KANE (Johannesburg): Did I understand, Mr. Quizmaster, that Mr. Milton is going to have copies of the Regulations available or is he going to issue copies tomorrow?

Mr. W. H. MILTON (Escom, Head Office): I will be able to get only one copy through the good offices of Mr. H. Alexander who is on my left, and we can have the contents of those regulations read out tomorrow should you so desire, and the Executive agree. I think it would be highly desirable, as there seems to be some ignorance on this point.

Mr. R. W. KANE (Johannesburg): Mr. Quizmaster, I just want to suggest that Escom are lagging; I have a spare copy for the questioner.

Mr. J. C. DOWNEY (Springs): Thank you, Mr. Kane.

Mr. W. H. MILTON (Escom, Head Office): Mr. Quizmaster, please place it on record that for the first time in all my travels, where I may have been faced with some business to do, I have travelled without a copy of the Electricity Act, including the Regulations. It was only when I opened my bag this morning to pull out the Act

to deal with this particular point that I found I had left it behind.

The Regulation lays down, as has been correctly reported, that it is + or - 5% and I think the period of time is also 10 minutes. That can be cleared up. But the Regulation does provide for a greater variation and also a difference from standard voltage as laid down in the Regulation. If you want to depart from the conditions of the Regulation as regards standard voltage or the period during which you will provide for the variation of voltage, within the limits agreed, then you can do so by agreement with the person receiving the supply. You must, however, reach agreement with your consumer. In other words, failing a notice to the contrary which is accepted by the consumer concerned, you are definitely tied by law to the maximum variation of + or - 5%, and also the period during which that variation may occur. Short time variations, of course, are not covered in the Regulation, and they are not limited. The Act itself deals with disconnection. You will also find that the frequency is dealt with in those regulations. You can again agree to depart from these requirements, as provision is made for agreement on the point, between the supply authority and the consumer. It is important, that such agreement be recorded. At the present time, in most of Escom's network supplies we have increased the variation to + or - 7%, which is very substantial but very necessary in these days of high conductor and transmission costs.

Mr. J. C. DOWNEY (Springs): Thank you, Mr. Milton.

Mr. R. M. O. SIMPSON (Durban): I also have a copy of the regulations here, Mr. Chairman, if anybody would like to read through them. If you like, I'll read them now, the ones relative to the case. Would you rather leave it until afterwards?

Mr. J. C. DOWNEY (Springs): We are pressed for time now, gentlemen.

Mr. J. L. VAN DER WALT (Krugersdorp): Mr. Quizmaster, with due respect to our Legal Adviser's opinion, it is still a legally debatable point whether municipal electricity undertakings are subject to that regulation under the Act.

Mr. J. C. DOWNEY (Springs): Thank

you, Mr. President.

Mr. P. BECHLER (Newcastle): Mr. Questionmaster, I have listened to all of what the Afrikaner calls "groot koppe". I wonder whether there is some colleague here who is in charge of a small station, with a three phase system? Let me assure you it is a very difficult job to control the pressure of a small station. If you just have it right, suddenly you get out of balance and one phase climbs up to 250 volts — "finished and klaar"! Dankie. (Laughter.)

Mr. R. W. KANE (Johannesburg): I think Mr. Burger answered the question correctly, "Are they responsible for all fluctuations?" and his answer was "No."

Mr. J. C. DOWNEY (Springs): Thank you, Mr. Kane. No further discussions gentlemen?

Mr. P. L. VERGOTTINI (Brakpan): I was not here when this question was put, and therefore have not followed all the discussions. Do I understand you correctly that the Council is not responsible for variations in voltage?

Mr. J. C. DOWNEY (Springs): "Can the supply authority disclaim responsibility for all fluctuations in pressure including temporary absence of pressure of electricity?"

Mr. P. L. VERGOTTINI (Brakpan): Well, in the by-laws of our Municipality we state that we will supply high pressure current at 6,600 volts, and we say that three-phase and single-phase low-pressure current will be available at 380/220 volts. Now whilst that has been laid down in our supply regulations, we are responsible for maintaining this voltage within reasonable limits. The agreement with the Electricity Supply Commission gives them the right to vary their supply by 7½% one way or the other. Now if we start off getting a supply from Eskom 7½% low, it makes it more difficult for a municipality to supply current at the correct voltage.

If a person connects a refrigerator to our supply, and he buys that refrigerator for a 220 volt supply, then he has done what you can expect a reasonable man to do. If our supply voltage goes right down to 180 volts or 160 as sometimes happens, then we are responsible for any damage that

may be caused because we have not supplied the consumer at our declared voltage. I submit, under correction, that the British Standard specification allows for a voltage variation of not more than 4%.

Mr. J. C. DOWNEY (Springs): For your clarification, Mr. Vergottini, Mr. Burger answered the question as "No". Mr. Milton confirmed the question by referring to an agreement. They are both correct, as Mr. Kane pointed out. It all hinges on the terms of the contract between the supplier and consumer. If you have no agreement, then you are responsible, as the previous speakers have said.

Mr. W. H. MILTON (Eskom, Head Office): I cannot let those remarks go without saying something.

When one is dealing with the supply of electricity, as we all know, we must cater for a certain amount of voltage drop. If a consumer wants his voltage regulated within shall we say + or - 1% then he must be prepared to pay for that close regulation, because in order to achieve it, a very considerable sum of money must be spent. In most instances, we are not supplying at the voltage which is used by the ultimate consumer, as the voltage is almost always stepped down to the consumer supply voltage. In such circumstances it is quite a simple matter to provide, by tap changing (automatic if necessary), for the close control of voltage despite primary voltage variation. And it is cheaper to do it that way than to ask the supply authority, furnishing supply over long distance transmission lines, for a closer regulation than + or - 7½% today. It is all a matter of economics. If you want closer regulation you can have it, but bear in mind it must be paid for, and few consumers, when they realise the cost, are prepared to make the payment, because they can do it cheaper themselves.

Mr. J. C. DOWNEY (Springs): Thank you for your further elucidation, Mr. Milton.

Mr. P. L. VERGOTTINI (Brakpan): Now, Mr. Quizmaster, what is the position? The Electricity Supply Commission advise us that the agreement allows for a + or - 7½% voltage regulation, and if a consumer wants a closer regulation then he must pay for it. I still maintain that the



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ordinary man, the man who pays for the current, must have some idea of the voltage of a municipality when he buys a refrigerator. I don't know what the other municipalities are doing, but we advise the public that we supply three-phase current at 380 volts, and single-phase current at 220 volts, and everything possible is done to supply current at this voltage. We must protect the interests of the public, and it is our duty to do so. It is our duty to give him supply voltage at the correct pressure. In every instance in Brakpan where it has been proved, and where it has been substantiated by recording volt meters, that the reason for a refrigerator motor burning out has been due to the fact that the council did not supply current at the declared voltage, the repairs have been paid for by the Council.

Mr. J. C. DOWNEY (Springs): Thank you, Mr. Vergottini. Perhaps you misunderstood me. That is exactly what Mr. Burger had said whilst you were out—that the Council cannot disclaim responsibility. He supports your contention.

Mr. F. P. W. HALL (Somerset West): Mr. Quizmaster, I am the author of this question, and I brought it up because in our agreement with the Electricity Supply Commission I find that they disclaim all responsibility for fluctuations of voltage. I wrote to the Electricity Control Board and received a letter from their Secretary stating that he could not adjudicate on a legal matter.

Now we have had some slight variations in voltage. Once I think they had minus 11%, and as I operate an off-peak control system, which is rather unique, we had some coils burnt out through the low voltage. The coils took about eleven times the current they should have taken and burnt out, because they didn't pull in. Well, when I argued with Escom, they rewound the coils very nicely for me, free of charge, and I discovered that, even though they were supplying on 33 kV, they had about 352 amps on one feeder which is a heavy load for a .1 square inch cable. Consequently we got low voltage. I went to the House of Assembly Library to see if I could get a full set of these regulations, and the librarians there were unable to find them for me. The first copy that I came across

was at Paarl. Councillor Knott-Craig very kindly showed it to me. I think it was Regulation 1044 which said that the fluctuation in voltage may not exceed 5% over a period of 10 minutes. Now may I ask who is to adjudicate whether it exceeds this ten minutes?

Mr. W. H. MILTON (Escom, Head Office): Mr. Quizmaster, I think we are rather flogging this point, and a later question also deals with a similar point. I think it is very clear that the supply authority does carry certain responsibilities. When the approach to the supply authority to accept those responsibilities is put in a reasonable manner, I think you'll find that they are met.

Mr. Hall has already stated that we agreed, and actually did, repair the damaged equipment in his particular case; although admitting no legal liability. There is, of course, always the difficulty of proof as to whether voltage varies by the extent laid down in the Agreement or Regulations, for a period exceeding the permissible period. Voltage recording instruments must be installed in order to determine that, but I do feel that if the supply authority is giving the service it should be giving, these difficulties do not arise.

In many cases we have installed voltage regulators in order to produce a regulated voltage at consumer's premises, and those regulators are set well within the 7% limit which is provided for in our agreements. The supply authority, however, must have regard not only to the best service it can give, but to the worst service it can contemplate and still give the supply. I put to you gentlemen, who must appreciate the point, that in the very distant areas of some of your undertakings, where you are dealing, perhaps, with a new suburban township situated some distance from the rest of your load, you may have to start off skimpily, you cannot afford to put in a service there which will ensure the normal supply voltage conditions enjoyed by the majority of people in the more densely populated areas of the town.

From that point of view you must, therefore, legislate for your maximum variation condition, but it certainly does not mean that Escom's voltage continually varies by

+ or - 7% throughout the period of supply to any of our consumers. That is merely a limit we set above or below which a consumer can actually lay claim against us that we have exceeded what was agreed. The question of the actual regulation of supply on a 220 volt system, of course, depends entirely on the copper you use, the number of points at which you inject into the system, and to what extent you provide for regulation at your sub-station points.

When the 33 kV. system, supplying a place like Somerset West, varies considerably, we take the necessary steps to improve the voltage regulation, but the supply is not furnished to Somerset West at 33 kV. I believe it is furnished at 11 kV. and that, to the best of our ability, is a regulated supply. Regulation of that supply is essential. I would stress the fact that, notwithstanding that we provide in our agreement for a + or - 7% our voltage very seldom varies to that extent.

Mr. J. C. DOWNEY (Springs): Gentlemen, I think that disposes of that question. We'll do question No. 10.

Question No. 10:

"Charges for Service Connections. Opinions differ greatly as to the charge that should or should be levied by Supply Authorities for effecting the connection between its overhead or underground mains, and the consumers' installations, and whether the mains between the point of entry and the meter board should form part of the connection.

"For a long time a number of Authorities made no charge for the connection including the house mains by way of an inducement to people to become consumers.

"Under present day conditions, what is considered the fairest and most easily administered way of dealing with this problem, bearing in mind there is future maintenance to be paid for by someone. Should the full cost be recovered or a nominal charge made to cover the interest for say 10 or 20 years on the capital outlay plus something for maintenance?"

Mr. R. M. O. SIMPSON (Durban): Mr. Quizmaster, the problem of service connections to a house can be split up into two parts—in the first, the person that set

the question is probably correct in saying that free services were given as an inducement in the early days, to assist people in taking supply, and probably also in competing with gas in places where they already had connections for gas. The other part is the question of responsibility for maintenance. If you give a service connection to a house, to avoid the trouble of whose responsibility it is to carry out maintenance on that service cable, it is preferable to levy a fee for connection, which represents a portion of the cost of installing the service. In Durban we aim to make this about 50% of the cost of an average service, which I think is reasonable. It is only a fee, and the cable connection to the meter remains the property of the Council and as such is maintained by them over its whole life.

With regard to the amount of cable that should be included in this connection fee, this is purely and simply a matter of policy of the authority concerned. Some authorities provide service to the boundary of the property, terminating at a meter there and leaving it to the consumer to connect from the meter into his house. Some authorities provide the service the whole way. Personally, from my own point of view, I think it is preferable that the service cable should be provided by the Supply Authority to a position as near as reasonably possible to the house, including what might be termed as a reasonable length of service cable in the Connection Fee, all over this amount being charged for at a tariff rate. In Durban we provide the service cable from the Main to a Meter Box fitted in a suitable position on the outer wall of the house, up to 10 ft. of cable inside of his property is included in the connection fee, all cable used in excess of this is charged for at the cost of the cable only plus 10% (excluding labour). Service connection charges are primarily a matter of policy of the particular Supply Authority concerned but a scheme which on the average provides for approximately 50% of the cost of the service being provided at the cost of the Authority is a reasonable one.

Mr. C. LOMBARD (Germiston): With regard to the first part of this question, as to whether a charge should be made for a

service connection or not, I think the point is that you do not get anything in this world for nothing. I think it is merely a question of policy as to whether a Council charges for a service connection or not. If it does not charge for a service connection, it will have to recover the cost via the tariffs. I think it really is a matter of policy, as to how the costs will be recovered.

With regard to the second part of this question, I think that where a charge is made for the service connection, it should be based on average conditions, that is to say average length of cable from the boundary to the line, otherwise you may get the position where the one consumer may have to subsidise the other. In the one case you may find that the one consumer requires a long connection from boundary to metering point, and the other one is comparatively short, so I think it should be done on some sort of cost plus basis, based on average lengths from line to boundary.

Mr. P. L. VERGOTTINI (Brakpan): It is the Council's responsibility where necessary, to establish a generating plant, and secondly to establish a reticulation system. I think once the Council has established a reticulation system in its streets, then it becomes the responsibility of the consumer to get connected on to that system—in my personal opinion, to establish a meter switch room, just inside the property, as I have seen in some of our big cities, does not solve the problem economically, and I say that with all respect to them. After all said and done, the consumer pays to bring the service to that little meter box, and even though the contractor takes it from there to the house, he consumer still pays, but more if the Council did it, so the Council might as well take the service right up to the house.

Now we work on the cost-plus-ten-percent basis, and I feel that it is the cheapest method for the Council to take the service from the mains right on to the consumer's property. As regards the second part of the question, whether the mains between the point of entry and the meter board should form part of the connection, I feel that it is more practicable for the contractor to take the service from, say the shackles on the roof, or from an end

box against the wall if it is a cable connection, to the meter board.

Mr. J. C. DOWNEY (Springs): Thank you, Mr. Vergottini.

Mr. H. M. S. MULLER (Upington): Mr. Quizmaster, I cannot speak for cable systems, but I have had very many years' experience of overhead systems and of consumers in general. In the first place you want to make it as little irksome as possible. You do not want to differentiate. In these days, you do not have to encourage them. It is such a vital necessity that you can actually victimise them, and you can charge whatever you like, but that is not the idea!

—As Mr. Vergottini has just said, I have found that the most satisfactory way is to let the contractors end with the shackles on the roof. Then you have rid yourself of one responsibility, and a lot of argument. Now comes your own responsibility, that is to your distribution from the roof to the mains, and if you take the useful life of that service, then I really don't think that any contribution by the consumer towards the cost is really significant. It always assumes that you are in proximity to a main in that street. It is quite a different matter if you are dealing with distant consumers, but in that respect again, you merely have a scale of charges, so much for single-phase connections, so much for a three-phase connection. If one consumer's connection is very much longer than the other, for instance, across the street, you don't differentiate, as that would not get you anywhere. I think that is a system which is most generally in use, and is the most effective.

Mr. R. K. FROST (Department of Labour, Pretoria): Mr. Chairman, I notice in the wording of this question, and also in the discussion that arose under Item 4, that there may be some confusion in people's minds as to exactly where the supplier's conductors end, and the consumer's conductors begin. The position is that the dividing point is the switch on the meter board. Everything up to that switch from the supply side belongs to the supplier, and is governed by the Factories Act; everything on the other side of the switch, that is on the consumer's side of the switch, is not under the Factories Act



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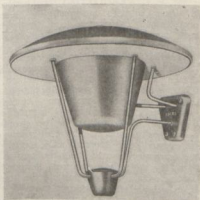
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at all, but is governed by the Wiremen's Act. So it may help you if you get that distinction clearly in your mind, when you levy a charge for this connection. It would be quite wrong to give the consumer the impression that he was buying that piece of cable that runs from the street mains into his premises. That portion of the system is part of the supplier's distribution, and ends at the switch. The other side of it is the domestic side, which is the domestic electrical conductors, which are not governed by the Factories Act.

Mr. J. E. MITCHELL (Salisbury): I feel that most speakers are wearing their rather short-sighted spectacles for this item, and are not dealing with the vital position of the cost of service connections.

The major trouble today is lack of capital. In the old days all our regulations, all our tariffs, were based on the fact that there was ample capital, and providing undertakings could get a return on their capital, they were quite willing to put any amount of money into a service, provided they got the interest and redemption.

Things have changed very considerably. Today, when a man buys a house, he obtains a mortgage, and the price contains, possibly, a service charge, but not the full cost of giving him that connection. The municipality then has to provide the necessary capital for the difference. I venture to suggest that as things are going today, especially in South Africa, more and more capital will have to be found outside of the supply of normal public funds. In other words, the consumer will have to pay a greater interest rate for the amount of money which he uses to build a house, and he will have to provide more and more of the cost of the service to the municipality by having a higher and higher connection fee. I am quite certain of this in my own mind. Mr. Simpson mentioned 50%, I think Salisbury is about 50%, but I have a distinct feeling that that will go higher and higher as public money becomes tighter and tighter. The public themselves, that is the consumer, will have to provide the necessary capital to provide the services.

Mr. F. STEVENS (Ladysmith): As I posed the question, I would like to point out what I had in mind. How many

delegates would be able to answer the question, if asked by a consumer, "What does the £5 connection fee represent?" or the £7 10s. or the £10 as the case might be? "How did you arrive at that figure? What does it represent?"

Dr. J. MARAIS (Johannesburg): Mr. Chairman, in starting a new reticulation system in a town, we find that quite a number of the future consumers are not prepared to connect up in the first instance. Therefore it is one of the pieces of advice I always put forward to give a bit of incentive to those people who are willing to connect right from the beginning, with the proviso that, should any latecomer, after the contractors have left, apply for a connection, they have to pay the full fee.

Now this is no more than right, because if you take a town, especially some of our smaller rural towns, there are quite a number of vacant erven in between. The Electricity Undertaking which has been put in and run for years have to pay extra capital to span these empty spots, and when a new house is built it is no more than right that they should pay the full connection fee and so make up a little bit of the extra expenditure incurred by the Council in spanning this vacant property.

Mr. P. BECHLER (Newcastle): Mostly we divide things like that. All the service connections outside in the road belong to the Raad; the Council is responsible for them and they put them up. Service connection is regarded from the pole to the roof box; from the roof box the contractor goes on to the meter board and so forth.

We did it in the Free State and we do it in Newcastle as well—we charge for two thirds of the cost to the roof box, to the consumer; and one third is taken by the Council, but that does not mean that the service connection is the property of the consumer. He is only contributing to the cost of the electricity undertaking.

Mr. W. H. MILTON (Escom, Head Office): Mr. Quizmaster in this connection I would like to support Mr. Mitchell.

When one deals with electricity supply, one is all too prone to regard ownership as if the undertaking belonged to some particular individual. In the electricity supply industry, which is a monopoly (we

have heard a lot of that during this Convention), one must bear in mind that the whole of the undertaking belongs to the consumers served from it. Those consumers are paying, through the medium of tariffs, for the purchase, and use, and running of the electricity department. One often hears of Councillors having provided this or that—the Councillors do not provide anything themselves—they are merely the instrument of the ratepayers, and are arranging for the ratepayers to obtain what they want, and for the consumer to obtain what he wants. They are not spending their money; they are spending ratepayers' money. When we are investing money in an undertaking, we are investing it not for ourselves, but for the consumers we serve.

When it comes to the actual service connection to a consumer, there is something which is a specific asset used solely and specifically for particular premises. We don't mind who the occupier is, it is the premises we really serve, and from that point of view, with the shortage of capital that exists, if we can collect the capital which we can reasonably say is capital invested for a particular premises (a particular consumer), then I think we are justified in so doing.

The fact that most of us average our costs is justified because the bookkeeping costs are reduced, and proof of the actual costs is avoided (it is a very difficult figure to prove). If, then, you establish an average connection fee which is reasonable, it means that the consumers are paying a reasonable sum towards the capital cost instead of meeting the equivalent capital charges through annual contributions.

I therefore support Mr. Mitchell in the reasonableness of asking the consumer to provide a certain amount of capital. A time may come when all consumers may have to provide capital for expansion, or go without expansion. I think this is a point we must bear in mind seriously.

Mr. J. C. DOWNEY (Springs): Gentlemen I think we have reached the end of our tether now. Our President is back on the dais as you see, and we shall have to leave the rest of the questions over, unless the President can fit it into the programme.

This leaves to me the duty of paying a great tribute to the contributors who

opened the remarks. In defence of the criticism of your Quizmaster, I would like to say that a dead donkey never kicks, and the kicks I have received from the opening remarks of the members of our Forum, only go to show how much alive they are.

And I want to tell you a secret gentlemen, (probably you have found it out already), they were not informed of the questions. It is a great tribute to those who answered the questions so ably and well, not having had the opportunity of studying the questions beforehand. I want to thank them for being the bright boys of the Convention.

At the same time I'd like to thank all those who contributed to the discussions. And thank you for your patience and help. (Applause.)

THE PRESIDENT: Thank you very much Mr. Downey for so ably running the Members' Forum for us.

This is no reflection on the Quizmaster, this is no reflection on the questioners, and it is no reflection on the people who took part in the discussion, but I must tell you about the Quizmaster who was quizzing a number of teenagers and he put the following question as an introduction to get them alive, and warm up to the subject.

He said, "Now if I had a little boy, six years of age, and he could walk to school in one and a half hours, and I could do it in half an hour, how old would I be?"

So a bright young lad between 12 and 14 jumped up and said, "44, sir".

The Quizmaster was staggered. He said, "Well that is good. Now tell me young man, that is my age, how did you manage to guess it?"

He said, "Well sir, my sister is 22 and she is only half daft". (Laughter).

Now I would like to thank the scrutineers for the good job they have done this morning in counting the votes.

I would like to mention that there will be an Executive Meeting in the King's View Hotel at 8.30 tomorrow morning.

I would also remind members not to be late for Convention tomorrow, which will resume at 9.30 a.m.

Thank you, gentlemen.

CONVENTION ADJOURNED
AT 5.45 p.m.

SECOND DAY

THE PRESIDENT: Goeie môre Menere.
Good morning Gentlemen.

I trust that you were all in bed before 12 o'clock and that you are fresh and ready for work this morning.

Messages from your Executive. I wish to announce the committee and representatives appointed by your Executive.

Electrical Wiremen's Registration Board; Mr. Kane.

South African Bureau of Standards; Mr. Downey. Alternate member; Mr. Lombard.

Coal Allocations Committee; Mr. Hugo. Alternate member, Mr. Kane.

Safety Precautions Committee, Mr. Fraser. Alternate Member, Mr. Downey.

Tariff Survey Committee, Mr. Kane, Mr. Downey, Mr. Sibson, Mr. Downie. Mr. Kane is the convenor.

Recommendations Committee for New Electrical Commodities, Mr. Downey, Alternate Member, Mr. Hugo.

Papers Sub-Committee, Mr. van der Walt, Mr. Downie, Mr. Mitchell.

(That is the usual procedure—the President, Vice-President, and immediate Past President.)

Technical Staff and Manpower, Mr. van der Walt, Mr. Downie, Mr. Simpson, Mr. Sibson, Mr. Giles, with myself as the convenor.

Rights of Supply, Reef Industrial Consumers, Mr. Lombard, Mr. Hugo, Mr. Downey, Mr. Giles, with Mr. Lombard as the convenor.

South African Institute of Electrical Engineers' Committee Code of Practice for Sub-Stations—your representative will be myself.

The Finance Sub-committee, Mr. Kane, Mr. Downey.

That is the only communication this morning from Council.

We will now proceed with the business on the Agenda and we have the Annual Report of the Secretaries.

ANNUAL REPORT OF THE SECRETARIES

To the President and Members of the Association.

Mr. President, Gentlemen,

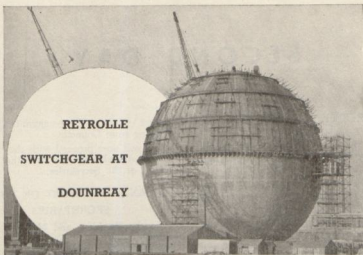
It gives me great pleasure to submit to you our Annual Report together with the Revenue and Expenditure Account and Balance Sheet for the financial year ended 28th February, 1957.

Obituary:

I deeply regret having to record the passing of Members of the Association during the year.

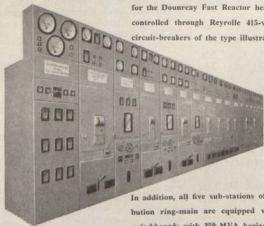
Messrs. T. P. Ashley and C. B. Foley, both of whom were Associate Members, passed away last year.

More recently, and indeed almost on the eve of the Thirty-first Annual Convention, when the Association had decided to present him, along with other Past Presidents and Honorary Members, with tokens of its esteem, has come the news of the sudden death of Mr. W. Bellad-Ellis. To most of you Mr. Bellad-Ellis was known either personally or by name and it is, I think, unnecessary for me to go to any great lengths in paying tribute to his memory. He was one of the grand old gentlemen of the Association and belonged to the generation of Electrical Engineers which saw the great pioneering days of the Industry. His efforts in the interests of the Association continued to the very last and only a few days before his death he wrote me at length on his latest activities in this direction.



Photograph by courtesy of the U.K.A.E.A.

The electro-magnetic liquid-metal pumps and other services for the Dounreay Fast Reactor heat-exchanger system are controlled through Reyrolle 415-volt 31.5-MVA air-break circuit-breakers of the type illustrated.



17-panel switchboard comprising Reyrolle type-S22A air-break circuit-breakers with associated control vehicles.

In addition, all five sub-stations of the main 11-kV distribution ring-main are equipped with Reyrolle metalclad switchboards with 350-MVA horizontal draw-out oil-break circuit-breakers.

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Thirtieth Convention:

The Thirtieth Convention of the Association was held in Salisbury from Monday the 7th May to Thursday the 10th May, 1956. The delegates were welcomed to Salisbury by His Worship the Mayor, Clr. H. Piehanick, and the Convention was formally opened by the Federal Minister of Power, Sir Malcolm Barrow.

A total of no less than 406 members, delegates, representatives, officials, visitors and ladies attended this truly outstanding Convention.

On behalf of the President, Members of the Association and all others who attended the Convention and enjoyed the unforgettable hospitality of the City of Salisbury, I wish to record sincere appreciation to His Worship the Mayor, the City Council and Officials of that City for all that was done for us. I do not propose to refer in particular to the visits and functions which were arranged either for delegates or wives, but feel I am expressing the opinion of all in saying that greater hospitality could not have been shown by any city. It does not appear to have been the practice in the past to personally thank the President in an Annual Report, but I feel that in this instance at least I would not be making a complete report if I did not place on record the unqualified appreciation of all concerned for the outstanding personal efforts of Mr. and Mrs. J. E. Mitchell.

Papers presented at the Convention were by Mr. E. C. Lynch on "Some Electrical Developments in the Salisbury Area" and by Mr. J. Yodaiken on "Some aspects of the Work and Difficulties confronting the Small Community Electrical Engineer". Both papers proved most interesting and not only resulted in valuable discussion at the Convention, but also gave rise to written contributions of a high order.

The Engineers' Forum again resulted in most informative discussion on a number of subjects.

The decision was unanimously taken at the Convention to hold the Thirty-first Convention in Margate.

A decision was taken at the Convention in regard to the recognition of the services of Past Presidents and Honorary Members

by the presentation of Certificates and Medals. It was also agreed that proposals in regard to the amendment of the Constitution be submitted to the Thirty-first Convention.

Membership:

The following new Members were elected during the year ended 28th February, 1957:

Councillor Members:

Municipality of Wellington.

Engineer Members:

I. L. Hobbs (Virginia).
A. Q. Harvey (Warmbaths).
J. D. Dawson (Uitenhage).
E. W. Ziervogel (Nigel).
W. A. Martinson (Nelspruit).

Honorary Members:

Alderman Morton Jaffray.
Councillor C. E. K. Young.
Mr. W. H. Milton.
Major S. G. Redman.

The comparative figures of Membership for the years 1954/55 and 1955/56 are:

	1954/5	1955/6
Councils	110	111
Engineer Members	108	98
Honorary Members	6	9
Associates	32	32

Finance:

The Income and Expenditure Account for the period under review, as well as the Balance Sheet as at 28th February, 1957, is attached hereto.

I prefaced my remarks last year concerning finance by saying that the year under review was the first one completed in which the new arrangements in regard to the financial contributions of Companies represented at Conventions and the financing of certain Convention Expenses had applied. I stated that it was accordingly too early to assess accurately the effect which this additional income and expenditure would have on the finances of the Association, when averaged out over a number of years. At the Salisbury Convention amendments were made in the rates of subscription by Councillor Members to compensate for the bearing by the Association in full of expenses in respect

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 28th FEBRUARY, 1956.

1956		12 12 0	1956		992 5 0
8	Audit Fees	11 6 2	1,114	Subscriptions	133 5 0
10	Bank Charges	4 0 0	129	Interest on Fixed Deposits	958 5 0
	Bad Debt—Sale of Proceed- ings	1,174 18 3	709	Convention Representation Fees	—
888	Convention Expenses	5 0 6	102	Proceedings	—
4	Insurance	6 6 0	27	Excess of Expenditure over Income transferred to Accumulated Funds	178 6 1
	Depreciation—Furniture and Fittings	138 1 10			
7	Printing and Stationery	55 0 10			
67	Postages and Telegrams	—			
34	Rent	—			
20	Secretarial Expenses	—			
25	Retiring Secretary's Salary	—			
300	Retiring Secretary's Gratuity	—			
250	Secretarial Fees	600 0 0			
400	Telephone	28 5 0			
13	Executive Committee Ex- penses	94 2 8			
29	Subscriptions	15 0 0			
15	Sundry Expenses	1 15 0			
11	Proceedings:				
	Cost of Printing	908 2 10			
	Less: Advertising				
	—Gross	531 0 0			
	Add: Overprovi- sion for Agent's Commission	41 12 0			
	1956	572 12 0			
	Deduct: Provision for Agent's Com- mission — 1957	53 2 0			
	519 10 0				
	Sales	273 0 0			
	792 10 0				
	0 115 12 10				
	£2,081	£2,262 1 1			£2,262 1 1

of the half-yearly Executive Meetings. This increased income and expenditure will apply in full for the first time in the 1957/58 financial year. The Proceedings of the Salisbury Convention proved to be the longest ever, with consequent increase in production costs. Since then the Executive Council has, in principle, decided that the Proceedings are, in future, to be edited with a view to reducing their published length and so again bring about a reduction in printing costs. At the same time we have adopted new facilities for advertisers and a revised tariff applicable thereto. The effect of these changes will not be fully evident until 1958/59. Last, but not least, amongst the many changes which will effect the finances of the Association is the experiment undertaken for the first time with the present-day set-up of the Association of holding the Thirty-first Convention in other than a major city, with such city acting as host. At the time of writing this Report I am not yet in a position to assess the impact of this Convention on the finances in the current year.

From the foregoing remarks it will, I think, be obvious to all that the finances of the Association are essentially fluid at the present time and it is impossible to indicate with any certainty what the trend will be over the next couple of years.

Turning now to the Accounts before you, it will be noted that they reflect an excess of expenditure over income amounting to £178 6s. 1d. In this connection it will be noted that subscriptions reflect a reduction over the previous year of approximately £122. It has always been the practice in the Association to show subscriptions received on a cash basis and not to bring in amounts outstanding. During the year under review a number of smaller Councillor Members fell into arrears with their subscriptions and as at 28th February, 1957, these amounted to an estimated figure of £145. Of these the sum of £33 10s. 0d. has been recovered up to the date of writing this report. Allowing for this shortfall in subscriptions, it will be seen that the Association approximated very closely to breaking even for the year under review and it is considered that, in view of the

great length of the Proceedings and consequent added expenditure under this item, this indicates a satisfactory position.

Once again, I wish to thank Messrs. R. W. Kane and J. C. Downey for their assistance as Members of the Finance Sub-Committee, and on behalf of the Association extend grateful thanks to those responsible for continued financial support thereto.

General:

At this point in my report I wish to place on record the alteration in name of our Secretarial business from Arthur Tingey, Ewing & Co. to Davidson & Ewing (Pty.) Ltd. as from 1st July, 1956. Our appointment under the new name was confirmed by the Executive at its Meeting in November last.

Lastly, it is my pleasure to take this opportunity of thanking you, Mr. President, and all other Members of the Executive Council for the courtesy and assistance given to us throughout the past year.

To the Association and all Members we extend our best wishes for the next year.

R. G. EWING,

for DAVIDSON & EWING (Pty.) Ltd.
Secretaries.

10th April, 1957.

THE PRESIDENT: If there are no discussions on the Secretaries' Report, I will ask Mr. Mitchell to propose a vote of thanks.

Mr. J. E. MITCHELL (Salisbury): Mr. President, this is the usual time for saying thank you to our Secretaries for an excellent job of work done throughout the year.

This year, of course, we have held a Convention in a completely different form from the normal, and this has placed a very heavy burden on the Secretaries' shoulders. I think you will agree that, in view of the difficulties, Mr. Ewing has done an excellent job of work.

I'd also like to congratulate him on the form of his report, and say "Thank you" on behalf of the Association for all the work he has done. I do that in proposing, formally, that this Annual Report be adopted.

THE PRESIDENT: Thank you, Mr. Mitchell. Cr. Marais, will you second that vote of thanks, please?

Cr. D. J. MARAIS (Johannesburg): Mr. Chairman, it is with pleasure that I second the adoption of this report. Going through it, there is no doubt, and it will appear from the report anyway, we have a very smooth running Association, and I think we are inclined to take things for granted; year after year we come along to these Conferences, and everything runs very smoothly and we don't give it a second thought, but there can be no doubt that our Secretary, with the help of the President and Vice-President, put in an enormous amount of work each year, and I want to personally thank them for doing a very good job of work again this year (Applause.)

THE PRESIDENT: Now Gentlemen, usually after the Secretaries' Report, we

appoint auditors for our Association, and I propose to you that we re-appoint Messrs. Savory and Brink as auditors for the ensuing year.

M. R. W. KANE (Johannesburg): I second that.

It was AGREED that Messrs. Savory and Brink be re-appointed as auditors to the Association for the ensuing year.

THE PRESIDENT: I will ask the Vice-President, Mr. Downie, to take the chair please.

(Mr. DOWNIE took the chair).

Mr. C. G. DOWNIE (Cape Town): Ladies and Gentlemen. I am assuming the President's chair to carry out a specific duty and that is to call upon our President to deliver his Presidential Address.

I have very great pleasure in calling upon Mr. van der Walt to deliver his Presidential Address.

Presidential Address

by

J. L. VAN DER WALT,
Krugersdorp.
AUTOMATION
AND TECHNICAL STAFF

There are two topics today which should demand the serious attention, not only of engineers, but also of governments, educationists, psychologists and any organisation interested in the future of the economical and industrial development of our country and the human affairs of our nation.

These two topics are: *Automation* and *Technical Staff*.

As the Electrical Industry is always very closely associated with economical and industrial development, I trust that all delegates present will find food for thought in this address.

Automation is a word very much to the fore today. Its concept is both old and new; old as far as it replaced human muscle by mechanical power and new as

Rede van die President

deur

J. L. VAN DER WALT,
Krugersdorp
AUTOMATISASIE
EN TEGNIESE PERSONEEL

Daar is twee onderwerpe wat vandag die onverdeelde aandag eis van nie alleen ingenieurs nie, maar ook gesaghebbendes, opvoedkundiges, sielkundiges en organisasies wat die belange van ons land se ekonomiese en industriële ontwikkeling en menslike aangeleenthede op hulle harte dra.

Hierdie twee onderwerpe is: *Automatisasie* en *Tegniese Personeel*.

Omdat die elektrisiteitsindustrie altyd in noue aanraking met ekonomiese industriële ontwikkeling verkeer, vertrou ek dat almal hier teenwoordig, iets nuttigs uit hierdie rede sal put.

Automatisasie is 'n woord wat vandag dikwels gebruik word. Sy begrip is oud sowel as nuut; oud in soverre dit die vervanging van menslike spierkrag deur meganiese krag en nuut in soverre dit die

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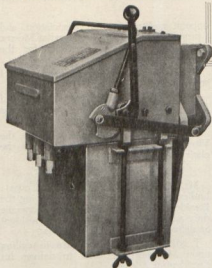


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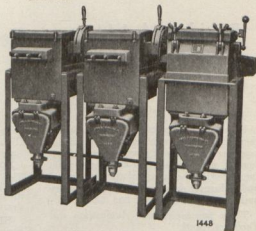
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far as it replaces mental by mechanical power.

Automation is difficult to define because of its different meanings in popular usage. There are different views on the meaning of automation. Lord Halsbury of the National Research Development Corporation, England, is of the opinion that every one of the topics which are grouped under the heading of automation, has in fact a technical name and these technical names should be used wherever the context requires it.

There is the general thought that it is a term to describe something quite independent. Automation has quite a definite meaning to the ordinary engineer—it means converting a process to self acting (automatic operation). This means that automation, as distinct from mechanisation, replaces some mental work rather than muscle power.

A third view is that automation replaces human muscle as well as mental work by mechanical power.

Automation is a further development of the Industrial Revolution, which was characterised by mechanisation of manufacturing processes some 150 years ago, and, as with the Industrial Revolution, which had no sudden impact on the human affairs, but was spread over a period of some 70 years, the effects of automation will be slow and spread over a considerable period.

The immediate important fields for progress in automation are:—

- (a) Automatic controlling of processes such as chemical plants, gauge of sheet steel in rolling mills, insulation thickness, etc.
- (b) Metal cutting.
- (c) Inspection.
- (d) Handling, such as gravity feeders for machines, vibrating conveyors, flow of materials, etc.
- (e) Assembly such as automatic marshalling of parts for assembly, fixing components of simple shapes together.

vervanging van denkvermoë deur meganiese krag aandui.

Automatisasie is 'n moeilike woord om te omskrywe, omdat dit soveel betekenis in die algemene gebruik het. Daar bestaan ook verskillende opinies i.v.m. die betekenis daarvan. Lord Halsbury van die National Research Development Corporation, Engeland, gaan van die standpunt uit dat elke onderwerp onder die benaming outomatisasie 'n eie tegniese naam besit en dat die naam dan verkieslik gebruik moet word wanneer die verband dit vereis.

Daar is ook nog die algemene sienswyse dat die woord 'n heeltemal onafhanklike begrip beskryf. Outomatisasie het beslis 'n definitiewe betekenis vir die gewone ingenieur—dit beteken die omsetting van 'n proses na 'n selfreëlende proses (outomaties). Dit beteken dat outomatisasie heeltemal verskil van meganisasie in soverre dit sekere denkvermoë i.p.v. spierkrag vervang.

'n Derde sienswyse is dat outomatisasie spierkrag asook denkvermoë met meganiese vermoë vervang.

Outomatisasie kan in werklikheid beskou word as maar net 'n voortsetting van die Industriële Omwenteling wat deur meganisasie van vervaardigingsprosesse sowat 150 jaar gelede gekenmerk was, en net soos in die geval van die Industriële Omwenteling, wat geen onmiddellike gevolge op die menslike aangeleenthede gehad het nie, maar wat wel oor sowat 70 jaar gestrek het, sal die daadwerklike gevolge van outomatisasie stadig en oor 'n tydperk van baie jare gestrek word.

Die onmiddellike belangrike gebiede van vooruitgang in outomatisasie is soos volg:

- (a) Outomatiese beheer van prosesse soos bv. in Chemiese fabriek, die meet van staalplate in walsmeulens, die meet van diktes van isolasie, ens.
- (b) Metaalsnyery.
- (c) Inspeksie.
- (d) Hantering soos bv. in valtoevoerders vir masjinerie, skommelvervoerbande, gang van materiaal, ens.

- (f) Control of combustion.
- (g) Electronic digital computers.

In addition there is a host of other fields already being explored or inviting exploration.

The most revolutionary development is in the field of automatic electronic computers, commonly known as the "electric brain". This electronic computer is the forerunner of the fully automatic factory and the electronic office. Semi-automatic factories already exist, using these "electric brains" which receive instructions and sets the factory going upon the instructions received. The electronic office is just around the corner, in which these machines will replace clerical staff on a large scale.

If ever the fully electronic office or automatic factory, of which the outlines are already clearly visible, is achieved, then serious impacts upon the human affairs of our every day lives may be expected, but we need not fear that automation will make robots of all of us. We need not fear that automation will overtake and overrun us overnight. Automation will be achieved slowly and over many years due to financial implications and shortage of technical staff. Automation has been taking place for many years without ill effects; think of our automatic telephone systems.

Modern civilisation with all the science and foresight available, will be able to adjust itself accordingly, with the minimum social disturbance possible. Disturbances there will be, but the major problem will be one of readjustment of thousands of individuals in new spheres of activity.

The fear of unemployment due to automation is just as unreal as it was during the Industrial Revolution, when man set upon and destroyed the machines which mechanised the factories. On the contrary, instead of unemployment, greater employment resulted and the same can be expected with automation. Even in the fully automatic factory, man power will still be necessary to mind and maintain the

- (e) Montering soos bv. rangskikking van onderdele vir montering, om onderwerpe van eenvoudige fatsoene aan mekaar te sit, ens.
- (f) Beheer van verbranding.
- (g) Elektroniese setberekenaars.

Daar is ook nog 'n menigte ander gebiede wat reeds ondersoek word of wat ondersoek uitlok.

Die grootste omwenteling vind vandag plaas op die gebied van die outomatiese elektroniese setberekenaars wat algemeen as die „elektriese brein" bekend staan, wat bevele kan ontvang en op hierdie bevele kan reageer om fabriek in werking te bring. Die elektroniese kantoor, wat groot aantal klerklike werkers gaan vervang, staan ons voor die deur.

As die algehele elektroniese kantoor, of die ten volle outomatiese fabriek, wat albei alreeds moontlik blyk te wees, ten volle verwesenlik word, kan 'n ernstige aanslag op die menslike aangeleenthede van ons alledaagse lewe verwag word, maar ons hoef nie te vrees dat outomatisasie van ons almal masjiennense sal maak nie. Ons hoef nie bang te wees dat outomatisasie ons oornag sal oorval en orrompel nie. Weens geldelike implikasies en 'n tekort aan tegnisi sal outomatisasie gelydelik en oor 'n tydperk van baie jare plaasvind; as't ware vind dit alreeds oor baie jare plaas, as ons maar net aan ons outomatiese telefoonsentrales dink.

Met al die wetenskaplike kennis beskikbaar en oorlegging kan die moderne beskawing homself so by outomatisasie aanskakel dat die sosiale ontwrigting tot 'n minimum beperk word. Ontwrigting sal sekerlik geskied, maar die groot probleem sal een van aanpassing van duisende werknemers by nuwe werksaamhede wees.

Die vrees dat outomatisasie werkloosheid sal bewerkstelling, is net so ongegrond as wat dit ten tye van die Industriële Rewolusie ongeveer 150 jaar gelede was, toe werknemers die masjiene aangeval en vernietig het. Inteendeel, i.v.p. werkloosheid was daar toe werk vir meer mense as voorheen. Ons kan dieselfde toedrag van sake met outomatisasie verwag. Sels in die algehele outomatiese fabriek sal werk-

machines, to do some clerical work and perform the many functions of management. The well known labour forces will however be employed elsewhere on totally different types of work than what they were used to and it is here that individual adjustment will be all important. The ratio of management and technical staff to labour force will be radically changed.

It is wrong to think that automation will make only large industrial concerns economical. On the contrary, small firms, due to their flexibility, will be essential to serve the larger firms producing vast quantities of articles, because they can change their products readily to meet the demands of such large factories and other consumers. Automatic devices are usually built into machines used by small concerns.

How will automation affect the Municipal Electricity Undertakings? This question many of us may have already asked.

Considering the fields in which automation may progress, it is doubtful whether South Africa has the markets for products to be produced in such large quantities to make the automatic factory an economical proposition. Markets will have to be found against severe competition from oversea countries, where home markets warrant the establishment of such automatic factories and once established it is a simple matter to produce for export markets as well; or where export markets already existed, and the concerns change over to automatic operation to lower production costs.

On the other hand, the challenge is issued and if the cudgels are not taken up, we may forever be dependent upon imports for a large percentage of our daily requirements. Overseas production costs may be so low that it will be unhealthy to protect local manufacturers by import control or import duties. As a typical example, the common electric lamp cap illustrates the possible condition that may arise. I believe that there are only three manufacturers of lamp caps in the world and they satisfy the demand for all lamp caps. On account of automation and low production costs, it is

nemers nog beskikbaar moet wees om toesig oor die masjiene te hou, en hulle te onderhou, om sekere klerklike werk te doen en om die veelvuldige pligte van die bestuur na te kom. Die welbekende arbeidskragte sal egter verdwyn en sal met nuwe werksaamhede vertrou moet raak.

Hierdie verskuiwing en aanpassing van arbeidskragte sal die grootste probleem wees. Die verhouding van bestuur tot tegniese personeel sal ook geheel en al verander.

Die algemene indruk bestaan dat outomatisasie alleen op groot fabriek van toepassing om ekonomiese redes is. Dit is tog nie so nie. In teendeel, weens hulle vaardigheid om gou en maklik van een produk na die ander te verander, sal die kleiner fabriek 'n vername aandeel hê om die groter fabriek en ook ander verbruikers van hulle benodighede te voorsien. Outomatiese apparaat word dan ook in masjiene ingebou wat deur sulke kleiner fabriek gebruik word.

Hoe sal outomatisasie die munisipale elektrisiteits-ondernemings raak? Hierdie vraag is seker dikwels al gestel.

As ons die gebiede van ontwikkeling vir outomatisasie in oënskou neem, blyk dit onwaarskynlik te wees of Suid-Afrika die afsetgebiede het vir goedere wat op so 'n groot skaal vervaardig moet word om die outomatiese fabriek ekonomies moontlik te maak.

Sulke afsetgebiede sal dan om gewedwyer moet word teen gedugte oorsese teenstanders wat reeds op vaderlandse grond die afsetgebied gevind het en dus deur outomatisasie ook maklik genoeg vir uitvoerdoeleindes kan produseer; of teen teenstanders wat reeds sulke groot afsetgebiede opgehou het dan hulle dit ekonomies gevind het om na outomatisasie oor te skakel.

En tog, daar is 'n uitdaging aan Suid-Afrika uitgereik, en as ons hierdie uitdaging nie aanneem nie, mag ons vir altyd van invoer vir 'n groot deel van ons alledaagse benodighede afhanklik wees. Oorsese produksiekoste kan deur outomatisasie so laag wees dat dit onwenslik sal wees

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not a payable proposition for any country to manufacture its own lamp caps. South African lamp manufacturers import their lamp caps.

Yet if we maintain this defeatist attitude, the economical future looks bleak. Should we not put up a stern fight and create the required markets? Overseas countries have their eyes on the whole of Africa for future markets. Should we not do the same? What of our large non-European population as a potential market? The greater part of our raw materials is not processed in this country, but is shipped overseas to be processed, and it is in the field of processing that automation can be applied advantageously.

The Government has established a committee to examine the aspects and effects of automation. It is trusted that they will consider the above possibilities. Automation requires an enormous amount of capital and unless the markets are found, no industrialist or financier will risk capital to such a degree, and South Africa may then economically and industrially, remain a second rate country.

Let us assume that the future is not so bleak after all, and that automation will eventually be applied in South African factories, and if we are not defeatists, this shall be so. We should not let the present slowing down of economical progress dishearten us. Our progress over the past 10 years was too phenomenal to be maintained. Let this be a period of consolidation and preparation for future progress.

Automation will cause greater use of electricity in industry. Present manual labour and supervision will be replaced by electrically operated automatic machinery wherever possible, in all the fields of development of automation.

The automatic office in South Africa is not so remote as the automatic factory and it will not be long (comparatively speaking) before its impact is felt. Financial concerns and business houses will largely depend upon electronic digital computers and

om beskermingstariewe toe te pas. Die vervaardiging van elektriese lamphouers dien as 'n goeie voorbeeld van wat wel kan gebeur. Daar is glo net drie fabriekie in die hele wêreld wat lamphouers deur middel van outomatiese masjiene vervaardig teen so 'n vaart en koste, dat hierdie drie fabriekie die hele wêreld se aanvraag bevredig. Dit is dus nie 'n lonende onderneming vir enige land om self so 'n fabriek op te rig nie. Suid-Afrikaanse elektriese lampvervaardigers voer derhalwe lamphouers in.

Maar as ons gaan volstaan met so 'n lamsakgees, dan is die ekonomiese toekoms van ons land maar treurig. Ons moet liever daadwerklik optree en afsetgebiede skep. Ons weet dat oorseese lande die hele Afrika vir afsetgebiede in gedagte het. Moet ons daan nie ook aan die werk spring nie? Ons groot nie-blankebevolking bied ook groot moontlikhede as afsetgebied aan. Die grootste gedeelte van ons grondstowwe word nie in ons land bewerk nie, maar word oorseese gestuur om daar bewerk te word en dit is juis op die gebied van prosesse wat outomatisasie sulke groot moontlikhede aanbied.

Die Regering het 'n komitee aangestel om op die moontlikhede van outomatisasie in te gaan. Daar word vertrou dat hulle bostaande gedagtes in oënskou sal neem. Outomatisasie verg geweldig baie kapitaal en tensy die afsetgebiede gevind word, sal geen nyweraar dit aanpak om sy kapitaal so te waag nie, en Suid-Afrika kan dan moontlik op industriële gebied altyd 'n tweederange land bly.

As ons aanneem dat ons toekoms tog nie so duister is nie, en dat ons wel die ondernemingsgees besit om outomatisasie te bevorder, en ek glo dat ons dit wel besit, wat dan? Ons moet tog nie dat die teenswoordige verminderde tempo van industriële ontwikkeling ons ontmoedig nie, omdat ons in die afgelope 10 jaar 'n ongekende vooruitgang deurelief het, en nie so kan aanhou nie. Ons moet dat die volgende paar jaar 'n tydperk van versterking en voorbereiding vir die toekoms wees.

Outomatisasie sal groter verbruik van elektrisiteit veroorsaak. Teenswoordige

although the electrical energy required to operate these machines is small, continuity of supply will become a very important factor. Clerical staff will be replaced and transferred to other duties.

The electronic digital computer can store data, and can do arithmetic calculations. It may revolutionise the treasury departments of local authorities, as these electric brains can revolutionise clerical work and even eliminate clerical staff. Statistics may be more readily available to engineers to base future policies and designs upon. Electricity departments may even control their own accounting departments—who knows? Cost accounting will be simplified and applied in all departments.

There are already talks of small automatic power stations for isolated towns in South Africa. As a point of interest, there are already on the market, atomic power stations of the order of 10 M.W. and costing £2 mil., with sufficient fuel to run fully automatically for two years, and occupying space the size of a tennis court.

Automation is already well established overseas in the control of combustion in large power stations, resulting in more efficient stations, less serious damage and wastage caused by excessive smoke due to incomplete combustion, and less polluting of air.

Automation is applied to industry to increase production, lower costs and improve quality. All these factors will benefit the Municipal Undertaking.

Summarising therefore, the effects of automation upon the future of municipal electricity undertakings will be: industrial loads will increase due to automation.

In commerce, electronic digital computers will replace clerks who will be transferred to other duties.

Electricity undertakings will be called upon to deliver more power with a greater factor of continuity, as power failures will create chaos on a scale not conceived before, and will disrupt the routine of

handarbeidskrag en toesig oor masjinerie sal deur elektriese outomatiese masjinerie waar moontlik vervang word.

Die outomatiese kantoor vir Suid-Afrika is nie so ver in die toekoms geleë soos die outomatiese fabriek nie, en verleë gesproke, sal dit nie lank duur voordat ons die aanslag daarvan op ons alledaagse lewe voel nie.

Finansieële en besigheidsondernemings sal al hoe meer op setberekenaars staat maak en alhoewel die elektriese kragverbruik van sulke masjiene maar gering is, sal die bestendigheid van toevoer al hoe meer belangrik word. Klerklike personeel sal na ander werksaamhede verplaas moet word.

Elektroniese setberekenaars kan gegewens bewaar en berekenings doen. Dit kan dus 'n groot omwenteling in munisipale tesouriersafdelings veroorsaak, omdat dit klerklike werknemers kan verplaas en selfs heeltemal uitskakel. Statistieke sal makliker bekombaar vir ingenieurs wees om sodoende hulle toekomstige beleid en ontwerpe rigting te gee. Elektrisiteitsafdelings mag selfs hulle eie rekeningkunde-afdelings beheer—niks is onmoontlik nie!!! Kosteberekening sal vereenvoudig word en sal dan in alle afdelings toegepas kan word.

Daar is alreeds sprake van kleinere outomatiese kragcentrales vir verafgeleë dorpe in Suid-Afrika. Noemenswaardig is die feit dat daar alreeds 'n atomiese kragcentrale van 10 M.W. en wat £2-miljoen kos, op die mark is. Dit is ten volle uitgerus met genoeg brandstof om geheel en al outomaties vir twee jaar aan die gang te bly en beslaan maar 'n oppervlakte so groot soos 'n tennisbaan.

Op die gebied van beheer oor verbranding in groot kragcentrales is outomatisasie oorsee al baie goed gevestig en het sodoende meer doeltreffende sentrales, minder skadeberokkening en verkwisting wat deur onvoldoende verbranding veroorsaak word, en minder besoedeling van lug te weeggebring.

Die doel met die toepassing van outomatisasie in die nywerhede is om produksie te verhoog, vervaardigingskoste te verlaag en kwaliteit te verbeter. Munisipale elek-

whole communities. Councils may have to forfeit the contributions to relief of rates from profits of the electricity undertakings which they have become so accustomed to in the past, as funds will be required to equip the undertakings with only the best that money can buy to ensure this continuity of supply. Cities, towns and their communities will become more and more dependent upon electricity.

The factors governing automation are: specialisation, standardisation, simplicity and repetition. Because these factors are not present in sufficient magnitude in the normal run of municipal undertakings, except as discussed in previous paragraphs, I cannot visualise any further effects of automation upon municipal undertakings.

Automation will demand a wider knowledge, greater ability and a higher degree of skill from worker and manager alike. This will also be true for electricity undertakings and this brings me to the second topic which demands our attention today, viz. *Technical Staff*.

Technical staff embraces the categories of professional engineers, engineering assistants and the technicians.

So much has already been written and said upon the shortage of engineers, that I wish only to touch upon a few aspects.

That there is a shortage of engineers is an undisputable fact. It has also been ascertained that this shortage will grow, as we do not appear to make headway against the back-log.

The advancement of science and engineering, and in particular, automation, will require more and more men in the category of the artisan and the professional engineer, viz. the *technician*. More technicians will be required due to the complexity of apparatus to be used in industry.

In the foreseeable future South Africa will require many of these technicians. The rate of progress of our country, and in particular in the field of automation, will depend upon the availability of man power in the category technicians to engineers.

triseitsondernemings sal deur al hierdie faktore voordeel trek.

In opsomming dus, sal die uitwerking van outomatisasie 'n groter verbruik van elektrisiteit meebring. Elektrieseitsondernemings sal meer krag met 'n groter mate van bestendigheid moet voorsien. In die sakewêreld sal setberekennars klerke op groot skaal vervang wat dan na ander werksaamhede verplaas sal word, en hier sal bestendigheid ook 'n groot rol speel. Kragonderbrekings sal chaos soos nog nooit tevore gekom nie, veroorsaak, en sal die lewenswyse van die gemeenskappe heeltemal omvergooi. Stadsrade sal moet afsien van die ou gebruik waaraan hulle al so gewoon geraak het om profyte op verkoop van elektrisiteit vir onderstand van belasting te gebruik. Hierdie profyte sal hoogs nodig wees om die ondernemings van die beste toerusting te voorsien om sodoende bestendigheid te bevorder. Stede en dorpe sal al hoe meer van elektrisiteit afhanklik word.

Die oorheersende faktore wat vir outomatisasie nodig is, is soos volg: spesialisasie standaardisasie, eenvoud en herhalings. Weens gebrek aan voldoende teenwoordigheid van hierdie faktore in die algemene bestuur en bedryf van munisipale elektriseitsondernemings kan geen verdere belangrike ontwikkeling verwag word nie.

Outomatisasie sal wel uitgebreider kennis, meer bekwaamheid en groter vaardigheid van beide werker en bestuurder vereis. Dit sal ook die geval in munisipale elektrisee ondernemings wees. Hierdie verklaring bring my dan na ons volgende onderwerp van bespreking nl. *tegniese personeel*.

Tegniese personeel omvat die professionele ingenieurs, assistent-ingenieurs en tegnisi.

Daar is al so baie i.v.m. die tekort aan ingenieurs gesê en geskryf dat ek nou maar net 'n paar gedagtes daarvoor wil wissel.

Daar bestaan geen twyfel dat daar wel 'n tekort aan ingenieurs is nie. Daar is ook reeds vasgestel dat hierdie tekort eerder sal toeneem as afneem, want blykbaar is ons nie in staat om die tekort in te haal nie.



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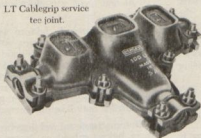
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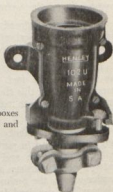
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In the field of automation this shortage, together with the shortage of capital, will constitute the main retarding force to progress.

If we already have a shortage of engineers and we are not making headway against this shortage, what are we going to do if the field of specialist men is enlarged? South Africa is already lagging behind other countries in the training of technologists and technicians and if the public, the authoritative powers and industry—this includes Municipal electrical undertakings—do not take a broad view of this matter, our country may be seriously affected in its economic and industrial development.

There is no single cure all remedy for this alarming state of affairs, but good foresight, good planning, good-will and co-operation can go a long way to lay the foundation for the future.

The electrical engineering career, be it professional engineer or technician, must be made so attractive that sufficient suitable young men will be attracted.

Remuneration in the electrical engineering industry needs consideration. The status of the profession is another matter of great concern. We are told that Russia is producing more engineers and technicians than the whole of the western world put together. How is this done? The engineering career in Russia has been made one of the most attractive careers in that country, both in remuneration and esteem. There is nothing to prevent this country from doing the same. Think of the low salaries paid to apprentices. Do we expect to draw young men to this career from which we may pick our future technicians? Because of the poor esteem in which the career is held, youngsters prefer the collar and tie jobs. We should give these matters our serious consideration.

The remuneration of professional engineers and engineering assistants leaves much to be desired, compared with other careers. The time is long past that we can expect young men to embark upon an

As gevolg van die vooruitgang van wetenskap en ingenieurswese en in besonder outomatisasie, sal daar in die toekoms altyd meer en meer van die klas werknemer tussen die professionele ingenieur en ambagsman n.l. die tegnisi benodig word. Meer van hulle soort sal benodig word, weens die ingewikkeldheid van apparaat wat in nywerhede gebruik sal word.

Suid-Afrika sal ook in die nabye toekoms baie van hierdie tegnisi nodig hê. Die tempo van vooruitgang van ons land en veral van outomatisasie sal van die beskikbaarheid van ingenieurs en tegnisi afhang. Op die gebied van outomatisasie sal hierdie tekort en die tekort aan kapitaal die hoof-oorsaak van 'n stadige vordering wees.

As ons dan alreeds 'n tekort aan ingenieurs het en blykbaar hierdie tekort nie inhaal nie, en ons brei nog die gebied van gespesialiseerde werknemers uit, wat staan ons dan te doen? Suid-Afrika is alreeds agterweë in vergelyking met ander lande wat die opleiding van tegnoloeë betref en as die publiek, gesaghebbendes, en nywerhede—wat munisipale elektrisiteitsondernemings ook insluit—nie 'n breë sienswyse i.v.m. hierdie saak aanneem nie, dan sal ons land seer sekerlik baie ernstige op ekonomiese en industriële gebied benadeel word.

Daar bestaan nie 'n enkele alomvattende oplossing vir hierdie verontrustende probleem nie, maar veel kan deur goeie voorsorg, goeie beplanning, wewillendheid en samewerking gedoen word om sodoende 'n goeie grondslag vir die toekoms te lê.

Die loopbane in die elektrotegniese ingenieurswese behoort so aantreklik moontlik gemaak te word dat dit baie van ons geskikte jong manne sal lok.

Salarisse wat in die elektriese industrie betaal word moet ook in hersiening geneem word. Die status van die profesie behoort ook in alle erns in oënskou geneem te word. Daar word vertel dat Rusland meer ingenieurs as die res van die westerse nasies oplei. Hoe is dit moontlik? Omdat die loopbaan so aantreklik gemaak is, in salarisse sowel as aansien, dat dit die ander loopbane oortref. Daar is niks wat ons

engineering career, because he considers it a calling. In this material world of ours, it is the hard facts that count, and hard cash speaks well for itself.

The next phase in this campaign will then be to provide the necessary institutes where these young men could be properly trained. Here I strongly advise the establishment of institutes of technology which would cater for every class of the engineering industries' requirements, from the technician to the fully professional engineer including the B.Sc. degree. Our Universities catering for engineering graduates today, are doing a wonderful job of work, but statistics show that the facilities are insufficient to supply our country's present requirements. As the tempo of advancement of science and engineering is increasing, this situation can be expected to deteriorate.

These proposed institutes of technology should not be in opposition to our Universities with engineering faculties, but should be complimentary to them. Both types of schools of learning are required and there should be no question of the one overshadowing the other.

These institutes should, in years to come, build up a tradition and character which should become the pride of past, present and future students. South Africa is lagging behind in not having such institutes. All major countries have them and they are world renowned. Why should this not be so in South Africa?

A problem of no uncertain magnitude will be the staffing of these institutes. Forgive me if I wander a little and talk about teaching staffs in general. The future of a nation depends largely upon the quality of its teaching profession. It is therefore of utmost importance that only the best and most suitable persons should be attracted to that profession and again remuneration is an important factor. We hear so often of teachers changing their careers for financial reasons and this should not be so. The teaching profession needs the public sympathy and support in their

verhoed om dieselfde te doen nie. Dink maar net aan die lae besoldiging van ons vakleerlinge en dan verwag ons om uit hulle geleedere ons toekomstige tegnici te kies? Baie van ons jong seuns verkies klerklike werk weens die lae aansien van die ingenieurswese loopbaan. Dit is sake om ernstig oor na te dink.

Die besoldiging van ingenieurs en ingenieurs-assistente, in vergelyking met ander professies, laat ook veel te wense. Die tyd dat van jong mans verwag kan word om 'n elektrotegniese loopbaan te kies bloot omdat hulle dit as 'n roeping beskou, is al lankal verstreke. In ons hedendaagse materialistiese wêreld is dit net blote feite wat gereken word, en harde kontant is een van die grootste van hierdie feite.

Na die lokking van genoeg geskikte jong mans is die voorsiening van geskikte inrigtings om hierdie tegnoloë en tegnific op te lei die volgende stap. Ek wil dan hier ten sterkste die stigting van tegnologiese institute aanbeveel, wat dan in al ons vereistes, van die tegnific tot die professionele ingenieur, (die B.Sc. graad ingesluit) sal voorsien. Ons Universiteite doen vandag goeie werk, maar gegewens bewys dat hulle nie aan die land se vereistes kan voldoen nie, en aangesien die tempo van wetenskaplike ontwikkeling en ingenieurswese altyd styg, kan daar eerder 'n agteruitgang in hierdie toestand verwag word.

Die voorgestelde institute behoort nie met die ingenieurswese fakulteite van universiteite te wedywer nie, maar behoort aanvullend daartoe te wees, want ons het altye die soorte van inrigtings nodig. Daar behoort geen sprake van oortreffing van die een deur die ander te wees nie.

Met die verloop van tyd behoort hierdie inrigtings so 'n mate van tradisie en karakter op te bou dat leerlinge, oud, teenswoordig sowel as toekomstig, trots daarop sal wees dat hulle daaraan verbonde is. Suid-Afrika het in hierdie opsig agterweë gebly want al die vernaamste lande het alreeds sulke inrigtings wat wêreldbekend geraak het. Daar is geen rede waarom dit hier nie ook so kan wees nie.

Dit sal egter 'n groot probleem wees om hierdie institute van dosente te voorsien.

campaign for better financial imbursement, because they have to lay the foundation of our future generations. It will be of immense value to our universities and proposed institutes of technology if they start with a product having a sound general foundation. It will then be their job to give this product an equally sound technical foundation.

The qualities of the teaching staffs of these institutes should also be of the highest order. In Russia, where engineering progress is on such a scale that the Western World is becoming alarmed, the teaching profession as far as salaries are concerned, has been made more attractive than industry. I strongly advocate and plead for the same far-sightedness in South Africa; we will need it in the future if we ever wish to be a highly rated nation.

In all these problems mentioned, industry can and must play an important role. There should be a much higher degree of co-ordination between engineering institutes and industry than has been the case up to date. The establishment of the recommended institutes will require costly buildings, highly paid technical staffs, and attractive careers for the end products. Our present universities require better facilities and expansion to cater for future requirements. Industry should not stand isolated from these problems because it is mainly industries' problem to find suitable staff to man their works.

Financial aid and teaching personnel can be supplied by industries on a larger scale than has been evident to date. Highly qualified and capable men from industry should be seconded or subsidised from industry to the teaching staffs of these institutes.

Municipal electricity undertakings in general, could offer more employment to engineering students during their vacation periods. Not only will they then be assisting in the education and training of these students, but they will also be advertising

As ek so 'n bietjie afwyk en van ons opvoedkundiges oor die algemeen praat, vertrou ek dat u my sal verskoon.

Die toekoms van 'n nasie hang tog baie van die opvoedkundiges, die onderwysers, af en dit is dan daarom dat die persone wat na die professie getrek word tog van die allergeskikste moet wees. Dit kan alleen deur besoldiging gedoen word en daarom het die onderwysers die publiek se simpatie en ondersteuning nodig in hulle pogings om beter salarisse te verkry, want hulle moet die grondlegging van ons toekomstige tegnoloe en tegnici doen. Ons hoor tog so dikwels dat onderwysers hulle neringe verander om beter besoldiging te verkry, en dit behoort nie so te wees nie. As 'n goeie grondslag gelê is dan sal dit soveel makliker vir die ingenieursweseinrigtings wees om op daardie grondslag voort te bou en sodoende 'n uitstekende tegniese grondslag te lê.

Die doserende personeel van sulke inrigtings behoort dan ook van die hoogste gehalte te wees. In Rusland, waar die vooruitgang op die gebied van ingenieurswese van so 'n aard is, dat die westerse nasies verontuis is, word aan tegniese onderwysers hoër salarisse betaal as wat hulle in nywerhede kan verdien. Ek wil dan graag ook so 'n sienswyse in ons land bepleit; ons sal dit *moet* doen as ons ooit 'n nasie van hoë aansien wil word.

Nywerhede behoort 'n groot aandeel in die oplossing van genoemde probleme te hê. Daar behoort 'n baie nouer samewerking tussen ingenieursweseopleidingsentrums en nywerhede te wees as wat daar tot nou toe was. Die daarstelling van die voorgestelde inrigtings sal baie kapitaal, hoër salarisse verg. Ons bestaande universiteite het ook gebrek aan fasiliteite en uitbreidings word vereis. Die nywerhede behoort nie afgesonder te wees nie maar behoort daadwerklik hand by te sit, want dit is die nywerhede wat behoorlike opgeleide tegnici en tegnoloe nodig het.

Geldelike bystand en die voorsiening van hoog-gekwalfiseerde personeel behoort deur nywerhede in groter mate aan sulke sentrums voorsien te word.

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their wares to these students, viz. future employment. Both stand to gain; no one to lose.

A special appeal is made to employers in industry in general: Make the career of engineers and technicians in your concerns financially attractive to attract sufficient and the best of our young men and so overcome the shortage of technical staff.

If we fail to do this, our country is doomed to the ranks of second rate nations forever.

In conclusion, I would like to stress that whilst in the past our natural resources drew the best of engineers and artisans to this country and we depended largely upon them to develop these resources, we have long reached the stage where we have to train and educate our own technical man power. We have been doing so, but up to date we appear, like the rest of the western world, to lag behind in this training and education.

Our system needs revision. As municipal electricity undertakings play such an important part in our country's economic and industrial development, we should also contribute to the solution of these problems and not depend upon others to provide us with the necessary man power and yet bear the burden alone.

South Africa with its vast natural resources and yet so little processed locally, has a great future. If we show the necessary foresight, plan well, obtain the necessary co-operation between industry and education and do our duty, we will be able to survive the "Automation Revolution" with the minimum disturbance in our human affairs and it will be well with our country.

Munisipale elektrisiteitsondernemings behoort meer studente gedurende hulle vakansietye in te neem, nie alleen om sodoende hulle in hulle studies te help nie, maar ook aan sulke studente die moontlikhede en voordele van toekomstige werkverskaffing aan te toon. Niemand sal iets daardeur verloor nie, en albei sal daardeur verryk word.

Daar word dus 'n besondere beroep op werkgewers van nywerhede gedoen om die loopbane van ingenieurs en tegnisi in hulle sake geldelik so aantreklik te maak dat genoeg van ons beste jong mans getrek sal word en aldus die veelbesproke tekort inhaal.

As dit nie gedoen word nie, is ons land verdoem om altyd maar 'n tweederangse land te bly.

Ten slotte wil ek graag nadruk op die feit lê, dat waar ons in die verlede groterdeels ingenieurs en tegnisi van ander lande deur ons natuurlike bronne van grondstowwe getrek het en van hulle afhanklik was om hierdie bronne te ontgin en te verwerk, ons nou op eie pote moet staan en ons eie tegnoloe en tegnisi moet voorsien. Ons doen dit alreeds 'n geruime tyd, maar soos die geval met al die ander westerse nasies is, blyk ons dit nie reg te kry nie. Ons stelsel behoort nagesien te word.

Aangesien munisipale elektriese ondernemings so 'n groot aandeel in die ontwikkeling van ons land se ekonomie en nywerhede het, behoort ons ook tot die oplossing van hierdie vraagstukke by te dra en nie van andere afhanklik te wees om hulle vir ons op te los en ons van die nodige opgeleide personeel te voorsien nie.

Met sy groot bronne van grondstowwe, (en tog so min hier verwerk) het Suid-Afrika 'n rooskleurige toekoms. As ons die nodige oorleg aan die dag lê, goed vooruit beplan, die nodige samewerking tussen nywerhede en opleidingsentrums verkry, en skouer aan die wiel sit, sal ons hierdie Outomatisasie-rewolusie met 'n minimum van ontwrigting in ons menslike aangeleenthede oorleef en dit sal met ons land goed gaan.

Mr. C. G. DOWNIE (Cape Town): Ladies and Gentlemen, I think you will agree that we have listened to a most timely and appropriate address considering the vast development which is now awaiting this country, and it is just as well that an address such as this should have been given by the President of this Association.

I now call upon Mr. Lombard to propose the vote of thanks.

Mr. C. LOMBARD (Germiston): Mr. Chairman, Mr. President, Ladies and Gentlemen. It is a great privilege to propose a vote of thanks to our President for his valuable and thought-provoking Presidential Address. He is, as you all know, the convenor of the Technical Staff and Manpower Sub-Committee of this Association, and can therefore speak with authority on one of the topics which he chose for his address, i.e. technical staff.

I imagine that in compiling data and statistics in regard to the present shortage of technical personnel and manpower his thoughts have turned to automation as possibly offering at least a partial solution to this difficult problem, and that he there-

fore decided to choose this as the other topic of his address.

I must confess that I have great difficulty in understanding just where mechanisation ends and where automation begins, and as I see it, there is no sharp dividing line between the two. However, there is no doubt about it that we shall in future hear a lot more about automation in our country. But as our President has mentioned, it will not overtake us overnight, and it is therefore unlikely to cause any serious social disturbance.

As far as its effects on municipal electricity undertakings are concerned, I can predict with confidence that these undertakings will welcome any increase in the use of electricity in industry caused by automation, and will meet the demands which will be made upon them.

In die tweede gedeelte van sy rede het ons President verwys na die te-kort aan tegniese personeel wat vandag in ons land bestaan en ek wil graag sy mening onderskryf dat, tensy daar daadwerklik opgetree word om hierdie probleem op te los, ons land by ander lande agterwee sal bly en

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feitlik niks anders as 'n tweederangse land sal wees nie. U sal onthou dat hierdie saak tydens die konvensies wat te Bloemfontein en Pretoria gehou is, ook te berde gebring is, en soos desyds voorspel versleg die toestand nog steeds.

Ons President het melding gemaak van die opleiding van ingenieurs en tegnici in Rusland waar die loopbane en ingenieurswese baie aantreklik gemaak word, en hulle in soveel talle opgelei word, dat die westerse nasies daaroor bekommerd begin raak. Volgens 'n artikel wat ek onlangs in 'n tydskrif gelees het, ontvang studente in ingenieurswese wat aan Russiese universiteite studeer, besoldiging van die staat tydens hulle studie jare benewens sekere andere voordele soos vrye verblyf en die meer.

Ek was eens op 'n tyd van mening dat die toekenning van meer studie beurse aan studente in ingenieurswese in ons land daartoe sal by dra dat meer jongmanne ingenieurswese as 'n loopbaan sou kies, maar die ondervinding het geleer dat dit nie genoeg aansporing bied nie en dat tensy ingenieurs se loopbane deur beter besoldiging meer aantreklik gemaak word, daar nie genoeg jongmanne gelok sal word nie.

Ek voel soos ons President dat munisipale elektrisiteits-ondernemings 'n baie groter bydrae kan lewer om die probleem in verband met die tekort aan tegniese personeel op te los veral ten opsigte van die opleiding van tegniese. Die verskillende ondervattings wat in munisipale elektrisiteits-ondernemings bestaan, bied 'n geleentheid aan om vakleerlinge 'n baie meer omvattende opleiding te gee as wat die geval b.v. in baie nywerhede en met elektrotegniese aannemers is. Ons moet onself die vraag stel of ons in die belang van ons land genoeg vakleerlinge oplei met die fasiliteite wat ons tot ons beskikking het. In die meeste gevalle sal ons moet erken dat dit in ons vermoë is om meer vakleerlinge op te lei as wat tans die geval is.

Mr. President, I understand that there is a possibility that the present system of training at our technical colleges will be revised drastically in the near future, somewhat on the lines suggested in your

address, and that facilities will be provided for training technicians for industry, etc., and to make it possible for the more ambitious young men to obtain the Government Certificate of Competency and even the B.Sc. (Engineering) degree by part-time study.

It will, therefore, be up to municipal electricity undertakings to do their share by taking on as many apprentices as they can train and to provide the necessary encouragement and incentive to these young men to devote themselves to their studies and obtain the higher qualifications which will be within their reach.

Mr. President, I sincerely hope that the points made by you in your valuable address will receive the attention which they deserve throughout our country and it now gives me great pleasure on behalf of all of us at this Convention to propose a vote of thanks to you.

Mr. C. G. DOWNIE (Cape Town): Thank you, Mr. Lombard.

I will now call upon Cr. Castelyn to second the vote of thanks.

Cr. F. J. C. CASTELYN (Bloemfontein): Mr. Chairman, Ladies and Gentlemen, It gives me much pleasure to second Mr. Lombard's proposal.

The address delivered by our President is indeed a credit to South Africa, and in particular to our Convention.

Dit is besonder aangenaam om te sien dat hierdie adres in beide tale gelewer is op so 'n wonderlike bekwame wyse. Vir my was dit besonder aangenaam om gisteraand aan die slaap te raak met die gedagte dat daar op die plaas, ek binnekort so 'n ysterboks sal hê waar ek in sy mond 'n briefie sal steek en sê, „Gaan pluk uit die boontjies daar op die land.”

Kyk, menere, dis 'n wonderlike ding vir die toekoms. Dis jammer dat ons so gou oud word, want ek sou graag daardie tyd wil beleef wanneer dit werklikheid word. En dis nie net meer by hierdie jongmanne 'n droom soos by ons oues nie; dis by hulle werklikheid.

Menere, oor daardie automatiese ding wil ek nie soveel sê nie. Ek laat dit aan die jongere oor, maar as raadslid, trek ek dit my 'n bietjie aan wat ons geagte President

gesê het oor die personeel en oor die ingenieurs en besonder. En u weet 'n raadslid is baie gevoelig. Dit lyk so of hy so 'n bietjie blaam wil gooi op die stadsrade; hoekom betaal hulle nie meer nie? Maar 'n raadslid is 'n man wat vir al let op vergelykings en die President het daar 'n vergelyking getref wat my nou glad nie aanstaan nie. Hy noem Rusland as die land waar daar soveel ingenieurs met sulke groot besoldiging werk. Meneer, Rusland (ek weet nie of hulle geld het om te betaal of betaal hulle met briefies nie), maar ons het 'n vreeslike groot skaarste aan personeel in Bloemfontein en ons het toe in die Pravda geadverteer. (Gelag.) Meneer die President, die salaris was nie die ding nie, maar daardie vodka, of wat is die ding? Die invoerbelasting was so hoog en die man wil eenvoudig nie mampoer drink nie. (Gelag.) Maar u weet dis ook ons plig om iets aan die hand te doen.

Meneer die President ek sal vreeslik bly wees as u tog by 'n later geleentheid 'n bietjie ondersoek instel by Ierland. Ek verstaan van gesaghebbende persone dat in Ierland 'n oorvloed van ingenieurs is. Dit is so, en in Ierland word hulle nie baie betaal nie. Maar ek wil tog dan aan die hand doen indien hy dit wil onderneem dat hy die lengte van die persoon wanneer die advertensies geplaas word, bepaal. Kyk! 'n Ier moet oor ses voet wees; daardie een wat onder ses voet is, jy moet hom tog nie aanstel nie. Hy is buskruit. (Gelag.)

Meneer ek wil nou regtigwaar ernstig wees om vir u te bedank vir hierdie werk wat u vir ons gedoen het. Dis voorwaar 'n puik stukkie werk. Ek sal dit saam neem, en ek wil dit nog 'n slag oorlees. Dis van baie waarde vir ons, en ek kan sien dat u 'n spesiale studie daarvan gemaak het. U het die onderwys so 'n bietjie geraak. Nouja, dit is min of meer in my lyn, Meneer die President. Ek dink nie die gewone onderwysers van ons land het baie rede om nou meer te kla oor hulle salarisse nie. Professore wel. Dit is 'n welbekende feit 'n volk is wat sy onderwysers is. Ek stem met u saam. Maar ons kom reg meneer; ons land is 'n wonderlike land.

Ek wil tog nou net ten slotte sê meneer, ek wil iets aan die hand doen, en dit is ten aansien van die status van die ingenieur. U weet ek het, toe ek 'n jong

man was, 'n vriend gehad wat 'n dokter was. Hy het hom so bekommer oordadig algemene ding, almal word nou 'n dokter. Toe het hy 'n plan gemaak. Nou noem hulle dit "Dokterandus". En weet u? Dit het die posisie dadelik gered. Kan ons nie so 'n plan maak om ook 'n ingenieur dis of das te noem nie, en dit sal miskien die posisie oplos. Die moeilikheid meneer lê nie by die stadsrade nie, om die status van die ingenieur te verhoog nie. Dit lê by die persone wat vir hulle vandag ingenieurs noem. Hy is 'n ingenieur. Hy werk met fietse, en die ander een met naaimasjiene, en hy is ook 'n ingenieur! Dit is nie die raad se skuld nie. Dis die ingenieurs se skuld. Hulle moet ook 'n "dus" of 'n "dos" daar by die naam sit en beperk hom dat hy nie 'n ingenieur is nie. Ek will ons geagte ingenieurs verseker dat in agting en in status staan hulle maar altyd hoog in ons land, want die werk wat hulle vir ons lewer is hoog.

Nou meneer, baie, baie dankie vir die deeglike werk wat u gedoen het, en nogmaals hartlik dank dat u die moeite geneem het om dit vir ons so mooi in Afrikaans te gee. Dankie. (Applause.)

Mr. C. G. DOWNIE (Cape Town): Ek kan nie Afrikaans praat nie, Mnr. Castelyn, but I have a pretty good idea that that was a very good seconding of the vote of thanks. (Applause.)

I must now ask the President to resume the chair, ladies and gentlemen.

THE PRESIDENT: I just want to say "Thank you very much" to my proposer and seconder for the very nice remarks they have made.

Baie dankie Mnr. Lombard, Mnr. Castelyn. Ek waardeer die baie aangename beoordeling.

(There followed Convention announcements.)

TEA ADJOURNMENT

On Resuming:

THE PRESIDENT: We will now proceed with the business on the Agenda.

The next item is Mr. Middlecote's paper on Earth Leakage. We welcome Mr. Middlecote, and I will now ask him to deliver his paper.

EARTH LEAKAGE

by A. A. MIDDLECOTE

1. GENERAL

It may be generally stated that an electrical system is earthed to limit the potential to the general mass of earth of the current-carrying conductors in the first case, when it is known as "system earthing", and the non-current carrying metal work associated with the electrical equipment in the second case when it is known as "equipment earthing" and is directed at ensuring the safety of human life, animals and property should such metal work become alive due to a breakdown of insulation.

The hazards which may arise on an electric system in which a fault has developed are those of lethal electric shocks to humans touching normally non-current carrying metal work which has assumed a high potential to earth due to the fault, and those of fires caused by the fault leakage current overheating materials or even causing sparks and arcs. The electrical engineering profession has, since its inception, been acutely aware of its responsibilities in this connection and it is therefore stressed that this paper is not a criticism of existing practice so much as a review of the present situation as it affects small low voltage installations. And it is given with the realization that developments in the electrical engineering supply industry, with the tremendous increase in domestic loads, have imposed more difficult conditions as regards the effectiveness of the established practices of earthing for safety. The large number of different approaches reviewed are indicative of the fact that the ultimate scheme adopted can only be decided by the engineer concerned after full consideration of the local conditions.

2. ELECTRICAL ACCIDENTS

In order to gain an impression of the problem which is being faced it is necessary to examine the incidence of electric fatalities and fires which occur annually. South African figures for domestic fatalities

are unfortunately not available but the figures for accidental deaths in industry are quite significant. During 1950 there were 214 accidental deaths among Europeans, coloureds and Asiatics of which only seven or 3.25 per cent. were due to electricity. Similarly of 1,281 deaths among natives eight or 0.62 per cent. were due to electricity. These figures compare reasonably well with those of 4.5 per cent. in U.S.A. and 7.5 per cent. in Britain.

Of the total of all accidental deaths which occurred in U.S.A. during one year, only 1,056 out of a total of 96,172 (a percentage of just over one) could be attributed to electricity and this appears relatively insignificant when compared to those deaths due to falls which totalled 20,945 or 22 per cent. of the total. The total fatal domestic accidents which occurred in U.S.A. during this same period was 27,500 but the number of these due to electricity was so small as not to warrant being listed as a cause and would appear to be less than one per cent. of the total. In Britain a similar situation is apparent and only 50 or just under one per cent. of the 5,500 fatal domestic accidents in one year were caused by electric currents while again those due to falls were preponderant. Bearing these figures in mind it can be safely assumed that in South Africa also the number of deaths due to electrocution in homes is probably about one per cent. of the total accidental deaths. Further it must be realized that about half of the fatal accidents were probably due to deliberate interference with otherwise safe circuits by amateur wiremen and experimenters.

At first these figures make one wonder why so much attention should be focussed on electrical safety and not more on prevention of other types of accidents such as falls. It is only fair that this should be borne in mind when considering the economic side of safety precautions, but on the other hand a mistaken sense of

security should not be created. Electricity is dangerous and the relatively low incidence of electric fatalities is in fact mainly due to the necessity for coincidence of occurrence of several conditions before death by electrocution will occur. There are five main requirements and these are briefly listed as:

- (1) Occurrence of a fault on the system.
- (2) Failure of the earth connection to the non-current carrying metal work effected by the fault (or else failure of any alternative protection).
- (3) Location of metal work concerned near a conducting or well earthed floor.
- (4) Actual touching of the metal work.
- (5) Physical condition of the person touching the metal work as regards ability to withstand electric current and also the body resistance as determined by the condition of the epidermis.

Because it is necessary for these conditions to occur simultaneously electric accidents have been kept down in the past though the use of good materials made to sound specification and the provision of good earths has also been necessary and cannot be relaxed. In this connection the wiring regulations have been most useful and in their compilation all the coincidental factors have been borne in mind, notable examples being the limitation of power point supplies in bathrooms and kitchens where the probability of occurrence of factor three above is high. Generally, however, the whole approach to electric safety must be based on probability of coincidental occurrences, and on no account should the safety requirements be relaxed since relaxation of care might lead to an increased probability of occurrence of one of the factors, with corresponding increase in probability of a fatality.

3. ELECTRIC FIRES

When the incidence of fires is considered the hazards of electricity in the home are made more obvious. Again there are no figures available for South Africa but using Britain and U.S.A. as a guide it appears that somewhere between 10 per cent. and 20 per cent. of the annual fires are probably

caused by electrical faults. In Britain 7,206 or 16 per cent of the 43,744 fires reported were considered to have been caused by electricity while in U.S.A. the corresponding figures were 88,400; 12 per cent. and 727,000. The higher incidence of fires is possibly due to the requirement of less coincidental occurrences. It is therefore claimed that the approach towards earth leakage problems should always bear the resultant fire hazard in mind to a large extent especially when it is realized that equipment earthing has little significance as a safeguard against fires. Earthing the frames and enclosures of such equipment may actually contribute to a fire hazard if it involves a sufficiently high resistance to prevent tripping or blowing of overcurrent protective devices and yet at the same time lead to localised overheating.

4. LETHAL CURRENTS

It is actually the value of the current which flows through the human body which determines whether an electric shock will be lethal or not. Unfortunately no definite dangerous value of current can be given at present due to variation of this value with the individual, sex and age. Many authorities accept 15 milliamps A.C. as the maximum safe current but Dalziel claims that eight milliamps A.C. allowed on electrified fences in U.S.A. can in fact prove lethal to small children. Electrocution at this level takes some time and is due to the muscular contraction which initially prevents anyone from letting go of the live circuit but later extends to the chest muscles and ultimately causes death by asphyxia.

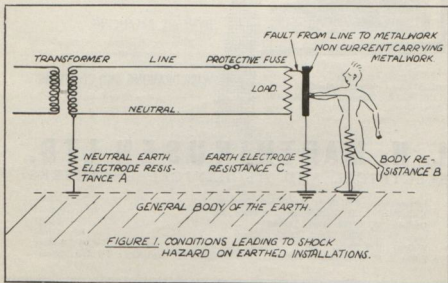
Shocks of short duration are usually fatal in a different way. They upset the heart rhythm by causing what is known as ventricular fibrillation. Dalziel suggests values such as 80 milliamps for less than five seconds, 600 milliamps for less than 0.1 seconds and one amp for less than 0.03 seconds. Death from fibrillation is almost inevitable and the victim does not normally react to first-aid, although new techniques of defibrillating by passing current of five to seven amps across the heart for one second are meeting with success provided this is done within a couple of minutes of the onset of the fibrillation.

It must also be remembered that people with weak hearts or other weaknesses may die from heart failure when subjected to weak shocks, just as this may be caused by an unexpected noise. For the purposes of safety it would seem that the safe let-go current should be taken. This is the current which will allow on the average 199 out of 200 to release contact, and values are nine milliamps for men, seven milliamps for women and something like five milliamps for children.

Since it is the current which is important where shocks are concerned it is really necessary to know the resistance of the body before any idea of safe voltages can be formed. Some authorities assume 500 ohms which is, however, the resistance of the body after complete breakdown of the epidermis. With the feet immersed in salt water and a wet hand used to touch a live electrode, values between 1,300 and 2,000 ohms are usually obtained. The resistance under normal conditions would be about ten times these values. Higher body resistances can be accepted in cases where earthing difficulties are encountered since if it is difficult to obtain a low earth

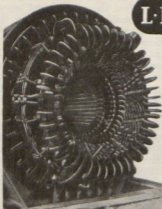
electrode resistance the "earthing resistance" of the body, i.e. between feet and general body of the earth must also be high.

The difficulty of using just experimental figures like these in assessing safe conditions is indicated by the fact that if a body resistance of 500 ohms and a current of five milliamps are taken as boundary conditions a voltage of 2.5 is to be avoided which in the light of practical experience is ridiculous. Values of 15 milliamps and 2,000 ohms are probably more realistic especially when the coincidental requirements are considered — and even these indicate that voltages of 30 are dangerous. This, however, compares well with the accepted value of 40 volts in certain B.S.S. documents. It will therefore be accepted that in the interests of safety steps must be taken to ensure that leakage currents in excess of 15 milliamps will not pass through the body of a person touching metal work which has become alive due to a fault or that such metal work will not be allowed to assume a voltage in excess of 40 volts to earth.



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5. EARTHING FOR SAFETY

The first and obvious approach towards safety is to bond securely to the general body of the earth all non-current carrying metal which could be made alive when a fault on the system occurs. This is called direct earthing and has been the general practice in most countries for many years. Figure I. illustrates simply the approach.

If the impedance C of the connection between the non-current carrying metal and the general body of earth was zero it would be impossible to develop a dangerous voltage across the body of a person, represented by the resistance B, standing on earth and touching the exposed metal work no matter how high the fault current was. In practice, however, C always has a value and it is even more difficult to keep this value down to reasonable limits in South Africa than in countries such as Britain and U.S.A. For instance if the earthing resistance C were four ohms a fault current of 10 amps to earth would cause a voltage of 40 volts to exist between the metal work and earth and this would constitute a hazard. Any fault current below this would be safe from a shock point of view although possibly still a fire hazard.

Apart from this effect, direct earthing should function in a second but yet more important manner. The earth electrode resistance C should be low enough to ensure that the protective devices, be they fuses or circuit breakers, should operate and isolate a circuit as soon as a fault develops between the live circuit and the non-current carrying metal work. For a circuit protected by a fuse a fault current of at least three times the fuse rating is required due to the fuse factor, while on circuits protected by miniature circuit breakers the fault current must be $1\frac{1}{2}$ times the breaker setting. Thus on a 200 volt circuit, if the consumer earth electrode resistance C were four ohms and the transformer neutral earthing resistance A negligible, the fault current would be 50 amps. This would blow the fuse on a circuit rated at 15 amps or open the breaker on a circuit rated at 30 amps. Circuits protected at higher levels would not be cleared. Again in practice the trans-

former neutral earthing resistance has a value unfortunately reaching as much as 50 ohms. Even if the value was four ohms it means that only circuits fused for less than eight amps or protected by 15 amp breakers would be safely cleared. This consideration also indicates the advantage of using miniature circuit breakers when operating where earthing is difficult.

TABLE I.

Circuit Rating	Maximum Earth Resistance	
	Fuse Protection	Miniature Circuit Breaker Protection
5 amp	6.7 ohms	13.3 ohms
10 amp	3.3 ohms	6.7 ohms
15 amp	2.2 ohms	3.3 ohms
50 amp	1.1 ohms	2.2 ohms
60 amp	0.55 ohms	1.1 ohms

Earthing Resistance necessary to give Protection on a 200 volt Circuit

- When the Circuit is Fused.
- When the Circuit is Protected by a Miniature Circuit Breaker.

(It is assumed that the supply transformer neutral earthing resistance is the same as that at the installation).

Table I. shows the maximum earthing resistances which could be allowed on various circuits assuming that in each case the transformer neutral earthing resistance has the same value. In practice it must be ascertained what the value of this resistance is or better still loop measurements should be made to measure the loop resistance including A and C. Instruments for this purpose are now commercially available. The responsibility of supply authorities is to keep A low.

It may therefore be said that for complete safety the earthing should be such that a normal fault to earth will always open the protective devices but also that should the fault current be restricted to less than the normal fault current the voltage between the exposed non-current carrying metal work and earth would not exceed 40 volts. Such restriction

of fault current could be due to the fault path itself having a certain impedance or else the fault could occur halfway along the element of a cooking plate or winding of a motor. In addition the earth continuity of all the metal work must be soundly done. The use of good materials especially screwed conduit of adequate manufacture, reasonable steps to avoid corrosion troubles and sound workmanship is necessary here and is the main safeguard against the fire hazard which can start at hotspots in the earth continuity.

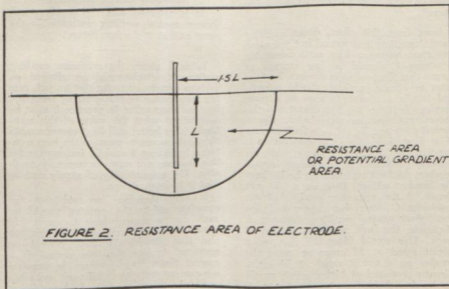
5.1 ADDITIONAL HAZARD CREATED BY EARTHING

It should be mentioned here that equipment earthing actually creates an additional hazard, not so pronounced on unearthed systems—that of dangerous shocks from worn and poor flexible cables used on portable appliances. Should the live wire of such a cable become exposed and the body of the appliance was not earthed the probability of someone touching the live wire and a good earth would be small, but with the appliance body earthed a good earth is easily to hand and serious shock

is almost inevitable. This is the reason why engineers are always concerned particularly with the establishment of sound specifications for flexible cords which are the only protection against this type of hazard. It would appear sounder to demand that the earth conductor of such cables should be braided round the two live conductors.

5.2 OTHER DIFFICULTIES ARISING FROM POOR EARTHS

Dangerous voltages can also arise in installations even though the local earthing is satisfactory. Referring again to figure 1, if the resistance C was four ohms and the transformer neutral earthing resistance A was 46 ohms a fault of four amps could develop on a 200 volt circuit and this would not cause the protective equipment to operate. The voltage of the non-current carrying metal work at the installation to earth would only be 16 volts which is quite safe. However, the drop across the transformer neutral earthing resistance A would be 184 volts and this can cause a lot of trouble. In the first instance the neutral throughout the whole system would have a voltage of 184 to earth and it is



realized that the neutral is more likely to be exposed and is not usually switched. In the second instance the area of ground in the immediate vicinity of the earth electrode would become dangerous.

It can be shown, referring to Figure 2 that about 90 per cent. of the total earthing resistance voltage drop takes place over the "resistance area" or "potential gradient area" which for a rod electrode is the area of a circle with the electrode as the centre and the radius equal to 1½ times the depth of the electrode. Thus in the case cited above, if the earth electrode depth were six feet there would be a volt drop of 150 volts from the electrode to any point nine feet away. This is a very dangerous condition for passing cattle and is likely to establish dangerous voltages on metal fences which pass through the resistance areas. The danger from the fence may be remote from the resistance area should the fence assume a potential relative to the earth electrode, or else in the resistance area should the fence provide a good connection elsewhere with the general mass of the earth.

Apart from keeping the earth resistance value low an effective remedy is to protect the resistance area from approach by animals or metal fences or else to insulate the top couple of feet of an earth electrode having its top just below the surface.

The other difficulty which arises from poor earths is only of moment in lightning areas especially where the distribution is by overhead line. It must be appreciated that no matter how good the lightning arrester used, the protection it affords depends largely on the earth electrode resistance associated with it. In the case of a domestic 200 volt supply a 100 kV surge might result in a discharge current of 500 amps peak dependent on the surge impedance of the circuit. If the arrester earth electrode resistance were two ohms this would result in a surge of 1 kV peak continuing into the house circuit which should normally cause no trouble. Should the earth electrode resistance be 20 ohms the surge would be 10 kV which is rather more than the average domestic circuit could safely take. This consideration would seem to put the upper limit of the earthing

resistance at about five ohms. As will be indicated later, it is unfortunate that this is a major task in most parts of South Africa.

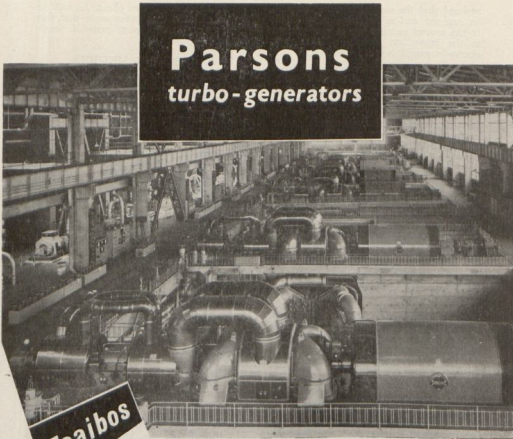
6. EARTHING METHODS

The study of the methods of obtaining good earths is extremely wide and can only be touched on here. References in the bibliography can be recommended for those wishing to study this matter more fully. The British Standards Institute Code on "Earthing" at present being prepared will give comprehensive data on the general problem while for the particular problem of earthing difficulties in South Africa the paper by Mr. C. F. Boyce "The Earthing of Telephone Systems with particular Reference to South Africa" published in the transactions of the South African Institute of Electrical Engineers of December, 1952, is very useful.

The earth electrode is intended to make good electrical contact with the main body of the earth. It has already been stressed how important it is to obtain a low earthing resistance but it is not always appreciated how difficult this is, to attain, especially here in South Africa and why other approaches to the question of safety often have to be made.

The resistance of the earth system to the main body of the earth consists of the following three components:

- (1) The resistance of the earth continuity conductor leading from the metal work to be earthed to the earth electrode itself. This component is easily controlled, can be kept low, is easily checked and can normally be neglected.
- (2) The contact resistance between the surface of the electrode and the soil in its immediate vicinity. Provided the earth round the electrode is compacted this is usually negligible.
- (3) The resistance to flow of current away from the earth electrode. Most of this is confined to the soil and rock surrounding the electrode and the volume involved depends on the type of earth electrode used. In the case of a rod electrode practically all the resistance occurs in a hemisphere having a radius 1.5 times the depth to which the rod



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TABLE II.

Rain-fall	Region	Class	Name	Colour	Texture	Average depth ft.	Resistivity in ohm-centimeters		
							Little moisture*	50 per cent water†	Variation with depth
125 Summer rainfall area	Arid and semi-arid	A	Desert	Light brown to yellow	Coarse sand	3	—	300-5 000	Moderate decrease
		B	Solonchalc	Grey	Fine sand and clay	4	—	600-6 000	Considerable decrease
		C	Kalahari sand	Red-brown	Coarse to fine sand	40-200	10^4-10^5	2 000-8 000	Moderate decrease
		D	Kalahari sand on lime	Red-brown	Coarse to fine sand	3-15	$2 \times 10^4-10^5$	2 000-8 000	Moderate decrease
		E	Subtropical black clay	Black-brown	Fine (clay)	3	—	1 000-4 000	Generally increases
		F	Brown forest (Lowveld)	Red-brown	Fine sand and clay	2	—	3 000-8 000	Small decrease
	Sub humid and humid regions	G	Waterberg and Zoutpansberg	Light brown	—	2-8	$10^4-5 \times 10^4$	—	—
		H	Lydenburg, Pretoria Quartzite	Dark brown	Sandy	3	—	10 000-60 000	—
		I	Drakensberg clay and basalt	Black clay	Fine (clay)	2-5	—	2 000-3 000	Little change
		J	High veld prairie	Grey	Fine sand	3-4	$10^4-3 \times 10^4$	1 000-8 000	Considerable decrease
		K	East Province semi-coastal	Grey	Fine sand	2	—	4 000-16 000	Small decrease
		L	Natal coastal (sugar belt)	Dark grey	Coarse to fine sand	3	—	2 000-8 000	Considerable decrease
		M	Laterite and lateritic red	Red-brown	Fine (clay)	3-20	$4 \times 10^4-2 \times 10^5$	5 000-60 000	Increases
		N	Lateritic yellow	Yellow-brown	Fine (clay)	6-20	$4 \times 10^4-2 \times 10^5$	10 000-60 000	Increases
		O	Ferruginous lateritic	Grey	Coarse (sandy)	4-6	$3 \times 10^4-10^5$	4 000-16 000	Moderate decrease
		P	Ferruginous lateritic	Brown-red	Coarse (sandy)	10-70	$10^4-2 \times 10^5$	1 500-15 000	Increases
		Q	Eastern littoral	Light brown	—	4-6	—	—	—
		R	Aeolian (N.W. O.F.S.)	Grey-brown	Coarse to fine sand	6-8	—	6 000-16 000	Moderate decrease
Winter rainfall S.W. and S. Cape Province	S	Sandy soil and T.M.S.	Grey-dark brown	Fine sand to silt	3-8	$5 \times 10^3-5 \times 10^4$	4 000-8 000	Little change	
	T	Gravelly sandy clay loam on clay	Grey-brown	Gravel to sand	2	$5 \times 10^3-3 \times 10^4$	3 000-6 000	Considerable decrease	
	U	Sandy loam on lime and clay	Red-brown	Sandy loam	7	$5 \times 10^4-2 \times 10^5$	—	—	
	V	As U but red-brown	Red-brown	Sandy loam	4-5	$5 \times 10^4-2 \times 10^5$	—	—	
	W	Coastal aeolian sand on lime and sandy soil	White or red	Sand	Deep	$5 \times 10^4-10^5$	—	—	
	X	Shifting sand	Yellow-white	Sand	Deep	—	—	—	

*After Dr. J. F. Enslin

†After Dr. C. R. van der Merwe

Reproduced from Paper "Earthing of Telephone Systems with particular reference to South Africa" by C. F. Boyce
Transactions of South African Institute of Electrical Engineers, Dec., 1952.

extends into the earth as is illustrated in Figure 2. As pointed out previously most of the volt drop of the earthing connection takes place over this sphere. The region is known as the "resistance area" of the electrode or the "potential gradient area". This is the main component of resistance.

6.1 SOIL RESISTIVITIES

The resistance of the body of soil surrounding the electrode depends on the resistivity of the soil itself. The resistivity in turn is dependent on the moisture content and also the amount of dissolved salts available to provide an electrolytic path. The texture, grain size, and aeration have an effect in as far as they decide the moisture retaining properties of the soil.

Table II. gives an idea of the resistivities of different types of soil. In general marshy soil and clays are much better than sandy soils and chalk and gravel soils are correspondingly worse. The depth at which the resistivity is considered is of importance being usually lower at the lower layers due to the higher moisture content but in some cases it is higher when rock formations of high resistivity are encountered. In frost areas it is most important to operate below the frost line since frozen water is an excellent insulator.

It is unfortunate that in South Africa the majority of soils have high resistivities. C. F. Boyce gives comprehensive details of the values in his paper but for easy reference Table II. and Figure 3 which are reproduced from his paper can be used as a guide as to what soil resistivities can be expected in the different parts of the country.

In most cases uneconomic, large and involved earth electrodes will be found necessary to obtain low enough earthing resistances and other steps will have to be taken. Broadly speaking the following points should be considered when designing an earth.

- (a) The type of soil which, from Table II., is likely to give the lowest resistivity should be selected.
- (b) The site should not be naturally drained so as to be sure of a constant moisture content. Marshy grounds are best from this point of view.

- (c) A site with flowing water should be avoided since the salts may be removed from the soil.
- (d) The soil should have a fine texture and where practicable should be sifted and all lumps broken up and stones removed.
- (e) Use should be made of the natural salts in the soil produced by bacteriological action on decaying vegetation. The resistivity of soil on which vegetation is growing will be lower than that without vegetation. This is the reason why strip electrodes are particularly successful when laid in hedgerows.
- (f) When necessary the soil should be treated by the addition of salts to improve its conductivity particularly over the resistance area.

7. TYPES OF EARTH ELECTRODES

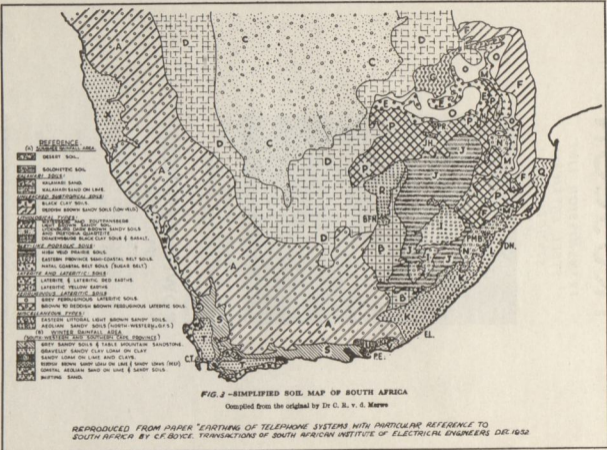
There are three types of electrodes, namely the plate electrode, the driven rod electrode and the strip or trench electrode. The former is generally a most uneconomic form and is only used where current-carrying capacity is the prime consideration. It is also more exposed to corrosion troubles since the attachment of the earth continuity conductor to the plate is done underground. The question of corrosion should not be forgotten and points of significance are that it is usually only in the upper two or so feet that corrosion is concentrated since there is a lack of free oxygen in the lower layers.

7.1 DRIVEN ROD ELECTRODES

On a basis of first cost and inspection facility it is usually claimed that the driven rod is the most satisfactory provided the soil resistivity is not too high. Unfortunately soil resistivities in South Africa are usually high and it appears that the strip electrode is more suitable.

The electrode usually consists of a 1" or ½" iron pipe, galvanized, sheradized or copper covered and driven into the earth to a depth of 4 to 10 feet.

Figure 4 gives the calculated resistance for a rod electrode for varying depths of penetration into the earth having a soil resistivity of 10,000 ohm cm. The value for other soil resistivities can be calculated by



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proportion. It will be generally found that one rod is insufficient to give a low enough resistance and it may be necessary to have more than one in parallel, but the resistance areas of the electrodes should not overlap. A simple rule is that they must be spaced at least the same distance apart as the depth to which they are sunk.

TABLE III.

Number of Rods	Per Cent of Resistance of One Rod	Number of Rods	Per Cent of Resistance of One Rod
1	100	5	19
2	57	6	12
3	38	7	9
4	27	8	8

Effect of Number on Parallel Rod Earths on Resistance, Rods being 10ft. Deep and 10 Ft. Apart.
Earths on Resistance, Rods being 10 Ft.

Table III. gives details of the reduction which may be expected from electrodes 10 feet deep and 10 feet apart. In addition to the cheapness of installation other advantages of rod electrodes are: ease of salting due to limited resistance area; ability to reach the lower layers, should these be of lower resistivity; lesser likelihood of being subject to seasonal variations.

7.2 STRIP OR TRENCH ELECTRODES

These are particularly useful where high resistivity soil underlies shallow surface layers of low resistivity. It is also necessary where bedrock is near the surface and it is difficult to excavate. It usually consists of a long length of copper strip or conductor laid horizontally in a trench dug in the earth and subsequently covered in, preferably with soil having a low resistivity. While theoretically there is not much to gain by burying the electrode more than 18 inches, it is preferable to exceed 2 feet if possible since this reduces the corrosion hazard and also the seasonal variation caused by the upper layers drying out.

Figure 5 gives the calculated earth resistance for a strip electrode of varying

length. Although looked upon overseas as a relatively expensive type of earth it would appear that for the high soil resistivity areas of South Africa this is not the case. It is interesting to note that cable sheaths and armouring often act as strip electrodes once the outer serving deteriorates and has been penetrated by moisture. When cable feeds to installations are utilized it is often advisable to lay a strip earth electrode in the cable trench to reduce costs.

7.3 WATER PIPES

In urban areas particularly, the water main may be utilized as an earth electrode provided that the main and service pipes are all metal and no insulated points are used. Asbestos cement water mains are being used to a greater extent nowadays both as new mains and as replacements. Replacements of metallic water mains with asbestos cement pipes can often upset previously satisfactory earthing conditions and this must constantly be checked since such mains are useless as earth electrodes and reliance has to be placed on the service pipe alone although a number of these bonded together may give satisfactory results. The E.R.A. investigated certain occurrences of shocks and outbreaks of fire in a certain area of Britain and results of their investigation showed that reliance upon the metallic water service pipes in eventual connection with non-metallic mains introduces serious risks. Because of the replacement possibility it is also essential that frequent checks should be made on water pipe earths to ensure that the original values have not been upset. More trouble may be expected in the future when it is possible that polythene pipes may be used as service pipes.

7.4 EARTH ELECTRODE COSTS

At present insufficient reliable data is available to advise in this connection but Mr. C. F. Boyce in his paper indicates that generally in South Africa the strip electrode is the cheapest. It would be very helpful if further data in this connection could be collected by an organization such as the A.M.E.U. from its members to establish a guiding principle in this direction.

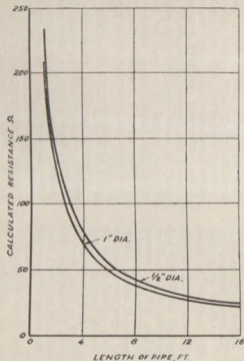


FIG. 4. EFFECT OF LENGTH OF PIPE ELECTRODE ON CALCULATED RESISTANCE FOR SOIL RESISTIVITY OF 10 000 OHM CM (ASSUMED UNIFORM)

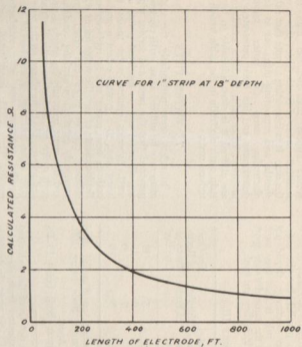


FIG. 5. EFFECT OF LENGTH OF STRIP OR CONDUCTOR ELECTRODES ON CALCULATED RESISTANCE FOR SOIL RESISTIVITY OF 10 000 OHM CM (ASSUMED UNIFORM)

8. DIRECT METALLIC CONNECTIONS

Where it is impossible to obtain satisfactory earth connections owing to the nature of the soil, other approaches have to be made to secure the safety of the system. The most obvious approach is the provision of a direct metallic connection between the bonded non-current-carrying metal work at each installation and the supply transformer neutral point. There are three methods in general use. Each system is subject to the occurrence of fortuitous earth due to inadvertent contact between the non-current-carrying metal work at any installation and other earthed bodies such as water pipes, gas pipes or structural steel. The actual resistance of these contact points can constitute a fire hazard if indefinite and variable, but this hazard can be minimized by making sure that the actual impedance of the direct metallic connection is low. Also to guard against abnormal increase of this impedance due to breakage of one of the direct metallic connections it is an advantage purposely to earth the metallic connection directly at as many points in the system as possible and at least at each consumer.

8.1 CABLE SHEATHS

The utilization of cable sheaths as the metallic connection is very reliable provided the distribution is wholly by means of a cable network. The local authority must, however, be satisfied about the current-carrying capacity of the sheath and the possible interference of the leakage currents with the protective system. It should be noted that in most cases the sheath will also act as a strip earth electrode so that in effect a cable sheath return is a multiple earthed affair. The use of P.V.C. and polythene servings on certain cables will, however, prevent the sheath from acting as an earth and this point must be remembered. It is possible that with the increasing use of such cables, more intentional direct earths will be required than with the older types of cables. It is generally claimed that the armouring should not be considered part of the metallic return but should nevertheless be bonded to the earth return circuit. This is probably for two reasons. First the corrosion of the armouring might cause a

big increase in the direct metallic return impedance and secondly the impedance of steel tape armouring is usually high although this is not the case with steel wire armouring. The steel wire armouring of P.V.C. served cables may, however, safely be used as the metallic connection since the P.V.C. serving prevents corrosion of the armour wires. Actually in practice major corrosion is only likely to take place where soil resistivities are low and therefore where earthing problems are not so severe. For this reason some people claim that high soil resistivities can be a "cloud with a silver lining".

8.2 SEPARATE EARTH WIRE

This is the alternative on a system using over head distribution and is in the first case expensive. It provides the same safety as cable sheaths except that it is not naturally multiple earthed and worse still is more prone to breakage. Should a breakage in the earth wire occur a fault to the non-current-carrying metal work will lead to dangerous voltages to earth not only at the installation where the fault occurs but also at all consumers on the fault side of the earth wire break. A dangerous voltage will also appear across the earthwire break. This situation will increase by many times the risk of a fatality. For this reason the separate earth wire should be earthed at consumers premises and even at certain of the distribution poles.

8.3 UTILIZATION OF THE NEUTRAL

It is only one step further to substitute the neutral wire itself for the separate earth wire covered above and this naturally results in much economy. It suffers from the same disadvantages as the separate earthwire with the additional hazard that should the neutral break at any point, the non-current-carrying metal work at all consumers on the load side of the break will assume the full line voltage to earth not only when a fault occurs but also when any circuit is switched on at any of the consumers. This again can be mitigated by multiple earthing of the neutral but since the neutral is virtually a live wire special consideration has to be given to this in order to ensure that other circuits such as telephones are not interfered with. It is however, widely practiced under a system



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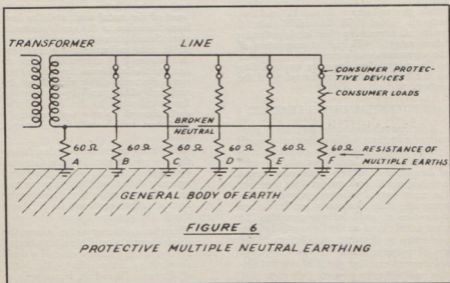
generally known as Protective Multiple Earthing or P.M.E. 9-0 Protective Multiple Earthing.

Protective Multiple Earthing is practised widely in Germany, U.S.A., New Zealand, Australia and Switzerland and is to some degree an answer to the problem of providing cheap protection on rural distribution systems where soil resistivities are high. In U.S.A. it is known as the grounded conductor system since because the non-current-carrying metal work is bonded to the neutral, persons can touch the neutral conductor while it is in normal operation. Under normal conditions a fault on any apparatus to the non-current-carrying metal work is virtually a direct fault from line to neutral and the protective devices are bound to operate. It is to be noted that were the neutral impedance not low enough the regulation on load would be very bad.

Troubles only arise on P.M.E. systems when there is a break in the neutral. Under these conditions all consumers on the load side of the break are exposed to a certain amount of risk limited only by the efficacy

of the multiple earths on both sides of the break.

The hypothetical case given in Figure 6 indicates what could happen on a 200 volt system with six consumers each earthed through an electrode having a resistance of 60 ohms. If the neutral should break at the mid point between consumers C and D the effect would be the same as having an earthing resistance of 20 ohms each side of the break. Should a load of 5,000 watts be switched in among consumers D, E and F this would result in a voltage between neutral (and therefore the bonded non-current-carrying metal work) and earth of about 83 volts at all consumers including those at A, B and C, and a voltage of 166 across the break in the neutral. Should the break occur between E and F and a load of 2,000 watts be switched in at E the voltage between neutral and earth at F would be 130 volts between neutral and earth at the other consumers 26 and 156 across the break. All these conditions can be considered hazardous and seem to indicate that P.M.E. is not entirely satisfactory. In Britain it is usual to specify that the resistance between neutral and earth



should be less than 10 ohms when measured at any point, but the case quoted above in Figure 6 complies with this requirement and yet has an analysis not proved satisfactory. In the U.S.A. it is required that the earths at each consumer should not be greater than 25 ohms. If this had been the case in the example quoted above the voltages would have been 67.5 and 135 volts for a break in the middle and 94, 31 and 124 volts for a break between E and F. The American approach would seem to be safer than the British but both indicate that P.M.E. is not entirely satisfactory for all conditions. And yet the general consensus of German opinion is that P.M.E. is the most simple and satisfactory system of protection. It is also favoured in Canada, U.S.A. Australia, New Zealand and Switzerland and approval by so many consumers cannot be lightly considered. If used it would be best to use the American rule of a maximum consumer earth electrode resistance of 25 ohms. For further safety it should also be an additional guiding principle of rather obtaining lower earth resistance for more distant consumers and near the transformer neutral point. Illustrative of this gain, if the earthing resistance at A and F were 15 ohms and that elsewhere 25 ohms, a mid point break would give voltages of 63 and 126 and that between E and F 76, 22 and 98 volts. A point of interest to the local authority when using P.M.E. is that connection of the consumers earth continuity conductor to the neutral does lay more responsibility on the local authority for the safety of the system.

10. POTENTIAL EARTH LEAKAGE

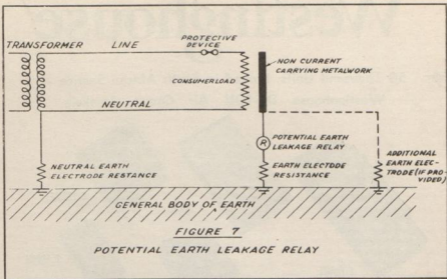
A further solution to the problem of poor earth connections is the utilization of earth leakage relays to trip out a circuit as soon as a fault likely to lead to the establishment of dangerous conditions on the non-current carrying metal work occurs. This is in fact the most logical solution, provided it is economic, since dangerous conditions are a function of earth leakage currents. The most widely used method of earth leakage protection at domestic installations is the use of potential earth leakage relays. All non-current-carrying parts of an installation required to be protected are connected

to the general body of the earth through one or more earth leakage relays. These relays are designed to disconnect the supply to the installation as soon as the earth leakage current exceeds a value that can raise the potential of the non-current-carrying metal work to earth to a dangerous value. The value generally accepted is 40 volts.

Figure 7 illustrates the general principle of operation. Most of the relays are designed to have an impedance of about 300 ohms and will operate with earth electrode resistances as high as 500 ohms.

Theoretically the use of these relays is a fully satisfactory answer to the shock hazard since the installation is switched out as soon as dangerous conditions develop and does not wait until someone touches the metal work. The protection against the fire hazard is not so pronounced but, if bonding of the earth continuity is initially sound and is periodically inspected, the probability of incidence of fires should be low. The earth continuity must also be sound to ensure the protection against the shock hazard. In addition the following points must be watched:

- (i) There must be no chance of inadvertent contact between the continuity bond of the metal work and the lead from the relay to the earth electrode since this shorts out the operating coil of the relay and renders it useless. For this reason it is always advisable to insulate the lead from the relay to the earth electrode. (This should not be confused with a parallel path from the metal work to the body of the earth through its own earth electrode resistance which will be discussed later.)
- (ii) In lightning areas there is the chance that the operating coil will be damaged by surges. It is not advisable to guard against this by providing a spark gap across the coil since this is inviting the type of failure envisaged in (i) above should the gap be bridged.
- (iii) There is no discrimination where the whole domestic installation is protected by one earth leakage relay. If a fault develops on a stove during the hours of darkness the whole house will be



plunged into darkness and the faulty circuit will have to be located by trial. Even if more than one relay were used, it would be very difficult to keep the non-current-carrying metal of each electrically separate and sympathetic tripping might still take place.

- (iv) It does not give protection for the case where the transformer neutral earthing resistance is high and the neutral consequently has a high voltage to earth.

On the credit side it must be pointed out that the potential relays are relatively cheap; usually incorporate simple checking devices to prove their operation and, since they only operate when dangerous voltages appear do allow emergency operation when there is a slight leak on an installation.

10.1 POTENTIAL EARTH LEAKAGE RELAYS WITH PARALLEL EARTH ELECTRODE.

To give a further measure of protection should the potential relay fail owing to the operating coil being open circuited or short circuited it is often advisable to earth the

non-current-carrying metal work at another point in addition to that through the relay. This additional earthing point is shown in Figure 7 in dotted lines. This virtual shunt resistance does not alter the voltage sensitivity of the potential relay having only increased the requisite leakage current to give the requisite voltage across the relay. However, the two earth electrodes must be sufficiently far apart not to have their resistance areas overlap since this condition will approach a short circuit across the operating coil of the relay. Positioning the electrodes at least 20 feet apart and preferably on opposite sides of the house will ensure satisfactory operation.

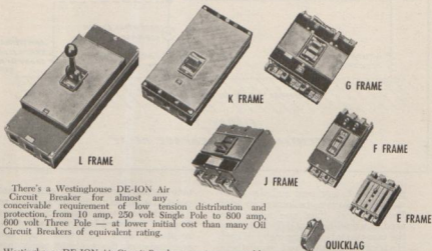
This system is much better than the straight potential relay circuit since it does give a measure of remnant protection should the relay fail.

10.2 POTENTIAL EARTH LEAKAGE WITH P.M.E.

A useful variation is the use of potential earth leakage relays on a protective multiple earthed neutral system. This overcomes the danger mentioned in Section 9 of excessive voltage being established when

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the neutral is broken. Unfortunately in addition to all installations on the load side of the break being tripped, those on the supply side will sometimes also come out, according to where the break is situated. This has rather a nuisance value and it would probably be far more effective to have undervoltage trips on the supply to each consumer. This would ensure that only consumers on the load side of the break would be tripped. This undervoltage trip would have to operate at about 60 per cent. voltage.

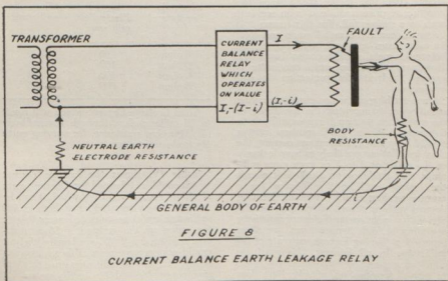
11. CURRENT BALANCE EARTH LEAKAGE RELAYS

The second type of earth leakage relay operates by measuring the leakage current on an installation and disconnecting the supply when this current reaches a dangerous value.

The most convenient method is, as shown in Figure 8, to compare the currents in the line and neutral, the difference being a measure of the leakage current. It may be equally applied to two or three phase networks. There is no reason why

the familiar and accustomed remnant connection of the secondary circuit of current transformers should not be used but most domestic type relay circuits operate on the core balance transformer principle.

The cheaper and more usual types of current balance relays have sensitivities of the order of amperes. Thus if the non-current-carrying metal work was connected to earth through a resistance of 40 ohms, the leakage current to ensure a voltage of the metal to earth of less than 40 volts would be 1 ampere which is possible with this type of relay. In effect when used in this manner there is little difference between this type of relay and the potential earth leakage except that the current relay is not so vulnerable. In fact as long as the earth electrode resistance is not allowed to exceed a certain value and the earth continuity is maintained there is little that can go wrong with this type of relay. Again however, it offers little protection against the fire hazard. With the sensitivities available it is restricted to use where earth electrode resistances of less than 40 ohms can be obtained. Breakers are on the market which are a combination of low



sensitivity current balance and potential earth leakage relays but it is felt that there is little difference in the ultimate operation of each element.

11.1 SENSITIVE CURRENT BALANCE RELAYS.

There are however now available more expensive but much more sensitive current balance relays which can operate at values of tens of milliamps. With such protection available it is possible to consider giving direct protection against the shock hazard by disconnecting the circuit as soon as a leakage current of a value likely to prove lethal occurs anywhere. This will also give a considerable protection against the fire hazard, since no trouble is likely to occur from leakage currents of the order of tens of milliamps. Figure 8 illustrates the circuit of such a relay.

As shown, operation can be expected even when the non-current-carrying metal work is not earthed but in this case someone must touch the metal work. If the person is on a conducting floor sufficient leakage current will pass to result in a shock but also disconnection of the circuit concerned. It is a disadvantage to have to accept even this minor shock since the resulting surprise could lead to an accident such as a serious fall. For this reason it is better to earth the metal work and thus in most cases a circuit will be tripped before the metal work becomes dangerous. However, where the earth continuity is broken inadvertently protection is still available.

Once earthing of the non-current-carrying metal work is accepted the sensitivity of the current protection becomes difficult to determine. While good modern wiring should have negligible leakage current, the older installations are likely to have leakages of the order of 2 to 5 or even more milliamps. For guidance on a 200 volt circuit the leakage will be 2 milliamps for a megger reading of 0.1 megohms. Heating devices such as stoves, which have insulation with a negative coefficient of resistivity operating at high temperatures, are often reported as having leakage currents of 10 milliamps. In all fairness, this must be admitted as possible although stoves made to sound specification usually have less

than 3 milliamps for normal operation and only values of 7 milliamps when all plates are switched on, with no pots or pans, and allowed to reach dull red heat.

If a sensitivity of 15 milliamps is accepted as the lethal level and applied to the relay it can be appreciated that a certain amount of instability will be encountered on many installations and this will have a great deal of nuisance value. But it must be admitted that the earth leakage relay has also become a "police-man" as far as the general condition of the installation is concerned. Protection is ideal both against shock and fire hazard.

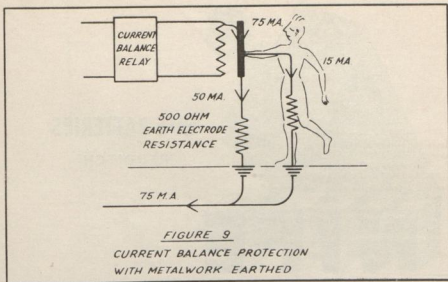
On the other hand, with little sacrifice of this ideal protection, higher settings can be tolerated in view of the intentional earthing of the non-current-carrying metal work. If as is shown in Figure 9 the metal work is earthed through 500 ohms a total leakage current of 75 milliamps can be allowed before 15 milliamps would flow through a body of 2,000 ohms resistance.

TABLE IV.

Earth Electrode Resistance	Current through Earth Electrode milliamps	Total Leakage Current milliamps
500 ohms	60	75
200 ohms	150	165
100 ohms	300	315
50 ohms	600	615

Total Leakage Current which will result in 15 millamp flow through human body of 2,000 ohm resistance, for varying earth electrode resistances.

Table IV. shows the leakage current which could be tolerated for different earth electrode resistances, from which it can be seen that relay sensitivities as high as 600 milliamps could be tolerated according to the value of the resistance. Since resistances in excess of 500 are hardly likely it would appear very reasonable to accept a setting of about 50 milliamps since this will give reasonable stability to the system.



This type of protection, in common with the potential earth leakage relay, suffers from the disadvantage that the faulty circuit is not isolated and the fault will cut out the complete supply to the house. It is, however, easier to discriminate using more than one current balance relays than with potential relays since the earth continuity circuits do not have to be isolated. However, the price is likely to go against such practice.

Altogether there is no doubt whatsoever that from the safety point of view, this is the most satisfactory type of protection.

11.2 CURRENT BALANCE RELAYS WITH P.M.E.

On no account should the current balance relays be used on protective multiple earthed neutral systems since they give no protection against the main weakness of the P.M.E. viz. breakage of the neutral.

12 GENERAL CONCLUSIONS

The question of safety of low voltage electrical circuits and the resultant approach to the problem depends entirely on local conditions and financial considera-

tions. The principle accepted can only be decided by the local authority after due consideration of all facts. Thereafter it is always the duty of the electrical installation contractor to consult the local authority regarding the efficiency of the safety protection on any installation. Where earth return circuits are relied on it is considered that the loop resistances of the neutral earth circuit should be measured with the instruments now commercially available.

12.1 Direct earthing is difficult in most parts of South Africa and should in any case not be considered when soil resistivities of over 2,000 ohm cm. are encountered. When direct earthing is used miniature circuit breakers are likely to be more satisfactory than fuses.

12.2 The water pipe system remains a very satisfactory system but is likely to be relied on less in the future with the increase in use of asbestos cement and polythene pipes. In rural districts the water pipe system is likely to be a useful electrode for P.M.E. Checks must, however, be made from time to time to ensure that there have been no major changes due to replace-



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ment of metallic pipes by non-metallic pipes.

12.3 The cable sheath metallic return will be most successful provided the initial installation is well done. In areas of high resistivity the corrosion troubles will be small.

12.4 Where suitable water pipe and cable systems are not available the alternatives of P.M.E. and earth leakage protection must be considered.

12.5 The soundest method of protection is by means of sensitive current balance relays although it is likely to be the most expensive. It is the only form which gives reasonably certain protection against fire hazard but should not be used with P.M.E. It is particularly effective when used on new fully insulated wiring systems (i.e. with plastic sheaths or non-metallic conduit) when the sensitivity can be made much lower with consequent increase in the level of protection. Older installations could be protected with less sensitive relays, provided the earth continuity conductors are intact and earthed reasonably well. The cost of these relays is, however, likely to dictate the use of alternative forms of protection.

12.6 P.M.E., though on analysis not ideal, is giving good and reasonable service overseas and can be used provided the multiple earthing can be done in such a way that the maximum earthing resistance at any consumer is 25 ohms. Further protection can be given by using potential earth leakage relays as well but this will lead to unnecessary tripping. It is better to give further protection by using under-voltage protection set to trip the supply when the voltage falls to 60 per cent.

12.7 The potential earth leakage relay should be satisfactory and is cheaper and more stable than the other types of relays. However, it is necessary for the earth continuity conductor to be in good condition or the protection will be nullified.

12.8 The only system which gives complete protection against the hazard arising from faulty flexible cords is the current balance system. For all the other systems more stress must be laid on the use of only good quality, well insulated cables.

12.9 The local authority must ensure that no hazards will be established at the

transformer neutral earthing points unless this area is safely fenced off.

12.10 Most of the considerations have indicated the importance of having a sound earth continuity system both from the shock and fire hazard point of view. Important features are the design of all earthing clips; the use of materials not likely to corrode and finally the use of only the best screwed conduit. Bad screwed joints have been found with resistances up to 1 ohm.

13. ACKNOWLEDGMENTS

I should like to acknowledge my indebtedness to the authors listed in the references; to the Safety Precautions Committee for the valuable work its members are doing to establish safety regulations; to the Director of the South African Bureau of Standards for permission to deliver this paper and finally to the President and Executive of the A.M.E.U. for doing me the great honour of allowing me to address this convention.

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THE PRESIDENT: Thank you very much Mr. Middlecote. I don't think I need to tell you (which I should have done in the beginning), that Mr. Middlecote is from the South African Bureau of Standards, where he is doing a lot of useful work for our members as well. I think this paper has been well appreciated, and I will call upon Mr. Sibson, Bulawayo, to propose the vote of thanks.

Mr. A. R. SIBSON (Bulawayo): Mr. President, Gentlemen. It gives me very great pleasure indeed to propose the vote of thanks to Mr. Middlecote for this very excellent paper, which will join the list of valuable contributions that appear in our proceedings and will form, in the future, a very useful reference.

I would also like to congratulate Mr. Middlecote on the very excellent way in which he submitted the précis of his paper this morning. Those of us who have had an opportunity of reading it, realise how well this was done.

I would also take the opportunity of opening the discussion on this paper by referring to three points that have occurred to me.

Mr. Middlecote deals very clearly with questions of the lethal currents, and, as he says this has been the subject of much diversity of opinion. He has indicated the low range of dangerous current when he gives a figure of 15 milli-amps, as his maximum through the human body to ensure safety. It may interest him, and members of the Convention, to have the first-hand personal experience of one who has carried several hundreds of milli-amps. I don't think that I have previously placed on permanent record just exactly what such an experience is like but for your interest, in 1932 I was unfortunate enough to become a conductor to the extent of carrying a current arising from contact between a 3,300 volt conductor and earth, and, as you will quickly calculate that was something like 1,900 volts. The nature of the contact quickly destroyed the skin resistance, in fact the burning went through as far as the bone at one place, on the left hand, and well through the skin on the right arm. So you will see there were first class conditions for a high flow of current. I will not tell you how this unfortunate

circumstance arose. Apart from being irrelevant, it would not be frightfully complimentary to myself!

But it might interest you to know just what the experience was like. When one has a serious accident of any sort, there is a brief moment in which there is a semi-blackout, and then the curtain rises on a new world. Any of you who have been in a motor accident will know what I am talking about.

The new world opened for me in a condition of what one might call physical unconsciousness but mental awareness. I was not conscious of any pain or of any of the normal physical senses. I could not see, hear, smell, or feel, but my brain was very, very much alive. So much so that it immediately perceived the state of affairs that had arisen, and proceeded to do a rapid mental calculation of the circuit characteristics and the probable future out come. The conclusions drawn were gloomy, but for some reason or other did not cause me any particular concern. I understand that is also common condition with people who realise there is no hope at all; I think the tendency is to accept one's fate, and that was certainly the position in my case.

The only sensation that I can refer to is one of mental awareness of the passage of enormous power. I could feel the 50 cycle vibration, quite effectively, and, as I say, my brain was completely alive and able to do all its normal engineering work. It so happened that it was possible to ascertain exactly how long this situation continued. Our old friend the late Mr. Clutterbuck did certain tests afterwards that proved that the period of time during which this power flow continued was approximately 6 seconds. Then the curtain fell once again and the reason was that by some involuntary physical effort I had made a slight movement of my left hand, which drew an arc and caused a flash over to earth which eventually blew the fuse which was supplying that current.

I woke up some little time later, and the rest of the story is not frightfully important, but the fact that I am able to tell it at all is, of course, a matter of interest in itself. I imagine that the only reason for my present existence is the fact that the moment of time when the current did

cease to flow must have coincided with the current zero, or with a particular value of flow which was just the right one to start the heart working again. I thought, Mr. President, you might be interested in that little personal reminiscence.

The second point that I would like to refer to is the reference that Mr. Middlecote has made to the making of earthing connections to the general mass of the earth. He has referred, quite rightly, to the importance of soil compaction, but I think it might be interesting for me to quote you some figures showing the effect of natural consolidation of soil following the making of an earth connection.

In 1953 we erected a transmission line consisting of 48 spans, and each of these spans was provided with a counterpoise, consisting of earth mats made of copper wire formed in various shapes and sizes, and measurements were taken of the individual earthing resistances of each span before the counterpoise was hooked up to form a continuous counterpoise. This was done immediately after construction was complete. The figures varied from as low as 5 ohms in one span to 35 ohms in the worst case.

Now the point of interest is this, in November, six months later, we went back and made a further series of tests, nothing else having been done in between. The resistances had now fallen to a maximum of 3.5 ohms in the worst case, down to about .8 ohms in the best case.

This was of great interest. In November the rains had barely started so the moisture content had little to do with that result, and we can only conclude that normal natural compaction had made that enormous difference.

The tests were repeated again in 1956, last year, in November, and the figures had dropped a little bit further below those of nearly three years previously, but they were not very much different.

To give you a summary, taking twelve of these spans at random the figures are as follows: the average footing resistances of the 12 spans taken was 16 ohms. in May, 1953, 2.1 ohms. in November, 1953, and 1.9 ohms. in May, 1956.

In the case of one span the resistance

had dropped by 27 times, in another case it had dropped by 2.4 times, but on an average, it had dropped by 8 times due to natural soil consolidation. I mention this so that in making earth resistance the important changes that can take place with time are not overlooked.

The only other point I want to refer to, Mr. President, is the question of multiple earthing.

I think members may remember the various previous occasions on which I have said that in Bulawayo we adopted the multiple earthed neutral some years ago. The disadvantage to which Mr. Middlecote has referred, i.e. the possibility of the breaking of a neutral with the attendant hazards, we perceived quite a long time ago, and have counteracted by running two neutrals, both of them being earthed, linked together, but separately supported. We consider that it is extremely improbable that two neutrals would break at the same time, except under circumstances that would almost certainly also break the phases, and we consider that the probability of such an event is sufficiently remote to be ruled out of all practical consideration.

By doing this, we believe that we have overcome the one major disadvantage to which Mr. Middlecote has referred, and therefore I would submit that this system, the double neutral, each wire being half the cross-section of the phase, provides the most effective and cheapest system of ensuring adequate protection against abnormal rises on earthed, or reputedly earthed, metal. The same principle is carried right through into the consumer's premises, two neutrals-cum-earths being carried through to the consumer's metering position, so that the principle of dual and multiple neutral earthing is employed to the logical conclusion.

Now, Mr. President, I will close my remarks by saying again how pleased we all are to have had this paper from Mr. Middlecote. It is always a pleasure to have those who are not engineer or councillor members of the Association to address us, and we have greatly welcomed this contribution. I do, therefore, propose a very hearty vote of thanks to Mr. Middlecote. (Applause.)

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THE PRESIDENT: Thank you, Mr. Sibson. Now I know how, and when, and why Mr. Sibson became a conductor! (Laughter and applause.)

His system of the double neutral wire, each half the cross-section, reminds me of a certain individual that phoned me and asked me what he had to do with the third wire in a plug that he was wiring up. So I explained to him that was the earth wire. He said, "Oh, well, I'll have to go and correct it, because I split it in half and gave each pin half!"

I will now call upon Mr. Wilson of Pretoria to second the vote of thanks.

Mr. J. WILSON (Pretoria): Mr. President, Ladies and Gentlemen. It affords me great pleasure to second this vote of thanks to Mr. Middlecote, particularly because, like myself, he comes from the Jacaranda City, sometimes referred to as the Northern Suburb of Johannesburg.

Mr. Sibson has proposed the Vote of Thanks in a very able manner, and I don't propose to take up a great deal of your time now.

The paper provided by Mr. Middlecote is a very valuable contribution as far as our proceedings are concerned; it is on a subject which is of the greatest importance to all of those engaged in electricity supply, and one about which we dare not be complacent. I think the lucid treatment of the subject which he has given us, and the concise review of the methods available for endeavouring to ensure that faulty apparatus is disconnected before it can result in either personal injury or damage to property by fire must form a useful reference to members, and I would like to congratulate him on his achievement in this respect.

Mr. Middlecote has emphasised the impossibility of advising on any one method of earthing, and I am sure our experience in Pretoria is paralleled by that in other undertakings, in finding that various combinations of plate, rod and strip or counterpoise earthing systems have to be adopted on different occasions to ensure earth resistance values which are sufficiently and consistently low.

We have certainly not so far arrived at any best system, and only after making

extensive tests, can we decide how and at what depths we are going to provide the earth, particularly at main sub-stations. As regards the earthing of our low voltage system, as many of you are aware, our reticulation in residential areas is derived from pole mounted transformers, a number of which are fed from high voltage radial feeders. The current method of earthing adopted at these outdoor sub-stations is by means of counterpoise earths comprising lengths of copper conductor, buried in the trench with the high voltage feeder cable. The copper conductors are of 1 sq. inch section, which have been recovered during reconstruction of parts of the old overhead system, and sufficient quantities have so far always become available so avoiding the use of new conductor.

Where, as in the case of the major portion of Pretoria proper, earthing at consumer's premises is by direct connection to the water mains, such counterpoise earths at the outdoor sub-stations are, of course, bonded to the water mains as well. However, in newer townships, where no extensive system of metallic water mains exists we have adopted the multiple earth neutral system, while in the rural areas, where there is no extensive low voltage reticulation system, we have recently provided solid earthing conductors between the step-down transformer neutrals and the consumer's premises.

We had previously employed potential earth leakage breakers on such premises, but have found them so vulnerable under our lightning conditions that we have had to dispense with them, at least for the present.

With these few remarks, Mr. President, I will formally second the vote of thanks to Mr. Middlecote for his excellent paper, which I am sure will give rise to much useful and informative discussion.

THE PRESIDENT: Thank you, Mr. Wilson.

Now I'd like you to show, in the usual manner, your appreciation of Mr. Middlecote's paper. (Applause.)

Thank you, Mr. Middlecote.

(There followed Convention announcements.)

CONVENTION ADJOURNED

THIRD DAY

On Resuming at 10.30 a.m.:

THE PRESIDENT opened the proceedings with a number of Convention announcements.

Regarding the Constitution, I have been asked by the Executive to point out that the Constitution will not be published in the 1957 Proceedings, because there is still a lot of work to be done to it, the translation into Afrikaans, and so forth, but it will be published in the 1958 Proceedings in both official languages.

I have an apology to make to Mr. Mitchell. Copies of his Valedictory Address were supposed to have been handed out to you on the day he delivered the address; unfortunately that did not occur. Copies are now available in the foyer.

Now, in terms of our new Constitution I would like to welcome Consulting Engineers and Commercial Representatives as Affiliates. To those Consulting Engineers and Commercial Representatives who attended the 30th and 31st Convention, we wish you welcome as our new affiliate members in accordance with our Constitution.

We can now proceed with the business on the Agenda.

THE PRESIDENT: The vote of thanks has been proposed and seconded, so Mr. Middlecote's paper is now open for discussion.

Mr. F. STEVENS (Ladysmith): Mr. President, I'd like to congratulate Mr. Middlecote on his paper. Although it deals with a subject on which so much has been written, nevertheless he has approached it from a new angle in comparing the different earthing arrangements adopted by Local Authorities.

In his concluding remarks (see 12-6) where he states that P.M.E., though on analysis is not ideal, is giving good and reasonable

service overseas, I would point out that it was adopted in Ladysmith in 1938. Since then practically the whole system has been changed over to this form of earthing. It must, however, be clearly understood that this form of earthing is out of the question unless every care is taken to ensure that the distant end of the neutral conductor is positively earthed, i.e. down to one or two ohms. To guarantee this we interconnect all sub-station earths through the system's neutrals and "ring" the neutrals of distributors, even to the extent of erecting poles to support a neutral conductor only.

I repeat that, to my mind, multiple earthing of the neutral should not be practised unless both ends are positively earthed.

Mr. C. LOMBARD (Germiston): Mr. Middlecote is to be congratulated on presenting a paper which is of interest to all electrical engineers, and particularly municipal electrical engineers, on whom the onus rests to see that the earthing and/or earth leakage protection of their municipal systems and of consumers' installations to be connected to the municipal mains is satisfactory in order to provide protection against the dangers to human life and property associated with the use of electrical energy.

With regard to the author's remarks, under the heading "Earthing for Safety", the correct approach as illustrated in the example quoted is of course that the earth fault loop resistance or impedance shall be such that on the occurrence of a fault to earth, sufficient fault current will flow to cause the protective device provided, such as a fuse or miniature circuit breaker to operate, and in Britain this has been provided for in the L.E.E. Regulation 406. In the example quoted by him, the author mentions that in the case of a circuit protected by a fuse a fault current of at

least three times the fuse rating is required to ensure adequate protection, and that with a fault current of 50 Amps the fuse rating should therefore be 15 Amps.

In the case of a circuit protected by a miniature circuit breaker, the fault current must be at least $1\frac{1}{2}$ times the overload setting of the breaker, which is in accordance with the I.E.E. Regulation 406. I must, however, draw attention to the fact that in this country the majority of circuit breakers used for circuit protection have inverse time characteristics, and on a fault current of $1\frac{1}{2}$ times the nominal rating, a miniature circuit breaker of this type may only trip after several minutes. For this reason the I.E.E. Regulations provide that where a circuit breaker with inverse time characteristics is used, it must be considered on the same basis as a fuse of the equivalent normal rating. In other words, the fault current should also be at least three times the nominal rating of the miniature circuit breaker protecting the circuit.

The author mentions that in practice loop measurements should be made to measure the loop resistance of the earth leakage path, and states that instruments for this purpose are now commercially available. Here I would like to point out that most of the test instruments which are available are of the current injection type, designed to carry out earth fault loop impedance tests in accordance with the method described in I.E.E. Regulation 507. The note attached to this Regulation states that "The plug or terminal of the tester should connect it to the neutral and earth points so that injected current (at a voltage not exceeding 40 volts) traverses the loop formed by the earth return path, the earthing point of the supply neutral and the neutral conductor. It is preferable for the current used in the test to approach $1\frac{1}{2}$ times the rating of the circuit, but in no instance need it exceed 25 amps. The ratio voltage current of a circuit may be taken as the total earth fault loop impedance."

It is obvious that this method of testing will give erroneous results where the following conditions exist:

- (i) Where the neutral conductor of a circuit is earthed at several points along its length;
- (ii) Where the neutral conductor's radial feeders are interconnected or ringed;
- (iii) Where there are installations connected to the same mains where the earthing lead of the consumer's installation has been connected to the neutral conductor of the Supply Authority's supply in accordance with Regulation 1302(c) of the Standard Wiring Regulations;
- (iv) Where the neutral conductor differs in size and therefore resistance from the phase conductor.

In selecting an earth loop resistance or impedance tester care must therefore be taken that it will be suitable for use under conditions obtaining in the area where it is to be used.

With reference to the author's remarks in regard to the three types of electrodes, i.e. plate electrode, driven electrode, and strip or trench electrode, I think that the experience generally in this country has been that the trench electrode has been the most satisfactory. On the question of cost, particularly in rocky ground where, despite the claims made by the manufacturers of copper-clad earth rods, it is often well nigh impossible to drive in rod electrodes, the trench electrode is undoubtedly the cheapest. The cost of this type of earth electrode can often be reduced somewhat and the risk of theft minimised by using copper-clad steel wire instead of copper wire or copper strip.

In regard to earth leakage relays, due to the fact that past experience has shown that they are easily damaged by lightning surges, most local authorities prefer not to use potential earth leakage relays to protect installations supplied from overhead mains. It would, however, be interesting to know whether there are relays of this type now on the market which are not so vulnerable to lightning surges.

I would like to ask the author whether, in his opinion, the incidence of failure of the potential coil of these relays could be reduced by connecting a good quality 250

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volt valve type lightning arrester across the coil.

Current balance earth leakage relays of the required sensitivity would appear to be the complete answer, but at this stage, due to the comparatively high cost, it is doubtful that they will be used to any great extent.

In conclusion may I once again congratulate Mr. Middlecote on his most interesting and informative paper.

Mr. K. ADAMS (Johannesburg): In an excellent paper, Mr. Middlecote has comprehensively reviewed all the known methods of protecting against the hazards of electric shock.

The sensitive current balance relay is a new device and further description will not be out of place. It consists of:—

1. A core balance current transformer.
2. An amplifier capable of operating the trip coil of the circuit breaker feeding the circuit.

The core balance current transformer uses a magnetic core wound in the shape of a hollow cylinder and all the current carrying conductors are passed through the centre, thus forming a single-turn primary winding.

A secondary winding on the core feeds the amplifier. In the order of 20 milliamps earth leakage current, the power output available from the core is a few microwatts or so, and consequently a "gain" of 1,000,000 or more is required from this amplifier. The amplifier may be electronic, magnetic or mechanical, (e.g. a relay). There is little to choose between the reliability of these devices nowadays. For intermittent service of this nature the lives of components appear to be well in advance of requirements. At a guess I would say 50 years is reasonable—but we do not know these upper limits yet.

I cannot give a clear indication of the prices which will be charged for these devices at this stage. I believe that selling prices will be in the order of £10 to £15 to start with. What I can tell you is that, in most designs of the equipment, the cost for sensitivities between 5 milliamps and 100 milliamps will be constant within 10/-.

These devices actually perform the vector addition of the primary currents to an accuracy better than 1 part in 10,000, and hence do not erroneously operate on transients. They can be set to operate at about 0.05% of the circuit current rating or 100 times better than the limit of 5% authoritatively believed, both in South Africa and in Britain, to exist. As a transformer-relay device, the equivalent over-current factor is in the order of 100,000.

In application, this device is a new tool, and worthy of serious consideration. It was, I believe, developed in advance of the rest of the world, and therefore potential users will not be able to draw from extended overseas experience. It covers all types of shocks, except contact between current carrying conductors without simultaneous contact with earth; I do not believe the latter problem will ever be solved.

Direct contact shocks can so easily occur. Any appliance, fed by a two core flex can develop a fault which will give such a shock. I believe that this should be protected, if at all possible, albeit associated with a breach of regulations.

This device provides an answer to questions 2 and 3 of the Engineer's Forum last Wednesday; an installation with an insulation resistance of 10,000 Ohms. would be condemned; this corresponds to 20 milliamps earth leakage current. It is quite feasible to use this device as a policeman for faulty installations. What is also extremely important is that the fire hazard is reduced considerably by such an insurance.

The protective device will, I believe, herald a new era in electrical safety; the notion of earthing, previously important, now needs only minor consideration.

I believe the preliminary work in the development of this device is complete, and it is now in your hands, as application engineers, to make full use of this new tool.

Mr. H. M. S. MULLER (Upington): Mr. President, and Gentlemen, I also identify myself with the expressions of appreciation of Mr. Middlecote's paper. He has even gone to the extent of informing us on what is a minimum lethal dose in case we wish to leave this earthly existence electrically!

I am only concerned with a matter that has often been discussed in the past, i.e. what is effective earth continuity?

It is opportune, Mr. President, to ask if we are not at this stage considering human life in terms of interest and redemption. The multiple earth neutral system, to use your neutral, seems to me that you might just as well use bare wire for the neutral in wiring your circuit. There seems to be only one thing for overhead distribution, and that is a separate "earth" wire to ensure continuity of circuit.

You have seen thus far that the underground cable system has always been fairly effective, but the overhead system is something which we cannot control in a similar way. There are, of course, disadvantages. You can have breaks, but if it is multiple, then I do not see that it is any worse than we have now. Are we not evaluating human life in terms of the interest and redemption on an outlay that will serve for very many years once you have it. That means a separate earth wire. After all, if you have that, you have solved a primary problem in a closely formed area, irrespective of what means you use for isolated places. That is all very well, but we want earth continuity. I have just recently seen again that where you have composition types you get into very serious trouble.

There is another very serious question. Are we not concerned with that which was our own handiwork, and which was in our own power, viz. our overhead connections to roofs? I have seen lethal traps all over. After all there is another fatality, and it is only another mother's little boy who went on the roof to get that ball! That is a matter for very serious consideration. You can go throughout towns in the Union (I am not speaking about cities), and if you just have a look round you will find a very disturbing state of affairs. I, for one, would advocate a separate continuity earth system on your overhead distribution, independent of your neutral which remains ordinarily insulated. Thank you.

Mr. R. K. FROST (Dept. of Labour, Pretoria): I would like to say how much I appreciate this paper of Mr. Middlecote, and congratulate him on it. I have actually

read it over twice to absorb the detail, and I think it is a valuable contribution to the cause of Accident Prevention. It may be of interest to you, Mr. President, to hear a few more recent figures on accident rates.

In 1953 in the Union, in the industrial world (that includes domestic but excludes mines and railways), there were 70 electrical casualties in 89 reported accidents. Of those 70 casualties, 20 were fatal, and there were 10 European and 10 Natives killed. This represents 11.7% of the total fatalities which happened that year in industrial and domestic situations.

If you wanted to get an overall picture you would have to add the S.A.R. and the Mining casualties, which I'm afraid I cannot give you, but this figure of 11.7% does not give us any cause for complacency, as Mr. Middlecote has mentioned.

Coming to more recent figures, I can only give you those for Natal, for last year. There were 9 fatal electrical accidents, causing 10 people to be killed. And there were 16 non-fatal, which were reported to us. Of the 9 fatal accidents, only 3 could be classified as domestic, and even those were due to the ignorance of the victims themselves, and could not be ascribed to faulty installation.

The 6 other fatal accidents in Natal last year, were associated with the local authority's distribution. They happened outside the domestic installation. Of the 16 non-fatal, 9 of them happened on consumers' premises, and 7 outside on the distribution scheme.

Mr. President I read this morning in the paper about a man having sustained a 6,000 volt headache by touching what they call an electric overhead cable, carrying nearly 6,000 volts. I leave it to your imagination what an overhead electric cable looks like. I submit we do not need to touch a cable in order to get a headache. We have a headache already, in connection with distribution schemes, where we are having this constant menace of overhead lines falling and remaining alive. This is a problem, of course, outside the domestic installation, but one which nevertheless demands the attention of all electrical engineers, and all research workers, in

order that this hazard to the public may be removed. The danger of a fallen conductor on the outside distribution scheme remaining alive and being touched by the public is a very real danger, which merits all the attention that electrical engineers can give to the solution of this problem.

Mr. P. A. GILES (East London): Mr. President, I wish to congratulate the author on his excellent paper which is extremely informative and covers many aspects of a complex problem. He has shown the need for an active investigation of any earthing arrangements which rely on a buried metallic water pipe system as a strip earth, particularly in view of the introduction of non-metallic pipes and packing pieces in the run of piping which destroys the efficacy of the piping system as a means of earthing.

Where it is necessary for a supply authority to establish its own electrical earthing arrangements, the P.M.E. or Protective Multiple Earthing system offers one main advantage, and that is through the medium of the connection at the

meter board of the earth continuity conductor to the neutral which has the effect of converting a consumer's earth fault into a phase to neutral fault, and this enables the main fuse to be blown or the switch to trip. In most cases, the supply authority is called in to rectify matters and the opportunity is taken to fully investigate the fault. This investigation assists in maintaining a high standard of insulation in the consumer's wiring installations connected to the distribution system. The important feature of protective multiple earthing is the fact that whether the fuse will blow or not is practically independent of the resistivity of the soil and the type of electrodes used and this is of considerable advantage in rural areas where it is frequently very expensive to secure electrodes of adequately low resistance for protective purposes. The earth continuity conductor thus provides a measure of safety by returning leakage current to the neutral at the source of supply. It also provides a path for radio frequency currents including those from radio suppression devices.

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As the author points out, the weakness of a multiple-earth system is that, should a mains neutral conductor break, that part of the neutral remaining intact beyond the break and all apparatus and equipment connected to it may well be raised to a dangerous voltage above earth. In the built up areas this possibility is considerably lessened by connecting up all neutral of all sub-stations circuits and earthing each steel pole and cross-arm by using a cast-iron ninepin. This brings into operation a considerable amount of ring earthing on each side of a broken neutral conductor. The combined effect of the several earth electrodes constituted by the steel poles seems to materially reduce the overall earth-fault impedance path and to reduce the shock risk in the event of a break in the neutral co-incident with a consumer's earth fault. Under normal conditions, however, the resultant parallel earth electrode resistance appears quite low enough to ensure safety.

The protective multiple earthing system has the merit of being economical and positive in action which are considerations that appear to outweigh the small additional risk arising from a broken mains neutral circuit. The likelihood of a broken neutral conductor in the street mains appears to be remote, being something of the order of two per 10,000 consumers per annum. A break in the bare neutral of an overhead house service connection, how-

ever, is a very dangerous occurrence. The meter shunt coil livens up the wire on the consumer's side and the voltage on the wire is limited only by the resistance of the earthing stake on the consumer's premises. However, this contingency can be practically eliminated by using twin or figure eight house service wire to each single-phase installation.

As shown in the following table, a strip earth appears to give a good earth for the soil resistivities and moisture content of the soils of the Eastern Province.

Normally the strip earthing of the underground cable system consists of a bare copper conductor 0.1 square-inch in section laid in the sub-station feeder trench and earthed at suitable marshy and salty points along the routs. On wooden pole lines the copper wire of 0.05 cross section is carried overhead and earthed at both ends to stakes as a guard against a break in the wire.

In addition, if the line is lengthy, earth stakes are put in at suitable earthing points not less than one quarter of a mile apart.

Protective multiple earthing of the neutral provides an effective and economical method of safeguarding against shock from faulty apparatus and provided prompt attention is given to fallen wires, the likelihood of dangerous shocks being received on the occurrence of a fault is considerably lessened. However, in my opinion, before

PROTECTIVE MULTIPLE EARTHING

Type of Earthing	Sub-station Earth Resistance.	Consumer's Premises 300-yards from Sub-station.
Water Pipe	0.32 ohm	1.00 ohm
Composite earth (Stake, mat and strip)	0.10 ohm	0.50 ohm
Strip 19/083 copper 500-yards long	0.20 ohm	0.40 ohm
3 Stakes and Strip	0.60 ohm	1.00 ohm
16 Stakes 300-yards apart .05 conductor	0.80 ohm	1.20 ohm
Mat 8-feet deep	0.15 ohm	0.50 ohm

a final decision is reached, further experience of the operation of the system in both town and rural areas is necessary.

Mr. C. L. DE BEER (Johannesburg): Mr. President, Mr. Mitchell in his Valedictory Address drew attention to the fact that it was the duty of all supply engineers to give the very best service at the lowest cost. I should like to draw attention to the fact that the capital cost of an installation is also part of the cost of the service to the consumer, and Mr. Middlecote is to be congratulated on so ably drawing our attention to not only the many technical aspects of earth leakage protection, but also the economic limitations.

It is obviously undesirable to enforce by regulation the use of relatively speaking costly equipment which can have the effect of putting the use of electricity outside the reach of the small user. I specially refer here to the small non-European installation where two or three lights are the total installation, as this type of installation is becoming necessary in this country of ours.

Passing now to the more technical aspects of the paper I note that very great stress has been laid on the impossibility of detecting the non-continuity of the earth return, and I should like to draw attention to some schemes which I have been working on for some period now, in which this defect is to some extent, eliminated.

In Fig. 1, you have the conventional secondary side of the transformer earthed, your line 'L', your neutral 'N', and your metallic earth 'E'. You have a high resistance between the line and the metallic earth, and a trip coil between the earth and neutral. Under normal conditions, the voltage between earth and neutral points is, relatively speaking, low, but should the earth return circuit fail for any reason whatever, you will, in effect, have the high resistance and trip coil in series between the line and neutral and this causes the circuit breaker to open.

This very simple device suffers from the defect that should you have a line to neutral fault, the neutral will also be raised to a potential sufficiently large to operate the trip coil and therefore in its simplest state, it is advisable to only connect the test resistance and the trip coil during the

closing of the circuit breaker itself by means of wiping contacts as shown at AL and AN.

This scheme could be applied to the very simplest type of installation where overload protection is in the vicinity of say, 5 to 15 amps, and no difficulty would be experienced in tripping your circuit breaker in the event of an earth fault on condition the earth return was healthy.

In the device shown in Fig. 2, which is purely current operated, you have what I term a differential core balance transformer on the left, in which you have 10 turns in the line side, 9 turns in the neutral side, in opposition to each other, and then your secondary circuit operating your trip coil.

It is obvious that under normal healthy conditions you have effectively one turn on the core balance transformer, and assuming that the circuit breaker is designed to trip at 50 amps you will have 50 amp turns at the point of trip.

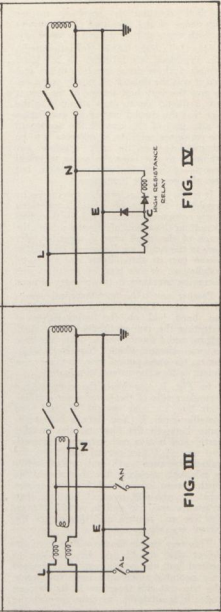
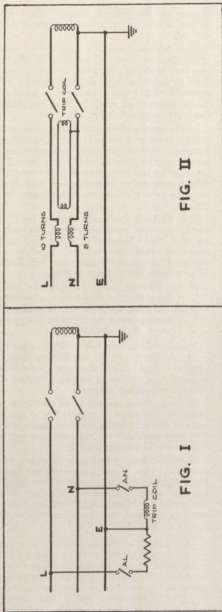
If you have an earth fault on the load side of the protective device, you obviously by-pass the nine turns in the neutral and so get 50 amp turns for tripping purposes with 5 amps. fault current.

You therefore, have with a single trip coil on a standard circuit breaker combined overload and earth leakage protection whereby you get earth leakage tripping at 10% of overloading tripping.

If your circuit breaker is set to trip at a value of 100 amps it is possible to get a ratio of 9½ to 10 turns, so once again, with 100 amp overload setting, you can get a 5 amp earth leakage setting.

It is obviously possible to combine the systems in Figs. 1 and 2, whereby you have fire protection by having a relatively speaking low current setting earth leakage trip and your earth continuity testing equipment in one and the same device. This is shown in Fig. 3.

This system has the great defect that you only test your circuit when you are closing your main circuit breaker or if you are operating a special piece of equipment when you are closing the breaker controlling that equipment, but it has certain advantages on for example, industrial



appliances where the main switch is used on every occasion that the equipment is made alive.

To cater for the more difficult installation where your earth resistance is, relatively speaking, high I have the device shown in Fig. 4.

In this we go back to the relatively simple scheme shown in Fig. 1 but with the insertion of two rectifiers between the points C and E and between the points C and N. These rectifiers firstly enable us to use a very sensitive high resistance D.C. relay, (you will notice that we do not use the trip coil of the circuit breaker on this occasion), and it secondly has the effect that with a line to neutral fault, while the neutral potential is appreciably higher than the earth potential, no current can pass through the high resistance relay because, firstly, point L is always at a higher voltage than point N and secondly, any current that tends to pass from N to E is blocked by the two rectifiers.

In the same way normal high voltage on the neutral due to voltage drop is prevented from operating the circuit breaker. Finally, you require a very small increase in potential of the earth lead over the neutral to cause the relay to operate.

In this case it should be noted that the operation of the relay in the event of an earth fault, is caused by the blocking action on the current passing from C to E by the fault voltage at E.

It should be obvious too without any further diagram, that the scheme shown in Fig. 2 can be superimposed on the scheme shown in Fig. 4, so that in effect, you can have a current operated earth leakage device which affords very useful protection against the fire hazard as the earth leakage tripping current is set at a figure in the order of 5 amps; simultaneously, as back-up protection you have the earth continuity tester, and finally, in the event of any normally earthed metal becoming alive at a voltage in excess of 20/40 volts, this also operates the device to isolate the fault.

In conclusion I should like to stress that notwithstanding the relative cheapness of the devices I have shown, it would be entirely incorrect to make use of them in any installation where experience has

shown that the present very sound system of good earth bonding has proved satisfactory.

I would also like to thank Mr. Middlecote for the wonderful way in which he has drawn our attention to the numerous small points in earth leakage protection which we are so liable to miss when thinking of the things ourselves.

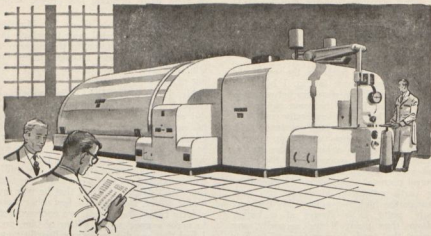
Mr. J. E. MITCHELL (Salisbury): I think I would be failing in my duty if I did not rise to thank Mr. Middlecote for his wonderful paper on earth leakage. The reason is that I was associated with Mr. Middlecote some 16 years ago, when we were investigating degaussing together. I think Mr. Middlecote still has a few milligrams bottled up that we collected at that time. And despite the fact that he was my senior officer, along with a few other more elderly types like myself, we endeavoured to make a good senior officer of him, and I feel that we did an extraordinarily good job of work!

One of the things that struck me was how he described the different insurable risks of cattle in accordance with their length between the forefeet and the back feet, and it seemed to me that dachshunds and landrace pigs were a very high insurable risk!

Mr. President, most of my points have been covered by previous speakers, but I do feel that Mr. Middlecote has not stressed that the resistance of the earth continuity conductor cannot be lightly dismissed. In the United States the fire hazard tests have shown that impedance and not resistance of the earth continuity conductor is all-important, and I believe that in the new United States codes they insist on the earth wire being run inside conduit to considerably reduce impedance.

A separate earth wire has been dealt with quite competently by other speakers, but I do consider that we should see what the cost is before we go too far in that line.

With regard to protective multiple earthing, the author states, I feel quite wrongly, that troubles only arise on such systems when there is a break in the neutral, because the original ERA tests on 3 phase systems quote quite dangerous



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effects due to resultant phase displacement of neutral with respect to earth from either phase fault to earth faults and broken phase wire in contact with the earth, and that point must be borne in mind.

As a matter of fact I think it was for this reason that the U.K. originally laid down the 2 ohm maximum resistance of neutral to earth when measured at any point. This of course, as pointed out by the author, has been increased to 10 ohms.

Finally, in regard to the current balance earth leakage protection, I understand that the delicate mechanisms of the sensitive disc type from the milliamp to 1 amp range are now being superseded in the United Kingdom by a new robust differential iron core type.

Mr. HALL (Somerset West): Mr. President, I am entirely converted after reading this paper to earth leakage relay, provided it is checked monthly and a log book kept by the owner. My experience of complicated switchgear is that unless it is tested frequently it doesn't operate. I think that is the experience of most people who have examined equipment used only occasionally.

Secondly isn't it better to have a lower voltage on all portable appliances than to maintain a higher voltage which can be abused? I can remember in a little place called Benoni where a native used a 220 volt electric drill connected across a crane's 400 volt system. The electric drill had a fault in it and consequently the native died, immediately he switched on the drill.

If your voltage is reduced to say 6 volts for electric drills and other portable appliances, I think many accidents would be saved, and amongst portable electric appliances I class all domestic refrigerators which I think can become alive very easily.

Another matter is that of house wiring. Why should we wire a house in steel armouring? Surely it is possible to evolve an insulated plastic cover made fire-proof say with asbestos or some similar covering. Why not also in the vicinity of all electrical apparatus which it is difficult to insulate, such as stoves, ensure that say the flooring and other places shall be of insulating material.

Mr. LATEGAN (Stellenbosch): Mr. President, Gentlemen. I wish to congratulate Mr. Middlecote on his very interesting paper on earth leakage protection and other points. On one point I do differ, and that is the approach to the resistance of the earth electrode. On the final tests by the inspector we loosen the council's neutral and put all the load of the building on to the earth, and insert a circuit breaker in the circuit to trip at 30 amps. If that occurs we are satisfied that any fault occurring will go to earth due to the earth electrode having a very low resistance.

Mr. A. F. TURNBULL (Vereeniging): May I just confine my remarks to asking a few questions?

This question of earth leakage has disturbed most municipal engineers for some time. Would the onus be on the municipal engineer to install suitable earth leakage protection, or would this onus be passed over to the consumer? And there again would we merely confine ourselves to satisfying that the earth leakage operated correctly when installed, or would we have to conduct periodic checks? I don't know of any consumer who would worry about checking that these appliances operated.

THE PRESIDENT made announcements.

TEA ADJOURNMENT

CONTRIBUTION TO DISCUSSION ON Mr. MIDDLECOTE'S PAPER ON "EARTH LEAKAGE".

Submitted by

Mr. H. T. TURNER.

From the figures presented in Mr. Middlecote's paper, and bearing in mind that more people are in daily contact with domestic than industrial installations and appliances, it would appear that more emphasis should be applied to the earthing and protective system regulations governing domestic installations. The vast majority of low percentage domestic electrocutions are, I consider, contributed to faulty electrical appliances rather than the bulk of the installation. During the past ten years in Umtali, only four cases of

electrical accidents have occurred, none of which was due to inadequate earthing conditions prevailing in the electrical wiring installation, but from faulty appliances and inadvertent contact with the conductors. Rigid application of the standard specifications relating to approved earthed appliances and enforcement of the use of 'shutter-type' earth terminal socket outlets, together with non-metallic fittings where possible, should be the prime consideration in attempting to reduce the possibility of electrocution. The danger of point to point electrocution should be minimised by bonding all immovable non-current-carrying metal work in a room with heavy copper earth strip and the point to ground possibility reduced by recommending insulating type floor coverings, such as plastic tiles or wood, where electrical apparatus is predominant, e.g. kitchens, workshops, etc.

In Umtali miniature circuit breakers are fitted to all domestic and small power installations to increase the fault current protection as outlined in Mr. Middlecote's paper. Furthermore, a maximum earth resistance of 3 ohms is permitted on all new earthing installations. Existing wiring installations where situated in areas of high soil resistivity, are periodically checked for earth resistance values, and if required, substantiated with improved earthing systems.

The use of braided earth flexible cables for all portable electrical appliances may be the answer to the hazard of exposed live wires in such cables and it has always been my wonder why such cables have not been commercialised.

Transformer neutral points on our systems are bonded to the main H.V. ringing and L.V. distribution cable networks together to external sub-station earthmats and as such the value of 3 ohms resistance is rarely exceeded. As all these connections are carried out within the sub-station the lengths of such are reduced to a minimum and the possibility of electrocution in the area surrounding the sub-station is remote. Furthermore, the neutral is again multiple earthed at points along the supply at each consumers installation.

Not unlike South Africa, soil resistivities in Rhodesia are greatly varied but we are,

however, somewhat blessed with an abundance of sandy soil of medium to low salt proportions which render fairly reasonable earthing conditions and the non existence of frost eliminates the frost line insulation hazard mentioned in Mr. Middlecote's paper.

All earth electrodes in Umtali are of the stranded copper wire 3 inch square mesh design having an overall surface area of not less than 10 sq. ft. and positioned horizontally approximately 4 feet deep below ground level. Duplicate heavy stranded leads are brazed to these earth mats and taken through protective conduit to the earthing terminals of the installation. Strip or trench electrodes are also in use where metal water piping has been substituted with the asbestos cement type. Driven rod electrodes have in the past been avoided owing to the hardness of the earth, but, as a result of the information submitted in this paper, I am most anxious to carry out tests in this respect.

Cable Sheaths, separate earth wire and utilization of the neutral for earthing purposes are extensively employed with good results here in Umtali. The case of the broken neutral is reduced by adequate multiple earthing.

Relays of the potential, current balance, and sensitive current balance types are now being experimented with on our L.V. supplies and although I am inclined to favour the potential type from an economical point of view there is no doubt that current type relay protection is to be preferred and will be standardised in certain areas of Umtali that warrant the added protection.

ON RESUMING:

THE PRESIDENT: I now call upon Mr. J. C. Downey to present a summary of his paper "Street Lighting".

Mr. J. C. DOWNEY: Mr. President, Ladies and Gentlemen. This paper is presented with the courtesy and kind permission of the South African Institute of Electrical Engineers, and was presented to the Institute at its meeting held in September, 1956, by the author. Copies of this paper have been circularised and therefore it is only proposed to give you a

summary and a few extracts of the paper this morning.

(Mr. Downey then presented the Summary of his paper, as well as a film on the subject. At the conclusion Mr. Downey expressed thanks for the assistance given to him by the following :

Mr. Axe and staff, Mr. Simpson, and the Town Clerk and Staff of Margate for the assistance received from them. He asked anyone whose name he had omitted to mention to accept his grateful thanks).

In presenting the paper to the A.M.E.U. the Author read extracts from the paper supporting his statements by diagrams and graphs as shewn in the Institute's Journal.

A practical demonstration was given of glare, speed of perception and the lettering of road signs together with animated diagrams from the epidiascope. In addition, points were brought to the fore by the use of natural coloured slides and photographs shewing examples of actual street lighting in Europe and South African towns and cities.

THE PRESIDENT: Thank you very much Mr. Downey.

I have one suggestion to make before I ask the proposer for his vote of thanks. I suggest that every engineer member send the following telegram to his home town :

"Re capital expenditure provided on loan programmes stop Double amount provided stop. Councillor member at AMEU Convention will come back and explain". I think you have a good chance of getting more for your street lighting gentlemen!

I now call upon Mr. Cator to propose a vote of thanks for this excellent paper from Mr. Downey.

Mr. F. CATOR (Johannesburg): Mr. President, Ladies and Gentlemen. As one of the blue ribbon brigade, I feel it a great privilege to be called upon to propose the vote of thanks for the most excellent paper we have just heard.

Even if I had not known Mr. Downey previously, it would have been obvious to me. after two days at your convention, that he is a veritable human dynamo. His name keeps cropping up. I have heard him referred to as Mr. Chris Downie's Irish

brother. Mr. Mitchell has referred to him as a willing horse. I have seen him receive a medal and certificate as one of your past presidents.

Last evening he presided over the Annual General Meeting of the S.A. National Committee on Illumination, and I am very pleased to tell you that Mr. Downey was again elected President of this national committee.

This brings me back to the matter of street lighting. Under Mr. Downey's guidance S.A.N.C.I. (as it's known for short) is fathering, with the S.A. Bureau of Standards as the mother, a South African code of practice for street lighting.

I may tell you that the successful demonstration of various types of street lighting which you have seen, and which has been such a feature of this convention, was Mr. Downey's idea, and now this morning you have heard his comprehensive and very important paper on street lighting.

I think it can be truly said that Mr. Downey has put the spotlight on street lighting in South Africa. I think you will all agree that our very grateful thanks are due to him for performing this very important service.

A recent article in the Johannesburg "Sunday Times" gave these figures for South Africa for 1956. Killed on the Roads: 1,885. Injured on the Roads: 25,515. Total cost to the community £23,500,000. This total cost, incidentally, was estimated by the Acting Director of the National Road Safety Organisation, and he computed it as follows :

Cost due to the people	
killed	£ 14,000,000
Injured	£ 2,500,000
Damage to cars and repair bills	£ 7,000,000

An unknown fact, of course, is what percentage of the above total could have been saved if the roads on which the accidents occurred had the lighting been adequate? I think Mr. Downey, and most of you will agree that one fact we can be certain of is that the cost of good street lighting is less to the community than the

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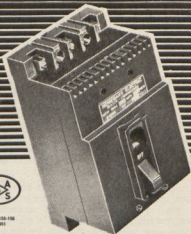
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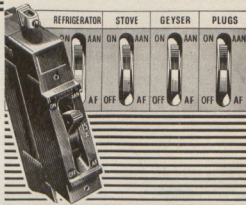
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cost of the accidents caused by inadequate visibility.

If I may quote from the newspapers again, a very recent article in the Rand Daily Mail said:

"We can expect the road toll to keep mounting as traffic grows denser. Five years ago there were 689,000 vehicles on the roads of South Africa. At the end of last year there were about 812,000 vehicles. The million mark may be reached in the coming five years, and almost certainly an annual toll of 10,000 lives."

A loss of 10,000 lives per annum on the roads, to say nothing of the injured and the damage to property, is a frightening figure, and one which we must obviously do everything in our power to cut down.

It emphasises very strongly the timeliness of Mr. Downey's paper, and I predict Mr. President that your wise action in having this paper read at this Convention, and in having copies circulated to all your members, will almost certainly be the indirect means of saving many lives, much injury, and a great deal of damage to property in the future.

I would like to intersperse a plea here gentlemen, and that plea is that you do not wait for the publication of the South African code of practice for improving your street lighting. It will be some time before the South African code appears, and in the meantime you cannot go wrong with the British code.

Mr. President, I came here prepared to contribute to Mr. Downey's paper if time allowed, but I did not realise that I would have the honour of proposing the vote of thanks. In view of the time factor I hope I shall be allowed to send my contribution in as a written contribution.

THE PRESIDENT: That will be allowed Mr. Cator.

Mr. F. L. CATOR (Johannesburg): Mr. President, Ladies and Gentlemen, I now have much pleasure in proposing that we accord to Mr. Downey a very hearty and sincere vote of thanks for his extremely important paper on the Theory and Practice of Street Lighting.

CONTRIBUTION TO DISCUSSION ON Mr. J. C. DOWNEY'S PAPER ON "STREET LIGHTING"

by

Mr. F. L. CATOR (Johannesburg)

In section 9-6 the author rightly calls attention to the difficulties encountered in trying to provide adequate street and pavement lighting for tree lined roads, although I cannot agree with his contention that "irrespective of the type of tree used the problem always remains". I would suggest that selection of the right types of trees goes a long way towards solving the problem.

It is interesting to note that in America in 1955 the Illuminating Engineering Society, the National Shade Tree Conference, and the Edison Electric Institute jointly sponsored a meeting of some 300 Arborists, Street Lighting Engineers, and Utility Authorities to study the common problem of how best to provide their respective services of shade trees, street lighting, and electric and telephone supplies, with the least interference to each other.

As between the Arborists and the Street Lighting Engineers the conclusions of the Conference were briefly that their problems could be overcome with proper consultation and planning and a bit of give and take on both sides. Although no suggestions were made regarding the number of trees per street lighting span (as suggested by Mr. Downey) the Arborists admitted that they could make the biggest contribution by recommending the right type and shade of tree. The street lighting Engineers agreed that they could assist by providing longer bracket arms for their lanterns, or alternatively central suspension on span wires, and both sides agreed that a proper system of tree pruning was essential.

It was considered that, when properly done, tree pruning enhances rather than detracts from the appearance of a street, especially in daytime when distant lanterns, brackets and poles are screened by foliage.

On the question of pruning an important point emphasised was that it is not

necessary to prune adjacent trees up to the height of the lantern, but only up to the point where interference would take place with the cone of maximum light distribution. The following diagram will make this clear, and the Tree Pruning Chart which follows is derived from the diagram.

The American Standard Practice for Street and Highway Lighting includes a section on what they call "Forestation". This section includes the diagram shown in Figure 1 and sums up the situation by saying "Far sighted arborists make selections based on trees which fit the street

space available, the soil condition, the room available for root system, exposure, and *minimum conflict with utilities*. Such selections may include upright, globular, or ordinary tree shapes. Where conflicts exist between trees and street lighting in most cases the answer is *proper pruning*. Where trees are too crowded often the best remedy is removal of the conflicting tree".

Part 1 of the British Code of Practice for Street Lighting does not mention trees, but in Part 2 they are mentioned under Section 203 as one of the factors influencing

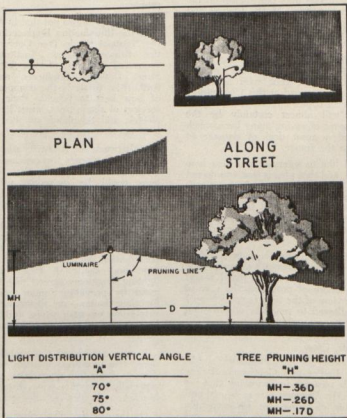


FIGURE 1.—Recommended tree pruning to minimize conflict with roadway lighting

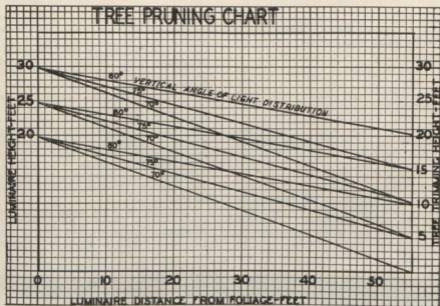


FIGURE 2

the design of an installation. The British Code, like the American, emphasises the care that should be taken in the selection of trees to be planted having regard to their ultimate size and shape, and to their siting. This point is also emphasised by the author in his final paragraph under section 9-6.

Under Section 7 — Street Lighting Lanterns, and Section 7-1 — Optical Systems, the author has only had time to touch very briefly on a very important aspect of street lighting planning, and that is the *representation and interpretation of street lantern characteristics*. For instance, he has shown (in Fig. 16) polar curves in the vertical plane illustrating the three types of beam angle light distribution covered by the British Code of Practice and (in Fig. 17), polar curves in the cone through maximum light intensity—illustrating symmetrical, axial and non axial light distributions for street lanterns. However, he has not mentioned *iso-foot candle*

diagrams and, although brief mention is made of *iso-candle diagrams*, no illustrations are given.

I know that the author agrees that, for municipal electrical engineers in particular, the representation and interpretation of street lantern performance are important subjects and I have his permission to enlarge somewhat on this aspect of the paper.

Beyond giving illustrations of polar curves and *iso-candle diagrams*, plus brief definitions, the British Code of Practice is not very helpful in this respect. To my mind, however, a study of the American Standard Practice for Street and Highway Lighting is well worth while for an understanding of lantern characteristics. The reason for this is possibly that the Americans classify their lighting systems differently and put less emphasis on silhouette vision. They also specify a range of average foot-candle values which should be obtained for various street classifica-

tions. The Americans work with 5 classified types of light distribution. These 5 types of distribution are classified:—

- (a) as to angle in the vertical plane at which the maximum intensity is emitted and;
- (b) as to the lateral width of light distribution in the cone of maximum candle-power.

In other words, these 5 distribution categories are governed both by the type of polar curve shown in Figure 16 and by the type of polar curve shown in Figure 17 of the author's paper.

This diagram shows clearly the polar curve of a lantern in the two vertical planes of maximum candle power. Note that the lantern concerned is obviously designed for side of the road mounting since not only does it distribute the light

from the lamp up and down the road, but the planes of maximum candle power make an angle with the axis of the road, i.e., by British Code definition it has a "non-axial" distribution. This "non-axiality" is defined on the diagram by the lateral angle from the transverse zero.

This diagram illustrates more graphically the type of polar curve shown in Fig 17(c) of the paper. It too, shows the polar curve of a lantern in the conical plane containing the maximum candle power. From the previous diagram it was noted that the angle of maximum candle power was 75° from the downward vertical, and this is the angle of the cone in the present diagram.

This diagram is the same as the last except that the *lateral width* of the light distribution has been added. In this case this lateral width is 40° . For a proper

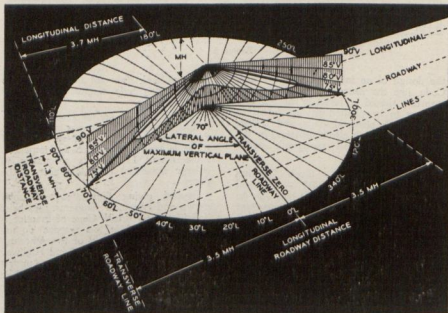


FIGURE 3.—Vertical planes of maximum candlepower extending out on a roadway surface. This is one example of Type III. light distributions.

coverage of the road surface it is obvious that the wider the road, the greater this lateral width should be and, in American practice, as mentioned earlier, the 5 types of light distribution are determined by this lateral width in conjunction with the angles of maximum candle power in the vertical plane.

This is an example of one of the iso-candle diagrams which the author quite rightly says in his paper are not so easy to follow as polar curves.

In the British Standard Code of Practice the iso-candle diagram is defined as follows:—

"A plane network indicating angles of azimuth and elevation about a lantern, upon which the distribution of luminous intensity in space is delineated by lines joining points of equal luminous intensity. A sinusoidal diagram is commonly used."

Most people find this of little help.

Having seen an example of an iso-candle diagram let us take a look at an iso-foot candle diagram, which nowadays British manufacturers very seldom supply with their lanterns.

This is an iso-foot candle diagram for a lantern with a 400 watt mercury vapour lamp mounted at 25 feet.

It will be observed that from this diagram one can read off the actual foot candles of illumination at any point of the road or pavement. The diagram also gives, at a glance, the "shape" of the light distribution and also what I referred to before as the angle of non-axiality.

The objection is sometimes raised that the iso-foot candle diagram is tied to one specific mounting height. This is quite true of the diagram just shown, but the

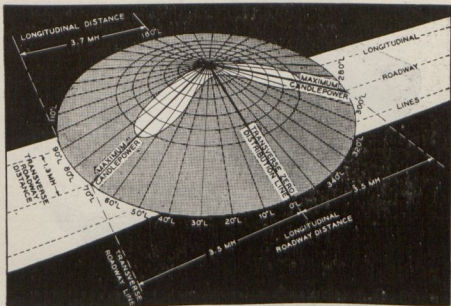


FIGURE 4—Lateral candlepower curves showing light distribution in cone of maximum candlepower. This diagram illustrates the designation of lateral angles such as maximum candlepower for one example of light distributions classified as Type III.

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next diagram, which is taken from the American Standard Street Lighting Practice, shows how this objection is overcome.

This iso-foot candle diagram is computed for a given mounting height, but in order to make it applicable to all conditions, it will be noted that distances both across and along the road are expressed *not* in feet but in ratios of the mounting height. As will be seen from the table alongside the curves, this iso-foot candle diagram was drawn for a lantern mounted at 30 feet but correction factors are given by which to multiply the illumination at any point when the lantern is mounted at any height between 25 feet and 35 feet.

Having shown these examples of iso-candle and iso-foot candle diagrams, I would like to ask the author if he does not agree that a busy municipal electrical engineer would much prefer to work with

iso-foot candle diagrams than iso-candle diagrams, I submit that the types of polar curves previously mentioned, plus an iso-foot candle diagram tells the municipal electrical engineer all he wants to know about the performance of any particular lantern.

As I have made frequent reference to American Street Lighting Practice, I would like to show a final diagram which I think illustrates very clearly how they classify their roads according to volume of vehicle and pedestrians, and how they specify the lighting layout recommended for each classification.

You will note that this diagram gives five typical street lighting layouts based upon volume of both vehicular and pedestrian traffic. It is assumed that the greater the traffic volume the wider the road, but unfortunately this is, of course, not always

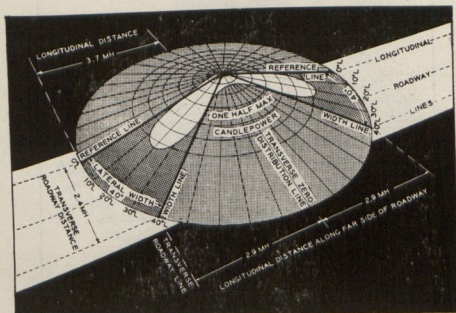


FIGURE 5.—Measurement of lateral width of light distribution from the Reference Line in an example cone of maximum candlepower. This 40-degree lateral width is preferred for Type III. lateral light distributions.

true. However, the average foot candle illumination recommended for the roadway (the Americans use the word "pavement" for road surface) is given and this, presumably, is determined by traffic volume and not road width.

With the British Code of Practice the layouts shown for "Very light Traffic" and "Light Traffic" would come under Class 'B' roads but it will be noted that even for these the Americans recommend 25 ft. mounting height for the first and 25 to 30 ft. for the second. For "Heavy" and "Heaviest Traffic", where the lumen required from the lamps is increased considerably, American practice wisely calls for 30 ft. mounting height for the lanterns.

With the British Code the lantern bracket outreach depends upon road width. It is interesting to note from the diagram that in America this outreach is standard at 5 ft. except for "Very Light Traffic" roads where 7 ft. is recommended because of the single side mounting.

THE PRESIDENT: Thank you very much Mr. Cator. I now call upon Cr. Davies to second that vote of thanks.

Cr. L. P. DAVIES (Springs): Mr. President, Mr. Downey's paper has been most interesting to me, and I am sure that it has been to everyone present.

It is well-known to all what a great part natural light plays in the interests of mankind. It is not necessary to describe the benefits both physically and economically

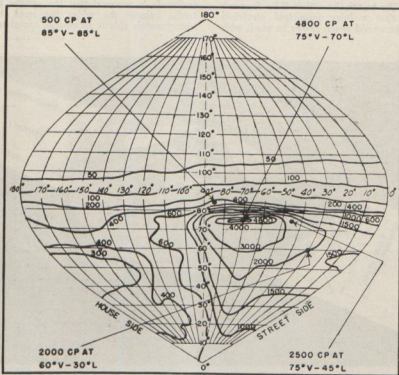


FIGURE 6.—Example of iso-candle diagram method for showing the light distribution from a luminaire. The distribution classification is Type III.

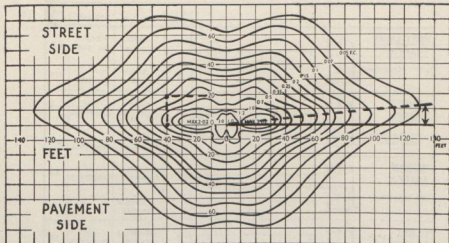


FIGURE 7.—ISO-FOOT CANDLE DIAGRAM. The intensities shown are measured on and normal to the road surface. Initial conditions.—Mounting height 25 ft. 0 in.

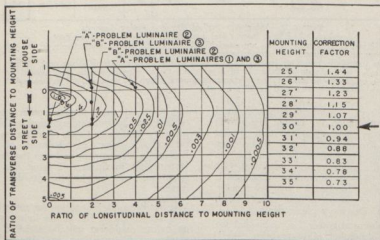


FIGURE 8.—Example of isofootcandle diagram of horizontal footcandles on pavement surface for a luminaire providing a Type III light distribution; 10,000 initial lumen lamp, luminaire maintenance factor omitted.

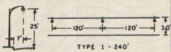
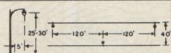
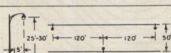
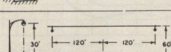
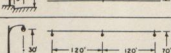
			DIST TYPE	LAMP SIZE	SPACING	BB AVG. FT-C
VERY LIGHT TRAFFIC LIGHT PEDESTRIAN		TYPE 1 - 240'	I	6,000L FILAMENT	240' ONE SIDE	0.2
			II	2500L FILAMENT	120' ONE SIDE	0.2
LIGHT TRAFFIC LIGHT-TO-MEDIUM PEDESTRIAN			III	6,000L FILAMENT	120' STAGGERED	0.4
			III	10,000L FILAMENT	120' STAGGERED	0.7
MEDIUM TRAFFIC MED PEDESTRIAN			III	15,000L FILAMENT	120' STAGGERED	0.8
				15,000L W MERCURY		
HEAVY TRAFFIC MED PEDESTRIAN			III	20,000L W MERCURY	120' STAGGERED	1.0
HEAVIEST TRAFFIC HEAVY PEDESTRIAN			III	20,000L W MERCURY	120' OPPOSITE	1.8
			IV	25,000L FILAMENT	120' OPPOSITE	1.8

FIGURE 9.—Table V. Typical Street Lighting Layouts

Based on initial lamp lumens and a maintenance factor of 80 per cent.

*A-H1 and E-H1 mercury lamps are rated 15,000 and 20,000 lumens respectively, in vertical operation. Lumens are slightly lower in horizontal operation.

**The footcandle values are based on a pavement having a reflectance of 10 per cent. When reflectance is poor (of the order of 3 per cent.) the average footcandle level should be increased 50 per cent. When reflectance is unusually high (20 per cent.) the recommended values may be decreased by 25 per cent.

which we receive from this source. Natural light has its limits. We cannot just switch on or off as required at any time during the normal cycle of 24 hours. It has been left to our engineers to find a substitute to meet the modern mode of living. Gas has been tried and found wanting, and is now being replaced by electricity, especially overseas in the sphere with which Mr. Downey's paper deals.

As a mining engineer I can say that we have for a number of years been experimenting underground to find the most efficient way of using electricity as the means of lighting our haulages and travell-

ing ways. It may surprise some present when I say that our underground problems are very similar to those of yours on the surface. However, as chairman of the Electricity Department and also the Traffic Department in Springs, I have had the opportunity of studying the problem still further.

It has been obvious to me for some time that street lighting has a very long way to go before engineers will be satisfied that maximum efficiency has been obtained.

To support that statement I can only say that if you travel along the Reef as I

have done from east to west, passing through the main streets of each town, and taking notice you will see the various types of lamps and fittings which have been used, i.e. by the electrical engineers concerned. You will even notice in some towns that along one street more than one type has been used. This all points, in my opinion, to a lack of satisfaction by the engineer that he has reached the standard he requires, and which he considers the best.

I appreciate that engineers are not always able to carry out experiments, or try out the latest methods. This is due, of course, to the very high costs involved. Sometimes, I am sorry to say, councillors are inclined to hinder this type of work, due to nothing else but ignorance of the facts. Councillors should remember that though better lighting may mean excessive expenditure, it is more than possible that the saving in life on the roads will show a handsome return on a very sound investment.

In conclusion, I would like to recommend to all councillors to make a very careful study of this paper, and if you want to see some samples of good (and bad) lighting, then come to Springs. We will be only too glad to show you around!

Mr. President, I would like to congratulate Mr. Downey on his paper, and thank him very sincerely for all the hard work and research he has put in on our behalf. It now gives me great pleasure to second the proposal already put to you.

THE PRESIDENT: Thank you Mr. Davies.

Gentlemen, there is some time left for discussion on this paper.

Mr. F. SEVENS (Ladysmith): Mr. President, I would like to congratulate Mr. Downey on his paper. It is one which is of interest to councillor delegates as well as engineers. I am particularly interested in his comments on fluorescent lighting, dealing with the question of whether covers are desirable or not. Seven years back we installed 24 such lights at a height of 25 ft. in Ladysmith's main street, which carries all the main road traffic between the Rand and Durban. The arrangement was staggered. It was the first fluorescent street lighting installation in Natal, and at

the time amongst the first two or three in the Union. I chose this form of lighting because of the comparative lack of glare from it, and the long life to be expected from the lamps. The lanterns were expensive, and their erection presented a problem. There were six or more designs to select from, viz. with and without reflectors, with and without covers, and the lamps arranged horizontally on more or less a common plane, or one above the other.

As there were no users in the country with extensive experience of this type of street lighting, I decided to put up three different designs which I shall refer to as A, B, and C, on three sections of the same street.

A has 3 80 watt lamps, each with its own reflector, and the whole is enclosed in a plastic cover.

B has 2 80 watt lamps, each with a reflector, there being no cover.

C has 4 40 watt lamps, lying horizontally one above the other, there being no reflector, the whole is in a plastic cover.

We found the visual effect in each system to be the same. The light intensity on the road surface, measured with a high class foot candle meter at a point midway between fittings was found to be as follows:—

Type A, 74 ft. spacing 0.03 foot candles.

Type B, 72 ft. spacing 0.01 foot candles.

Type C, 80 ft. spacing 0.02 foot candles.

By way of an experiment, and to overcome insect trouble, we have removed the cover from some of the Type C fittings.

From the experience so far gained with fluorescent street lighting, we are inclined towards lamps being set one above the other without reflectors, should one fail, the light on the road surface on both sides of the fitting is affected to the same extent.

Further, reflectors call for a certain amount of maintenance in the way of polishing.

Finally, no covers, as their extra cost is not justified, and without them insect trouble disappears.

Mr. A. P. BURGER (Parow): As one so long associated with Mr. Downey I too would very much like this morning to add

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my congratulations to him on this excellent paper.

In doing so, I would like to tell you how much I have learned from this paper, both as a lawyer, and as a municipal official.

As a lawyer, Mr. President, I learned this morning why 12 years ago I lost a case of *Rex vs. F.* Now that is a case which illustrates to you the necessity of proper street lighting on the kerb. Mr. President, if the knowledge which I gained here this morning had been available to me that day in the Supreme Court 12 years ago, *F.* would have been acquitted. As it happened, the Court I think, rather underestimated the complexity of the case, and only two judges of appeal were empanelled. Unfortunately, the judges disagreed. Because of this disagreement on appeal, he then stood convicted.

As a municipal official I have learned even more from Mr. Downey's paper. I have learned, as we all know, and as we hear stated at conferences, but as we so seldom see emphasised by practical facts, the absolute need for co-ordination — co-ordination of departments, co-ordination of knowledge; co-ordination of all those responsible for carrying on a municipal undertaking, and doing away with that departmentalisation which is a tendency today.

I think, Mr. President, here you have seen the need for civil engineers, electrical engineers, traffic chiefs and legal men concerned in a municipal undertaking, to take note of one another's knowledge. And in saying these few words, I again want to say: "Thank you, Mr. Downey, for your excellent paper."

Mr. J. I. INGLIS (Pietersburg): I would like to add my congratulations to Mr. Downey for his very illuminating paper. The importance attached to this paper was such that my council's Chairman of Finance has attended this conference.

Fluorescent street lighting was first undertaken in Pietersburg approximately 9 years ago. These fittings were made in our own workshops and consisted of lanterns constructed from aluminium sheeting, white enamel painted. Two 40 watt tubes are in use. These lanterns are not enclosed, but experience shows that when

extremely cold wind strikes the tube, trouble is experienced. There appears to be, therefore, some ground for enclosing the tubes.

I do not propose to add further to the discussion, but I would like to suggest to Mr. Downey that he supplements this paper by adding a section dealing with street lighting control. This, I feel, would be of great value.

In conclusion I would like to thank Mr. Downey once again for this very illuminating paper.

Mr. P. A. GILES (East London): I wish to congratulate the author on the excellence of his paper and the comprehensive treatment of the subject matter.

It is fundamental that visibility is the essential of good street lighting, but the determination of a suitable yardstick to measure and compare visibility in street lighting, as the author states, is not yet available.

Many instances occur where a motorist involved in an accident will say that the pedestrian or object was invisible to him at the time of the accident. A subsequent inspection in loco, by the court, of the scene of the accident, with the same street lighting on, together with the object stated not to be visible, very often results in a declaration by impartial observers that the visibility was good. Other factors in an accident are, (a) a misled driver or pedestrian, due to poor judgment of traffic conditions; (b) the vehicle in a critical position due generally to speed; (c) the obstacle in a critical position and unable to take avoiding action; and (d) the situation beyond recovery due to loss of control.

In my opinion visual acuity has a great deal to do with the problem, and although the author mentions this factor he does not develop the implications of it. Visual acuity in seeing is by definition "the ability to detect fine details" and is very dependent on the brightness of the object viewed. The light received on the object acts as a magnifier of detail. If an object is so small that it is visible under illumination of 1 foot candle, it would be seen just as clearly even if it were half the size, with illumination raised to 100 ft. candles.

However, if eye-strain and fatigue caused by ocular adjustment is to be avoided it is considered that the brightness at a point should not be more than 10 times the surroundings.

It is of interest to note that the human eye undergoes certain automatic changes during life, which have the effect of reducing the area of the pupil with increasing age. If the pupil of a man aged 20 years is taken as a standard, it is found, I believe, that the pupil area of a man aged 50 years is only 55% of its former size, so that, in effect only 55% of the available light is useful for seeing. It is therefore apparent that when planning a street-lighting system some allowance should be made for elderly drivers and pedestrians.

Another factor which plays a part in seeing is speed of vision. The author has likened the human eye to an ordinary camera. He has referred by analogy to the fact that both have a lens by which the image of objects seen can be focussed on to the sensitive film or retina. Carrying the analogy further, both have an iris diaphragm which can be opened or closed,

depending on the illumination available, and both depend to a very large extent on the available illumination for their speed of operation.

If one wishes to take a clear picture in dim lighting, it is necessary to give a time exposure with the result that any moving object will appear blurred in outline. As the illumination is raised, so it becomes possible to take snapshots with more and more rapid exposures till eventually it is possible to photograph very rapidly moving objects which will appear to have sharp outlines in the final print.

The same occurs with the human eye. Vision under poor lighting is uncertain and blurred, but vision under good lighting is sharp and rapid.

Mr. Downey showed that very clearly, Mr. President.

These remarks on visual-acuity and speed of vision are offered to supplement the valuable information given in the paper and to serve to point out that the act of seeing is so much better and surer under good street lighting.

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When the question of improved street lighting of the main street in East London was under discussion in 1947, it was found that the ease with which an object was picked up by a road user was governed by the following considerations:

- (a) the brightness of the object against the background, and the general level of brightness, mainly from the shop windows;
- (b) the amount of glare present, due to the lights of approaching vehicles;
- (c) the colour contrast between the object and its background as affected by the colour of the light admitted by the street lighting fittings under trial; and
- (d) confusion due to the uneven appearance of the roadway with the consequent dazzle pattern as seen in camouflage.

It was considered that visibility would be improved by increasing contrast of both brightness and colour and by decreasing glare of motor car headlamps, through raising the general standard of illumination.

Eventually it was decided, on economic grounds mainly, to install 400 watt high pressure mercury street lighting fittings, in rows 40 feet apart. The light sources would be opposite each other on existing poles at a spacing of 120 feet with an overhang from the pavement into the roadway of 15 feet. The aim was to provide as even and as high a brightness as possible, on the dark macadam surface of the roadway, so that objects seen by the driver of a vehicle would be mostly in silhouette. The driver is watching that part of the roadway which lies ahead at a distance say of between 100 feet and 300 feet. If his eyes are about 4 feet above road level, the light from the fittings makes angles of 2.3 degrees and 0.8 degrees with the roadway surface, which gives a high road surface brightness using fittings with a high angle beam distribution of peak at 79 degrees. The lanterns give a vertical fan beam slightly non-axial and extending above the horizontal. The average tested illumination on the roadway, taking into account all factors, varies from one foot candle to point three (0.3) of a foot candle on the street surface.

There had been a number of fatal accidents in the street previously, but since the installation of the mercury lighting, no fatal accidents attributable to glare from headlamps or fittings have taken place.

The mercury lamps at present in use are uncorrected. The development of the colour corrected lamp in which a fluorescent power coating is excited by the ultraviolet radiation from the mercury arc and emits light predominantly in the red region of the spectrum is expected to improve the colour contrast of objects seen and thus add to the efficiency of the lighting.

The gain in red rays emitted is as a proportion from one percent to seven percent of total light and this gives a marked improvement in, the colour rendering properties of the light source.

In conclusion, it would appear that the broad basis of the subject has been well established, but it seems that the practical application of the principles bristle with difficulties. At this stage, in my view, no one can be dogmatic about the design of a street lighting system. Further experience and maybe experiment is necessary before acceptable or permissible standards are laid down to enable the technique to be widely applied.

RAADSLID P. DE BRUYN (Germiston): Mnr. die President, dit het van die begin af hier met die Konvensie vir my gelyk asof ons Raadslede almal doofstom was. Maar ek wil vanmôre net 'n beroep maak op my raadslede, nie net van Germiston nie, maar al die Raadslede. Ons het die gevare gesien, ons het die uiteensetting hier gesien wat Mnr. Downey ons vanmôre gegee het. Ons het ook ander syfers gesien aanhaal deur sprekers, 'n bewys hoeveel van ons bevolking wat in Suid Afrika die lewe inskiet deur slegte beligting in ons strate en ek wil 'n beroep maak op hulle, Mnr. die President, dat ons na ons Rade sal teruggaan en nie met geslote monde sit wanneer ons teruggaan huis-toe nie, maar dat ons sal onderneem om ons verskillende Rade te vertel die gevare wat daar is deur slegte straatbeligting.

U weet Mnr. die President, ek was vir 33 jaar 'n munisipale amptenaar en ek het altyd gewonder waarom ons straatligte in sulke treurige toestande verkeer, en ek het



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aan die slaap gesit die elf jaar wat ek al op die Raad is om daar 'n verbetering aan te bring. Ons het verbeterings aangebring, maar Mnr. die President, elke jaar kom die Minister van Finansies van ons Rade en hy wil net surplusse wys maar hy kom nooit tevore en wys vir die publiek die lewe wat in daardie tyd in sy dorp die ewigheid ingegaan het nie.

Ek wil u nie ophou nie, Mnr. die President, maar ek wil tog 'n ernstige beroep maak. Ons staan almal nou weer by die einde van die jaar wanneer die begrotings opgetrek moet word, en ek wil vra dat al die raadslede wat teenwoordig is om te sien dat daar soveel as moontlik geld vir die doel beskikbaar gestel word.

Dankie Mnr. die President.

THE PRESIDENT: Dankie Mnr. de Bruyn. Ek neem aan dat u sal ook daardie telegram van die ingenieurs onderteken.

Mr. G. A. LOTTER (Louis Trichardt): Mr. Chairman, I also compliment Mr. Downey on his excellent paper on Street Lighting.

Owing to the high cost of acquiring proper street lighting fittings, smaller municipalities have various difficulties in finding the necessary funds for this commodity.

The government provide subsidies for roads through the towns. Therefore I would at this stage, propose that this Association recommends to the government that subsidies be paid to smaller municipalities to have the through-roads properly lit.

Further, if consideration is given to accidents caused by faulty earthing, there seems to be no comparison as to the toll of accidents caused by inefficient street lighting and road accidents.

REPLY BY Mr. J. C. DOWNEY TO DISCUSSIONS AND CONTRIBUTIONS ON HIS PAPER "STREET LIGHTING"

The author wishes to acknowledge the kind and appreciative remarks of Mr. Cator and Mr. Davies, the proposer and seconder of the vote of thanks and to thank all the contributors for their contributions to the discussion on the paper and their very kind remarks, but owing to the need for cutting

down the length of the reply by the author he has confined his remarks to the points raised by Mr. Cator in his written contribution only.

Mr. Cator's remarks regarding trees are most interesting and informative, and the author agrees that while the right selection of the type of tree will make a great contribution to the improvement of the position, a tree never remains dormant even when regular pruning is carried out therefore one cannot assume that the conditions will remain stable.

The general system of supply in South Africa is by means of overhead mains and, therefore, the height of growth of the tree in many cases is limited by the height of the mains.

The height of the lower branches is then also limited if it is desired to maintain a good appearance of the trees. Perhaps the umbrella type of tree would meet the case. The tree pruning chart is a very useful guide where the conditions would apply, but no rule can be applied for all conditions in practice.

Mr. Cator quite rightly points out that the author's contention that "irrespective of the type of tree used the problem always remains" is simply borne out by his own remarks in regard to pruning and the selection of the type of tree selected. Unfortunately, the trees only reveal the problem later when fully grown.

The author is most grateful to Mr. Cator for enlarging on lantern characteristics and their application, as the length of the paper and complexity of the subject could not be dealt with by the author without unduly lengthening the paper.

The author agrees that the whole position should be clarified and a simple common basis for the selection of lanterns for a street lighting system would be of advantage to all concerned. Mr. Cator has gone to some trouble in an endeavour to clarify the position, and the author wishes to thank him for his contribution.

In conclusion, the author wishes to thank the President and Executive for the opportunity afforded him in presenting this

paper, and for the interest and attention given in its presentation by all attending the Convention at Margate.

LUNCHEON ADJOURNMENT

On Resuming:

THE PRESIDENT: We will proceed with the business on the Agenda, gentlemen. "Reports of Sub-Committees" which have been submitted to you. The first one is the Electrical Wiremen's Registration Board.

ELECTRICAL WIREMEN'S REGISTRATION BOARD

Annual Report by the representative of the Association of Municipal Electricity Undertakings of Southern Africa, Mr. R. W. Kane.

During the year 1956, the Board met on thirteen occasions, two of which were special meetings to consider amendments to the Wiremen's and Contractor's Act. This latter work has been completed, but it is not anticipated that the proposed amendments will be considered by Parliament during the 1957 session except perhaps a few that are considered urgent and non-controversial.

Practically all the amendments suggested by the A.M.E.U. and S.A.I.E.E. have been accepted by the Board in their proposals to the Department and in brief the more important proposals are:

- (a) The Municipal Electrical Engineer on the Board must also be a member of the A.M.E.U.
- (b) Supply authorities premises not to be exempt from the Act.
- (c) Registration of contractors to be on a national basis.
- (d) The S.A.I.E.E. Regulations for the wiring of premises to be accepted as regulations under the Act and applicable in all determined areas.
- (e) Provision made for licensing persons under the age of 20 if the apprenticeship has been completed in terms of Act No. 27 of 1944.
- (f) No continuous supervision required in final year of apprenticeship.

- (g) Period of provisional certificate extended.
- (h) Wiremen's certificates may be issued on such conditions as the Board may determine.
- (i) The Act to bind the Crown except in the case of the Railway Administration.

Schedule "A" (attached) gives the proposed amendments in greater detail.

During the early portion of 1957, consideration was also given to a further amendment making provision for African trainees or learners to be permitted to work on installations prior to taking the Wiremen's examination.

The Department gave a ruling that the Act was not applicable to Government and Provincial bodies if the work was carried out by them, but finally the ruling was altered to imply that the connecting authority was required to test the wiring installation in terms of the Act.

Several areas given in Schedule "B" were considered for determination and recommendations were made. No new areas were determined during 1956. Certain Free State areas proposed in 1955 were held over on the decision of the Minister, following the receipt of objections by contractors.

The usual four written examinations were held during 1956. The number of notifications issued were 2,015, acceptances were 1,021, and actual entrants were 922 of which 115 (12.5%) were successful.

There were ten practical examinations, 376 entrants and 285 (75.7%) were successful.

304 Registration certificates were issued, bringing the total at 31st December, 1956, to 6,456.

During the early portion of 1957, the effect of the requirement for apprentices to take the examination at the end of the penultimate year was noticeable in the increased applications received.

The Chairman, Mr. R. N. F. Smit (Chief Inspector of Factories) retired from the service on the 3rd April, 1957. Subsequent meetings of the Board have been under the Chairmanship of Mr. R. K. Frost.

I am indebted to the Board for the details submitted regarding determination of areas and examinations and for permission to present this report.

SCHEDULE "A"

A special meeting of the Electrical Wiremen's Registration Board was held on Thursday, 12th July, 1956, in Pretoria, to consider amendments to the Electrical Wiremen and Contractors' Act, 1939. The meeting had proposals from the South African Electrical Workers' Association, the Electrical Contractors' Association, South African Institute of Electrical Engineers and the A.M.E.U., originally submitted in 1953 for consideration.

It was agreed initially that the scope of the Act should remain unaltered in so far as no provision should be made in this Act for the control of Radio Appliance Mechanics, Refrigeration Mechanics and Domestic Appliance Mechanics.

Dealing with the various sections it was agreed to leave unaltered the definition of an Improver. Under the definition of Wiring Work the word "wire" was omitted and the words "cable, conductor and conduit" added. In addition the use of the word "premises" was accepted in place of "buildings".

It was agreed under the exemptions for wiring work to delete entirely Exemption (b). It was also agreed that the limit of voltage should be changed from 110 to 40 volts, and it was finally agreed that the cutting and screwing of conduit would be included under exemption (f).

Under Definitions, the definition of "Premises" submitted by Cape Town was included. The original Exemption under (a) for wiring work was left intact.

Under Section 3 of the Act, the proposal of the South African Institute of Electrical Engineers for the member who was a municipal engineer was accepted.

The proposals of the Workers' Association to increase the representation on the Board was not accepted.

No further alterations were made to Sections 3, 4 or 5.

Under Section 10 the only alteration was one to enforce written examinations being held in either of the two official languages.

This is to be included in Regulation 20.

Section 11—it was agreed to delete the words from "provided" to "Act" in Section 11(i) and Section 11(ii) to be altered to include "such conditions as the Board may determine".

Discussion on Section 12(i)(a) proposed that a new section be included "that he is not less than 20 years of age or has completed an apprenticeship in terms of Act 27 of 1944, as amended".

Section 12(i)(e) to be deleted.

Section 12(iii) to include a reference to 30 days.

Under 13(i) and (ii) the reference to six months to be deleted.

Under Section 15 the reference to "Any electrical engineer or officer in the Public Service" was altered to read "any person". In addition Section 17(ii) to be deleted and also 14(i)(d).

Under Section 19 the reference to "wire" was omitted and the words "cable, conductor and conduit" included.

It was also decided to accept the Contractors' suggestion that in 19(iii) reference should be made to the Standard Wiring Regulations or the local By-laws. In addition Section 19(viii) was deleted.

Under Section 20 considerable discussion took place on continuous supervision which was finally altered to provide continuous supervision up to the 5th year or last year of training.

Under Section 21 the proposals of the South African Institute of Electrical Engineers for the registration of contractors on a national basis were accepted.

Following this the word "Board" was substituted for "Supplier" in Section 22(i).

Under Section 23(i) the reference to "Supplier" was altered and the word "Board" substituted therefor. A corresponding amendment was made in Section 24 concerning the appeal by a Contractor to be altered to permit a Contractor to appeal to the Minister against the decision of the Board.

No alteration was made to Section 25.

In Section 26 the words "or By-law" were omitted in the first line.



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Under Section 33 a new section was included to permit the Governor General to prepare regulations for the wiring of premises in determined areas.

The final recommendation was for the last section—a new section to be added stipulating that the Act shall bind the Crown except in the case of the Railways Administration.

It was agreed that arising from these proposed amendments a review of the regulations would be necessary and this review would be prepared by the Secretary for submission to the Board.

In addition to the Regulations, some guide should be given to the minimum requirements necessary for contractors' premises and for the required equipment to be carried by contractors and in this connection the proposals and comments considered by the A.M.E.U. were submitted to the Board.

SCHEDULE "B"

DETERMINATION OF AREAS, 1956

1. The Board decided to recommend the determination of the following areas to the Minister, with effect from 1st June, 1957:

Ermelo	Municipal Area
Heidelberg, (Tvl.)	Magisterial District
Louis Trichardt	Municipal Area
Middelburg, (Tvl.)	" "
Burgersdorp	" "
Caledon	" "
Ceres	" "
de Aar	" "
Upington	" "
Middelburg, (C.P.)	Magisterial District
Umtata	Municipal Area
Harrismith	Magisterial District
Estcourt	Municipal Area
Vryheid	Magisterial District

2. (a) A provisional notice in regard to the proposed determination of the Magisterial District, Warmbaths, was published on the 21st September, 1956.

(b) Provisional notice re Municipal Area Wolsley was published on 23rd March, 1956.

R. W. KANE,
Representative.

Mr. R. W. KANE (Johannesburg): I don't think I have much to say about the report. I take it you have all read it—I hope you have, and I think it would be wiser to answer questions arising from the report.

Mr. J. McGIBBON ('Ndola, N. Rhodesia): I have nothing to comment on, on the report itself, sir, but I would like to ask a question and that is, does the Executive Committee consider the registration of electrical wiremen to be serving a useful purpose?

Before this question is answered, I would mention that at the convention held in Salisbury last year, I raised the question of the registration of Wiremen in the Federation. Replies to this question were made, and the only comment that I have to make is that I was surprised, on discussing this question with some of my colleagues, to learn that they agree that registration is a "must". This, in all probability, is due to the fact that we engineers in the smaller councils are still more closely associated with our staff.

Southern Rhodesia is well represented at these conventions, but not so Northern Rhodesia, I would be failing in my duties if I did not raise this question. After all, we do work under conditions that do not exist in Southern Rhodesia.

Another matter of importance is the standardising of Wiring Regulations in the Federation. We in N. Rhodesia work to the I.E. regulations. In S. Rhodesia I understand that the majority of the council work the S.A.I.E.E. and Salisbury and Bulawayo have their own regulations. I do not know what Regulations are in force in Nyasaland. If they, too, work to their own regulations we then have in the Federation 5 different sets of Regulations. I certainly do not envy Government Departments who have to do installations under these conditions.

I submit, sir, that the Federation is still in its infancy. The standardising of Wiring Regulations is something that must be encouraged by engineers, and surely we can have a uniform set of wiring regulations which would be applicable to the Federation. I would go so far as to say that I, in my humble opinion, consider that we should work to the S.A.I.E.E. regula-

tions, because these regulations were drawn up for South African conditions which exist in N. Rhodesia.

Mr. J. E. MITCHELL (Salisbury): In answer to the last speaker, he possibly is not aware that there has been a committee set up representing Northern Rhodesia, Southern Rhodesia, and Nyasaland, including municipalities, government departments, and the Federal Power Board whose terms of reference are to get out standard wiring regulations and also to consider the licensing of Wiremen.

Mr. R. K. FROST (Dept. of Labour, Pretoria): Mr. Kane has given us a very concise and comprehensive report here. There are two points of interest that I would like to mention, and one is the results of the examinations.

Intending wiremen seem to find great difficulty with the written examination which consists of regulations and theory. This last year only 12% obtained a full pass. That is a worse result than in the two previous years where the percentage was 25% and 26% respectively.

In the practical examination they do much better, and 75% of the candidates were successful. Even that result, however, was not as good as the two previous years, which were 85% and 86% respectively. We seem to be deteriorating in the standard of applicant wiremen.

The other point is concerning prosecutions. During the year the Board was advised of only five prosecutions in cases where persons were found doing wiring work without the necessary certificate. If the Wiremen's Act is to be applied, it will be necessary for the local authority to assist in dealing with persons who continue to contravene the provisions of the Act. The Department is quite happy for the engineer to initiate these prosecutions; in fact, we feel that the engineer is the most appropriate person to do so. His staff, his wiring inspectors are in direct touch with the jobs going on; they are the ones who actually see the offence being committed, and all that is necessary is for them to draw up affidavits and submit these to the public prosecutor. It is quite appropriate therefore, for the local authority to initiate prosecutions for contravention of this

section of the Act. All we ask is that when they do so, if they are in a larger centre, they advise the local Inspector of Factories Engineering. Also if they are in the smaller centres similarly advise the Department of the results of the prosecution so that the records under the Wiremen's Act may be kept up to date.

Mr. E. DALTON (Windhoek): It may be of interest to members to know that within the next couple of weeks we are proclaiming in the South West African official Gazette the Standard Wiring Regulations on the South African standard. Just of Electrical Engineers. Steps are also being taken to have an Ordinance which will enforce, on a national basis, in South West Africa, the registration of contractors, the licensing and registration of Wiremen, and other matters regarding electrical legislation.

THE PRESIDENT: Now, gentlemen, you will note from Mr. Kane's report, that one of the amendments suggested is the registration of contractors on a national basis, and we look forward to its adoption.

Mr. F. P. W. HALL (Somerset West): Mr. President, am I to understand from your last statement that any registered contractor, say in Johannesburg, can come down to Cape Town or any other town, and as long as he complies with the Wiring Act can start work immediately? We, in the small towns, usually have in our Electricity Regulations that any contractor in the municipal area must be registered with the local council. Failure to do so is an offence.

Secondly, it is very easy for the Inspector of Factories to say that the engineers can initiate a prosecution. I have done so on various occasions, and the town clerk has drawn my attention to the terms of the municipal regulations which lay down that the council shall initiate the prosecution. In various cases it is not the policy of the council to continue with a prosecution. I think that the engineer, as he is held responsible, should be placed in an independent position rather than under the thumb of each municipal council.

Mr. R. W. KANE (Johannesburg): Mr. President, first of all, Mr. McGibbon of Ndola. I remember his question last year,

and probably just as well as he does, I remember my answer to him. He will appreciate that, more than anything else, I am not in a position to answer for the Executive, regarding their views on this subject. I did hear later on that he had some very peculiar problems, and I think if I had appreciated his problems last year my reply might have been couched in somewhat different terms.

Coming back to Mr. Hall and his question on amendments, I want to be quite frank about it. My impression of the Labour Department as distinct from the Wiremen's Board is that the Labour Department is quite prepared to arrange for amendments or accept and recommend to the Minister that certain amendments go through right away, particularly those amendments that they term non-controversial, and in addition are amendments which are going to prevent any conflict with other Acts, there was one last year, I think a special amendment to the Act dealing with trainees, and according to this morning's paper, there is a reference to an amendment Act going through—I think it really deals, subject to any correction Mr. Frost may have, with the apprentice who is compelled to take this particular examination in his penultimate year, and thereby successfully become a journeyman at the end of the fourth year, but at the same time cannot get his Wiremen's Licence because he isn't 19 years old. There are one or two peculiar conflicts between the various Acts.

Regarding contractors, I am not too sure in my own mind what the wording of the Act is, but because of serious difficulties between those towns that have the licensing of contractors and those that do not, it was felt that it should be done on a national basis, as this Association accepted some years ago. How it will be done will have to be settled, I think, between the local authorities and the labour department, but in theory I think it will really mean that a contractor who has acceptable premises, equipment, and things like that, and has been officially licensed will or should be permitted to work in any determined area.

Mr. J. L. McNEIL (Stanger): Mr. President, we have the same conditions in our

area—in other words, we licence the contractor, so that any amendment would be contrary to the provisions of our by-laws if it was on a national scale.

Mr. R. M. O. SIMPSON (Durban): I presume in this latter case that if national registration of the contractors was adopted, it would still be in order for a municipality to demand a trading licence from them?

Mr. R. W. KANE (Johannesburg): I don't know what Mr. Simpson means by demanding a licence. Does he mean a sight of the national licence, or does he mean that the municipality should in turn impose a further licence, or does he really mean a general business licence? I really don't know. If he is going to be domiciled in his own town I should imagine he would have to have the general business licence.

Referring to Mr. McNeil I am rather intrigued with his concern about the local by-law. I fancy that every one of us, certainly in the Transvaal, licenced our Wiremen, until the Wiremen's Act was introduced. In fact, I think only a few months ago Johannesburg solemnly rescinded the right to licence their own electricians that had been applied in 1922, but from 1940 we dropped the licensing of Wiremen entirely and handed over in terms of the Act.

Mr. R. M. O. SIMPSON (Durban): Mr. President, on that particular point, the Local Government Ordinance of Natal allows the local authorities to pass by-laws for the licensing of certain trades and businesses, and one of those is electrical contracting. It is only during the last few years that they have exercised this right, until about three or four years ago registration was carried out by the Supply Authorities. The present procedure is for all contractors in the Durban area to be registered by the Supply Undertaking and subject to this, the Licensing Officer requires them to take out a trading licence as a Contractor. The Councils in Natal are empowered in terms of the Ordinance to carry out this procedure.

THE PRESIDENT: The next report, gentlemen. The South African Bureau of Standards.

REPORT ON WORK OF THE TECHNICAL COMMITTEES OF THE SOUTH AFRICAN BUREAU OF STANDARDS.

11 kV. Cable Specification to S.A.B.S. Specification No. 97 :

Arising out of the discussions at the last Convention held at Salisbury, in the Engineer's Forum when the question of cable failures was discussed, this matter was followed up by the South African Bureau of Standards.

A full technical committee was called when the whole question was discussed. A fact finding committee was appointed and after investigation the main technical committee met the Executive Engineer Members of the A.M.E.U. to thrash out the relevant data available.

While the technical committee has not yet completed its work, it would appear that, provided adequate care has been taken as regards the installation, particularly the end terminations, reasonable service should be obtained from cable made to the existing South African Bureau of Standards specification No. 97, but where the necessary skilled labour or other local conditions demand it, there should be a second type of cable with slightly heavier insulation on the cores covered by the S.A.B.S. specification No. 97.

It is interesting to note that as a result of similar troubles in India and Australia, the Commonwealth Conference took up the S.A.B.S. approach.

The exact dimensions and electrical requirements of the cables to be covered by the revised S.A.B.S. specification No. 97 still have to be finally decided upon and it will be some time before this final specification is available. It is, therefore, recommended that until such time as the S.A.B.S. specification No. 97 is revised orders for 11 kV. cable be restricted to the following specifications :

- (1) For normal conditions and where reliable labour is available S.A.B.S. specification No. 97.
- (2) For conditions which are unusual and/

or where the labour is not completely reliable, a mixed specification quoting that the core insulation to be in accordance with the S.A.B.S. specification No. 98, and the belting insulation, lead sheathing and armouring to be in accordance with the S.A.B.S. specification No. 97 for a cable of the same conductor size.

Electric Stoves and Hotplates :

A draft specification has been circulated for comment.

International Electrotechnical Commission: Nomenclature meetings are still being held for the translation of this document into Afrikaans.

Small Domestic Type Lighting Arresters :

A draft specification has been drawn up and is being considered by the technical committee.

Committees drawing up specifications for Bituminous Filling Compounds for Electrical purposes, transformer oils and transformers are still preparing specifications.

Street Lighting Code of Practice for Highways and Streets :

The first meeting of this committee was held in March, and divided up into small exploratory sub-committees, which will be reporting back to the Main Technical Committee. It will, however, be some time before this work will be completed as many aspects of South African conditions, will have to be investigated.

S.A.B.S. Specification No. 162 for Electrical Conduit :

Attention is drawn to the fact that the 1st Edition of the Standard Regulations for the Wiring of Premises refers to the relevant British Standard Specification and the 2nd edition refers to the relevant S.A.B.S. Specification as the only approved standards of conduit to which wiring work is permitted.

It has, however, been pointed out that tubing not conforming to these standards is in extensive use in Southern Africa. Some of this tubing has a thickness gauge which shews the thread lines inside the tubing when threaded and in some cases the threads have cut into the inside of the tubing.

It is, therefore, of not much use in drawing up specifications for materials and regulations for the wiring of premises, if these are not being adhered to. I must, therefore, as your representative on the S.A.B.S., draw your attention to these facts, otherwise they will lead to a deterioration of the standard of work expected, and it is urged that a constant check be made on the conduit in use.

In conclusion, I should like to thank all who have so ably assisted me, in representing your Association on the S.A.B.S. Committees during the past year.

J. C. DOWNEY,

Representative.

Mr. J. C. DOWNEY (Springs): Mr. President, Gentlemen: I have pleasure in submitting the Report of the Technical Committee of the Bureau of Standards. I do, however, wish to amplify two points.

The first is 11 kV. cable specification to SABS Specification 97. As you will remember, arising out of the discussions at the last convention held in Salisbury, in the Engineers' Forum, when the question of cable faults was discussed, this matter was followed up by the Bureau of Standards, and I would like to say that I think a very fine job of work is being done in this matter.

Mr. Middlecote or Mr. Yates will give you further information on this matter.

The other point is one that concerns engineers, and I think it concerns us very deeply, and that is the SABS Specification No. 162 for Electrical Conduit.

As you know the first edition of the Standard Regulations for the Wiring of Premises refers to the B.S.I. Specification, or any other specification accepted. Now the second edition specifies SABS only.

According to this report, as you see gentlemen, there is conduit being supplied in this country that is not to this specification. It is not necessary that tubing must carry the mark, but is must comply in all respects to that specification.

It is not much use your representatives spending days in Johannesburg and travelling 60 miles at a time to attend a meeting

to draw up a specification for standards for South Africa if you are permitting non-standard tubing to be used.

This matter is a really serious one; tubing is being used in every town in South Africa, and I would like to say that some of it might even be in Rhodesia. It is very difficult to keep a tab on this matter, but I draw your attention to this subject and ask you to take the necessary action to see that this sort of thing is stamped out from the list of wiring materials used in our countries.

There may be other items that we have not caught up on yet, but I would appeal to all members to be really wide awake, and check on all these materials.

I would like to suggest, Mr. President, that you ask either Mr. Middlecote or Mr. Yates to give some further information on 11 kV. cable.

Mr. A. A. MIDDLECOTE (Bureau of Standards, Pretoria): It might interest members of the A.M.E.U. to hear that Mr. Yates attended the Commonwealth Conference in New Delhi a few months ago as an observer and a very useful observer he was, too—he came back with some very useful information, among other things were the facts that India had been experiencing the sort of trouble that you have been experiencing in this country, and as a result of the deliberations at New Delhi it was decided to follow the precedent established in this fact-finding committee of having two standards of 11 kV. cables, i.e. the existing type of cable which, when used with good end box practice, oil-filled end boxes and under ideal conditions, where you have good reliable workmen, it should give reasonable service. but that there should be another type of cable which should be used where conditions could not be entirely relied on. In fact the sort of case that you will almost inevitable have with normal type compound filled end box—probably the same wouldn't hold for, shall we say, the oil.

We very much appreciate the information Mr. Yates obtained there. He has, in fact, brought back recommended insulation increases which the commonwealth in their deliberations established as highly desirable dimensions. Unfortunately, we as a national

body are unable to put these dimensions before the S.A. manufacturers until we have ourselves discussed the matter and decided what the new insulation thicknesses for this additional type of cable should be; but it is a very useful basis on which to start and we shall proceed on those lines.

I should like to take this opportunity, Mr. President, of thanking the A.M.E.U. on behalf of the Bureau for the valuable help they have given us. Frankly, we couldn't get on without the help of the A.M.E.U. and I would particularly like to refer to the yeoman efforts of the ever-green Mr. Downey, who has carried a large proportion of these labours on his shoulders.

A final point—I would like to draw the attention of the members to this, that this year we definitely will be attacking the point of standardisation of transformers on a similar approach to the B.E.A. and this has the full support of the industry of this country, both the ceramic industry who desire simplification to a large degree, and of the transformer manufacturers as a whole, and we should very much appreciate support from the members in discussions and suggestions on this point.

Mr. G. YATES (Vereeniging): Mr. President, as Mr. Middlecote has just said, I was fortunate enough to be present at the Commonwealth Conference in New Delhi and attended the sessions on electric cables as an observer on behalf of the South African Bureau of Standards, and the Association of Electric Cable Makers of Southern Africa. I thought that delegates to this convention might be interested in hearing some of the main recommendations made, which I will briefly review.

The general impressions gained were that other Commonwealth countries were very appreciative of the work being carried out on cable standards in Southern Africa, and, in many instances have recommended ideas originating from this country for adoption in all other Commonwealth countries.

As an instance of this Mr. Downey has already mentioned that for 11 kV. paper insulated cables to specifications corresponding with SABS 97/1950 and BSS 480/54 it was recommended that additional

tables of dimensions be included in national specifications for 11,000 volt single and 3 core belted type (earthed and unearthed) cables, and 3 core screened earthed cables for use on systems operating under specially onerous conditions. We understand that action is already being taken to have these tables included in BSS 480/54.

There is no need for me to elaborate on the reasons for this decision. It is an interesting fact that the troubles experienced in the Union and Rhodesia with 11 kV. oil impregnated cables made to the existing specification have also been experienced in several other Commonwealth countries, notably India and Pakistan, and involve cables supplied from all available sources.

The actual detail to be included in the alternative cables was discussed at great length, and as a result tables have been produced which are the result of the combined experience of all Commonwealth members, including South Africa. I strongly recommend that these tables be adopted in South Africa, which are rather different from those calculated on the basis given in Mr. Downey's report.

In addition to the advantages derived from international standardisation the tables have the advantage that 11 kV. cables supplied in accordance therewith can be supplied non-bleeding or otherwise, according to the user's wishes, as there has already been considerable satisfactory experience with drained cables made to the recommended dimensions.

I have prepared a detailed report on the various topics discussed and have copies of this report available for anyone who is interested. I would, however, itemise the following as the main points from this report.

Firstly, PVC Insulated Cables: It was recommended that Commonwealth countries should consider extending the scope of their standards to cover PVC insulated cables up to and including 6.6 kV., and that the inclusion of shaped conductors with PVC insulation should also be considered.

Members of the SABS Cables Committee will be interested to learn that the dimen-

sions agreed upon for PVC beddings and servings on cables included in SABS 150 Revision have been accepted for Commonwealth consideration and will be circulated with the official report.

Another topic discussed was the question of termite attack on PVC and considerable information was made available on this matter.

Secondly, Rubber Insulated Cables: All Commonwealth countries were in agreement with the view taken in South Africa that the rubber content of the insulation and general purpose sheathing compound could be reduced and that the relevant electrical and mechanical requirements of the specification should be modified accordingly.

A further important point was that it was recommended that for conduit wiring cables of the rubber insulated taped braided and compounded type that the tape should be eliminated in sizes up to and including 7/064.

Thirdly, Paper Insulated Cables: Apart from the discussions on 11 kV. cables mentioned previously, the question of the use of aluminium for conductors and cable sheaths was discussed. In regard to aluminium cable sheaths it was mentioned that the initial corrosion difficulties had now been overcome by the use of special protection in the form of water impermeable layers of PVC and rubber and that a special saline bath test had been developed to test the effectiveness of this protection.

So far as aluminium conductor cables were concerned, it was agreed that BS 2791/56 should be recommended for use by other Commonwealth countries.

Another important point was the question of whether or not the thickness of lead sheaths in paper insulated cables could be reduced. It was agreed that investigation should be carried out in this connection.

The question of specifying impulse levels for cables of voltages from 11 kV. upwards was also examined. The final recommendations being that:

- (a) The impulse level should be stated for 11 kV cables for information only;

- (b) The impulse test should be applied as an optional requirement in the case of 22 kV. cables.
 (c) In the case of 33 kV. cables it should be applied as a type test.

Other aspects discussed were:—

1. Current ratings and operating temperatures.
2. Paper insulated cables for mines.
3. Standards for varnished cambric cables.
4. The possibility of an international system for the inclusion of identification threads in cables; and lastly
5. Metric sizes for cables.

An important principle established was the formation of inter-Commonwealth work groups on problems which required investigational work to be carried out, and such items as the investigation of termite attack on cables, the development of suitable tests to determine the ageing and deformation characteristics of PVC insulation and sheathings, the possibility of reducing the lead sheath thicknesses on cables to SABS 97 and other equivalent Commonwealth specifications for paper insulated cables. These were nominated as subjects to be considered by these working groups.

In conclusion, Mr. President, I should like to thank yourself and the Executive of the A.M.E.U. for permission to present this report.

THE PRESIDENT: Thank you very much, Mr. Yates.

Mr. C. LOMBARD (Germiston): Mr. President, with reference to Mr. Downey's remarks with regard to electrical conduit, I think you will find that a similar position exists with regard to built-in wall radiators. As you know there is a SABS specification for radiators and, being fixed apparatus, built-in wall radiators should comply with the relevant SABS specifications. In fact, I think you will find there are many makes on the market which do not comply with this specification. I mention this because it was brought home to me recently as a result of a fairly serious accident in our area.

Mr. A. R. SIBSON (Bulawayo): Mr. President, Mr. Yates' very valuable informa-

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tion was of great interest to all of us. One of the remarks he made concerned the alleged validity of the new paper thicknesses that are proposed in respect of drained cables, and I would like to sound a note of warning here, because we have had several failures on drained cables to Spec. BSS 760 which appear to be almost identical with the sort of failures that are complained of in the lower specification, either 97 SABS or 460 BSS. Personally I am very loth indeed to consider drained cables, whatever the paper thicknesses are.

THE PRESIDENT: Thank you Mr. Sibson, for your valuable information and experience.

Mr. J. A. MATHEWS (Kimberley): I have listened with considerable interest to the report of Mr. Yates, and also to the fact that Mr. Middlecote finds that the Bureau might not be able to adopt the table of dimensions for some considerable time—or at least until they have been investigated. I would like to ask Mr. Middlecote whether it would not be possible to produce, as an interim measure, a table of dimension which combines 97 and 98 in terms of the recommendation of this committee. I think this would be of some value, particularly to the smaller towns, whereby they may have some yardstick when buying cables with this dual specification.

It has been my experience with recent tenders that there is considerable divergence of dimensions given by the individual manufacturers for over-sheath diameters. I would like to know if it would not be possible to have this interim table of dimensions produced at a very early stage. Thank you.

Mr. A. A. MIDDLECOTE (Pretoria): I think Mr. Downey actually pointed out the fact that we have suggested that there be some form of industrial simplification by people asking for the core insulation to be in accordance with SABS Spec. 98 and that the belting insulation lead sheathing and armouring to be in accordance with SABS 97, for a cable of the same conductor size. The other varieties that one gets in practice are due to the fact that some people say they will have the belting, lead

sheathing, and armouring to a cable of equivalent diameter, overall, and, as a Bureau (not as a national specification, because we cannot issue one until our committee has approved it), we have suggested this as an interim measure, that the members should ask for this one type until we can produce a cable which is acceptable to the South African Committee on Cables. I would like to assure Mr. Mathews that we will do our best to get that out as soon as possible, but we cannot produce a specification unless it is approved by the committee.

THE PRESIDENT: We will have to close the discussion on this committee's report now, gentlemen.

You have been warned by Mr. Downey who appealed to members to see that tubing of the correct standard is installed in your areas, and you have had all the information on the cable that you want.

Can we now proceed to the Recommendations Committee for New Electrical Commodities.

REPORT OF RECOMMENDATIONS COMMITTEE FOR NEW ELECTRICAL PRODUCTS

Two meetings of the recommendation's committee were held during the year, and 15 items were considered at these meetings.

The recommendations of the committee have been circulated to all members.

J. C. DOWNEY,
Representative.

Mr. J. C. DOWNEY (Springs): Mr. President, gentlemen, a very brief report has been circularised.

I would like to say why the details of the recommendations made by this committee are not being tabled, is because your Executive have agreed that this matter is a confidential one to its members only, and not for publication. That is why the report is so brief.

THE PRESIDENT: If there is no discussion on that report, we shall proceed

to the next one. Coal Allocations Committee. Your representative, Mr. Hugo. You have had the report, and Mr. Kane, your alternate member, will reply to any questions or discussions on that report.

REPORT OF COAL ALLOCATION COMMITTEE

During the period since the last Convention the Coal Allocation Committee has met regularly in Johannesburg every month under the chairmanship of Mr. W. J. Lamb. Your Association was represented at all meetings and usually by both Messrs. Kane and Hugo with Mr. Chris Downie, the official representative of the United Municipal Executive, looking after the interests of municipalities as well.

No municipal Power Station was at any time seriously short of coal although it was not possible for the suppliers always to meet the special requirements of some stations in regard to quality. It is becoming increasingly clear that Natal requires all the small coal she produces, for her own power stations, and stations in other Provinces will have to become accustomed to the fact that Natal coal of this type will more than likely no longer be available to them.

Road haulage between the Witbank Mines and Pretoria and the Reef has again played an important part in ensuring supplies to domestic consumers and industrialists. Road haulage is subsidised from a pool into which is paid the levy of 10d. per ton on coal produced by the Transvaal and Orange Free State Collieries.

There is every reason to believe that the Coal Allocation Committee with the continued assistance and valued co-operation of the Railways and coal owners will ensure that the requirements of Power Stations are met during the ensuing twelve months.

D. J. HUGO,
Representative.

Mr. J. A. MATHEWS (Kimberley): Mr. President, I would like to make known certain important facts about the road haulage of coal from the Witbank area to Pretoria and the Reef.

I do not refer to the enormous damage done by the hauliers to the road system. I want to refer more to the injustices which have come about since the imposition of the levy of 10d. per ton on coals produced in the Transvaal and the Orange Free State.

In June, 1954, under the provisions of a Government Notice, No. 1285, sellers of Transvaal and Orange Free State coals were permitted to increase the price of coal by 5d. per ton for the purpose of creating a special fund to meet the additional costs arising from the transportation of coal by road during (and I quote from the notice) "the present winter months".

In December, 1955, a further Government Notice increased the levy to 10d. per ton. As no exclusions can be read into the relevant notices, it is assumed that the levy is also paid by the Railway Administration. Based upon this assumption, and upon the average coal output of the Transvaal and the Orange Free State collieries of more than 2,000,000 tons per month, the levy in 1956 would have been in excess of £1,000,000. Of this large sum a substantial proportion is contributed by users of coal remote from the Reef and the Pretoria areas. There is no assurance that in times of shortage of coal due to transport difficulties the latter users will receive their normal requirements, whereas coal users in the Reef and Pretoria areas will be assured of their supplies, albeit in slightly less quantities. The road hauled coal, in the main, reaches the domestic and industrial consumer. The power stations are still being supplied by rail. Thus the consumer on the Reef and Pretoria areas can obtain an alternative source of energy, and generally at considerably less cost than the consumers in the remoter areas.

Such conditions are not considered to be equitable, and show discrimination against the domestic and industrial consumer in the remote areas. It has been noted that the Minister of Transport said recently in Parliament that the amount of coal to be transported by road from the Witbank coalfields would be doubled, so that more

trucks could be freed for other purposes. In reply to a question on this subject, the Minister also stated that he thought the road haulage of coal would have to continue for the next two years.

The present quantity of coal transported by road is stated to be 1,000,000 tons per annum, while the total levy collected is also about £1,000,000. Is this then a subsidy of £1 per ton for road hauled coal and what will be the position when the transport is increased to 2,000,000 tons?

I feel that this subject is worthy of further comment by those supply authorities who are paying for the subsidy for the Reef and Pretoria consumers, and would like to propose formally that the Honourable the Minister of Economic Affairs be requested to withdraw immediately the levy imposed on the Transvaal and Orange Free State coals for road haulage subsidy, and that the Department concerned be required to furnish a full statement of all payments made from this fund since its establishment.

Mr. R. W. KANE (Johannesburg): Mr. President, probably Mr. Milton would be able to answer this a lot better than I can, because I don't attend all the meetings, but as I see the thing that 5d. and finally the 10d. was imposed on all coal users to enable the coal consumed in the vicinity of the coal fields to be transported by road, and thereby relieve the Railways of the pressure of their troubles, not only trucks and locomotives, but staff problems—to relieve them until such time as they could catch up the leeway, to use their available trucks for transportation further afield.

From the figures I have seen, I think you can rest assured that not only does the Railway keep a tight grip on the situation, but so does the Minister of Economics, because I think there have been one or two attacks, although there is 10d. now levied per ton, really the payment to the road hauliers varies, in some cases I think up to 17/6 per ton mile.

The whole point is that everybody is paying throughout the country for the right to get coal, and as there is now going to be two million tons out of the 24 or 26 tons per annum produced in the Transvaal

—the indication is that the Railways appear to me to be somewhat slipping back in their ability to meet the situation.

To put it very bluntly, if that levy did not exist there would be no road haulage, there would be roughly a 10% shortage of transport throughout the country, and somebody would suffer—probably those further afield.

Mr. W. H. MILTON (Escom, Head Office): As is probably well-known, I am also a member of the Coal Allocations Committee, and I think I have missed only one of their meetings since its inception. There is a misconception on this question of the road levy. In the first place, the subsidy is not paid to the hauliers. The subsidy is paid to the person who actually receives the coal on delivery, i.e. the man who uses the coal, and it is based, at the present moment, on 1½d. per ton mile, for the haulage involved.

The idea of the payment is that the person who is receiving his coal by road pays considerably more to the road hauliers than he would pay for railage of that coal to its destination, the subsidy enables him to reduce his loss to the extent of the amount that is paid out to him from the Road Levy Fund.

I don't think anyone objected more strongly to the imposition of this levy than Escom, but it must be borne in mind that Escom, Iscor, and the Railways pay the levy just as any other user of railed coal does.

It is fair to say that the Railways are bearing approximately half the burden. Iscor, which is a Government-sponsored or semi-owned body, is also paying into that fund a very appreciable sum.

My friend Mr. Mathews, does not seem to realise what actually happens. In spite of the fact that some 2,000,000 tons per annum, which is the present rate for road haulage, is coal which is going to users within a hundred mile radius of the Witbank coal fields, this does not enable those users to secure their full requirements and to build up normal stocks, or to obtain coal at the expense of anyone else. The actual distribution of coal is, of course, carried out by the coal owners, who report

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that distribution to the Coal Allocations Committee. Their reports show that the various types of users throughout the Union are being rationed on the same basis, whether they are receiving that coal by road or by rail.

The 2,000,000 tons transported by road, as Mr. Kane has pointed out, does relieve 2,000,000 tons of transport to the railway system.

The big point is that the Railways, being relieved of the necessity of transporting that coal by rail, can, with the co-operation of the coal owners, on advice of the Truck Allocation Committee and the Coal Allocation Committee, see to it that the users of coal other than those having 100% priority, receive a fair proportion of the coal which is available to be sent by rail and road. By paying the levy of 10d. per ton what we are effectively doing is ensuring that the supplies for Power Station purposes do receive 100% priority and that those supplies are kept compatible with the requirements year by year. If one goes into this problem, one finds that the allocation to industrialists, to the merchants for domestic use, is still only a proportion of their 1952 usage—and it does not represent the normal expanding requirements of those people, the expansion having been virtually as great as the expansion of the electricity supply industry in the intervening years.

If you removed the 10d. per ton levy, I am certain that it would mean that the power supply authorities would be called upon to ration their output, so as to fall into line with the present limited capacity of the railway system. Several suggestions have been put forward from time to time, that power stations should not receive the 100% priority for their expanding requirements, when other users are being pared down to proportions of what they used previously. The idea is that many people who can't get coal are now buying electricity in substitution for the heat value of the coal they formerly used, and that doesn't seem to be fair. In other words, industry is switching over from their own plants to taking supplies from local authorities, and domestic consumers are doing likewise and these people are getting

advantages over the fellows who are still using coal. If you remove the tenpenny levy you will strengthen the hand of those people who want the supply of coal to power industries rationed.

I venture to suggest that you should not adopt the proposal that has been put forward.

THE PRESIDENT: Thank you, Mr. Milton. I think we will have to proceed with the next report: Safety Precautions Committee.

REPORT OF SAFETY PRECAUTIONS COMMITTEE

On behalf of the Safety Precautions Committee I have much pleasure in submitting the following summary of the Safety Precautions Committee's activities since the last Convention.

Four meetings have been held with a fairly good attendance of members at each meeting.

A number of matters have been discussed and the following are some of the most important.

(a) *Hazardous Situations*

Arising out of the discussions that took place at the last Convention on the question of amending the regulations to include a specific section on hazardous situations experienced at the coast.

Correspondence from the City Electrical Engineer, Durban, has been considered and the Committee has requested the Electrical Engineer of Durban to assist them in formulating additional suitable clauses to the existing regulations.

(b) *Earthing and Circuit Protection*

The problem of ensuring the disconnection of faulty circuits, appliances and equipment on consumers premises has been under consideration by the Committee for some time.

In an endeavour to frame similar regulations as appear in the 13th edition of the I.E.E. (London), No. 406 and 507 (1) but suitable for South African conditions the Committee has sought the co-operation of

members of the A.M.E.U. and a number of other interested bodies.

So far the Committee has only received twenty-five replies—not a very encouraging number.

These replies are being scheduled and will be dealt with by the Committee in due course.

(c) Loading of Circuits exceeding 15 amps.

Consideration has been given to amending Regulation 1202, exemption (ii) which deals with the number of socket outlets in any one room of a domestic installation. The Committee has now agreed that when the regulations are amended, they will recommend that provision be made for a maximum of six socket outlets to be connected to a final sub-circuit provided the circuit is protected by a non-adjustable 30 Ampere Circuit Breaker.

(d) Wiring Rules Interpretations

During the last few months the Institute of Electrical Engineers (London) has issued to the Technical Press interpretations by the Wiring Regulations Committee on the thirteenth Edition of Wiring Regulations which were issued 1st September, 1955.

Your Committee has under consideration the advantages that such a service would be to South African Installation Engineers and provided the South African Institute of Electrical Engineers agree, the Committee is prepared to furnish their interpretations on any of the Standard Regulations for the wiring of premises should they be requested.

For those who are interested these interpretations may be found in the transactions of the Institute of Electrical Engineers (London) October 1956, January 1957, March 1957.

(e) Children's Toys: Electrically operated at full mains voltage.

The Durban City Electrical Engineer has had cause to draw the attention of the South African Bureau of Standards and the Safety Precaution Committee to the number of imported toys which are designed to operate at full mains voltage (220 volts) and connected only with a twin plastic cord.

These toys are being sold to the public and would be used by the 5/10 years age group.

Your Committee takes a very serious view of this matter and have supported the suggestion that the Bureau of Standards should immediately issue a National warning to the public of the potential danger which arises from allowing children to handle electrical toys where the connection is made for operation on the full mains voltage.

The Committee is of the opinion that this is yet another case where suitable safety specifications should be declared compulsory in this country, and have decided to approach the Minister of Health and Education, Arts and Science, the Honourable J. H. Viljoen, for his support in this matter.

(f) Size of Overhead Conductors

The Committee is considering an amendment to Regulation 309 (vi) Blue Book which covers the minimum size of aerial conductor in line with the new current rating as permitted in the 13th edition of the I.E.E. regulations (London).

(g) Earthed Concentric Wiring

A request to make provision in the regulations to use earthed Concentric Wiring which is now permitted under the I.E.E. regulations has been discussed by the Committee who have agreed to consider this matter when amending the regulation.

(h) South African Bureau of Standards Specification

A number of the Bureau of Standard's Specifications have been in front of the Committee for revision during the period under review and in certain cases members of the Committee have served on the Bureau redrafting Committees.

A number of other minor matters have been considered by the Committee and are still under discussion.

J. C. FRASER, *Chairman*
Safety Precautions Committee

Mr. J. C. FRASER (Johannesburg): Mr. President, Gentlemen: In submitting my report it has been suggested that members do not know what the various committees do and how they are constituted. In regard to the Safety Precautions Committee, I'd like to say that on the introduction page of the Blue Book of the Standard Regulations for the Wiring of Premises, the Safety Precautions Committee and its setup is described. We have increased the number of bodies who are on the committee to ten. In addition to the names we have on this introductory page, we have the Electrical Consultants' Engineers' Association, the Electricity Department of Johannesburg, the Theatres have a representative, and there are one or two others but I haven't the names with me at the moment.

The Committee is endeavouring to hold six meetings a year, and their purpose is to receive suggestions, considerations, and give interpretations on the Wiring Regulations, and in addition try and keep them up-to-date as far as is humanly possible.

In regard to my report, Mr. President, I understand the copies are set in front of members, and therefore will not read the full report, but I would like to refer to one or two items.

Firstly, Item (b): Earthing and Circuit Protection. The committee has tried, by sending questionnaires to members of the A.M.E.U., to get the experience of members, so that they can frame similar regulations as are appearing in the 13th edition of the I.E.E. London for Earthing and Circuit Protection.

The response so far has been very poor, and I would appeal to members who have any experience to send their questionnaires to the secretary of the Association who will forward them on to the Committee.

My next point, Mr. President, which is rather an important one, is (e). Children's Toys, electrically operated at full mains voltage.

I shall read what I have put down:—

"The Durban City Electrical Engineer had cause to draw the attention of the South African Bureau of Standards and the

Safety Precautions Committee to the number of imported toys which are designed to operate at full mains voltage, viz. 220 volts, and connected only with a twin plastic cord. These toys are being sold to the public and would be used by the 5-10 years age group. Your committee takes a very serious view of this matter, and has supported the suggestion that the Bureau of Standards should immediately issue a national warning to the public of the potential danger which arises from allowing children to handle electrical toys where a connection is made for operation on full mains voltage. The committee is of the opinion that this is yet another case where suitable safety specifications should be declared compulsory in this country, and have decided to approach the Minister of Health and Education Arts and Science, the Hon. J. H. Viljoen, for his support in this matter."

I think Mr. Simpson, the Durban City Electrical Engineer might have something to say on this item.

THE PRESIDENT: Thank you, Mr. Fraser. We'll go into that last remark. Thank you very much for so forcibly drawing the attention of this Convention to the dangerous condition which exists as far as children's toys are concerned.

Mr. R. M. O. SIMPSON (Durban): Mr. President, I would like to make one or two points about the problem of electric toys. I was very concerned when we found miniature stoves wired for 220 units on sale in Durban. I would like to express my appreciation to those traders who assisted me by stopping the sale of these toys, particularly the little miniature stove, which was very neat but would eventually prove to be a proper deathtrap.

I think it is very important that we give a lead in this matter—it is all very well saying that they are not to sell these toys, but I think we should give some lead to the purchasers, retailers or distributors of toys as to what they can sell and what they cannot sell, otherwise they are going to incur unnecessary financial losses.

I therefore feel that it is essential that a compulsory safety specification be prepared by the Bureau, and that the Minister

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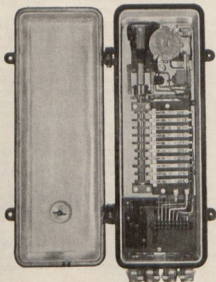
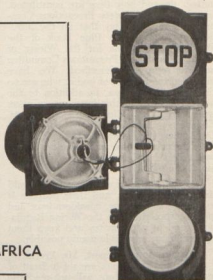
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be approached and asked to promulgate it as a compulsory specification.

The form of the resolution from the meeting needs a little thought. At one time it was considered that an urgent telegram be sent to the Minister asking him to act, but following subsequent discussions, I think it will be better if we asked the Bureau to put into train the necessary means of producing this compulsory specification, and that the Minister be approached for its very urgent promulgation.

I would like Mr. du Toit to express an opinion on this point, but I think this will probably meet the case.

There is one other point I would like to raise, I think it falls under this category. I would like to mention the experience we have had in the Durban area with fatal accidents arising from use of transformer type welders. In Durban we probably have the worst conditions for accidents of this type, due to the high humidity, and recently we have had three fatal accidents, one of which I think is still under review, all emanating from the open circuit voltage of the welding transformer, which, as you know, can exceed 100 volts. It is very possible in each case, that if the welder had taken the precautions that are normally necessary, he would not have been electrocuted but this does not simplify the problem. Automatic control units are being developed to reduce the voltage on open circuit to a safe limit. These will probably be available in due course. I would like to hear the Acting Inspector of Factories' comments on this matter. Arising out of information we have obtained, the S.A. Railways do not favour the use of the Transformer type of welder in damp situations.

It is quite obvious how the accident can happen. The welder gets very hot and he is often in a position where there is plenty of earthed metal about when he is working, and the conditions are ideal for electrocution at very low voltages.

I would like to hear further discussion on this matter, Mr. President.

MR. DU TOIT (Pretoria): Mr. President, gentlemen: I would like to

support Mr. Simpson in his remarks about the toys. In that connection I would first like to make a general remark about the electrical safety specifications which the Bureau was asked to get the Minister to declare compulsory. Those have been delayed because of some resistance from the F.C.I. in connection with the financing of the project, but I have to report that we are making very good progress, and we are hoping to get our safety specifications for electrical appliances declared compulsory very shortly.

Now I feel that we could quite adequately cope with the toys by dealing with them under the same category, and I feel it would add weight to our own approach to the Minister if this meeting were to write a letter to the Minister and draw his attention to it, and we will go to the Minister with a separate approach, including the toys, under the normal Safety specifications.

In addition to that, I would like to say that the Bureau will definitely make an effort to issue enough warning about these toys at a very early date, and I think we should undertake to issue another warning when the "toy season" comes around again, that will be just before Christmas.

I again want to take the opportunity of thanking the A.M.E.U. for the support they have given the Bureau in their normal activities.

THE PRESIDENT: Thank you, Mr. du Toit. Your suggestion is that we write a supporting letter to the Minister of Economic Affairs.

(The Convention agreed that this matter would be left in the hands of the Executive).

MR. FROST (Department of Labour, Pretoria): Mr. President this concern about accidents on AC Welders originated from the General Manager of the South African Railways. His decision in the matter was to eliminate all AC welding in confined and in damp spaces where the worker was either surrounded by moisture or in a state of perspiration. Their policy is to definitely cut out AC welding in such circumstances. His recommendations were forwarded to our department, and we had a round table

conference in Durban on the question and formulated certain recommendations. These have now been circulated to the other inspectors of the Department. We are also waiting for more particulars of this voltage limiting device, which I understand has only just been patented. There are no technical details forthcoming as yet. When that is available, and with the information collected from all the other centres, we should be in a position to issue a recommendation. I doubt whether this is a matter that could be covered by regulation. Certainly Safety Precautions could be recommended when we have all the information collated.

THE PRESIDENT: I think we shall proceed with the next report, if there are no further comments. Tariff Survey Committee.

Mr. R. W. KANE (Johannesburg): Mr. President and gentlemen: this is merely a progress report. Your committee was formed, I think in 1953, with fairly stringent terms of reference which I personally feel are ambitious, particularly in connection with standardisation. We are not in a position to make any recommendations yet, but in terms of the progress report I want to let you know that we approached all members for complete details of their tariffs; we received 74 replies, which covered 347 tariffs; and we also took a sample survey from three towns. The sample consisted of a thousand domestic consumers in each town. One of the towns was on a room basis, the other two were on a block basis, though the two blocks were different in the number of steps. We have prepared graphs, we have scheduled all the information that has been obtained, and we have had a meeting this week, and hope to be in a position to give reports for the next Convention, particularly with recommendations. We have discussed it with your Executive Committee, and I think I am right in saying that we will make recommendations, principally on the basis of rationalisation instead of standardisation.

As a matter of interest, there are only three towns we note that treat business and industry consumers on the same tariff. By that I mean the same type of tariff.

There are 169 variable block tariffs; 124 fixed block tariffs. By variable block tariff I am referring to valuation, room basis, floor area, and the true demand tariff, which is really a variable block tariff.

If anything the variable block tariff seems to have some form of preference in the country. The latter figures quoted do not include the various alternatives that seem to exist where there are block tariffs. Under domestic consumers there seems to be about 50 variable block tariffs, and about 41 fixed block.

Only 35 towns have a common tariff structure for all classes of consumers, six of which are the fixed block, and one of the six appears to have the same value of tariff right throughout.

THE PRESIDENT: Thank you, Mr. Kane. That is the progress report. You will remember this Committee had 20 years in which to deliver the final result, and I think they are doing well. Only four years have gone by, so they still have quite a number of years ahead of them!

Joking aside, gentlemen, it is a very difficult task which you have set this sub-committee. Some would say it is an impossible task, and I think we can be satisfied with the good progress that is being made.

Any discussions on this report?

We will carry on with the next report: Rights of Supply — Reef Industrial Consumers.

Now before Mr. Lombard gives this report, I want to point out that your Executive has decided to call this the Rights of Supply Industrial Consumers' Sub-committee in future, because it is now not only a problem for the Reef, but it is affecting more of our members.

REPORT OF THE RIGHTS OF SUPPLY SUB-COMMITTEE

In my last report I mentioned that this Sub-Committee had proposed a Memorandum regarding the right of supply of electricity within the areas of jurisdiction of urban local authorities and that this Memorandum had been submitted to the Electricity Control Board by the A.M.E.U.

The representations made to the Electricity Control Board in this Memorandum were supported by the Transvaal Municipal Association.

The A.M.E.U. subsequently received an invitation to send a deputation to meet the Electricity Control Board on the 22nd June, 1956, and during this interview, the members of the Sub-Committee were given an opportunity to discuss various matters raised in the Memorandum with the Board.

The Electricity Control Board has since then requested the A.M.E.U. to furnish it with certain additional information and the Sub-Committee met on several occasions during the year for the purpose of compiling the information required by the Board.

At this stage, the position is therefore that this matter is under active consideration by the Board.

C. LOMBARD,
Convenor.

Mr. C. LOMBARD (Germiston): Mr. President, gentlemen: I have pleasure in submitting the report of this sub-committee. It has been circulated and I take it it has been read.

As you will see at this stage, the memorandum on the subject submitted to the control board is under active consideration by the Board.

Mr. P. L. VERGOTTINI (Brakpan): Mr. President, while sitting here, I made a few notes which I will read out to you.

During the period when the late Dr. Bernard Price was resident director and manager of the VFP and Transvaal Power Company, he supported applications by certain Reef municipalities to supply power to industries in their areas, to enable them to operate at a better load factor. Following on the above you will be interested to learn that the ESC Rand Undertaking during the past year has supplied 870,000,000 to municipalities and 1,600,000,000 units to industry direct. If all these industries were supplied with current by municipalities the ESC would lose the financial benefit of the different diversities of these industries they now supply, and as a non-profit concern will be

obliged to increase the price of current to municipalities.

Mr. President, this thought just occurred to me and I thought it just as well to mention this so that the sub-committee can bear this in mind in their negotiations with ESC.

THE PRESIDENT: Thank you, Mr. Vergottini. Sub-committee, will you please take note. Are there any further discussions?

We will carry on with the next report if there is no further discussion. The South African Electrical Engineers' Committee, Code of Practice for Sub-stations.

REPORT OF THE S.A.I.E.E. COMMITTEE: CODE OF PRACTICE FOR SUB-STATIONS

This Committee has not met during the year under review and there have been no further developments in connection with this matter.

C. LOMBARD,
Representative.

Mr. C. LOMBARD (Germiston): I would just like to mention the fact that this sub-committee was sponsored by the S.A. Institute of Electrical Engineers, and I was your representative on the sub-committee. I was therefore not the convenor.

As you see no progress has been made.

THE PRESIDENT: Any discussions?

We will go to the last report, then, which is Technical Staff and Manpower, which is by myself. I shall ask Mr. Downie to take the chair.

(Mr. Downie took the chair at this stage.)

REPORT OF TECHNICAL STAFF AND MAN POWER SUB-COMMITTEE

It will be remembered that at Salisbury a full report was submitted upon the artisan staff and apprentices shortage. This report was based upon the replies received from 50 member undertakings. It was found that there was not really a serious national shortage of artisans (8.9%) and apprentices (8.8%). It was felt however, that the number

of journeymen per apprentice (4-2) it too great and it was recommended that more apprentices should be appointed to cater for our future requirements.

A number of suggestions were made by the sub-committee, regarding the education, remuneration, status, classification of trades, employers obligations and training of future technicians. These recommendations are published fully in the 1956 Proceedings. Members have not indicated whether they agree with these recommendations and whether these suggestions should be forwarded to the Department of Education, Arts and Science for their consideration.

In the questionnaire, the aspect of technicians was just touched upon. From replies received, the inference was made that too few undertakings undertook the training of technicians. The number trained is also too small; in this field local authorities can, and should, do much more.

The Department of Education, Arts and Science considered the desirability of training technicians of such importance that they organised a conference in Pretoria from 18th to 21st February, 1957. One of the recommendations your sub-committee made in 1956 is therefore now receiving the serious attention of the authorities your sub-committee had in mind.

At this conference the facilities and training of technicians were debated. The following organisations were represented:

1. Association of Technical Colleges.
2. Association of Municipal Electricity Undertakings of Southern Africa.
3. Chamber of Mines.
4. Council for Scientific and Industrial Research.
5. Department of Education, Arts and Science.
6. Iscor.
7. Public Services Commission.
8. Radio, Refrigeration and Electrical Appliances Society.
9. South African Chemical Institute.
10. Sasol.
11. South African Institute of Electrical Engineers.

12. South African Railways and Harbours.
13. South African Institute of Civil Engineers.
14. Steel and Engineering Industries Federation of South Africa.
15. Transvaal Chemical Manufacturers.
16. United Municipal Executive.
17. Universities.

A technician in the field of Engineering has been defined as one who can apply in a reasonable manner, proven techniques which are commonly understood by those who are expert in a Branch of engineering or those techniques specially prescribed by professional engineers.

Under general professional engineering direction, or by following established engineering techniques, a technician is capable of carrying out duties such as: working on design and development of engineering plant and structures; erection and commissioning of engineering equipment and structures; engineering drawing; estimating, inspecting and testing, operating, maintaining and repairing machinery and locating defects therein; research and development; testing of materials and components; advising consumers.

It was felt that a contributing factor to the shortage of engineers was the fact that many engineers were employed in positions which could be held by technicians, but that no trained technicians were available.

Separate committees for civil, chemical, electrical and mechanical engineering were then established to work out in detail the type of technician to be trained, the necessary courses and syllabuses.

The Electrical Engineering Working Committee, with which we are mostly concerned, recommended as follows to the Main Committee:

1. Types of Technicians.

- (a) Generation, Power Station and operation.
- (b) Transmission and distribution (including domestic and rural.)
- (c) Draughtsmen.
- (d) Illumination.
- (e) Telecommunication.

- (f) Radio and Television.
- (g) Construction, operation, repair and maintenance of electrical machines.
- (h) Industrial Electronics and Radar.
- (i) Electrical Measurements and Testing.

2. *Minimum Entrance Qualifications.*

N.T.C. II, with (a) Electrical Construction and Drawing I. (b) Mathematics II. and (c) Physical Science II. as subjects and one year practical experience at the works.

Students for the technician's course will further have to be recommended by their employers.

3. *Form of Course.*

The sandwich course is the only course thought suitable, whereby students will attend a technical college for four months continuously each year for a period of two years, three years or four years, depending upon the qualifications he wishes to obtain.

Common and non technical subjects such as Afrikaans, English, Organisation and Relations and Economics will be included.

Technicians should complete their apprenticeship to enable them to have a trade to rely upon in the event of the final year proving too difficult.

4. *General.*

Some difficulties still remain to be overcome, such as labour legislation, remuneration, remuneration in the event of apprenticeship having been completed before training as technician has been completed, etc.

A sub-committee of the Electrical Engineering Working Committee was established to prepare courses and syllabuses and further meetings will be held in the near future to finalise the details of the training of technicians in the various fields of electrical engineering, after which the Department of Education Arts and Science will probably inaugurate such a scheme.

5. *Appeal to Employers.*

It is sincerely trusted that employers (and here a special plea is made to City and Town Councils) will support this

scheme. It is feared that some employers will not be in favour of the scheme due to the fact that while the trainees are away from the works the employer *may* still have to pay the trainee full wages, and yet not have his services during the period of attendance of technical classes. Such wages *may* be higher than those payed to ordinary apprentices.

It can only be stressed here, that this scheme is a long term policy in the interest of the employer and in the interest of the Country as a whole. The employer will in the future obtain the services of a competent technician to give him the best of service. The Country is short of technicians and due to the rapid developments in the field of science and engineering, his services will become indispensable. Employers will be at liberty to contract with technician trainees to ensure their services for a fixed period after completion of the course.

If we do not train technicians our country's economical and industrial development will be retarded and we will not be able to take our right place in this world of severe competition.

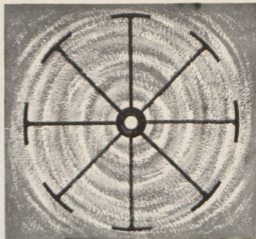
The sub-committee therefore appeals with all sincerity to Councils of all Municipal Electricity Undertakings and all employers in the electrical engineering industry in general, that should this scheme for training of technicians be launched, to employ and train technicians in accordance therewith.

In the interests of the nation the councils of all municipalities and employers of labour must employ and train technicians to ensure the success of the proposed scheme.

The sub-committee is confident that in view of the present rate of progress in South Africa, members of the Association of Municipal Electricity Undertakings of Southern Africa will play a prominent part in the projected scheme for the training of technicians.

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Mr. J. L. VAN DER WALT (Krugersdorp): Gentlemen, you will remember, that at the Salisbury Conference we reported on the results of the questionnaire submitted to you, and you had the shortages there of artisans and apprentices. Your sub-committee had to report further on the technical staff side of the shortages, and you have had the report with you for quite a while, so I shall not extend on that.

I would like to draw attention to this very important development which is taking place at the moment.

Under the auspices of the Department of Education Arts and Science, in South Africa, this ad hoc committee has been established to go into the training and facilities for technicians. These committees have progressed very well, and they are actually busy with the syllabuses for the various courses. Your members of the A.M.E.U. have played an important role in assisting them to draw up these syllabuses. As far as we are concerned on the electrical side, Mr. Aspinall of the Witwatersrand Technical College is playing the leading part. I would leave it at that, and I would ask Mr. Aspinall, if he is here, if he would care to say a few words.

Mr. ASPINALL (Technical College, Johannesburg): Mr. President, I would first of all like to inform you that the Director has asked me to wish you a very happy year of office and, in addition, to express the hope that this Association will continue its extended activities in the promotion of the interests of electrical engineering with particular application to technical education.

In his very inspiring Presidential address, Mr. van der Walt referred to the dearth of engineers and technicians. As we know, this condition prevails throughout the world but it is particularly the case in South Africa.

He referred, too, in his address to insufficient lecturing staff at technical colleges, and as he mentions, this is mainly due to the lack of adequate remuneration. A contributing factor is the lack of status of members of staff at technical colleges. It is not generally appreciated that about 80 per cent of the staff of engineering

departments of the various colleges throughout the Union are fully qualified engineers. There is, however, an unfortunate tendency in a number of circles to regard technical college lectures as glorified schoolteachers.

At the present time a step of revolutionary importance is being taken by the Department of Education, Arts and Science in the institution of a type of training, new in so far as this country is concerned, the "sandwich" course.

At meetings of the working committees for the training of technicians called by the Department in Pretoria in February last, it was decided that the "sandwich" course was the only type which could cover the advanced techniques continually being introduced into industry overseas.

These committees spent a considerable time in discussing the general nature of courses and syllabuses and it will be of interest to note that the mechanical and electrical engineering committees found themselves in full accord on the basic points underlying the projected courses.

It was agreed that the sandwich courses for mechanical and electrical engineering should take the form of four months' full-time attendance at a technical college and one day per week release during the remaining eight months of the year. Following a preliminary year of training with attendance at classes on one day per week the selected student would take a sandwich course for a period of two, three, or four years depending on the qualifying grade of technician. As Mr. van der Walt stated in the Report of the Technical Staff and Man Power Sub-Committee, the minimum entrance qualification would be N.T.C. 2 and the selected students would be indentured.

In brief outline, the projected scheme is as follows: It is suggested that during the first two years of the course, the basic sciences be treated with the introduction of such subjects as Drawing, Workshop Technology, English and Afrikaans. In the third year there would be a degree of specialisation and, apart from basic subjects, such as Electrotechnics and Electronics, it should be possible to devote about 100 teaching hours to the subject

applicable to the branch of industry with which the apprentice is associated. The types of electrical engineering technicians include the following: power station, distribution, lifts, mine electrical, production, laboratory, telecommunications, and (Mr. Jack Downey is aware of this)—the illumination technician.

The proposed syllabuses for the fourth year would have a relatively high technical content and would be of the same standard as the Institution of Electrical Engineers, London.

As a rough guide to members, I would mention that at the end of the first year, the suggested standard would be approximately equivalent to the existing National Technical Certificate, Part 3, or N.T.C. 3 but on a broader basis; at the end of the first year there would be an internal examination. On the termination of the second year the qualification would be that of the Advanced Technical Certificate, Part 1, or A.T.C. 1 standard but of a more comprehensive nature possibly known as a Technician Grade 2 Certificate awarded for success in an external examination. The suggested course for the third year would be of A.T.C. 2 standard but extended. The external examination would possibly cover the requirements of the Engineers' Certificate of Competency and the corresponding certificate might be termed Technician, Grade 1. As mentioned previously, the fourth year course would be of overseas Institution standard and an external examination would be held at its conclusion. The successful candidates might be awarded the title "Associateship of the College of Technology". If this suggestion is accepted, it is possible that the technical colleges at Durban, Cape Town, Pretoria and Johannesburg would be termed "Colleges of Technology".

As far as the suggested subjects and syllabuses for electrical engineering are concerned, it may be mentioned that:

1. Electrical engineering (heavy current) and electrical engineering (electronics) would continue throughout the four year course.
2. The subject of industrial or applied electronics would be introduced during the third year.

3. Mathematics for the third year would be of the existing Diploma standard and would meet overseas Institution requirements.

There would be a further grade of Mathematics during the fourth year mainly for the Telecommunications student.

As mentioned previously, the sandwich courses would necessitate four months' full time and eight months' one day per week attendance at classes. During the latter period, it should be possible to revise each of the main subjects treated during the preceding four months. In addition, laboratory work would be included during the latter part of the year.

It should be possible to arrange for apprentices from the country areas to take sandwich courses in a city such as Johannesburg. There would be difficulties particularly in regard to the time available for laboratory work. This might be included with a reduced class timetable during the period of four months' full-time attendance at classes. Portions of subjects not treated during this period might be covered by correspondence courses during the remaining eight months. Hostel accommodation could be provided by the technical college concerned.

A vital point now arises. Electrical engineers are generally regarded as very level-headed and will ask the question: Who is going to pay for all this?

The student himself might make a contribution towards the fee for the course. If the student cannot afford to help to defray the cost, perhaps the Department of Education, Arts and Science would consider a system of bursaries to meet particular cases.

No employer would be obliged to release any apprentice for a "sandwich" course. There would be relatively few apprentices selected for the technicians' courses. In the case of a relatively big firm with say thirty apprentices, a mechanical engineering and an electrical engineering apprentice of ability might be released and the financial sacrifice would be of relative insignificance.

A firm or public body might regard the payment of the class fees of the apprentice

and the release for attendance at classes as a form of bursary. It is the practice of some companies and municipalities to award University scholarships of £200 per annum to apprentices of merit. It would be a further fine gesture on their part if they were to encourage the bright boys by awarding bursaries for "sandwich" courses. By this means, the selected apprentices would receive a thorough training at possibly one third the cost without the complete release of the apprentice during the period of training.

It was the general view of the working committees that the selected apprentice should begin his "sandwich" training as early as possible. If, however, the apprenticeship were completed prior to the termination of the course, the apprentice would receive the wages of a fifth-year apprentice during the remainder of the period of attendance at classes.

At this stage, I would like to refer to the indebtedness of technical colleges to the local municipalities. In the case of Johannesburg, every encouragement and assistance has been afforded by the various managers of the Electricity Department, to the Witwatersrand Technical College. In so far as the latter years are concerned, Mr. John Cameron Fraser and Mr. Robert Kane have been very helpful.

As an indication to the interest shown by municipalities in technical education, I would mention that, through the good offices of the President, as a result of collaboration between the municipal electrical engineers of Krugersdorp, Springs, Johannesburg, Pretoria, Port Elizabeth and Cape Town, suggested syllabuses have been submitted for the subjects of Measurement and Testing, and Power Station and Operation. In this connection, too, assistance has been received from the Electricity Supply Commission.

We shall naturally have to rely on Mr. Jack Downey and his National Illumination Committee for help on the compilation of the syllabus for Illumination to be introduced in the third year of the course to meet the requirements of the illumination technician.

The advantages of the "sandwich" type of course as visualised are as follows:—

1. The apprentice will be selected; there will be an inducement for the better educated youth to enter industry.
2. The practical and theoretical training will run simultaneously. It is generally recognised, for example, that this procedure has its advantages over attendance at a university followed by a pupilage.
3. The specialisation in the third year will enable the apprentice particularly interested in one of the branches of electrical engineering to concentrate on that particular aspect.
4. The possibility of the introduction of slight modifications in the main scheme to enable boys from rural areas to take sandwich courses.
5. The scheme is flexible. An employer may be satisfied with an apprentice taking the course for a period of two years, that is, with a Technician, Grade 2. He may, however, require a technician of a higher grade involving a three-year course, namely a Technician Grade 1.

There is a fair proportion of apprentices of outstanding ability who cannot afford to attend full-time at a university. These youths are fully capable of taking full advantage of higher technological training and it is for this group that the fourth year course is intended.

In concluding this discourse on the training of technicians, I would mention that the details of the sandwich scheme as discussed are purely tentative and will be considered at later meetings of the working committees.

It is opportune to make brief reference to another form of technical training, namely, that of a part-time nature for the B.Sc. (Engineering) degree. A course of this kind would prove very advantageous to those in possession of the National Engineering Diploma and the Matriculation Certificate who have completed their apprenticeship and are fully capable of obtaining the degree qualification.

It is of interest to note that at the meeting of the Liaison Committee of the Universities held in early February last, it

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was agreed to recommend that part-time engineering degree courses be instituted in South Africa. A similar resolution was passed at a meeting of the combined working committees for the training of technicians held in Pretoria in late February. No reference was made in this resolution as to the type of institution to be responsible for this training. If the universities do not wish to undertake the work, certain technical colleges should be allowed to provide facilities which form an essential part of the technical training structure of industrialised countries overseas.

In conclusion, Mr. President, I would like to thank you for the privilege of addressing the Convention.

Mr. C. G. DOWNIE (Cape Town): Thank you very much Mr. Aspinall.

Gentlemen, we shall stop now for tea.

THE PRESIDENT: Thank you, Mr. Vice-President. We are now going to adjourn for tea, and at the same time we are adjourning the Convention until tomorrow morning.

CONVENTION ADJOURNED

FOURTH DAY

On Resuming at 9.30 a.m.:

THE PRESIDENT: Good morning, Gentlemen. Are you quite sure that there are none of our delegate members asleep in their baths this morning? The hall seems to be pretty empty. I think we should delegate someone to go round all the hotel bathrooms and get them out.

Ek verstaan daar is ook party mense wat hulle skoene gisteraand verloor het. Ons het die stadsklerk gevra om die dorp deur te gaan en kyk of hy skoene kan kry—and those that lost their shoes last night can apply to the Town Clerk. You will probably get them back.

Gentlemen, we will resume with the business on the agenda. We were still busy with the report on manpower, and I believe Mr. Frank Stevens wanted to say something. Is he not here? Bathroom? (Laughter.)

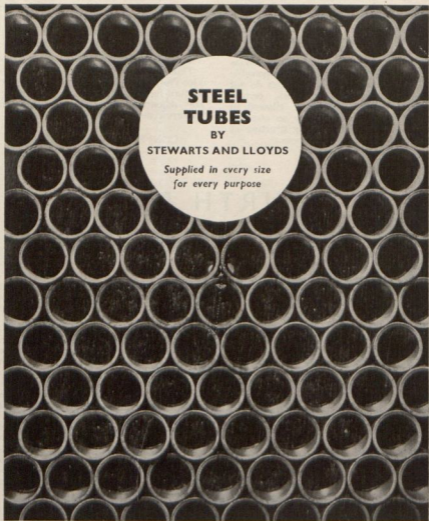
That report is then open for discussion for a few moments. Does anybody want to discuss the report on Technical Staff and Manpower? Well, if Mr. Stevens comes back, (I know he very much wanted to speak), with your permission we will throw the report open for discussion again. Agreed?

Then we go to "General".

Mr. J. C. FRASER (Johannesburg): Mr. President, Gentlemen: I thought I would like to make myself known to you under "General".

On the first day of our Conference we passed what is now known as the new constitution, and as one who has had a good deal of experience in trying to get a constitution through this Association I missed an opportunity of asking our delegates to propose a hearty vote of thanks to our honorary legal adviser, Mr. A. P. Burger, to whose efforts during the last twelve months, I think you will agree, we owe the fact that we finally managed to get the constitution through this Convention. I would like to place on record the valuable services given to this Association by our honorary legal adviser.

THE PRESIDENT: Thank you, Mr. Fraser. The Executive has already thanked Mr. Burger, but we have not finished with him yet. He has still a lot to do and I think at a later date, possibly at the next convention, there will be an opportunity to thank him properly. Unfortunately, however, Mr. Burger had to leave early



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this morning. Thank you very much for that vote of thanks.

Mr. C. R. HALLE (Pietermaritzburg): I would like to refute an allegation that I entered this Convention on the strength of a rubber sheet! (Laughter.) I want to draw your attention to the proceedings of the 1st Annual Convention of the A.M.E.U. held in Johannesburg in 1915. The first resolution said that they were to include Tramway Managers. Of course, Tramway Managers are the right people for handling live conductors! You then proceeded to elect your first president who was a Tramway Manager and an Electrical Engineer—Mr. Dobson. Now the first entertainment given to this august body was by Mr. Hubert Davies, who took the Convention to lunch at the Grand Hotel, Krugersdorp. In those days, the worthy President we now have had not even attained the dignity of a rubber sheet. At least I believe there is no record of the I.R. Resistance of his napkins or anything like that at that date! (Laughter.) I feel that that puts me right, and that I have a right to be here, as one of a sort of dying race, "a technical hermaphrodite", I was going to say, but of a Transport Manager and an Electrical Engineer. There were only four of us, Dobson, Maudie Lamb, Colonel Ewer, and myself, and so we are the bastions of your reputation and tradition, and if Jimmy Mitchell ever calls me an old bastion, I hope he'll pronounce it very carefully. (Laughter).

To come down to more serious things, one of the next resolutions you passed was that the Association should be open to other engineers, not only tramway engineers, and so forth. I think they even mentioned Civil Engineers and, of course, we are so unwieldy and big today that that is impossible, but I do want to seriously suggest that copies of our proceedings which contain very valuable and useful things be sent to other municipal departments, including Traffic, City Engineers, and City Treasurers, that these copies should be presented to their Associations, so that there will be a little more harmony and co-operation among the municipal affairs.

THE PRESIDENT: Thank you very much, Mr. Hallé. Your suggestion will be seriously considered by the Executive.

I see Mr. Frank Stevens has got out of his bath, and I will give him an opportunity to speak on the sub-committee's report on Manpower and Technical Staff.

Mr. F. STEVENS (Ladysmith): My apologies for being late, Mr. President.

While there is a lot to be said for sandwiching full-time studies in with the practical training for apprentices, I am wondering how it is proposed to apply the idea to boys in the smaller towns where there are no technical colleges. The present system of correspondence courses for these apprentices is far from satisfactory. I am speaking as one who has, for the past fifteen years, supervised the courses from the apprentices' end, and so I know something of the boys' difficulties.

The lads are largely responsible for its shortcomings, of course, but the Department of Arts and Science is not without blame. Papers are returned to the college for correction, and often not seen again for periods of up to two months, and more. Consequently the boys do not know whether they are working along the right lines or not. Examination results are not known until well into February or early March. This may, of course, be the fault of our local Secretary, but as he is paid by the department it is their responsibility.

As a result, the apprentices do not start their new courses until March. In November they are required to sit the examination. Therefore the time available for doing the course is 9 months, out of which they have to attend military camps for periods of from two to twelve weeks take their annual leave of two weeks; the net available time for the course then is only 7 to 8 months.

I'd like to suggest that Mr. Aspinall be appealed to in this connection.

Thank you.

THE PRESIDENT: Thank you, Mr. Stevens. Mr. Aspinall, would you care to reply?

Mr. ASPINALL (Witwatersrand Technical College, Johannesburg): Mr. President,

I am sorry to say there is some truth in the allegation that everything is not quite right with our Correspondence Courses Department. I am very happy to say it has not got anything to do with the Electrical Engineering Department of the college. As we are all aware, electrical engineers have a very high standard of efficiency, and there is no possibility of any accusation in that regard.

I am going to mention this particular fact to the head of the Correspondence Courses Department when I return to Johannesburg.

In regard to the sandwich courses, I feel it should be possible to cater for the boy from the country. We will have to modify our four months' full-time sandwich course, and so arrange it that we include practical work as well. I feel that we can get over that particular difficulty.

Thank you, Mr. President.

THE PRESIDENT: That report is still open in the light of the last two discussions. Is there anybody else who would like to say anything before we close it finally?

Mr. E. DALTON (Windhoek): Mr. President, as I am on the Apprenticeship Board in South West, I am interested in this sort of thing. Mr. Aspinall yesterday was talking about technicians with associate membership of the London Institutes. I feel you are going a little bit too far. I think technicians should be something in the line of our postal service technicians. They are a sort of half step between a professional engineer on one hand and the artisan on the other. The trouble that people have had with apprentices and the correspondence courses is well known to me, as I was in the sugar mills for some time, and we have that trouble in South West Africa.

I feel that a lot of trouble is caused by the fact that these courses are not leading anywhere. Take the experience of an apprentice I had. He won some money in the Rhodesian sweep. He had a national engineering diploma and he decided, quite rightly, that he would proceed to Cape Town University and take a degree. Now he was allowed absolutely nothing for his

national engineering diploma. I feel that the professional institutes and this Association should come together, approach universities, and get these men some recognition, then people like myself, and other engineers who have charge of apprentices, would be able to encourage these men and let them see that the technical education they are taking is leading somewhere.

Another big failing is that our local technical colleges are not in any way recognised by the overseas professional organisations, whereas a man who has a similar qualification gained in Britain can gain an exemption from say Part A. Our certificates are reckoned by those people to be practically useless, whilst the standard is quite high enough.

So I feel Mr. President, and gentlemen, that we should do something to have our local technical institutes recognised by these professional bodies and also, principally, by our universities.

THE PRESIDENT: Thank you, Mr. Dalton. Gentlemen, if there are no further discussions on that report, the subject is now closed, and we will revert back to "General".

Mr. O. H. HODGKIN (Pretoria): Mr. President, Ladies and Gentlemen, I would like to trespass on the time of the Convention shortly to revert back to Mr. Downey's report in connection with the work of the Bureau of Standards. Speaking on behalf of a substantial section of the conduit manufacturers, we, I think, would welcome most heartily the phrase he used "that members of the Convention and Undertakings should do everything possible to stamp out the use of sub-grade conduit, to the dangers of which we are very much alive". But I should like to have some guidance, if possible, from this Convention, or the Executive, or members, as to how they propose to go about that stamping-out process.

The usual answer one gets in discussion on this matter, is "Oh, well, the wiring inspector can always check the gauge of the tube", and I would like to suggest that that is scarcely adequate. First of all, having been some years in the industry myself, I would find it very difficult to

satisfy myself on the gauge of any particular tube which was cast in concrete and from which you have a short piece of screwed end protruding, and I would suggest that it is not only the gauge that is covered by either British standard, or South African standard, but the control factor starts with the steel, with the welding, with the annealing, with the screwing, and the smooth bore, and, as the coastal members will appreciate, the adherence of galvanising, and all these points are covered by all manufacturers, I think without exception, in greater or lesser degree. There is one body who can apply proper control and that would appear to be the Bureau of Standards, and I would like to that in the various areas represented here, suggest very seriously for consideration it should be a stipulation that either conduit bearing the British standard mark or the South African mark should be employed exclusively within the areas controlled. This is no longer a question of applying monopolies. The majority of members, the trade manufacturers, either produce with the mark on or state their conduit complies with the specification, and if that statement is correct, it will be apparently quite easy for them to secure the mark. It would then mean that you would pass the onus back to the examining body, the Bureau of Standards, who would relieve your inspectors of the control, and it might be possible to assist such inspectors by arranging for a more thorough marking; shall we say, marking right down the length of tubes to allow them to identify whether suitable material has been used, and thereby make things easier for all concerned. That is a point that could be discussed at any rate.

There was one other thing that has cropped up in discussion. Some people have felt that possibly the Bureau of Standards' specification of a conduit is too tight, and there might be scope for a lighter gauge within the specification, in other words an alternative grade, leaving it to consultants, architects, or in the case of your own requirements, electrical engineers to specify whichever grade they chose, and we would like some guidance on that particular point.

I would like to thank you, Mr. President, for allowing me to bring this matter back again, and I would appreciate any help I can get from the Convention on this matter. Thank you.

Mr. J. C. DOWNEY: Mr. President, Gentlemen: The question of tubing, I appreciate, is not an easy one. The proposal to get our inspectors to keep a close check on all grades of tubing by gauging is the initial step. Once manufacturers realise that we are not going to accept anything but standard tubing—we hope that the inspectors will also take severe action—then we think you will also find that any person or contractor wishing to use any tubing that he feels shaky about, would rather submit that tubing to the engineer for approval before he starts to use it. The obvious thing to do is to have various lengths for the tests specified in the specification, but it is sometimes extremely difficult for smaller undertakings to carry out these tests.

If there is any doubt about it, it is always possible to submit that tubing, if no specification exists for it, to the Recommendations Committee. The manufacturer or supplier will have to do that. They'll soon find out what they will do with it.

The other alternative in your own interests is to submit a sample of that tubing to the Bureau for tests.

At the present moment as you know the 2nd edition does not permit the use of B.S.I. tubing in those regulations. In the 1st Edition it was one or the other. In the first case it was B.S.I. in the absence of a S.A. Bureau of Standards specification.

I quite agree with the previous speaker that mere gauging is not enough, but that is the only answer we have at the present moment, and if we carry out very careful examinations, and keep a vigilant eye on this sort of thing, I think we'll stamp it out and bring the manufacturers into line.

Mr. F. STEVENS (Ladysmith): Mr. President, under what authority could one condemn any conduit?

THE PRESIDENT: Mr. Stevens, if I may reply to you, it would be under your own by-laws. If you have adopted the standard Wiring Regulations which state

that the equipment installed in wiring installations should comply with the S.A. Bureau of Standards' specifications, if available, or in existence, you can, under your by-laws, condemn any tubing. I think that is my verdict. Is there anybody else who would like to put Mr. Stevens right there?

Gentlemen, it is usually under "General" that you get rid of what you have had on your chests for a whole year. You won't have another chance until next year in Cape Town. We are inviting you to participate and say something.

Mr. J. C. FRASER (Johannesburg): I have nothing on my chest that I want to get rid of, but I have been asked, and I think you will remember, sir, we have been approached during the last twelve months on the question of the fourth year apprentice taking his examinations so that he can become a journeyman immediately after he passes the examination.

A number of our municipalities have found that the training which they give their apprentices is not in line with the training in which the examination is set.

As far back as 1945 I suggested to a Conference that it was high time that municipalities had their own apprenticeship committee so that they could dictate to the government the class of training they consider necessary for a municipal electrician. As you know, sir, the training is slightly different from that of industry. I was wondering if the Executive have taken steps to make enquiries, or to try and get what we would like to be known as an apprenticeship committee for municipal electricians?

THE PRESIDENT: Thank you, Mr. Fraser. That is a very important item. Unfortunately, since the time when we were fighting for a separate apprenticeship committee for municipalities, which would have included other trades as well as electricians, conditions have changed in the Transvaal. I do not know about the rest of the country. All apprenticeship committees in the Transvaal were abandoned, and a new apprenticeship committee was established, embracing all the old committees, and known as the Metal

Industries Apprenticeship Committee. I still think that now, more than ever before, your suggestion becomes very important, because our apprentices are now lost in a large field. I think your remarks will be well received, and will receive the serious attention of the Executive. Thank you very much for drawing our attention to the matter, Mr. Fraser.

Mr. R. W. KANE (Johannesburg): I want to refer to Mr. Hallé's suggestion. It was a very laudable proposal, for another reason. He did suggest that we should forward copies of our proceedings to the "sister bodies". I think we should take that a stage further. If you did send these documents to a sister body, no doubt the secretary would file it. He might pass it round his executive, but not necessarily, and the members who should see it. I would suggest that Mr. Hallé buy himself a couple of copies, gives himself one as the transport manager and the other as an electricity department manager—and that the rest of you do the same thing. In other words, buy more copies of our proceedings, and send them round to the heads of the departments in your own town, and then the individuals will see them—and, of course, our funds will be assisted!

THE PRESIDENT: Thank you, Mr. Kane. I trust you will carry back this good proposal from Mr. Kane.

Mr. K. W. J. HALLIDAY (Port Shepstone): Mr. President, I'd like to put a matter forward.

In a declared area I am very much in favour of all wiring inspectors having a Government Wireman's Licence, but it is very difficult in a small town to always find electricians trained in wiring and in power supply work. I'd like to see if there could not be some method, even if it came to oral examination, for a power supply trained electrician to get his ticket, instead of having to come from an apprenticeship, leave a department to work outside, and then come back afterwards.

Mr. R. W. KANE (Johannesburg): I think I am right, (Mr. Frost may argue with me, and Mr. Fraser may support me), my 2½ years experience on the Board indicates that the Board, in accepting candidates for the examination, are very

tolerant to this extent: if a man is an electrician and gives indication in his apprenticeship of wiring experience he is accepted. If his past is rather doubtful, they will insist on proof of wiring experience. I will not give you the period, but it is not unreasonable, and they are very much inclined to argue that, as long as he has that background which is satisfactory, they will accept him for the examination, the examination being the criterion, I think the real trouble is that 90% of the lads would like it handed to them on a plate! There are dozens of cases where they are accepted, are notified for every examination, and you hear nothing of them for a year or two. Then they ask for an oral examination—they are too old, or there are too many in the family, or something like that. Generally the Board is tolerant. It all comes back to the examination, and, if it is worthwhile getting, in very special circumstances they will grant an oral examination. Normally, as I say, they are tolerant of the acceptance. It is up to the man to get the results later on.

Mr. E. DALTON (Windhoek): I feel that there should be something done by way of regulating, or statute, to compel a municipality, or any electrical undertaking, to employ nothing other than registered wiremen as wiring inspectors. It goes without saying that the only way a man can prove that he is a wireman, and has a good knowledge of wiring, is by having that licence. I feel, Mr. President, in the Union and in South West (we are going to try to bring that into our Ordinance actually), that the wiring inspector should be at least equally qualified with the wireman whose work he is going to examine.

Mr. E. L. SMITH (Boksburg): I'd like to make a suggestion that the Board give a directive, not only to municipal electrical engineers, but also to public prosecutors as to procedure with regard to conviction of wiremen who do wiring work without a licence. We had a case in Boksburg where there were two wiremen who were handed over to the Public Prosecutor to be prosecuted because they hadn't wiring licences. The Public Prosecutor of Boksburg informed me that he had contacted the Electrical Contractors' Association

about the matter, and they had informed him that they would investigate the position, and notify him whether to proceed or not. I immediately corrected him on that matter, and the next communication was from the Department of Labour on the East Rand. I eventually told the Public Prosecutor that the best information he could get would be from Mr. Kane in Johannesburg (whether he contacted him or not I don't know), and I understand that the Board did eventually contact the Prosecutor in Boksburg, and put him right on procedure.

I do think it would be a great help to us all if the Board could issue a directive, not only to the municipal electrical engineers, but to Public Prosecutors as well.

Mr. R. W. KANE (Johannesburg): First of all, Mr. Dalton. I think he is a stranger in a strange land! Our Act does exist. Although it exempts at the present moment supply authorities from the requirements of the Act generally, when it refers to the premises, it does insist that the inspector must be a licensed wireman. I have a copy of the Act, and I will see him at tea time and prove it to him.

Mr. Smith—I certainly don't remember any public prosecutor getting in touch with me.

Mr. J. E. MITCHELL (Salisbury): Not for that! (Laughter.)

Mr. R. W. KANE (Johannesburg): I have a feeling that a directive was issued some years ago, but I'll certainly take it up. This business of prosecutions causes, I think, a lot more trouble, and is the subject of greater misunderstanding than anything else. It is surprising how many people simply write to the Board and say "Will you go and hang so-and-so, he's done so-and-so". The Board cannot do that without genuine proof. The man who has the proof is the man who is laying the complaint, and if the man is going to lay that complaint he might as well take it across the road to his Town Clerk and let him go ahead in terms of the Act, or to the local prosecutor. We have had that in Johannesburg, where some of these industrial inspectors catching non-licensed people doing work and wanting us to take action.

We have said, "No, you're the lads who have the evidence. It would mean we would have to take statements from you and then hand it over. You go ahead and do it". They are quite hurt about it, but nevertheless, if you have the proof you have the power.

THE PRESIDENT: Thank you, Mr. Kane.

Mnr. P. BECHLER (Newcastle): Hoe is nou die posisie, Mnr. die President, met 'n gediplomeerde ingenieur? Die ingenieur is in bevel van al die bedradingswerk—verantwoording en al die—maar so ver as ek verstaan onder die wet op Draadwerkers staan hy onder die draadwerker. Mag hy nie installasies doen nie?

DIE PRESIDENT: Herhaal net die vraag? Is die die ingenieur wat onder die draadwerker staan?

Mnr. P. BECHLER (Newcastle): Ja. Kyk dit is so. As, by voorbeeld, 'n gediplomeerde ingenieur gaan op pensioen en hy wil 'n kontrakteur word, dan mag hy nie bedrading doen nie. Hy het nie die draadwerkerslisensie nie.

DIE PRESIDENT: Jy is heeltemal reg, Mnr. Bechler. Hy mag nie. Hy het nie 'n draadwerkerslisensie nie. Hy moet net soos enige ander persoon aansoek doen by die Raad om sy lisensie so te verkry. Hy moet bewys lewer dat hy die nodige ondervinding gehad het, en die Raad sal besluit of hy 'n lisensie kry en of hy 'n eksamen teoreties sowel as prakties, moet aflê. Maar geen persoon, volgens die Wet, mag bedradingswerk doen sonder dat hy die lisensie besit nie. Daar is geen uitweg nie. Hierdie toestand is natuurlik net van toepassing in verklaarde gebiede. Buite gebiede kan enige persoon bedradingswerk doen.

Mnr. P. BECHLER: Dankie, Mnr. die President. Dan sal ek dit maar in die geheim doen as ek iets in my huis verander, hoor?

TEA ADJOURNMENT

On Resuming:

THE PRESIDENT: Good morning Ladies and Gentlemen—Those of you who were not at the early session. We are very

glad to have the ladies with us.

We have now reached the final stage Convention and there will be a little time for messages and greetings which you wish to extend.

Mr. W. H. MILTON (Head office, Escom): I have to thank you very much for the invitation extended to Escom Head Office to be present at your Convention, and at the same time express with regret our Chairman's inability to attend the Convention owing to ill health.

These meetings are of very great benefit to Escom, as we are able to appreciate the points of view, not only of some of our bulk supply consumers, (those points of view I don't think I should mention in the presence of ladies), but also in the contacts which it enables us to establish with the majority of the municipal electrical engineers, whose problems, when they become really serious, are usually referred through the Provincial Department to Escom.

Whilst there is not only business at these Conventions, but pleasure, both sides I think are fully appreciated by those of us who come from Escom Head Office to attend these Conventions. That has been my fortunate privilege, although I have been accompanied by others from time to time.

Mr. President I have to express to you the sincere wish of our Escom Head Office, that your year of office will be a fruitful one and that your Association will continue to grow from strength to strength.

THE PRESIDENT: Thank you, Mr. Milton.

Mr. H. P. ALEXANDER (E.S.C., Natal): Mr. President, Ladies and Gentlemen. On behalf of the Natal Undertakings of the Electricity Supply Commission, I want to thank you for the very cordial invitation to attend your Convention. It has been a great pleasure and joy to us to be present and to hear the interesting discussions you have had, and personally, you have discussed so many matters with which I have been so intimately associated in the past, that I have found them of particular interest.

I wish you, on behalf of the Natal Undertakings, Mr. President, a very good year of office, and a very successful year altogether.

Cr. P. G. C. BLIGNAUT (Pretoria): Mnr. die President, daar ons aan die einde gekom het van hierdie konvensie wil ek van die geleentheid gebruik maak om u baie hartlik te bedank vir alles wat u vir ons hier gedoen het, Ek kan u die versekering gee dat ons dit baie geniet het. Ook wil ek vir Margate vir hulle gasvryheid bedank. Ek glo nie hulle kan dit al verbeter nie. Ek moet sê dat ek moet ook die mense wat die referade hier gelewer het geluk wens met die bekwame wyse waarop hulle dit gedoen het. Waar die Raadslede gewoonlik die mense is wat al die praatwerk doen, en die ingenieurs moet luister, het hulle nou weer die geleentheid gehad die keer om die praatwerk te doen en die Raadslede moes luister. En al het ons nie die telegram aan ons Rade gestuur wat u aan die hand gedoen het nie, kan ek u verseker as ons teruggaan, sal ons seker 'n bietjie in daardie rigting raak, want ek dink nie alleenlik was daardie referade baie leersaam omdat ons hier die demonstrasies gehad het nie, maar ons het ook die praktiese hier in die strate gehad, en ek dink dit sal nog hulle mooi gebaar wees van die firmas as hulle Margate so verlig wil hou.

Baie dankie.

DIE PRESIDENT: Dankie Mnr. Blignaut.

Mr. T. R. J. BISHOP (Johannesburg): Mr. Mayor, Mr. Deputy Mayor, Mr. President, Ladies and Gentlemen. On behalf of the affiliated members and the consulting engineers, I would like to express to the Borough of Margate and the Council of Krugersdorp and to your Association our very sincere appreciation of being accorded the privilege of attending your Convention, and taking part in your wide and extensive deliberations.

Also we very much enjoyed the friendly and hospitable functions to which we have been invited, and which always form so pleasant a part of these Conventions. Each year the Convention and the work of the A.M.E.U. assumes more and more impor-

tance in the fast-growing power supply industry of Southern Africa, and in your able hands this year, Mr. President, we are certain we shall see continuing progress in the municipal electricity supply industry which will, in turn, further the progress of development in Southern Africa as a whole.

May we once again express our thanks for being given the privilege of attendance here, and wish you and your Executive Council, and your Association every success in the forthcoming year.

Thank you, Mr. President.

THE PRESIDENT: Thank you, Mr. Bishop.

Are there any further messages?

Cr. Mrs. R. GAILEY (Ladysmith): Mr. President, Ladies and Gentlemen. I would like to say how very much I have appreciated coming to this conference. I came with absolute diffidence. I thought the discussions would be Greek to me, and that I would feel completely at sea. Far from it! I have enjoyed every minute of this Convention and have understood a great deal more than you men will give me credit for!

I would also like to say to you, Mr. President, and the gentlemen here, how grateful I am to them for not making me feel a lone woman among them. I have felt as one of them, and I am truly grateful to them for it.

Thank you, Mr. President.

Mr. R. L. DE LANGE (East London): I want to congratulate you on behalf of the Cape Municipal Association. Now most probably the Cape Municipal Association—being the unfortunate Vice-President—deals more with administrative affairs, and we most probably can short circuit matters much more than you electrical brain people do.

Mr. President, I want to assure you, sir, that where we deal with administrative matters, we city councillors do take an interest in members of our staff. We have heard about how the electrical engineers were being underpaid and over-worked. Well, I want to assure you that the city councillors in the Cape Province are all under worked and over-fed and over-paid.

That is why it is very nice to know that we have some of the younger members of the municipal organisation, such as yourself, coming up. It is encouraging to know this, and therefore, I would like to congratulate you on behalf of the Cape Municipal Association.

THE PRESIDENT: Thank you for those kind remarks Mr. de Lange. Is daar nog iemand wat nogiets wil sê. If not, I will ask Mr. Hallé, who has a very important duty to perform to say a few words.

Mr. C. R. HALLE (Pietermaritzburg): Mr. President, Ladies and Gentlemen. Owing to my well-known platonic and academic interest in the unfair sex, I have been asked to propose a vote of thanks for the entertainment and delightful convention they have enjoyed.

Speaking of figures in particular—I mean in general, there are some 170 wives, co-opted wives or Associates and so forth (Laughter) and I believe that is a record. Of course the reason for those figures in general is the figures in particular! There was one Bikini, I'm told — of course I hardly noticed her — who, I believe, was right up to the Bureau of Standards specifications! (Laughter.) And believe you me those boys know their jobs!

Anyway some of the male delegates were so busy trying to see where she carried her Bureau of Standards approval mark, that they nearly wrecked the official photograph.

My real job, when I get round to it, is to express on behalf of the ladies, their thanks to the Mayoress, Mrs. Herbert, for all she has done for them. Not only (I believe she is the Mayoress of Krugersdorp or Margersdorp—yes, I have it right), . . . not only for the tea party and for the very fine speech she made there, and her general activity throughout the whole proceedings, but for providing transport for lots of people who wished to go about and see the beauties of this town. Mind you, she not only did that, but I believe that at the Oribi Gorge she restrained several wives from falling for the temptation of pushing their husbands over the precipice. Of course, we know that they have all got a lot to be thankful for, these

women, and when I look at this handsome body of men, these husbands, I feel "Gosh, they really should be thankful!" But there are other things . . .

Now there are two ladies who aren't feeling so thankful. Mrs. Simms and Mrs. Kurland. They have been tripping all the type—I mean typing all the tripe that we have been producing in the last few days, but they are so speedy and efficient that in some parts of the proceedings they were just about two pages ahead. Which is very good! Anyway, on our behalf we will thank them.

Now I believe that the main trouble with these conferences is that the ladies don't know quite whether the conference interfered with the holiday or the holiday interfered with the conference. But they are hoping that if we ever come back to Margate, if it coincides with the Hibiscus Festival, they be allowed to leave their husbands behind.

Anyway, sir, they are very grateful to you, and your dear lady, for all you have done, and as a final note, I'd like to say, on behalf of my own wife and myself, that when some of you younger people reach the stage that you have to retire from these conferences, we can wish you nothing finer than that you should leave this assembly with the happy memories we have.

Thank you, sir, on behalf of the ladies, and all the best. Thank you very much indeed.

THE PRESIDENT: Thank you very much, Mr. Hallé.

Ladies and gentlemen, this is the last opportunity Mr. Hallé will have to be with us; officially he is about to retire and as you heard this morning, he has been with this Association since the early years. I think it is generally accepted that we wish him a very happy retirement. May he always keep that jovial spirit, the humourous side of his life, in front of him throughout his retirement. Thank you very much Mr. Hallé. (Applause.)

I will now call upon His Worship the Mayor of Margate, Cr. Herbert, to address you.

HIS WORSHIP THE MAYOR: Mr. President, Ladies and Gentlemen. Rather a surprise was sprung on me this morning when the President said that he wanted me to say a few words now that you had come to the end of your Convention, and it rather set me back.

However, it is a great pleasure to have this opportunity once again to thank Krugersdorp, on behalf of Margate, for the great honour that you did us in asking to have this convention here. We do appreciate it, Mr. Deputy Mayor and Mr. van der Walt, and I can assure you that we, as a council, have done our best to entertain you, and I do hope that we have been successful.

I heard a remark in the street the other day that they have never seen so many bright sparks in Margate. Well, this rather shook me, but knowing it was an electrical conference, I saw what they meant! Actually, I thought they were talking about the street lighting, but I see now that the object was that with the electrical men and electrical engineers in this town, they felt Margate was alive.

I did hear one of the speakers say just now that they hoped the next time the conference is arranged, that it would be during our Hibiscus Festival, and I sincerely hope that if that is the case the women who are here today will take heed, and come with your husbands! I am definitely on your side!

I do hope that our O/C Mr. Alexander from the E.S.C. who, you will realise, is our electrical engineer in Margate, not having our own Undertaking, is taking heed, and we hope, Mr. Alexander, that Margate, in the near future will be up to standard with all the other towns.

I do hope that the deliberations here at this convention have been successful and I sincerely hope that one day Margate will be in a position with the electrical engineer to invite this conference, he being President of the Association, and we do hope that that is not too far distant.

On behalf of Margate, then, we do wish to thank you very, very much. We do hope that you have all enjoyed yourselves, and we do hope that our efforts have been a success. (Applause.)

THE PRESIDENT: Thank you very much, Mr. Mayor.

I will now call upon Cr. Marais of Krugersdorp to thank Margate.

Ek sal nou Raadslid Marais van Krugersdorp vra om Margate te bedank vir hulle gasvryheid.

Cr. P. J. MARAIS (Krugersdorp): Mnr. die President, Geagte Meneer die Burgermeester van Margate, dames en here: Ons verigtiging van hierdie konvensie die snel nou ten einde, en dit pas ons om 'n woordjie van dank aan die betrokke instansies te rig. Ek het egtere nare suspisie dat my bewegings hier tydens die konferensie noukeuriger dopgehou is as wat ek oorspronklik vermoed het, en dis daarom dat die uitvoerende bestuur vanmôre besluit het dat ek Margate in besonder moet gedank.

Ek wil daaren vanmôre hier opregte behoefte van die hart ontbloed en ek wil sê ek is dankbaar teenoor die Skepper dat ons in ons sonnige Suid Afrika sulke mooi plekke het soos Margate. Krugersdorp—en ek is seker al die konferensiegangers hier aan die Raad van Margate en in besonder aan die Burgermeester en sy goeie vrou 'n besondere woordjie van dank wil rig. Ons wens en bede is dat u lank gespaar sal bly, en dat Margate mag aanhou floreer soos wat hy in die laaste jaar gedoen het.

Mr. President, it is my pleasant duty to say "Thank you" and "Goodbye" to Margate—to its Council and especially to the Mayor and his good wife. Margate is a good place, with kind, friendly people. After such a Conference the human aspect is always the outstanding one, and this Conference has not been an exception in this respect. I for one shall always remember the lovely days we spent together in Margate, and whenever I happen to pass this way, I would like to drop in and say "Hullo" to Mr. and Mrs. Herbert personally. They have done everything humanly possible to make us feel at home here, and they have succeeded in doing so.

(Applause.)

The saying that once you get Margate sand in your shoes you will always return is a very true one, and I can now understand why John Masefield once said:

"One road leads to London
One road runs to Wales
My road leads me seawards
To the white dripping sails . . ."

This could also be said about Margate. I would, however, make one suggestion while we are still on the subject of illumination. The Electricity Department shouldn't overdo this kind of business here in Margate. (Laughter.)

If they go about and illuminate all the good places here, Margate will lose much of its well-known mysterious attraction and popularity. I mean, after all is said and done, this is still a holiday resort! (Laughter.)

Well, Mr. President, ladies and gentlemen, I think I have said enough (perhaps a little too much), but in conclusion I should once more like to say, on behalf of Krugersdorp and all the delegates here, "Thank you Margate". (Applause.)

Mr. PRESIDENT: I will now call upon Mr. Mitchell.

Mr. J. E. MITCHELL (Salisbury): Before the President has a chance to close this Convention, I feel there is something which should be done, which is traditionally done by the Mayor of the Host Town, but only when the President is the engineer of that town, and that is to eulogise the President today.

Therefore I feel that somebody should do this work, and I want to do it for you. As I say, this is usually His Worship the Mayor's duty, but it is not one which we have put on Mr. Herbert.

As I think you are well aware, the Mayor, in making his closing speech says some wonderful things about the President, and this, of course, is recorded in the proceedings. This becomes written evidence for the engineer of that host town when he makes a claim for a double increment at the next estimates. This cannot be done in this case, but I intend to see that some record is put in the proceedings which our President can use for that purpose.

As you well know, I think, Margate was chosen as the venue for this Convention with the one main reason of seeing that 'Our Van' was made President, and I think

you will agree with me that he has acquitted himself in the same way as all other Presidents that have gone before, in other words in controlling the Convention, making it enjoyable, keeping us all cheerful, and, at the same time, getting on with the business with great efficiency.

(Applause.)

I think that his brain has been alert throughout. I think the finest crack I have ever heard was when he said that he finally realised why Mr. Sibson had become a conductor.

I have therefore great pleasure, ladies and gentlemen, in proposing a vote of thanks to our President, Mr. van der Walt, and I couple with that his good lady, and I am going to ask his very great friend, Bob Kane, to second that. Thank you.

Mr. R. W. KANE (Johannesburg): Jimmy, Ladies and Gentlemen: I join with you in thanking Van for a very pleasant week in Margate. We have admired you Van, the way you have handled us—particularly the Executive. You made some of us work far too hard—4 o'clock in the afternoon, 10 o'clock at night, correcting our own mistakes—and I join with Jimmy in thanking you and your good lady for a very happy week, and we wish you a very successful year.

THE PRESIDENT: Mr. Mitchell, Mr. Kane, I thank you very much for those very nice remarks. I don't think I deserve them, but I appreciate them in any case.

Cr. R. L. DE LANGE (East London): Mr. President, Mr. Mayor, Madam Mayor-ess, Ladies and Gentlemen. It is my extreme pleasure to pass a vote of thanks to our friends the Town Council of Krugersdorp.

When it was first decided to have the conference down at Margate, we knew that the Mayor and all his kind councillors were keen to have the conference, but Krugersdorp felt that they would like to support the Association and Mr. President, we would like the Deputy Mayor, Cr. Marais, to go back and tell his Council what a wonderful time we had here.

Mr. Marais spoke about Margate being such a wonderful city—it will be a city very shortly—Krugersdorp being uranium,

I don't know what is going to happen. If you have uranium in Krugersdorp, well, I think you've got something else in Margate . . . especially those ladies with the Bikini suits, and I know that the President nearly fell off the platform when the photograph was taken!

Mr. President, once again, on behalf of the delegates, wil ons vir u sê "Baie, baie dankie vir daardie groot en goeie gees wat heers tussen Margate en Krugersdorp". Dit is aangenaam om te weet dat daar so 'n gees heers. Ek dink Mnr. die President, dames en here, as ons meer van daardie gees kan ontwikkel, en mekaar beter kan verstaan in plaas van mekaar in die hare vleg, dit miskien 'n goeie ding sal wees. Maar daar is somtyds 'n kortsluiting in enige kongres, en wanneer daardie kortsluiting kom, dan is dit lekkerder om daardie kortsluiting op Margate daar op die sand met die water naby jou dan op enige ander plek te hê.

Nogmaals Mnr. die President, Mnr. die Onder-Burgermeester van Krugersdorp, baie dankie en alle sukses.

I heard the Mayor of Margate saying that they would have an electrical engineer in Margate very shortly. Well, I heard somebody saying "Goodbye" to Margate, but I know what the President is going to say, he is going to say "Au revoir". I am quite sure that when applications are asked for the position in Margate, the President will be the first one to apply!

Once again, thank you very much. Baie dankie.

THE PRESIDENT: Baie dankie, Mnr. de Lange. Namens Krugersdorp sal ek ook sê baie dankie.

Your Worship, ladies and gentlemen, all good things come to an end. It has been a very happy and pleasant convention to me, and although there was hard work to be done, we have seen so many old faces again, and you will forgive me if I refer to a few of them.

I have noticed Mr. Taylor who was for many years our Secretary. (Applause.) He was present, and I am very pleased to see that he and his good lady still enjoy good health.

We have also had Mr. Marchant with us from the Electricity Supply Undertaking, who has for many years attended conferences under his own steam, if I may put it that way. He had such a personal interest in us that he has been attending them regularly. Baie dankie, Mnr. Merchant, vir daardie belangstelling ook in ons.

(Applause.)

And to those that I have perhaps not mentioned, thank you very much for helping to make our conference such a success.

But before officially closing this convention, Mr. Mayor, I would like to thank your Town Clerk, Mr. Mourant and his staff personally. We started negotiating for this conference in Margate well in advance. Mr. Mourant was the man we contacted. Mr. Mourant was the man we pestered with all our little details, and the things we wanted. What a wonderful job he has done for us. I think one and all must agree that this convention as far as his side of the organisation is concerned, ran very smoothly. We thank you very much for that, Mr. Mourant, and I can assure you that if ever the opportunity arises, we will be back in Margate again.

Will you also convey our thanks to your staff, who have so ably assisted you?

In particular I would like to mention Mrs. van den Berg in the foyer, who had to answer thousands of possible and impossible questions put by our delegate members. Thank you very much.

Then you have a good lady, Mrs. Topham, who has been responsible for the floral arrangements in making this hall so attractive, which materially assisted in creating that correct and pleasant conference atmosphere which we have continually had in this hall, and which helped to make it so great a success.

I would also like to thank the Chamber of Commerce of Margate, who also went out of their way to make delegates happy, and see that everything ran smoothly, and in particular I would like to thank Mr. Levitt who so ably assisted us with all the assistance we asked.

To Mr. Burd, who has been responsible for the sound effects in this hall, and the tape recording, thank you very much, it was a very efficient service, and efficient service is always appreciated. Thank you very much, sir.

I would also like to thank Madam the Mayoress, and her good ladies, who were responsible for running the crèche on behalf of the ladies of this conference. That was really a great service, and it enabled the wives to keep a better eye on their roving husbands, who would otherwise have been searching the beaches of Margate for the Hibiscus Queens.

It also materially assisted in keeping this hall full. The men couldn't slip out so easily. They knew their wives were free and were watching for them on the beach. We had wonderful conference as far as that is concerned, and I think we had a good attendance throughout the conference. Thank you, Madam Mayoress, for that good service done for the conference.

Lastly, I think all of you will agree with me that our secretary needs a word of thanks. Our secretary started the arrangements and organisation of this conference immediately after we left Salisbury. He

made a trip from the Reef, came to see Mr. Mourant the Town Clerk, and he is a stickler for detail. That is the main reason why this conference went off so smoothly. Mr. Ewing saw to everything, he thought of everything, and our conference ran very smoothly. This was an experiment—a great experiment which your Executive decided to make. To Dick I say thank you very much for making this experiment a success. It would not have been so if we had had a secretary with fewer capabilities than Dick Ewing. Thank you very much, Dick, I must thank you also for being personally helpful to me, assisting me, advising me in what to do and how to do it. Not only I, not only the Executive, but the whole body appreciates it. (Applause.)

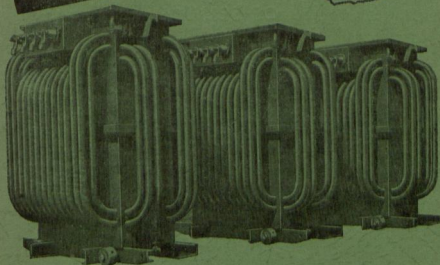
I trust everyone has had a good time, and that we will again meet under the same genial conditions in Cape Town. I now wish you a safe journey home, and I officially declare this 31st Convention of our Association closed.

Dames en Here ek verklaar nou dat hierdie 31ste Konvensie van ons Vereeniging gesluit is en ek vertrou dat u almal

Thank you very much.

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