VERRIGTINGS 1967
Deel 2

40ste KONVENSIE

15de tot 18de MEI 1967

Lourenco Marques

Die Vereniging van Munisipale Elektrisiteits-ondernemings van Suidelike Afrika

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Die Vereniging van Munisipale Elektrisiteits-ondernemings van Suidelike Afrika

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INHOUD

LIST OF ADVERTISERS
LYS VAN ADVERTEERDERS

EXECUTIVE COUNCIL 1967—1969

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G. C. Theron (Vanderbijlpark).
PRESIDENT ELECT:
H. T. Turner (Umtali).
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R. Leishman (Johannesburg).
J. C. Waddy (Pieitermaritzburg).
C. Lombard (Germiston).
R. W. Barton (Welkom).
P. A. Giles (East London).
A. C. T. Frantz (Cape Town).
CO-OPTED MEMBER:
J. K. von Ahlften (Springs).
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Cape Eastern: V. E. O. Barratt (Queenstown),
Highveld: E. de C. Pretorius (Potchefstroom).
Good Hope: J. F. Lategan (Stellenbosch),
Rhodesia: H. T. Turner (Umtali).
SECRETARIES:
Davidson & Ewing (Pty.) Ltd.,
P.O. Box 7462,
JOHANNESBURG.
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H. T. Turner, together with the Councillor Representatives of Vanderbijlpark and Umtali and "ex officio" the Secretaries.
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Technical Training:
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R. M. O. Simpson, Alternate J. C. Waddy,
A. C. T. Frantz, Alternate P. A. Giles.
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R. W. Barton,
R. Leishman,
R. M. O. Simpson and A. C. T. Frantz.
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and the Secretaries "ex officio".
Strategic Materials:
P. A. Giles (Convenor)
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AANGEWESE PRESIDENT:
H. T. Turner (Umtali).
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R. W. Barton (Welkom),
P. A. Giles (Oos-Londen),
A. C. T. Frantz (Kaapstad).
GEKOÖPTEERDE LEDE:
J. K. von Ahlften (Springs).
STEDE OF DORPE VERTEENWOORDIG:
Vanderbijlpark — Umtali — Johannesburg — Pietermaritzburg — Germiston — Welkom — Oos-Londen — Kaapstad.
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Oos-Kaapland: V. E. O. Barratt (Queenstown),
Hoëveld: E. de C. Pretorius (Potchefstroom),
Goeie Hoop: J. F. Lategan (Stellenbosch),
Rhodesië: H. T. Turner (Umtali).
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Posbus 7462,
JOHANNESBURG.
DAGBESTUUR:
G. C. Theron,
H. T. Turner, tesame met Raadslid-verteenwoordigers van Vanderbijlpark en Umtali, en die Sekretarisse ampshalwe.
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A. C. T. Frantz, plaasvervanger, P. A. Giles.
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R. W. Barton, R. Leishman, R. M. O. Simpson en A. C. T. Frantz.
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Strategiese Materiaal:
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Wiring Regulations Committee:
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G. C. Theron.

Sub-komitee vir Hoogspanningslaboratoriumgeriewe:
R. Leishman.

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J. von Ahlften (Plaasvervanger).

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Witwatersrandse Hoofkomitee, R. Leishman.
Durbanse Sub-komitee, R. M. O. Simpson.
Kaapstadse Sub-komitee, A. C. T. Frantz.

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S.A. Nasionale Komitee vir Verligting:
P. A. Giles.

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R. W. Barton (Plaasvervanger).

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	J. W. Phillips, Bulawayo
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1948-49	A. Foden, East Londen
1949-50	D. A. Bradley, Port Elizabeth
1950-51	C. R. Hallé, Pietermaritzburg
1951-52	J. C. Downey, Springs
1952-53	A. R. Sibson, Bulawayo

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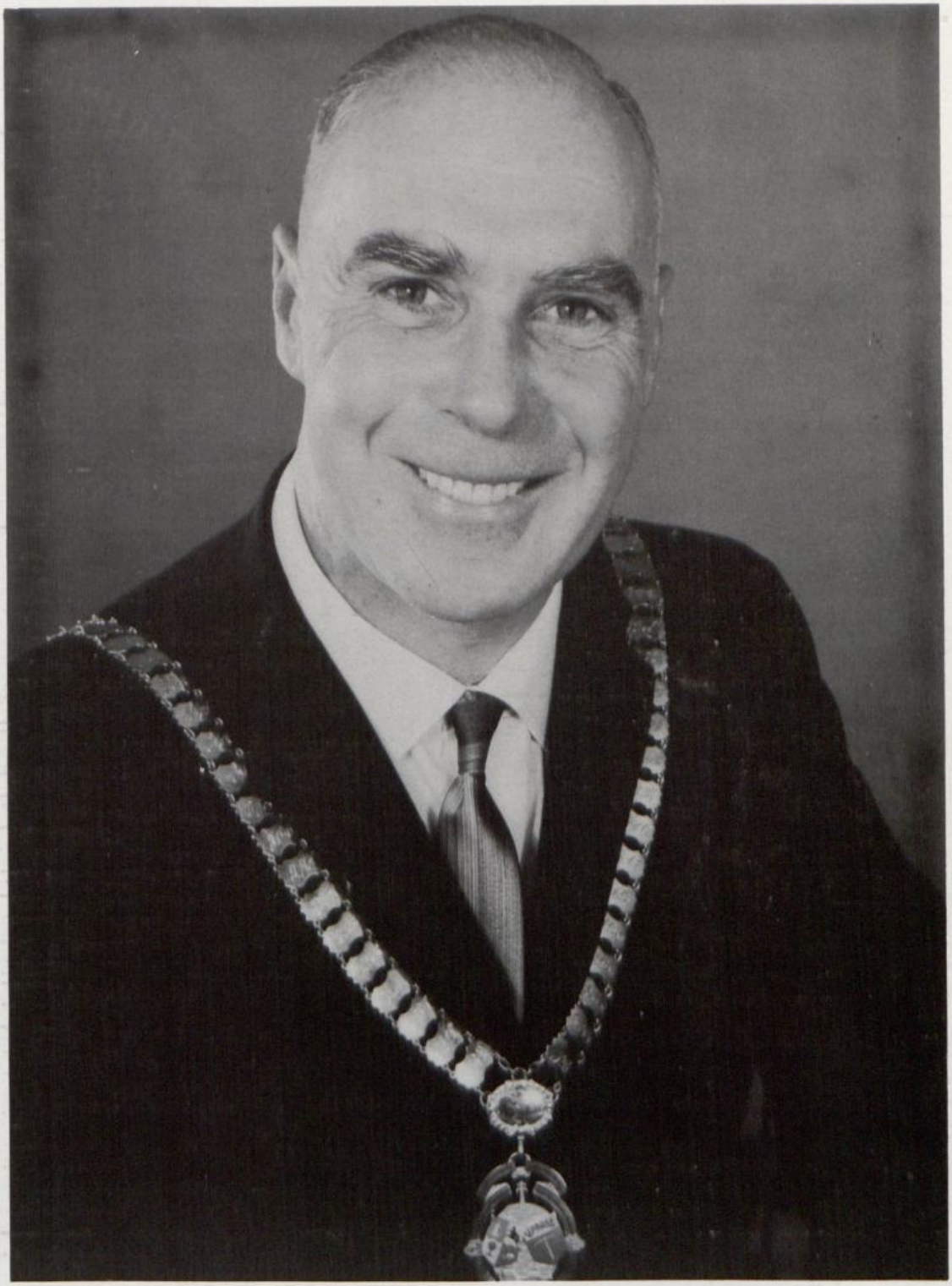

G. C. THERON

1967 CONVENTION/KONVENSIE, LOURENCO MARQUES

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1954-55	G. J. Muller, Bloemfontein	A. T. Taylor*
1955-56	D. J. Hugo, Pretoria	A. T. Taylor to 30/6/55*
1956-57	J. E. Mitchell, Salisbury	Arthur Tingey, Ewing & Co., 1/7/55
1957-58	J. L. van der Walt, Krugersdorp	Davidson & Ewing (Pty.) Ltd., 1/7/56.
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1959-60	R. W. Kane, Johannesburg	Davidson & Ewing (Pty.) Ltd.
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All correspondence to be addressed to:
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Telegramme: „Minute" Foon 834-3021

LIST OF MEMBERS/LYS VAN LEDE 30-6-67

Honorary Members/Ere-Lede:

1967 Beesley, W., Box/Bus 29, Livingstone.
1949 Bradley, D. A., 9 Target Kloof Road, Port Elizabeth.*
1960 Castelyn, F. J. C., 1a Arboretum Avenue, Bloemfontein.*
1963 (1944) Downey, J. C., 10 Jessop Road, Selection Park, Springs.*
1963 (1947) Downie, C. G., 25 Rectory Gardens, Broadwater, Worthing, Sussex.*
1951 (1922) Eastman, H. A., Torwood, Parel Vallei, Somerset West, C.P.*
~~1955 (1944) Fraser, J. C., 26 Grace Road, Mountain View, Johannesburg.*~~
1948 (1938) Foden, A., 4 Hardy Road, Selborne, East London.*
1958 (1944) Hallé, C. R., P.O. Box 399, Pietermaritzburg.*
1956 Jaffray, A. Morton (Alderman), 8 Fairbridge Avenue, Salisbury.
1964 (1946) Kane, R. W., 21 Kernick Avenue, Melrose North, Johannesburg.*
1954 (1938) Kinsman, C., 7 Highgate Place, Durban North.*
1967 Marais, J. D., ~~8 Wallis Street, Johannesburg~~.
1956 (1939) Milton, W. H., c/o Electricity Supply Commission, Box/Bus 1091, Johannesburg.
1962 (1948) Mitchell, J. E., Box/Bus 819, Kitwe, N.R.*
1964 (1934) Muller, G. J., 35, Wilcocks Road, Bloemfontein.
1962 (1935) Sibson, A. R., Box/Bus 9074, Hillside, Rhodesia.*
1967 Telles, J., Box/Bus 1861, Lourenco Marques
1962 (1949) Van der Walt, J. L., Box/Bus 45, Springs.*

* Past President * Uitgetrede President

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1962 (1935) Adelaide, Box/Bus 38.
1946 (1917) Aliwal North, Box/Bus 46.
1948 (1934) Alberton, Box/Bus 4.
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1964 Caroliina, Box/Bus 24.
1949 Ceres, Box/Bus 44.

Howick.
P O Box 5.

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1964 Keetmanshoop, Box/Bus 25.
1952 Kempton Park, Box/Bus 13.
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1959 Orkney, Box/Bus 34.
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1935 (1926) Paarl, Box/Bus 12.
1935 (1920) Pietersburg, Box/Bus 111.
1935 (1915) Pietermaritizburg, Box/Bus 321.
1936 Piet Retief, Box/Bus 23.
1936 (1934) Port Alfred, Box/Bus 13.
1935 (1915) Port Elizabeth, Box/Bus 116.
1936 Port Shepstone, Box/Bus 5.
1948 (1915) Potchefstroom, Box/Bus 113.
1944 Potgietersrust, Box/Bus 34.
1935 (1915) Pretoria, Box 440.
1951 Parys, Box/Bus 39.
1953 Postmasburg, Box/Bus 5.
1959 Peri-Urban Areas Health Board, Box/Bus 1341, Pretoria.
1935 (1915) Queenstown, Box/Bus 113.
1948 ~~Que Que, Box/Bus 15.~~
1935 (1929) Randfontein, Box/Bus 139.
1935 (1929) Robertson, Box/Bus 52.
1935 (1926) Roodepoort-Maraisburg, Box/Bus 217, Roodepoort.
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1935 (1926) Salisbury, Box/Bus ~~990~~. 1680.
1956 Sasolburg, Box 60.
1935 (1916) Somerset East, Box 21.
1948 (1927) Somerset West, Box/Bus 19.
1935 (1916) Springs, Box/Bus 45.
Stanger, Box 72.
1938 (1916) Stellenbosch, Box/Bus 17.
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1959 Stutterheim, Box/Bus 2.
1959 (1927) Tarkastad, Box/Bus 21.
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1957 Tzaneen, Box/Bus 24.
1963 Thabazmbi, Box/Bus 90.
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1936 (1927) Umtata, Box 57.
1935 (1927) Umtali, Box/Bus 121.
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1955 Virginia, Box/Bus 156.
1947 (1929) Vrede, Box/Bus 155.
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1948 (1920) Vryheid, Box/Bus 57.
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1935 (1934) ~~Walmer, Box/Bus 5010.~~
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1956 Wellington, Box/Bus 12.
1953 Welkom, Box/Bus 708.
1953 Westonaria, Box/Bus 19.
1946 Willowmore, Box/Bus 15.
1944 (1919) Winburg, Box/Bus 26.
1945 (1924) Windhoek, Box/Bus 59.
1955 (1927) Witbank, Box/Bus 3.
1936 (1922) Worcester, Box/Bus 37.
1960 Walvis Bay, Box/Bus 2.
1964 Wolmaransstad, Box/Bus 17.

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Datums in hakies verteenwoordig eerste lidmaatskap as of deur bemiddeling van Ingenieur. Lidmaatskap nie noodwendig aaneenlopend nie.

Engineer Members/Ingenieurslede:

1947 Aalbers, C., Municipal Electrical Engineer, Box Bus 12, Wellington, C.P.
1933 Adams, C. H., Municiipal Electrcal Engineer, Box/ Bus 19, Somerset West, C.P.
1949 Asselbergs, P. C., Town and Electrical Engineer, Phalaborwa, Tvl.
1964 Bailey, R. V., Electrical Engineer, Box/Bus 55, Middelburg, Cape.
1962 Baillie, T. H., Town Electrical Engineer, Box/Bus 24, Broken Hill, Zambia.
1965 Barnard, H., Town Electrical Engineer, Box/Bus 15, Brakpan, Tvl.
1948 Barratt, V. E. O., Municipal Electrical Engineer, Box/Bus 113, Queenstown, C.P.
1964 Barrie, J. J., Muncipal Electrical Engineer, Box/ Bus 25, Edenvale, Tvl.
1948 Barton, R. W., Electrical Engineer, Box/Bus 708, Welkom, O.F.S. (Past President).
1959 Beard, G. R., Town Electrical Engineer, Box/Bus 176, Grahamstown, C.P.
1957 Booysens, L., Town and Electrical Engineer, Box/ Bus 155, Vrede, O.F.S.
1960 Boshoff, J. J., Assistent Electrical Engineer, Box/ Bus 3, Vanderbijlpark, Tvl.
1962 Boshoff, M. H. L., Assistant Electrical Engineer, Box/Bus 45, Uitenhage, C.P.
1959 Botes, P. J., Municipal Electrical Engineer, Box/Bus 217, Roodepoort, Tvl.
1958 Brown, D. C., Municipal Electrical Engineer, Box/ Bus 3, The Strand, C.P.
1959 Carpenter, B. F., Town Electrical Engineer, Box/ Bus 45, Umtata.
1948 Cherry, J. R., Municipal Electrical Engineer, Box/ Bus 139, Randfontein, Tvl.
1955 Clarke, M. P. P., Municipal Electrical Engineer, Box/Bus 21, Somerset East, C.P.
1956 Craig, J. S., Borough Electrical Engineer, Box/Bus 21, Newcastle, Natal.
1965 Cronje, W. F., Electrical Engineer, Peri-Urban Areas Health Board, Box/Bus 1341, Pretoria, Tvl.
1956 Dawson, J. D., Municipal Electrical Engineer, Box/ Bus 45, Uitenhage, C.P.
1965 Dernier, W., Electrical Engineer, Box/Bus 46, Aliwal North, C.P.
1955 De Villiers, E. E., City Electrical Engineer, Box/ Bus 288, Bloemfontein.
1964 De Villiers, S. de V., Municipal Electrical Engineer, Box/Bus 44, Ceres, C.P.
1957 Dreyer, H. C., Electrical Engineer, Box/Bus 12, Paarl, C.P.
1950 Dreyer, L., Municipal Electrical Engineer, Box/Bus 19, Westonaria, Tvl.
1957 Dunstan, R. S., ~~Deputy~~ City Electrical Engineer, Box/Bus 369, Port Elizabeth.
1963 Du Plooy, D. P., Electrical Engineer, Box/Bus 45, Nelspruit, Tvl.
1963 du Plessis, G. C., Deputy Town Electrical Engineer, Box/Bus 113, Potchefstroom.
1963 Du Toit, A. A., Municipal Electrical Engineer, Box/ Bus 19, George, C.P.
1950 Erikson, J. G. F., Borough Electrical Engineer, Box/Bus 15, Estcourt, Natal.
1944 Fisher, K. M., Municipal Electrical Engineer, Box/ Bus 3, Bedfordview, Tvl.
1957 Fohren, H., Borough Electrical Engineer, Box/Bus 37, Eshowe, Zululand.
1966 Fortman, A. H. L., Deputy Town Electrical Engineer, Box/Bus 215, Boksburg, Tvl.
1961 Frantz, A. C. T., City Electrical Engineer, Box/Bus 82, Cape Town, C.P.
1952 Futcher, L., Municipal Electrical Engineer, Box/ Bus 13, Kempton Park, Tvl.
1965 Fraser, D. H., Deputy City Electrical Engineer, Box/Bus 147, Durban, Natal.
1945 Gericke, J. M., Municipal Electrical Engineer, Box/ Bus 99, Klerksdorp, Tvl.
1939 ~~Giles, P. A., City Electrical Engineer, Box/Bus 529, East London, C.P. (Past President).~~
1949 Halliday, K. W. J., Municipal Electrical Engineer, Box/Bus 5, Port Shepstone, Natal.
1927 Harvey, A. Q., Town Electrical Engineer, Box/Bus 96, Louis Trichardt.
1953 Hatwich, A. H. J., Town and Electrical Engineer, Box/Bus 13, Dewetsdorp, O.F.S.
1953 Heunis, G. B., Town and Electrical Engineer, Box/ Bus 66, Standerton, Tvl.
1965 Heydenrych, J. E., Electrical Engineer, Box/Bus 14, Middelburg, Tvl.
1956 Hobbs, I. L., Town Electrical Engineer, Box/Bus 156, Virginia, O.F.S.
1965 Hosking, N. G., Deputy General Manager, Electricity Department, Box/Bus 699, Johannesburg.
1966 ~~Hough, J. W., Town Electrical Engineer, Box/Bus 15, Brakpan, Tvl.~~
1944 Inglis, J. I., Town Electrical and Water Engineer, Box/Bus 111, Pietersburg, Tvl.
1949 Kirberger, M. N., Town Engineer, Box/Bus 3, Bethal, Tvl.
1959 Keoslag, H. J., Electrical Engineer, Box/Bus 52, Robertson.
1949 Kruger, M. J. C., Municipal Electrical Engneer, Box/Bus 13, Port Alfred, C.P.
1931 Lategan, J. F., Town Electrical Engineer, Box/Bus 17, Stellenbosch, C.P.

+ Ms. C. P. du Plessis
Elect Engineer
Box 42, De Aar

* Ms. H. Foden
Deputy City Elec Engineer
Box 73 Salisbury

1953 Lees, D., Town Electrical Engineer, Box/Bus 45, Benoni, Tvl.

1944 Leishman, R., General Manager, Electricity Department, Box/Bus 699, Johannesburg.

1956 Lewis, L., Town Electrical Engineer, Box/Bus 59, Windhoek, S.W.A.

1947 Lombard, C., City Electrical Engineer, Box/Bus 145, Germiston, Tvl. (Past President).

1944 Lotter, G. A., Town Electrical Engineer, Box/Bus 34, Potgietersrust, Tvl.

1966 Louw, H. A. ~~L.~~, Asst. Electrical Engineer, Box/Bus 12, Paarl, C.P.

1955 Lynch, E. C., City Electrical Engineer, Box/Bus 73, Salisbury, Rhodesia.

1953 Macques, J. A., Municipal Electrical Engineer, Box/Bus 42, De Aar, C.P.

1966 MacHutchon, J. F., Asst. Electrical Engineer, Box/Bus 82, Cape Town.

1965 McLachlan, A. C., Town Electrical Engineer, Box/Bus 22, Saldahna, C.P.

1948 Mathews, J. A., City Electrical Engineer, Box/Bus 194, Kimberley, C.P.

1948 McIntyre, H. A., Assistant Town Electrical Engineer, Box/Bus 35, Vereeniging, Tvl.

1954 McNeil, J. L., Borough Electrical Engineer, Box/Bus 21, Empangeni. 5, Hamick

1945 Meintjies, P. A., Municipal Electrical Engineer, Box/Bus 16, Rustenburg, Tvl.

1952 Millen, T. J., Town and Electrical Engineer, Box/Bus 24, Tzaneen, Tvl.

1929 Mocke, T. M., Town and Electrical Engineer, Box/Bus 23, Piet Retief, Tvl.

1955 ~~Nobbs, D. Murray, City Electrical Engineer, Box/Bus 369, Port Elizabeth, C.P.~~

1964 Odendaal, M. W., Town Electrical Engineer, Box/Bus 4, Alberton, Tvl.

1957 Paull, R. A., Borough & Elec. Engineer, Box/Bus 57, Vryheid.

1963 Peters, A. G., Town Electrical Engineer, Box/Bus 278, Gwelo, Rhodesia.

1966 Pike, E. B., Town and Electrical Engineer, Box/Bus 8, Kokstad.

1951 Pretorius, D. R., Town Electrical Engineer, Box/Bus 39, Parys, O.F.S.

1952 Pretorius, E. de C., Electrical Engineer, Box/Bus 113, Potchefstroom, Tvl.

1960 Pretorius, J. W., Assistant Electrical Engineer, Box/Bus 23, Nigel, Tvl.

1957 Rautenbach, G. F., Electrical Engineer, Box/Bus 99, Klerksdorp, Tvl.

1965 ~~Reichert, W. J., Town Electrical Engineer, Box/Bus 25, Keetmanshoop, S.W.A.~~

1948 Reyneke, G. M., Town Electrical Engineer, Box/Bus 26, Winburg, O.F.S.

1962 Rishworth, D. L., Town Electrical and Mechanical Engineer, Box/Bus 21, Odendaalsrus, O.F.S.

1966 Robertson, F. H., Electrical Engineer, Box/Bus 19, George, C.P.

1954 Ross, J. W., Municipal Electrical Engineer, Box/Bus 106, Brits, Tvl.

1935 Rossler, W., Town Electrical Engineer, Box/Bus 302, Kroonstad, O.F.S.

1944 Rush, W., Town Electrical Engineer, Box/Bus 43, Harrismith, O.F.S.

1953 Simpson, R. M. O., City Electrical Engineer, Box/Bus 147, Durban, Natal. (Past President).

1937 ~~Smith, E. L., Municipal Electrical Engineer, Box/Bus 215, Boksburg, Tvl.~~

1962 Stanton, R. J. G., Deputy Town Electrical Engineer, Box/Bus 255, Oudtshoorn, C.P.

1934 Stevens, F., Borough Electrical Engineer, Box/Bus 29, Ladysmith, Natal.

1965 Strauss, J. C., Town Electrical Engineer, Box/Bus 60, Sasolburg, O.F.S.

1956 Sulter, F. J., Assistant Electrical Engineer, Box/Bus 145, Germiston, Tvl.

1962 ~~Summers, H. E., City Electrical Engineer, Box/Bus 1803, Bulawayo, Rhodesia.~~

1962 Surtees, E. H., Electrical Engineer, Box/Bus 76, Dundee, Natal.

1962 Te Brugge, E. J., Town Electrical Engineer, Box/Bus 42, Mafeking, C.P.

1946 Theron, G. C., Town Electrical Engineer, Box/Bus 3, Vanderbijlpark, Tvl.

1945 Theron, W. C., Municipal Electrical Engineer, Box/Bus 37, Worcester, C.P.

1966 Trautmann, E. P. E. W., Town Electrical Engineer, Box/Bus 61, Lydenburg.

1950 Turnbull, A. F., Town and Electrical Engineer, Box/Bus 35, Vereeniging, Tvl.

1931 Turner, H. T., Town and Electrical Engineer, Box/Bus 121, Umtali, Rhodesia.

1964 Van den Berg, A. J., Town Electrical Engineer, Box/Bus 94, Krugersdorp, Tvl.

1964 Van der Merwe, D. S., Electrical Engineer, Box/Bus 3, Witbank.

1955 Van der Merwe, F. J., Municipal Electrical Engineer, Box/Bus 20, Stilfontein, Tvl.

1957 Van Heerden, W. J., Electrical Engineer, Box/Bus 201, Heidelberg, Tvl.

1956 Van Meerdervoort, J. K. L. Pompe, Town Electrical Engineer, Box/Bus 33, Barberton, Tvl.

1967 Van Schalkwyk, A. P., Deputy City Electrical Engineer, Box/Bus 288, Bloemfontein, O.F.S.

1965 Van Wyk, A. A., Town Electrical Engineer, Box/Bus 9, Meyerton, Tvl.

1966 Van Wyk, Schoombee, Electrical Engineer, Box/Bus 12, Bothaville.

1945 Vergottini, P. L., Town and Electrical Engineer, Box/Bus 48, Warmbaths.

1951 Verschoor, D. R., Town and Electrical Engineer, Box/Bus 36, Fort Beaufort, C.P.

1957 Von Ahlften, J. K., Town Electrical Engineer, Box/Bus 45, Springs, Tvl.

1955 Vorster, P. J., Municipal Electrical Engineer, Box/Bus 3, Witbank, Tvl.

1954 Waddy, J. C., City Electrical Engineer, Box/Bus 399, Pietermaritzburg, Natal.
1952 Waldron, F. R., Municipal Electrical Engineer, Box/Bus 86, Walvis Bay, S.W.A.
1961 Wiehahn, G. D., Town Engineer, Box/Bus 551, Bethlehem, O.F.S.
1952 Williams, A. H., Assistant Electrical Engineer, Box/Bus 45, Springs, Tvl.
1956 Yodaiken, J., Municipal Electrical Engineer, Box/Bus 197, Ndola, Zambia.

Technical Associates/Tegniese-Geassosieerders:

1965 Barnard, W., Assistant General Manager (Technical Administration) Electricity Department, Box/Bus 699, Johannesburg.
W.J. Ruchit, assistent, Elektrotegnies Ingenieur. Posbus 20, Stilfontein.

Associates/Geassosieerders:

1965 Clarke, J., Municipal Electrical Engineer, Box/Bus 115, Que Que, Rhodesia.
1963 Coetzee, J. C., Town Engineer, Box/Bus 130, Bethlehem, O.F.S.
1965 De Bruyn, Town Electrical Engineer, Box/Bus 15 Willowmore, C.P.
1965 De Jager, M. J., Electrical Engineer, Box/Bus 37, Viljoenskroon, O.F.S.
1962 De Witt, F., Electrical Engineer, Box/Bus 38, Adelaide, C.P.
1966 Hugo, J. G., Electrical Engineer, Box/Bus 51, Bredasdorp.
1953 Haig-Smith, D., Assistant Municipal Electrical Engineer, Box/Bus 113, Queenstown, C.P. (previously of Cradock).
1962 Huysamen, G. A., Electrical Engineer, Box/Bus 5, Postmasburg, C.P.
1959 Jordaan, J. H., Municipal Electrical Engineer, Box/Bus 35, Vryburg, C.P.
1966 Jooste, P. M., Electrical Engineer, Box/Bus 44, Messina. elektrisasteits-ingenieurs-beampte.
1959 Laas, C. P., Electrical Engineer, Box/Bus 15, Kenhardt, C.P.
1959 Lochner, J. van S., Town Electrical Engineer, Box/Bus 64, Ladybrand, O.F.S.
1956 McNamara, A. B., Electrical Engineer, Box/Bus 21, Komgha, C.P.
1962 Ploos van Amstel, W. F., Electrical Engineer, Box/Bus 14, Koppies, O.F.S.
1962 Van der Schyff, G. W., Town Engineer, Box/Bus 24, Carolina, Tvl.
1965 Wilson, A. McD., Town Electrical Engineer, Box/Bus 17, Fort Victoria.

Associate Members/Verbonde Lede:

1946 Andrew, W. M., 7 Tainton Avenue, Bonnie Doon, East London, C.P.
1951 Attridge, W. H., Box/Bus 412, Sasolburg, O.F.S.
1944 Burton, C. R., 54 Memorial Road, Kimberley, C.P.
1956 Barnard, F. J. W., c/o Electricity Supply Commission, Box/Bus 12, Springs, Tvl.
1960 Bozyczko, W. B., Box/Bus 133, Bramley, Tvl. KLIPFONTEIN.
1948 Conradie, D. J. R., Box/Bus 1009, Bloemfontein, O.F.S.
1954 Coetzee, F. J., Box/Bus 21, Evaton, Tvl.
1934 Dawson, C., Electricity Supply Commission, Box/Bus 2408, Durban, Natal.
1965 De Wet, D. P., Box/Bus 19, Groot Brakrivier, C.P.
1948 De Wit, T., Box/Bus 44, Brits, Tvl.
1960 Ford, W. P., Box/Bus 40, Lusaka, Zambia.
1936 Heasman, G. G., Box/Bus 77, Fort Victoria, Rhodesia.
1962 Honiball, G. T., 35 End Street, Rowhill, Springs, Tvl. Park. Tvl.
1962 Liebenberg, S. J., Electrical and Mechanical Engineer, Department of Bantu Administration and Development, Box/Bus 384, Pretoria, Tvl.
1960 McGibbon, J., Box/Bus 92, Carletonville, Tvl.
1946 Mole, E. W., Box/Bus 118, Bramley, Johannesburg.
1926 Muller, H. M. S., Box/Bus 112, Upington, C.P.
1961 Magowan, J. M., Southern Rhodesia Electricity Supply Commission, Box/Bus 377, Salisbury.
1934 Rossler, A., 3 Greenwood Road, Pietermaritzburg, Natal.
1953 Rothman, J. L., Box/Bus 606, Kimberley, C.P.
1966 Thackwray, W. G., c/o Mountbatten Hotel, 44 Soper Road, Berea, Johannesburg.
1948 Woolridge, W. E. L., Box/Bus 24, Harding, Natal.
1947 Williams, J. T., Box/Bus 1617, Pretoria, Tvl.
1946 Wylie, R. J. S., c/o. E.S.C. Rand Undertaking, Box/Bus 103, Germiston, Tvl.
1957 Zeederberg, T. D., Private Bag No. 1, P.O. Pyramid, Northern Transvaal.

Affiliates/Geaffileerders:

1959 AEG South Africa (Pty.) Ltd., Box/Bus 10264, Johannesburg, Tvl.
1957 Aberdare Cables (Africa) Ltd., Box/Bus 494, Port Elizabeth.
1957 Adams, Symes & Partners, Box/Bus 1498, Johannesburg.
1957 African Cables Ltd., Box/Bus 9909, Johannesburg.
1959 African Explosives & Chemical Industries, Ltd., Box/Bus 1122, Johannesburg.
1962 African Wire Ropes, Ltd., Box/Bus 6554, Johannesburg, Tvl.
1957 Allenwest S.A. (Pty.) Ltd., Box/Bus 6168, Johannesburg.
1957 Alcan Aluminium of S.A. Ltd., Box/Bus 2430, Johannesburg.

DAUTH. W.J. Box 5, POSTMASBURG.
SMITH E.L. 23 Kellan Court, Ross St, Germiston (returned mail)

1957 Arthur Trevor Williams (Pty.) Ltd., Box/Bus 2873, Johannesburg.

1959 Asea Electric (Pty.) Ltd., Box/Bus 691, Pretoria.

1957 Aycliffe Cables Ltd., Hargreaves Works, Main Road, Eastleigh, Edenvale.

1963 A. E. I. Henley Africa (Pty.) Ltd., Box/Bus 7404, Johannesburg.

1960 African Lamps (Pty.) Ltd., Box/Bus 75, Industria.

1960 Associated Electrical Industries C.A. (Pvt.) Ltd., Box/Bus 1979, Salisbury, Rhodesia.

1960 Associated Electrical Industries (Pty.) Ltd., Box/Bus 7755, Johannesburg.

1965 Ballenden & Robb, Box/Bus 4648, Johannesburg.

1963 Bell, Harold E., (Pty.) Ltd., Box/Bus 6906, Johannesburg.

1967 Bellis & Morcom Southern Africa (Pty.) Ltd., Box/Bus 815, Johannesburg.

1957 Babcock & Wilcox of Africa Ltd., Box/Bus 4561, Johannesburg.

1957 Brian Colquhoun O'Donell & Partners (Rhodesia), 10th Floor, Chester House, Speke Ave., Salisbury.

1957 British General Electric Co. of S.A. (Pvt.) Ltd., Box/Bus 845, Salisbury, Rhodesia.

1959 British Insulated Callender's Cables S.A. Ltd., Box/Bus 2827, Johannesburg.

1936 W. R. Burnett (Pty.) Ltd., Box/Bus 358, Johannesburg.

1964 Cohen, S., Ltd., Box/Bus 215, Windhoek, S.W.A.

1957 Chloride Electrical Storage Co. S.A. (Pty.) Ltd., Box/Bus 7508, Johannesburg.

1957 C.M.B. Engineering Co. (Pty.) Ltd., Box/Bus 55, Denver, Johannesburg.

1959 Construction Electric Co. (Pty.) Ltd., Box/Bus 10100, Johannesburg.

1959 Contactor (Pty.) Ltd., Zuider Paarl, C.P.
1963 (P.N.) Copperbelt Power Co. Ltd., Box/Bus 819, Kitwe, Zambia.

1964 Crawford Clinksales, Maugham-Brown & Partners, Box/Bus 196, Port Elizabeth.

1957 Crompton Parkinson S.A. (Pty.) Ltd., Box/Bus 4236, Johannesburg.

1965 Cullinan Refractories Ltd., P.O. Olifantsfontein, Tvl.

1957 Davidson & Co (Africa) (Pty.) Ltd., 207 Biccard House, 24 Biccard Street, Braamfontein, Johannesburg.

1957 Dowson & Dobson Ltd., Box/Bus 7764, Johannesburg, Tvl.

1959 Ian Drewett, Box/Bus 35, Johannesburg, Tvl.

1959 Electrical Contractors Association (South Africa), Box/Bus 5327, Johannesburg.

1966 Electrical Protection Co., Box/Bus 570, Benoni.

1957 Enfield Cables (S.A.) Ltd., Box/Bus 5289, Johannesburg, Tvl.

1959 English Electric Co. (C.A.) (Pvt.) Ltd., Box/Bus 2191, Salisbury, Rhodesia.

1957 English Electric Co. S.A. Ltd., Box/Bus 2387, Johannesburg, Tvl.

1961 Farad (Pty.) Ltd., Box/Bus 220, Jeppestown, Tvl.

1957 First Electric Corp. of S.A., Box/Bus 3961, Johannesburg, Tvl.

1957 F. W. J. Electrical Industries Ltd., Box/Bus 58, Alberton, Tvl.
1957 (P.N.) G.E.C. South Africa (Pty.) Ltd., Box/Bus 2406, Johannesburg, Tvl.

1958 George Kent S.A. (Pty.) Ltd., Box/Bus 7396, Johannesburg, Tvl.

1957 W. T. Glover & Co. Ltd., Box/Bus 1386, Johannesburg, Tvl.

1957 E. Green & Son. S.A. (Pty.) Ltd., 406 Barclays Bank Buildings, Kruis Street, Johannesburg.

1957 Heinnemann Electric (S.A.) Ltd., Box/Bus 99, Bramley, Tvl.

1957 Hopkinsons S.A. (Pty.) Ltd., Box/Bus 11029, Johannesburg, Tvl.

1957 James Howden & Safanco (Africa) (Pty.) Ltd., Box 9501, Johannesburg, Tvl.

1957 Hubert Davies & Co. Ltd., Box/Bus 1386, Johannesburg, Tvl.

1960 Hawker Siddeley Brush (Southern Africa) Ltd., Box/Bus 67, Germiston.

1957 International Combustion Africa Ltd., Box/Bus 5981, Johannesburg, Tvl.

1962 A. Jackson, Box/Bus 4814, Cape Town, C.P.

1957 John Thompson (S.A.) (Pty.) Ltd., Box/Bus 3570, Johannesburg, Tvl.

1957 Johnson & Phillips S.A. (Pty.) Ltd., Box/Bus 552, Germiston, Tvl.

1957 R. T. Jones, Esq., 43 The Avenue, Orchards, Johannesburg, Tvl.

1967 Keen's Electrical Distributors (Pty.) Ltd., Box/Bus 2656, Johannesburg, Tvl.

1957 G. H. Langler & Co. Ltd., Box/Bus 3762, Johannesburg, Tvl.

1961 Lodge-Cottrell (Africa) (Pty.) Ltd., Box/Bus 6070, Johannesburg, Tvl.

1957 Harold Martinusen & Co. (Pty.) Ltd., Box/Bus 469, Johannesburg, Tvl.

1957 L. H. Martinusen Ltd., Box/Bus 25664, Denver, Tvl.

1967 Marthinusen & Coutts (Pty.) Ltd., Box/Bus 469, Johannesburg, Tvl.

1957 Merz & McLellan, Box/Bus 11578, Johannesburg.

1965 Minnesota Mining and Manufacturing Co. (S.A.) (Pty.) Ltd., Box/Bus 10465, Johannesburg.

1957 Mitchell Engineering Group S.A. (Pty.) Ltd., 63 Harrison Street, Johannesburg, Tvl.

1965 (P.N.) Motorola S.A. (Pty.) Ltd., Box/Bus 118, Bramley, Tvl.

1959 N.V. Nederlandsche Kabelfabrieken Ltd., Box/Bus 3513, Cape Town, C.P.

1965 North and Robertson (Pty.) Ltd., Box/Bus 309, East London.

1957 Oerlikon S.A. (Pty.) Ltd., Box/Bus 132, Jeppestown, Tvl.

1957 C. A. Parsons & Co. (S.A.) (Pty.) Ltd., Box/Bus 3425, Johannesburg, Tvl.

1959 Patrick Murray (Pty.) Ltd., Box/Bus 1541, Durban, Natal.

1963 Pratley Manufacturing and Engineering Co. (Pty.) Ltd., Box/Bus 55, Luipaardsvlei, Tvl.

1957 ~~Rhotec Sales (Pvt.) Ltd., Box/Bus 2356, Salisbury~~.

1957 Reunert & Lenz Ltd., Box/Bus 92, Johannesburg.

1957 A. Reyrolle & Co. Ltd., Box/Bus 9677, Johannesburg, Tvl.

1960 A. Reyrolle & Co. (Rhodesia) Ltd., Box 1975, Salisbury, Rhodesia.

1957 Rice & Diethelm Ltd., Box/Bus 930, Johannesburg, Tvl.

1967 G. S. Rogers (Pty.) Ltd., Box/Bus 3667, Johannesburg.

1957 Scottish Cables (S.A.) Ltd., Box/Bus 2882, Johannesburg, Tvl.

1960 Siemens S.A. (Pty.) Ltd., Box/Bus 4583, Johannesburg, Tvl.

1957 Standard Telephones & Cables Ltd., Box/Bus 286, Boksburg, Tvl.

1957 Stamcor (Pty.) Ltd., Box/Bus ~~6107~~, ~~Johannesburg~~.

1957 ~~Stewarts & Lloyds of S.A. Ltd., Box/Bus 1195, Johannesburg, Tvl.~~

1957 S.A. General Electric Co. Ltd., Box/Bus 1905, Johannesburg, Tvl.

1957 ~~SA. Philips (Pty.) Ltd., Box/Bus 7703, Johannesburg, Tvl.~~

1957 Superconcrete Pipes (Pty.) Ltd., Box/Bus 92, Roodepoort, Tvl.

1957 Switchcraft (Pty.) Ltd., Box/Bus 6444, Johannesburg, Tvl.

1960 South Wales Electric (Pty.) Ltd., Box/Bus 2180, Johannesburg, Tvl.

1965 South Wales Electric Rhodesia (Pvt.) Ltd., Box/Bus 343, Salisbury.

1965 South Wales Electric Rhodesia (Pvt.) Ltd., Box/Bus 343, Salisbury.

1957 Southern African Cable Makers' Association, Box/Bus 2258, Johannesburg, Tvl.

1967 S.A. National Committee on Illumination, Box/Bus 395, Pretoria, Tvl.

1967 ~~Tork Time Controls Inc., 1 Grove Street, Mount Vernon, New York, U.S.A.~~

1965 G. D. Wiehahn, Box/Bus 664, Bethlehem, O.F.S.

1957 Wilson & Herd (Pty.) Ltd., Box/Bus 3093, Johannesburg, Tvl.

1957 Yarrow Africa (Pty.) Ltd., Box/Bus 6918, Johannesburg, Tvl.

1959 Yorkshire Transformers (S.A.) (Pty.) Ltd., Box/Bus 43, Bedfordview, Tvl.

LIST OF MEMBERS, COUNCIL MEMBERS AND VISITORS ATTENDING THE 40TH CONVENTION OF THE ASSOCIATION OF MUNICIPAL ELECTRICITY UNDERTAKINGS.

COUNCIL AND ENGINEER MEMBERS

(Name of Councillor appears first except where only Engineer attended.)

ALBERTON:
Odendaal, M. W.

BARBERTON:
Van Meerdervoort, Pmpe J. K. L.

BENONI:
Goëbel, R. H. A.
Lees, D.

BETHAL:
Kirkberger, M. N.

BLOEMFONTEIN:
De Villiers, E. E.

BETHLEHEM:
Brown, D. C.

BOKSBURG:
Smith, E. L.

BRAKPAN:
Kruger, M. J.
Barnard, H.

BRITS:
Van Heerden, C. W.
Ross, J. W.

BULAWAYO:
Summers, H. E.

CAPE TOWN:
Barry, C. N.
Frantz, A. C. T.

CARLTONVILLE:
Kriek, C. J.
Loubser, J. A.

DURBAN:
Goldman, R.
Simpson, R. M. O.

EAST LONDON:
Kipling, H. G.
Giles, P. A.

EDENVALE:
Heydenrych, J. N.
Barrie, J. J.

EMPANGENI:
McNeil, J. L.

ESTCOURT:
Erikson, J. G. F.

GEORGE:
Robertson, F. H.

GERMISTON:
Kruger, P. J.
Lombard, C. G.

GWELO:
Peters, A. G.

HARRISMITH:
Rush, W. G.

HEIDELBERG:
Van Heerden, W. J. B.

JOHANNESBURG:
Eager, B. D.
Leishman, R. W.

KEETMANSHOOP:
Psotta, K. J.

KEMPTON PARK:
Marais, W. C.
Futcher, L.

KLERKSDORP:
Randles, T. L.
Gericke, J. M.

KOPPIES:
Ploos-van Amstel, W. F.

KROONSTAD:
Rule, P. C.
Rossler, W.

KRUGERSDORP:
Du Plessis, J. E.
Van den Berg, A. J.

LADYSMITH:
Stevens, F.

LYDENBURG:
Trautmann, E.

MEYERTON:
Thomas, A.
Van Wyk, A. A.

LYS VAN LEDE, RAADSLEDE EN BESOEKERS —40STE KONVENSIE VAN DIE VERENIGING VAN MUNISIPALE ELEKTRISITEITSONDERNEMINGS.

RAAD EN INGENIEUR-LEDE

(Die naam van die Raadslid verskyn eerste, behalwe waar slegs die Ingenieur die vergadering bygewoon het.)

MIDELBURG (Tvl.):
Heydenrych, J. E.

MOSSEL BAY:
Phillips, F. W.

NELSPRUIT:
Du Plooy, D. P.

NIGEL:
Lumsden, D. G.
De Bruyn, P. C.

ORKNEY:
Rutherford, W.
Du Toit, P. L.

PARYS:
Laas, P. A. J.
Pretorius, D. R.

PERI-URBAN AREAS HEALTH BOARD:
Van der Merwe, C. J.
Cronje, W. F.

PIETERSBURG:
De Wet, G. D.
Inglis, J. I.

PIETERMARITZBURG:
White-Cooper, D. H.
Waddy, J. C.

PIET RETIEF:
Mocke, T. M.

PORT ELIZABETH:
Erasmus, J. C. K.
Murray Nobbs, D.

POTCHEFSTROOM:
De Kock, C.
De C. Pretorius, E.

PRETORIA:
Denyschen, A. P.
Stoffberg, T. C.

QUEENSTOWN:
Mattushek, E. F.
Barratt, V. E. O.

RANDFONTEIN:
Kotze, J. F.
Cherry, J. R.
Van Loggerenberg, J. F.
(Town Clerk/Stadsklerk)

ROODEPOORT:
Hugo, H. J.
Botes, P. J.

RUSTENBURG:
Meintjies, P. A.

SALISBURY:
Steer, W.
Lynch, E. C.

SASOLBURG:
Bowden, H. R.
Strauss, J. C.

SOMERSET EAST:
Clarke, M. P. P.

SOMERSET WEST:
Adams, C. H.

SPRINGS:
Ellis, Dr. J. A.
Von Ahlften, J. K.

STANDERTON:
Viljoen, J. H.
Potgieter, N. A.

STILFONTEIN:
Chuk, R. C. E.
Barnard, S. S.
Van der Merwe, F. J.

TZANEEN:
Millen, T. J.

UITENHAGE:
Rens, E. S.
Dawson, J. D.

UMTALI:
Morris, Alderman L.
Turner, H.

UMTATA:
Harris, S.
Carpenter, B. F.

VANDERBIJLPARK:
Van der Walt, H. C.
(Mayor/Burgemeester)
Jamneck, L.
Theron, G. C.

VEREENIGING:
Oliver, R. W.
Turnbull, A. F.

VRYHEID:
Barnard, G. E.
Paull, R. A.

VIRGINIA:
Badenhorst, H.
Hobbs, I. L.

WARMBAD:
Petzer, Dr. J. S.
Heuer, R. W.

WELKOM:
Meyer, W. F.
Barton, R. W.

WESTONARIA:
Pienaar, D. A.
Dreyer, L.

WINDHOEK:
Von Pritwitz, J. B. H.
Lewis, L.

WITBANK:
Van der Merwe, D. S.

AFFILIATES/GEAFFILEERDES :

ORGANISATION/ORGANISASIE	NAME/NAAM	TOWN/STAD
Adams, Ripley & Durr	H. A. Durr	Johannesburg
A.E.I. Henley (Pty.) Ltd.	J. F. Charles L. O. Foster J. T. Grunley	Johannesburg
A.S.E.A. Electric S.A. Ltd.	F. Frank S. C. Roberts	Pretoria
Aberdare Cables Africa Ltd.	G. McL. Yuill J. C. Sutherland	Johannesburg
African Cables Ltd.	W. Randell D. F. Wills	Johannesburg
African Lamps (Pty.) Ltd.	E. Crole	Johannesburg
Alcan Aluminium of S.A. Ltd.	E. B. Martin A. H. W. Hugo	Johannesburg
Arthur Trevor Williams (Pty.) Ltd.	A. T. Williams J. A. Barnett	Johannesburg
Associated Electrical Industries	V. N. N. Pougnet (also representing S.A. Institution of Mechanical Engineers) A. J. Crompton	Johannesburg
Aycliffe Cables Ltd.	C. A. Rist M. Frankle	Johannesburg
Babcock & Wilcox of Africa Ltd.	J. R. Gauld	Johannesburg
British Insulated Callender's Cables (S.A.) (Pty.) Ltd.	R. F. Weaire N. R. Thomas	Johannesburg

ORGANISATION/ORGANISASIE	NAME/NAAM	TOWN/STAD
Central Electricity Corporation	W. P. Ford	Lusaka
Chloride Electrical Storage Co.	P. M. Duggan	Johannesburg
Clinksales, Maughan-Brown & Partners	N. D. Jones W. D. S. Clinkscales	Port Elizabeth
Copperbelt Power Co. Ltd.	J. E. Mitchell	Kitwe
Crompton Parkinson (S.A.) (Pty.) Ltd.	P. M. H. Allen	Johannesburg
Davidson & Co. (Africa) (Pty.) Ltd.	G. R. Parker	Johannesburg
Dowson & Dobson Ltd.	J. V. Grant C. R. Dalton	Johannesburg
Electrical Protection Co.	M. R. Marot H. P. Smith	Benoni
English Electric Co. of S.A. (Pty.) Ltd.	H. Prins M. M. Widman	Johannesburg
	A. L. Castley	United Kingdom
F.W.J. Electrical Industries	G. R. Hain	Johannesburg
Farad (Pty.) Ltd.	G. Gerber	Johannesburg
First Electric Corp. of S.A.	V. F. Checketts	Knights, Tvl.
G.E.C. South Africa (Pty.) Ltd.	H. Frankle	Johannesburg
W. T. Glover & Co. Ltd.	M. Suthers	Johannesburg
E. Green & Son (S.A.) (Pty.) Ltd.	A. W. Bulless	Vereeniging
Hawker Siddeley Brush Ltd.	P. N. Vickerman A. R. Royal W. U. Snell	Germiston
	M. Stratemeier (Rolls Royce Ltd.)	England.
Hopkinsons (S.A.) (Pty.) Ltd.	A. D. Sayers	Johannesburg
Heinemann Electric S.A. Ltd.	E. Tarchalski W. Bozyczko	Johannesburg
Johnson & Phillips S.A. (Pty.) Ltd.	N. M. Clatworthy R. L. Reeves W. Lashley	Germiston
Lodge-Cottrell (Africa) (Pty.) Ltd.	J. L. Easterbrook	Johannesburg
Harold Marthinusen & Co. (Pty.) Ltd.	G. Roeske	Johannesburg
Marthinusen & Coutts (Pty.) Ltd.	C. H. Coutts	Johannesburg
Nederlandsche Kabelfabrieken Ltd.	G. H. van Harten	Port Elizabeth
Merz & McLellan (S.A.)	T. R. J. Bishop R. R. Pattinson	Johannesburg
Oerlikon S.A. (Pty.) Ltd.	C. E. Weber	Johannesburg
C. A. Parsons & Co. (S.A.) (Pty.) Ltd.	T. R. Strawson	Johannesburg
G. S. Rogers (Pty.) Ltd.	J. H. Charter	Johannesburg
Reunert & Lenz Ltd.	T. C. Marsh	Johannesburg
A. Reyrolle & Co. (Rhodesia) Ltd.	M. R. C. Strickland	Salisbury
A. Reyrolle & Co. (S.A.) (Pty.) Ltd.	N. Kirschner	Johannesburg
Scottish Cables S.A. Ltd.	D. G. Sutherland A. C. Grant	Pietermaritzburg Johannesburg

ORGANISATION/ORGANISASIE	NAME/NAAM	TOWN/STAD
Siemens S.A. (Pty.) Ltd.	A. Biehler Dr. O. F. W. Meyer-Witting	Johannesburg
South African General Electric Co. (Pty.) Ltd.	F. W. de Zeeuw S. W. Ralphs	Johannesburg
South Wales Electric (Pty.) Ltd.	C. L. de Beer	Johannesburg
Standard Telephones & Cables (S.A.) (Pty.) Ltd.	J. H. Buss V. Coetzee	Boksburg
John Thompson (Africa)	D. W. Eaton	Johannesburg
Yarrow (Africa) (Pty.) Ltd.	I. C. Fraser	Johannesburg

VISITORS/BESOEKERS

NAME/NAAM	ORGANISATION/ORGANISASIE	TOWN/STAD
Anderson, R. B.	C.S.I.R. (National Research Institute for Math. Sciences)	Pretoria
Bozzoli, Prof. G. R.	University of Witwatersrand	Johannesburg
Das Neves, H.	Mayor of/Burgemeester van Lourenco Marques	Lourenco Marques
Domingos, M.	S.M.A.E.	Lourenco Marques
Du Preez, J. A.	Town Electrical Engineer/Stad-elektrotegniese Ingenieur	Wepener
Duffield, J. R.	Escom Head Office/Eskom Hoofkantoor	Johannesburg
Durr, H. A.	Adams, Durr & Ripley	Johannesburg
Fothergill, E. R. B.	Rhodesia Electricity Supply Commission	Salisbury
Fulcao e Cunha, A. — Eng.	S.M.A.E.	Lourenco Marques
Giesteira, M. V.	Mozambique Railways	Lourenco Marques
Gilmour, A. L.	Rhodesia Electricity Supply Commission	Salisbury
Gosling, A. J. G.	S.A. Railways & Harbours/S.A. Spoorweë en Hawens	Johannesburg
Harding, G. R. D.	Electricity Supply Cmmission/ Elektrisiteitsvoorsieningkommissie	Johannesburg
Hawkins, L. S. (Consul-General)	H.M. Consulate-General of Rhodesia	Lourenco Marques
Hewett, R. F.	Town Electrical Engineer/Stad-elektrotegniese Ingenieur	Mooi River/Rivier
Hooley, L. J.	Rhodesia Government, Ministry of Transport and Power	Salisbury
Lategan, Dr. P. N.	Transvaal Coal Owners Association	Johannesburg
Lino Pires, M.	S.M.A.E.	Lourenco Marques
Lopes, E. — Eng.	Camara Municipal	Lourenco Marques
Martinho, R. — Eng.	President — S.M.A.E.	Lourenco Marques
Malan, G. J.	Munitions Production Board/Krygstuigproduksieraad	Pretoria
Mata, T.	S.M.A.E.	Lourenco Marques
Mariz, M. S. — Eng.	Camara Municipal	Lourenco Marques
Middlecote, A. A.	S.A. Bureau of Standards/S.A. Buro van Standaarde **also representing/verteenwoordig ook** S.A. Institute of Electrical Engineers/ S.A. Instituut van ElektrotegnieseIngenieurs	Pretoria
Moutinho, A. G. — Eng.	S.O.N.E.F.E.	Lourenco Marques
Nel, G. C. (Consul-General)	Republic of South Africa/Republiek van Suid-Afrika.	Lourenco Marques
President	Sociedade de Estudos	Lourenco Marques
Price, E. T.	Electricity Supply Commission/ Elektrisiteitsvoorsieningkommissie	Johannesburg
Shepherd, E. M.	Central African Power Corp.	Salisbury
Silva, J. F. N. — Eng.	Engineer/Ingenieur	Lourenco Marques

NAME/NAAM	ORGANISATION/ORGANISASIE	TOWN/STAD
Sousa, Santos, L.	S.M.A.E.	Lourenco Marques
Sopa,, E. F. da C. — Eng.	Camara Municipal de Beira	Beira
Spaan, J.	Department of Public Works/ Departement van Openbare Werke	Pretoria
Smit, J. W.	S.A. Bureau of Standards/S.A. Buro van Standaarde	Pretoria
Stephen, I. R. G.	The Institute of Certificated Mechanical and Electrical/ Engineers, S.A./Die Instituut van Gediplomeerde Werktuigkundige- en Elektrotegniese Ingenieurs, S.A.	Johannesburg
Subtil, A. B.	Mocambique Secretary for Public Works, Transport and Communications	Lourenco Marques
Straszacker, Dr. R. L.	Electricity Supply Commission/ Elektrisiteitsvoorsieningkommissie	Johannesburg
Telles, J. R. — Eng.	Camara Municipal	Lourenco Marques
Theron, J. N.	Electricity Control Board/Elektrisiteitsbeheerraad	Pretoria
Tomlin, A. W.	Electricity Supply Commission (Rand and O.F.S. Undertaking)/Elektrisiteitsvoorsieningskommissie (Randse en O.V.S. Onderneming)	Johannesburg
Van Schalkwyk, J. N.	S.A. Consulate-General/S.A. Konsulaat-Generaal	Lourenco Marques
Van Wyk, J. D. N.	C.S.I.R. (National Research Institute for Math. Sciences)	Pretoria
Vidago, A. L. — Eng.	Camara Municipal	Lourenco Marques
Wanklin, R. D. (Consul-Commercial)	H.M. Consulate-General of Rhodesia	Lourenco Marques
Wannenburg, G. J.	Department of Labour/Departement van Arbeid	Pretoria

NAME/NAAM	OTHER MEMBERS/ANDER LEDE	TOWN/STAD
Burton, C. R.	(Associate Member/Geassosieerde-lid)	Kimberley
Kane, R. W.	(Honorary Member/Ere-lid)	Johannesburg
Magowan, J. M.	(Associate Member/Geassosieerde-lid)	Salisbury
Milton, W. H.	(Honorary Member/Ere-lid)	Johannesburg
Mitchell, J. E.	(Honorary Member/Ere-lid)	Kitwe
Muller, H. M. S.	(Associate Member/Geassosieerde-lid)	Upington
Muller, G. J.	(Honorary Member/Ere-lid)	Bloemfontein

NAME/NAAM	A.M.E.U. OFFICIALS/A.M.E.U. OFFISIEËLE	TOWN/STAD
Ewing, R. G.	(Representing the Secretaries/ Verteenwoordiger van die Sekretariat)	East London/Oos-Londen
Brewin, Miss E. R.	(Representing the Secretaries/ Verteenwoordiger van die Sekretariat)	Johannesburg
Botha, W. J.	(Sonex — Sound Engineering/Sonex — Klank Tegniek)	East London/Oos-Londen
Conradie, P. J.	(Official Translator/Amptelike Vertaler)	Vanderbijlpark

LADIES/DAMES

(Read Mrs. unless otherwise indicated) (Lees Mev. behalwe waar anders aangetoon)

Name/Naam	Town/Stad	Name/Naam	Town/Stad	Name/Naam	Town/Stad
Adams, C. H.,	Somerset West.	Botes, P. J.,	Roodepoort.	Brewin, Miss E.,	Johannesburg.
Barnard, H.,	Brakpan.	Bowden, A. R.,	Sasolburg.	Bulless, A. W.,	Vereeniging.
Barnett, J. A.,	Johannesburg.	Bozzoli, G. R.,	Johannesburg.	Burton, C. R.,	Kimberley.

Name/Naam Town/Stad

Buss, J. H., Boksburg.

Charles, J. F.
Cherry, J. R., Randfontein.
Clarke, M. P. P., Somerset East.
Coetzee, V., Boksburg.
Coutts, C. H., Johannesburg.
Crompton, A. J., Johannesburg.

Dalton, C. R., Johannesburg.
De Beer, C. L., Johannesburg.
Denyschen, A. P., Pretoria.
Domingos, M., Lourenco Marques.
Dreyer, L., Westonaria.
De Wet, G. D., Pietersburg.
Dugue Martinho, R., Lourenco Marques
Du Toit, P. L., Orkney.

Ellis, J. A., Springs.
Erikson, J. G. F., Estcourt.
Ewing, R. G., East London.

Falcao e Cunha, A., Lourenco Marques
Ford, W. P., Lusaka.
Frantz, A. C. T., Cape Town.
Fraser, I. C., Johannesburg.
Futcher, L., Johannesburg.

Goëbel, R. H. A., Benoni.
Goldman, R., Durban.
Gosling, A. J. G., Johannesburg.
Grant, A. C., Johannesburg.

Hain, G. R., Johannesburg.
Harding, G. R. D., Johannesburg.
Heuer, R. W., Warmbad.
Hewet, R. F., Mooi River.
Heydenrych, J. E., Middelburg, Tvl.
Hugo, A., Johannesburg.

Inglis, J. I., Pietersburg.

Jones, N. D., Johannesburg.

Name/Naam Town/Stad

Kane, R. W., Johannesburg.
Kemp, J. C. G., Piet Retief.
Kirberger, M. N., Bethal.
Kotze, J. F., Randfontein.
Kruger, M. J., Brakpan.

Laas, P. A. J., Parys.
Lashley, W., Germiston.
Lees, D., Benoni.
Leishman, R. W., Johannesburg.
Lino Pires
Lombard, C. G., Germiston.
Fernandos Lopez, S. W., Lourenco Marques

Marais, W. C. Kempton Park.
Mata, T., Lourenco Marques.
Mattushek, E. F., Queenstown.
Meintjies, P. A., Rustenburg.
Meiring, G., Sasolburg.
Meyer, W. F., Welkom.
Meyer-Witting, O. F. W., Johannesburg.
Millen, T. J., Tzaneen.
Mitchell, J. E., Kitwe.
Mocke, T. M., Piet Retief.
Muller, H. M. S., Upington.
Murray Nobbs, D., Port Elizabeth.

Odendaal, M. W., Alberton.

Pattinson, R. R., Johannesburg.
Paull, R. A., Vryheid.
Peters, A. G., Gwelo.
Pienaar, D. A., Westonaria.
Potgieter, N. A., Standerton.
Pougnet, V. N. N., Johannesburg.
Price, E. T., Johannesburg.
Prins, H., Johannesburg.

Randles, T. L., Klerksdorp.
Reeves, R. L., Germiston.
Rist, C. A., Johannesburg.
Roeske, G., Johannesburg.
Ross, J. W., Brits.
Rossler, W., Kroonstad.

Name/Naam Town/Stad

Rule, P. C., Kroonstad.
Rush, W. G., Harrismith.
Rutherford, W., Orkney.

Sayers, A. D., Johannesburg.
Simpson, R. M. O., Durban.
Smith, E. L., Boksburg.
Sousa Santos, L., Lourenco Marques.
Stevens, F., Ladysmith.
Stoffberg, T. C., Pretoria.
Straszacker, R. L., Johannesburg.
Strauss, J. C., Sasolburg.
Strawson, T. R., Johannesburg.
Strickland, M. R. C., Salisbury.
Summers, H. E., Bulawayo.
Sutherland, D. G., Johannesburg.
Sutherland, J. C., Johannesburg.

Tarchalski, E., Johannesburg.
Teles, J. R. Lourenco Marques.
Theron, G. C., Vanderbijlpark.
Theron, J. N., Pretoria.
Thomas, A., Meyerton.
Thomas, W. R.
Tomlin, A. W., Johannesburg.
Trautman, E., Lydenburg.

Van der Merwe, F. J., Stilfontein.
Van der Walt, H. C., Vanderbijlpark.
Van Harten, G. H., Port Elizabeth.
Van Heerden, W. J. B., Heidelberg.
Van Meerdervoort, Pompe, J. K. L. Barberton.
Van Wyk, A. A., Heidelberg.
Viljoen, J. H., Standerton.
Von Ahlften, J. K., Springs.

Waddy, J. C., Pietermaritzburg.
Weaire, R. F., Johannesburg.
White-Cooper, D. H., Pietermaritzburg.
Widman, M. M., Johannesburg.
Williams, A. T., Johannesburg.
Willcox, B. J.

APOLOGIES

COUNCIL AND ENGINEER MEMBERS

The Town Clerk, Robertson Municipality.
Messina Health Committee.
Acting Electrical Engineer, Mafeking.
Town Electrical Engineer, Strand Municipality.

The Town Clerk, Grahamstown Municipality.
The Town Clerk, Kokstad Municipality.
The Town Clerk, Bredasdorp.

VERSKONINGS

RADE- EN INGENIEURSLEDE:

Die Stadsklerk, Munisipaliteit, Robertson.
Die Gesondheidskomitee van Messina.
Die Waarnemende Elektrotegniese Ingenieur, Mafeking.
Elektrotegniese Stadsingenieur, Munisipaliteit Die Strand.
Die Stadsklerk, Munisipaliteit Grahamstad.
Die Stadsklerk, Munisipaliteit Kokstad.
Die Stadsklerk, Bredasdorp.

The Town Clerk, Riversdale Municipality.
The Town Electrical Engineer, Oudtshoorn Municipality.

J. Wilson, Pretoria.
Councillor Representative of Bloemfontein.
The Electrical Engineer, Potgietersrus Municipality.

The Town Clerk, Burgersdorp Municipality.
The Secretary, Thabazimbi Health Committee.
Clerk of the Council, Louis Trichardt Municipality.
The Town Clerk, Dewetsdorp Municipality.
The Town Clerk, Cradock Municipality.
Newcastle Municipality.
Aliwal North Municipality.
J. A. Matthews, Kimberley.
B. Marchand, Witbank.

HONORARY MEMBERS

J. Downey.
J. C. Fraser.

AFFILIATES

Associated Electrical Industries, Salisbury.
The English Electric Co., Salisbury.
R. T. Jones, Johannesburg.
African Explosives & Chemical Industries Ltd., Germiston.
Ballenden & Robb, Johannesburg.

VISITORS

Mr. J. D. C. Baxter, Northern Cape Regional Electrification Board, Kimberley.
Mr. F. H. E. Read, Chief Electrical Engineer, Rhodesia Railways, Bulawayo.
The Secretary, Fuel Research Institute of S.A., Pretoria.

Mr. H. P. Alexander, Natal Undertaking, Electricity Supply Commission, Durban.
The Director of Local Government, Transvaal Provincial Administration, Pretoria.
Mr. F. O. Pearce, Electricity Supply Commission, Border Undertaking, East London.
The Atomic Energy Board, Pretoria.
The Provincial Secretary, Orange Free State, Bloemfontein.
The Provincial Secretary, Natal Provincial Administration, Pietermaritzburg.
The Secretary, Community Development Department, Pretoria.
The Secretary, Department of Commerce & Industries, Pretoria.
The President, Institute of Town Clerks of S.A., Pretoria.

Mr. P. J. W. Henderson, Embalagens de Mocambique (Metal Box), Lourenco Marques.
Mr. G. Ferry, Deputy Mayor, Cape Town.
Cape Provincial Administration, Cape Town.

Die Stadsklerk, Munisipaliteit Riversdale.
Die Elektrotegniese Stadsingenieur, Munisipaliteit Oudtshoorn.
J. Wilson, Pretoria.
Raadslid-verteenwoordiger van Bloemfontein.
Die Elektrotegniese Ingenieur, Munisipaliteit Potgietersrus.
Die Stadsklerk, Munisipaliteit Burgersdorp.
Die Sekretaris, Gesondheidskomitee van Thabazimbi.
Die Klerk van die Raad, Munisipaliteit Louis Trichard.
Die Stadsklerk, Munisipaliteit Dewetsdorp.
Die Stadsklerk, Munisipaliteit Cradock.
Munisipaliteit Newcastle.
Munisipaliteit Aliwal Noord.
J. A. Matthews, Kimberley.
B. Marchand, Witbank.

ERE-LEDE

J. Downey.
J. C. Fraser.

GEAFFILIEERDES

Associated Electrical Industries, Salisbury.
The English Electric Co., Salisbury.
R. T. Jones, Johannesburg.
African Explosives & Chemical Industries Ltd., Germiston.
Ballenden & Robb., Johannesburg.

BESOEKERS

Mnr. J. D. C. Baxter, Noordkaaplandse Streeks-elektrisifikasieraad, Kimberley.
Mnr. F. H. E. Read, Elektrotegniese Hoofingenieur, Rhodesiese Spoorweë, Bulawayo.
Die Sekretaris, Brandstof-navorsingsinstituut van S.A., Pretoria.
Mnr. H. P. Alexander, Natalse Onderneming, Elektrisiteitskommissie, Durban.
Die Direkteur van Plaaslike Bestuur, Transvaalse Provinsiale Administrateur, Pretoria.
Mnr. F. O. Pearce, Elektrisiteitsvoorsieningskommissie, Grens-onderneming, Oos-Londen.
Die Raad op Atoomkrag, Pretoria.
Die Provinsiale Sekretaris, Oranje-Vrystaat, Bloemfontein.

Die Provinsiale Sekretaris, Natalse Provinsiale Administrasie, Pietermaritzburg.
Die Sekretaris, Departement Gemeenskapsbou, Pretoria.

Die Sekretaris, Departement Handel & Nywerheid, Pretoria.
Die President, Instituut van Stadsklerke van S.A., Pretoria.
Mnr. P. J. W. Henderson, Embalagens de Mocambique (Metal Box), Lourenco Marques.
Mnr. G. Ferry, Onderburgemeester, Kaapstad.
Kaaplandse Provinsiale Administrasie, Kaapstad.

The Fortieth Convention of the Association was opened in the City Hall, Lourenco Marques, on Monday, 15th May, 1967. Sessions of the Convention were held in the Sociedade de Estudos. Attendance at the Convention was as follows :— 70 Councils, represented by 46 Councillors and 69 Engineers and Associates ; 4 Honorary Members (not representing Councils or Affiliates); 3 Associate Members ; 74 Representatives of 49 Affiliates ; 45 Visitors (representing Government Departments, Public Utilities and other organisations); 121 Ladies, 4 A.M.E.U. Officials — a total of 366 persons.

FIRST DAY

OPENING SESSION

THE PRESIDENT, Mr. D. Murray Nobbs greeted those at the Convention and called upon the Reverend Father Meisters to lead those present in prayer. In his speech of welcome, the President referred particularly to the following distinguished visitors on the dais: The Honourable, the Mozambique Secretary for Public Works, Transport and Communications; His Worship the Mayor of Lourenco Marques; His Worship the Mayor of Vanderbijlpark; The Consul-General of the Republic of South Africa in Mocambique and the Consul-General of Rhodesia in Mozambique. His Worship the Mayor of Lourenco Marques, Senor Humberto das Neves, then welcomed the Convention to the city. He referred to the bonds of friendship existing between the citizens of the countries of Southern Africa — the Portuguese, South Africans and the Rhodesians, which would, in time he felt, also extend to the newer states of the sub-continent. All visitors were welcome in Lourenco Marques but this was particularly true of those constituting the Association of Municipal Electricity Undertakings of Southern Africa. Electricity symbolised peace and well-being and today entered into all aspects of life and the fundamental object of the

Die Veertigste Konvensie van die Vereniging is op Maandag, 15 Mei 1967, in die Stadsaal, Lourenco Marques, geopen. Die sittings van die Konvensie het in die Sociedade de Estudos plaasgevind. Die Konvensie is deur die volgende persone bygewoon :— 70 Stadsrade, verteenwoordig deur 46 Raadslede en 69 Ingenieurs en Geassosieerdes; 4 Erelede (wat nie Rade of Geaffilieerdes verteenwoordig nie); 3 Geassosieerde lede; 74 Verteenwoordigers van 49 Geaffilieerdes ; 45 Besoekers (wat Regeringsdepartemente, Openbare Nutsmaatskappye en ander organisasies verteenwoordig); 121 Dames en 4 V.M.E.O.-beamptes — altesaam 366 persone.

EERSTE DAG

OPENINGSSITTING

DIE PRESIDENT, Mnr. D. Murray Nobbs, het die aanwesiges welkom geheet en Eerwaarde Meisters versoek om die verrigtinge met gebed te open. In sy verwelkomingstoespraak het die President in die besonder na die volgende hooggeplaaste besoekers op die verhoog verwys:

Sy Edele die Sekretaris van Openbare Werke, Vervoer en Verbindinge van Mosambiek; Sy Agbare die Burgermeester van Lourenco Marques; Sy Agbare die Burgemeester van Vanderbijlpark; die Konsul-Generaal van die Republiek van Suid-Afrika in Mosambiek en die Konsul-Generaal van Rhodesië in Mosambiek. Hierna het Sy Agbare die Burgemeester van Lourenco Marques, Senor Humberto das Neves, die Konvensie in die stad welkom geheet. Hy het verwys na die bande van vriendskap wat daar tussen die burgers van die lande van Suidelike Afrika — die Portugese, die Suid-Afrikaners en die Rhodesiërs — bestaan en wat, na sy mening, ook mettertyd na die nuwere state van die sub-kontinent sal uitbrei. Alle besoekers is welkom in Lourenco Marques, maar dit geld in 'n besonder mate diegene wat die Konvensie van die Vereniging van Munisipale Elektrisiteitsondernemings van Suidelike Afrika uitmaak. Elektrisiteit is 'n simbool van vrede en welsyn, wat vandag alle terreine van die alledaagse lewe betree, en die fundamentele doelstelling van die Vereniging is om die gebruik van elektrisiteit te bevorder, tot die uiteindelike voordeel

Association was to further the utilisation of electricity to the ultimate advantage of the individual citizen, family and community as a whole. In thanking the Mayor for his very warm welcome, the President referred to the fact that the Association had endeavoured to organise a convention in Lourenco Marques the previous year, but circumstances had prevented this; this ambition had only now been realised and with two years of keen anticipation coupled with the warmth of welcome and the surroundings, the occasion could not fail to be successful and memorable.

His Worship, the Mayor of Vanderbijlpark, Councillor H. C. van der Walt, welcomed those present to the Convention with the following words:—

Dit is vir my 'n besondere eer en voorreg om u vandag namens die Stadsraad van Vanderbijlpark by die konvensie welkom te heet.

Twee jaar gelede in Port Elizabeth wou raadslid Jamneck 'n baie gewaagde ding aanvang deur u na Vanderbijlpark uit te nooi maar gelukkig het hy hom betyds besin toe hy gedink het aan die groeipyne van sy jongelingsjare en onthou het dat Vanderbijlpark, as 'n jong en groeiende stad, ook nog aan sulke pyne ly. Soos 'n ware leier het hy sy blik ver in Suidelike Afrika gewerp en voorgestel dat die konvensie in Lourenco Marques gehou word, met Vanderbijlpark as die gashere. Raadslid Deysel het die voorstel gesekondeer en, volgens die notule van die vergadering, is dit eenparig aanvaar. Die groot getal afgevaardigdes wat vandag hier teenwoordig is en die baie aangename gees wat hier heers, bewys dat dit 'n gesonde besluit was.

We are deeply indebted to the City Council of Lourenco Marques for their willingness to share the honour (and the responsibilities!) with us and to act as joint hosts for the Convention.

We should have liked to welcome you in the Steel City, Vanderbijlpark, but we are not as yet in a position to accommodate so many distinguished persons in a manner befitting their standing and in keeping with the high standard which we have set for ourselves in matters such as these. In addition, we in Vanderbijlpark are

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The President expressed the sincere gratitude of the Association for all that the Municipality of Vanderbijlpark had done to make this a happy and successful occasion and then introduced the Honourable, the Mozambique Secretary for Public Works, Transport and Communications, Senor A. V. Subtil, who officially opened the Convention. He addressed the Convention as follows:

"It is for me an honour today to deliver the official opening address to the Convention of the Association of Municipal Electricity Undertakings of Southern Africa.

In deciding on Lourenco Marques as the venue of this Convention, the Association has, I believe, taken what

van die indiwiduele burger, die gesin en die gemeenskap as geheel.

Toe hy die Burgemeester vir sy warme verwelkoming bedank het, het die President verwys na die feit dat die Vereniging gepoog het om reeds gedurende die vorige jaar 'n Konvensie in Lourenco Marques te hou, dog dat dit deur omstandighede verhoed is. Hierdie ambisie word nou eers vervul en met twee jaar se blye verwagting, tesame met die warme verwelkoming en die aangename omgewing waarin die Konvensie plaasvind, kan dit niks anders as 'n suksesvolle en gedenkwaardige geleentheid wees nie.

Sy Agbare die Burgemeester van Vanderbijlpark, Raadslid H. C. van der Walt, het die aanwesiges met die volgende woorde welkom geheet:—

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called upon to make steel for power lines, from Cape to Kariba. (I nearly said Cape to Cairo), for oil pipe lines from Durban to Johannesburg (the one from Beira to Umtali is fortunately already there), and possibly for gas pipe lines from Mocambique to the Reef, and, according to the latest news, the end is not yet in sight.

You will agree, therefore, Mr. President, that our products serve mankind far and wide and that our suburbs are situated far apart (not that we really look upon Lourenco Marques as a suburb), and we trust that you will enjoy yourselves here just as much as you would have done on the banks of the Vaal River back home.

The agenda for the Convention has been prepared with care and insight. A full programme of hard work is in store for you during working hours and formalities have been reduced to a minimum. You gentlemen will, therefore, have to wait until Friday and the weekend before you can enjoy the delights of Lourenco Marques and take a good look at this fair and interesting city.

In these quiet and peaceful surroundings you will be able to think deeply about all the problems awaiting your attention, and, on behalf of the Town Council of Vanderbijlpark, I welcome you once again and wish you a very pleasant and a most successful Convention. I sincerely trust that this Convention will result in ties of lasting friendship and good neighbourship amongst the delegates here assembled and between the various States from which they come.

DIE PRESIDENT het die opregte dank van die Vereniging uitgespreek vir alles wat die Munisipaliteit van Vanderbijlpark gedoen het om die Konvensie so aangenaam en suksesvol te laat verloop, en het toe die Mosambiekse Sekretaris vir Openbare Werke, Vervoer en Verbindinge, Sy Edele Mnr. A. V. Subtil, aan die woord gestel om die Konvensie amptelik te open. Hy het die Konvensie soos volg toegespreek:—

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in years to come will be accepted as a step of great importance in the fostering of closer relations between the territories of Southern Africa. The Republic of South Africa is now one of the most highly industrialised of the 'new' countries of the world and co-operation between

it and some of the lesser developed territories in Southern Africa is of utmost importance to all concerned at this stage of our history. To me it is significant that today there are not only represented here all major electericity generation and distribution authorities in Southern Africa and Government Departments associated with the industry, but also representation of the manufacturing industries connected with electricity generation and supply in the Republic of South Africa as well as overseas countries. Co-operation in pooling of power supplies has long been practised in other parts of the world and to a small extent Mozambique has supplied power to the Eastern areas of Rhodesia for many years. I look forward to the time when, to the benefit of all concerned, the states of Southern Africa will be linked through their electricity undertakings.

It now gives me much pleasure in declaring open this 40th Convention of the Association of Municipal Electricity Undertakings of Southern Africa and to wish it every success in its deliberations."

The President expressed the thanks of the Association to Senor A. V. Subtil for his interesting address and for opening the Convention. He then called upon the Consul-General of the Republic of South Africa in Mozambique, Mr. G. C. Nel, to address the meeting. Mr. Nel spoke as follows:

"É com a maior satisfañao que me encontro hoje aqui e aproveito a opertunidade para endereçar a todos os presentes a esta Convençao algumas palavras de saudaçao.

Suponho ser esta a primeira vez que uma Associaçao se reune nesta Provincia para abordar assuntos de interesses municipais referentes à África Meridional, o que revela uma estreita colaboraçao digna de louvor. Demonstra, do mesmo modo, a preocupaçao que Portugal e o povo português atribuem ao progresso que constitui, felizmente, uma verdadeira realidade ao longo de todo o Moçambique, reflectindo, assim, a determinaçao de Portugal e do seu povo de manterem a integridade do seu todo nacional, decisao de transcendente imporância para nós, seus vizinhos mais próximos.

Vir die buurstate van Mosambiek is vriendskap en samewerking met hierdie gebied, noodsaaklik. Gelukkig bestaan dit reeds. Dit is slegs nodig om hierdie goeie betrekkinge te handhaaf en waar moontlik verder uit te bou. Teenslae in Mosambiek kan ons huidige en toekomstige belange ook nadelig beïnvloed. In ons optrede met hierdie ou buurstaat, hetsy op amptelike-, besigheids- of persoonlike vlak, moet ons dit steeds in gedagte hou en die nodige takt, verstaanbaarheid en vriendskap, toon.

One does not always, however, realize the great difficulties which confront this centuries-old friendly ally of ours and her people in promoting development in Mozambique. The success of this depends on a sound economy. The fact that Portugal has been engaged in guerilla-warfare for over four years in Guinea, Angola and Mozambique that this territory, in addition, is losing valuable revenue as a result of diminishing trade with neighbouring territories through her sea ports and recently suffered severe losses because of adverse climatic conditions, this is no easy task.

This Convention is concerned with the valuable product of electricity, of which Mozambique is known to possess great potential. The development of this commodity, in conformity with the theme of this Convention — "Engineering Knows No Boundaries" — can largely contribute to the sound economy of Mozambique and to the common benefit of all Southern Africa. May your deliberations be successful."

THE PRESIDENT thanked the South African Consul-General and continued:

DIE PRESIDENT het die Suid-Afrikaanse Konsul-Generaal bedank en voortgegaan om te sê:—

Before proceeding with the next item on the programme I would like to take this opportunity of thanking you for electing me as your President for the past two years, thereby honouring the City of Port Elizabeth.

The President, however, can do little without an effective Executive Council, and in this respect I have been indeed fortunate. I would like, therefore, to express my appreciation of all the willing assistance I received from that Executive throughout my term of office. Furthermore, I must give full credit to the convenors and members of the various Sub-Committees which form the machinery which keeps the Association in motion. They do a sterling job of work and I would like them to know that their efforts have been much appreciated.

I would like also to express my thanks to Dick Ewing for the valuable assistance I received during my term of office. Dick's experience of the workings of this Association has been accumulated over many years, and as President one finds that experience of considerable assistance.

And lastly I have much pleasure in recording my sincere thanks to the President-Elect who has been of very great service to me as President of your Association.

Mr. G. C. Theron, Town Electrical Engineer of Vanderbijlpark, has been a member of this Association since

1946, and during the intervening period he has served on the Executive Council of the Association on a number of occasions. He has been also convenor and member of various Sub-Committees associated with the A.M.E.U. and in all this he has proved to be an indefatigable worker for our organisation.

Mr. D. Murray Nobbs then invested Mr. G. C. Theron with the Chain of Office of President of the Association and said "having inducted you into the highest office in our Association, and vested you with the symbol of that office, it is now my privilege to be the first to address you as President, and to wish you a very happy, fruitful and satisfying term of office.

The new President, Mr. G. C. Theron, then gave his Presidential Address:

With the experience he has acquired and the ability he has displayed, I have no hesitation in inviting him on your behalf to come forward and receive the chain of office as President of the Association of Municipal Electricity Undertakings of Southern Africa for the ensuing two years.

Mnr. D. Murray-Nobbs het toe Mnr. G. C. Theron met die ampsketting as President van die Vereniging ingehuldig en gesê:— „noudat ek u in die hoogste amp in ons Vereniging ingestel en u met die simbool van daardie amp beklee het, is dit my voorreg om die eerste een te wees om u as President aan to spreek, en om u 'n baie gelukkige, vrugbare en genoeglike ampstermyn toe te wens."

Die nuwe President, Mnr. G. C. Theron, het hierop sy Presidentsrede gelewer:—

PRESIDENTSREDE, 1967.

deur

G. C. THERON,

Elektrotegniese en Meganiese Ingenieur, Vanderbijlpark.

Dit is nie die eerste keer dat 'n Konvensie nie in die President se tuisdorp sitting hou nie. Konvensies is ook vantevore buite die grense van die Republiek van Suid-Afrika gehou, maar dit is beslis 'n geskiedkundige geleentheid vir 'n Konvensie van hierdie vereniging om te open in Lourenco Marques in die Portugese Provinsie van Mosambiek. Vir dié eer beweys aan Vanderbijlpark en myself, deur my op hierdie unieke geleentheid as u President te verkies, betuig ek my innige dank en waardering.

Ons is diep bewus van die hoë eise verbonde aan hierdie pos, die hoogste eer wat 'n munisipale elektrotegniese ingenieur te beurt kan val en vertrou dat met diens aan die vereniging ons die tekortkominge sal kan bedek.

Ek sê ook dankie aan die Stadsraad van Vanderbijlpark wat dit vir my moontlik gemaak het om hierdie benoeming te aanvaar en vir hulle ondersteuning en hulp.

ENKELE GEDAGTES OOR DIE MUNISIPALE ELEKTROTEGNIESE INGENIEUR EN SY ARBEIDSVELD.

1.0 INLEIDING :

Nooit vantervore was daar so 'n versameling van die alfabet after die name van persone, of ingespan om slagspreuke te vorm nie, as juis nou.

Nuwe metodes, posbenamings en 'n vloedgolf van publikasies het menige kerngesonde ingenieur tydelik verwar.

'n Gevoel van onsekerhied word dan ook dikwels by ingenieurs waargeneem en in die rede sal gepoog word om igenieurs te wys op hulle natuurlike sterkte en die benutting daarvan in diens van die gemeenskap.

PRESIDENTIAL ADDRESS, 1967.

by

G. C. THERON,

Electrical and Mechanical Engineer, Vanderbijlpark.

This is not the first time that a Convention is not sitting in the President's home town. Conventions have also been held outside the borders of the Republic of South Africa, but for a Convention of this Association to open in Lourence Marques in the Portuguese Province of Mozambique is certainly a historical event. For this honour conferred on the Town of Vanderbijlpark and myself by electing me as your President on this unique occasion, I thank you sincerely.

We are deeply conscious of the high standards set previously for this position, the highest honour which can be bestowed on a municipal electrical engineer and trust that through service to the Association we shall be able to conceal the many shortcomings.

I also thank the Town Council of Vanderbijlpark for making it possible for me to accept this honour and for their support and assistance.

SOME THOUGHTS ON THE MUNICIPAL ELECTRICAL ENGINEER AND HIS FIELD OF ACTIVITY

1.0 INTRODUCTION :

Never before has there been such a spate of initials behind person's names or lined up into catch phrases as at the present time.

New techniques, job designations and a flood of literature have temporarily confused many a sound engineer.

A feeling of uncertainty is often noticed amongst engineers and an attempt will be made in this address to focus attention on the engineers' inherent strength and how to employ it in the service of the community.

2.1 INGENIEUR :

In die Oxford Engelse Woordeboek word INGENIEUR verklaar as een wie planne maak, ontwerp of uitvind; 'n skepper, beplanner; ook 'n versinner, 'n samesweerder, een wie strikke span.

In een van sy werke skrywe Spurgeon van "daardie groot ingenieur, Satan" !

In hierdie geval bepaal ek my by die Stads- of Dorpselektrotegniese ingenieurs, as die groep wie se belange my na aan die hart lê en nie die tipe waarna Spurgeon verwys nie.

Beplan of ontwerp kom meermale voor in die woordomskrywing hierbo aangehaal en in die gedagtes wat volg en moet duidelik omskrywe word.

2.2 BEPLANNING :

BEPLANNING word omskrywe as die proses om die verhouding tussen verwante kenmerke te vind, en genoemde verhoudings aan te wend om te skep, teen 'n agtergrond van omstandighede en uiteindelik gebruik.

Vir die doel van die bespreking behels dit dus veel meer as die ontwerp van 'n stuk masjinerie of toerusting en die klem val op SKEP en GEBRUIK.

3.0 OPLEIDING :

Kom ons aanvaar dat die jong student die roeping voel om planne te maak, met ander woorde hy besluit om 'n ingenieur te word.

Uit 'n studie van die leergange aangebied by universiteite in ons land neem kursusse en praktiese klasse, waarby ontwerp betrokke is, van 15% tot 20% van die totale tyd van klasse aangebied in beslag. In die laaste jaar van die kursus is ontwerp so sterk met ander vakke geintegreer dat definitiewe tye vir ontwerp beswaarlik afgeskei kan word.

In 1965 het Dr. Bozzoli, hoof van die ingenieursfakulteit van die Universiteit van die Witwatersrand, die volgende stelling in 'n onderhoud gemaak :-

"Die beweging terug na ontwerp het, glo ek, in Engeland begin en het vinnig versprei. Die tema van die Chicago kongres was : "Bring weer ontwerp terug in die universiteit," en hy het die posisie in die Suid Afrikaanse Universiteite met die volgende stelling opgesom :-

"Deur stadig te wees om te verander is ons nou op datum," Dit is dus 'n feit dat in die verlede ontwerp 'n aansienlike deel van die opleiding van ingenieurs by ons Suid-Afrikaanse Universiteite in beslag geneem het en ook in die toekoms daardie posisie sal behou.

Hierdie waardevolle kleinood van die graduant moet ontwikkel en deur die praktiserende ingenieur gebruik word tot voordeel van die gemeenskap wat hy dien, maar word dikwels afgeskeep en onbenut gelaat vernaamlik gedurende die later jare.

4.0 OORGANGSTADIUM :

Die jong ingenieur wie sy loopbaan in die wêreld van praktiese ingenieurswese begin, voel homself waar-

2.1 ENGINEER :

In the Oxford Engilsh Dictionary ENGINEER is defined as one who contrives, designer; also an inventor, a plotter, a layer of snares.

Spurgeon in one of his works talks of " that great engineer, Satan " !

But in this case we refer to the City or Town electrical engineers, who as a group is my first concern and not the type Spurgeon had in mind.

The word design is used a number of times in the definition above and the thoughts that follow and must be clearly defined.

2.2 DESIGN :

DESIGN is defined as the process of finding the relationships to **create,** against a background of circumstances and ultimate use.

Its scope is therefore, for the purpose of this discussion much wider than the design of a piece of machinery or plant and the emphasis is on CREATE and USE.

3.0 TRAINING :

Let us accept that the young student feels the calling to make plans, to create in accordance with the divine urge in every human being, in other words he decides to become an engineer.

From a study of the carricula offered by universities in our country it is observed that courses and practical classes, which have a bearing on design, occupies from 15% to 20% of the total time devoted to all classes. In the final year, design is so integrated with other subjects that it is difficult to obtain a specific time allocation for this subject.

After attending a conference in 1965 Dr. Bozzoli, Dean of the faculty of Engineering of the University of the Witwatersrand, made the following statement in an interview :-

"The move back to design started in England, I believe, and it has spread very rapidly. The theme of the Chicago congress was : "Re-introduce design in the universities," and he summarised the position in South African Universities with the statement :-

"By being slow to change we are now up to date." It is therefore a fact that design has in the past and will continue in the future to occupy a prominent position in the training of engineers produced by our South African Universities.

This valuable asset of the young graduate should be developed and utilised by the practising engineer to the benefit of the community he serves, but it often left neglected and unemployed, particularly during the later years.

4.0 TRANSITION PERIOD:

The young engineer starting work in the world of practical engineering probably finds his feet first in the

skynlik die gouste tuis in die veld van ontwerp. Dit is wat hy studeer het en waarmee hy slaags kan raak en tasbare resultate kan toon. Hier kan hy met ander saampraat, voorstelle maak en nuttig voel. Maar, helaas, gaan hierdie interessante periode te gou verby en met bevordering kom ander probleme en verantwoordelikhede en word ontwerp deur die druk van omsstandighede in die agtergrond gekuif. Dit is 'n erkende feit dat soos daar geklim word op die leer na die bestuursvlak, die ingenieur in dieselfde verhouding sy rekenliniaal minder gebruik. Aangesien dit die peil is waar die meeste van dié teenwoordig ons bevind, of die visier stel om te kom, sal ons die tussenjare oorslaan en ondersoek hoe beplanning toegepas kan word deur die ingenieur op die bestuursvlak.

5.0 DIE BESTUURDER EN VEREISTES :

Robert L. Katz het die vereistes vir bestuur ondersoek en drie noodsaaklike bekwaamhede voorvereistes vir goeie bestuur soos volg aangegee nl. tegnies, menseverhoudings en begrip.

Henri Fayol onderskei tussen vyf hoof elemente wat die verantwoordlikheid van 'n bestuurder uitmaak en plaas eerste BEPLANNING.

Na 'n ondersoek deur die Amerikaanse sakeblad " Fortune " word top bestuurshandelinge in tien breë kategorieë saamgevat en wanneer geplaas in die volgorde van hulle frekwensie vind ons tweede op die lys " BEPLANNING EN DIE OPSTEL VAN BELEIDE EN OOGMERKE. "

Genoeg is reeds gesê om te bewys dat wat ons bepaal het as die basiese opleiding van die ingenieur nl. ontwerp, hom goed toerus om 'n suksesvolle bestuurder te word indien die talent nie in 'n sweetdoek begrawe word nie.

As ons weer mag put uit die " Fortune " ondersoek dan is die volgende tabel insiggewend :-

Bestuursgroep waaruit bevorder na die boonste pos	% van alle Top-bestuurders	% van Topbestuurders in Nutsondernemings
Wetsgroep	8.2	15.4
Verkope	24.9	4.6
Finansies	16.5	16.9
Algemene bestuurswese	15.9	33.8
Produksie en bedryf	22.8	9.2
Ingenieurswese en Navorsing	10.8	20.0
Andere	0.9	—

As daar aangeneem word dat produksie — en bedryfsposte hoofsaaklik deur persone met 'n ingenieursagtergrond beklee word, dan wil dit voorkom asof 29.2% van top bestuurders — nie lynbestuurders nie — in nutsondernemings in Amerika beklee word deur persone met 'n ingenieursopleiding.

Dit behoort vir ingenieurs 'n riem onder die hart te wees om te onthou dat die vaders van die moderne bestuurs-

sphere of design because this is what he was taught and with which he can come to grips and show tangible results. Here he can take part in discussions, offer suggestions and feel useful. But unfortunately this very interesting period passes all too quickly and promotion brings other problems and responsibilities in its wake and design is pushed into the background and very often forgotten. It is a known fact that as the engineer climbs the ladder to the management level he finds less use for his old friend the slide rule. This is the level where the greater majority present today find ourselves, or is set to achieve and we shall therefore skip the intervening years and see how design can be utilised by the engineer at management level.

5.0 THE MANAGER AND HIS REQUIREMENTS :

Robert L. Katz investigated the management requirements and placed the three first essentials for a successful manager as technical, human relations and understanding.

Henri Fayol groups the manager's responsibilities into five categories and places PLANNING first.

After an investigation the American business paper "Fortune" classified the activities of top management into ten groups and when placed in terms of frequency we find " PLANNING AND THE FORMULATION OF POLICY AND TARGETS " second on the list.

Enough has been said to prove the point that by the basic training of the engineer i. e. design, he is well equipped to become a successful manager if his talent is not neglected.

Taking more material from the " Fortune " investigation we can compile the following interesting schedule :-

Managers' Group from which promotions were made to most senior post	% of all Top Managers	% of Top Managers in Utility Undertakings
Law	8.2	15.4
Sales	24.9	4.6
Finance	16.5	16.9
General Management	15.9	33.8
Production and operation	22.8	9.2
Engineering and research	10.8	20.0
Other	0.9	—

If it is accepted that production and operational posts are mainly filled by persons with engineering background, it would appear that 29.2% of top managers — not line managers — in utility undertakings in America are persons with engineering training.

Engineers should be encouraged by the knowledge that the fathers of the modern management techniques, men

tegniek, manne soos Taylor, Gantt, Gilbreth en andere, almal ingenieurs was. Hulle werk word beskrywe as die toepassing op stowwe, toerusting en werk van gespesialiseerde kennis en vernuf in die wiskundige en fisiese wetenskappe en die beginsels en metodes van ingenieursontleding — juis daardie beginsels wat die fondament vorm van die ingenieur se opleiding.

As ons dink aan plaaslike bestuur in Suid-Afrika dan het ons ingenieurs voorwaar nog 'n groot agterstand om in te haal. Ons lig ons hoed vir diegene wat in die jongste tyd die weg aangewys het.

Die opleiding is reg, die geleenthede is daar maar dit berus by die ingenieurs om dit uit te buit.

6.0 DIE INGENIEUR IN DIE SAMELEWING :

Geen amptenaar wat die gemeenskap in 'n senior posisie dien kan hom alleenlik tot sy vak beperk en verwag om vir langer as 'n beperkte tyd as leier erken te word nie.

Ek wil nie beweer dat ingenieurs soos filmsterre opgehemel moet word nie, maar is die mening toegedaan dat ingenieurs opgelei is om te beplan, te skep en te dien, nie net in die tegniese veld van hulle vak nie maar ook in die alledaagse werksaamhede van die gemeenskap.

Elektrisiteit, ons handelsware, is nie 'n brandstof nie en is meer as 'n vorm van energie; dit is 'n diens.

Die verbruiker kan beswaarlik die verskil verstaan tussen to elektrisiën wat in sy huis kom om hom te help as hy probleme het met 'n toestel, en die elektrotegniese ingenieur tensy die ingenieur gewillig is om met dieselfde verbruiker mee to doen op een of ander vlak van gemeenskaplike belangstelling, en hy sy talente en opleiding kan gebruik om leiding te gee in die bestuur van sulke openbare bedrywighede. Ons moet die regte beeld by die openbare mening skep en status sal vanself volg.

Soos Caesar gesê het: ". . . . die fout, liewe Brutus, is in onsself geleë en nie by ons sterre nie . . . . "

Na alles, status word geskep en gehandhaaf deur eenheid en groei: deur wat ons bereid is om aan te bied en nie deur te agiteer vir wat daaruit gehaal kan word nie.

7.0 DIE INGENIEUR EN DIE PLAASLIKE BESTUUR:

Eendrag Maak Mag en nêrens is dit meer toepaslik nie as juis by die derde vlak van regering, wat staan as 'n bolwerk tussen die kieserskorps en die ander regeringsvlakke.

Stradsraadslede en hulle elektrotegniese ingenieurs is baie nou verbonde aan Jan Burger en moet 'n noodsaaklike diens in die persoonlike lewens van mense lewer. Maar meer as in die geval van die meeste ander professies, moet die ingenieur persoonlik die verantwoordelikheid van die gevolge van sy werk dra. Sy foute is duidelik sigbaar vir almal, vernaamlik as die lig waarby gesien moet word uitgedoof is.

Die ingenieur en sy Raad moet soos 'n span fungeer. Omrede van die besonder gespesialiseerde aard van elektrotegniese ingenieurswese, moet die ingenieur bereid wees om die Raad met advies te bedien, soos 'n INGENIEUR dit in die ware sin van die woord behoort te doen — skepper in die rol van bestuurder van die afdeling, en beplanner as tegniese adviseur vir die Raad.

such as Taylor, Gantt, Gilbreth and others, were all engineers. Their work is described as applying to materials, equipment and work, the specialised knowledge and skill in the mathematical and physical sciences and the principles and methods of engineering analysis — the very principles which form the foundation of an engineer's training.

If we consider local authorities in South Africa, engineers have still a long way to go and we salute those who in more recent years indicated the way.

The training is right, the opportunities are there, but it lies with the engineers to exploit them.

6.0 THE ENGINEER IN THE COMMUNITY :

No official serving a community in a senior position can confine his activities to his speciality only and expect to be looked upon as the leader in his sphere for any length of time.

Without advocating that engineers should be publicised like film stars, I do consider that engineers are trained to plan and create and serve, not only in the technical field of their speciality, but also in the general activities of the community.

Electricity, the commodity we handle, is not a fuel and it is more than a form of energy; it is a service.

How can the consumer appreciate the difference between an electrician, who comes into his house to help him with an appliance when he is in trouble and the electrical engineer, unless the engineer is prepared to meet the same consumer at some level of common interest and use his talents and training in the management of such public activities. We must create the correct image in the public mind and status will look after itself.

As Caesar said: ". . . . the fault, dear Brutus, is in ourselves, not in our stars . . . . "

Status is established and maintained by unity and growth: by what we are prepared to put into the job and not by shouting for what is to be taken out of it.

7.0 THE ENGINEER AND THE LOCAL AUTHORITY:

Ex Unitate Vires — and where is this more necessary than at the third level of government which stands as the bastion between the electorate and the higher levels of goverment.

Town Councillors and their electrical engineers are in the closest contact with the public and must cater for an essential service in the personal lives of people. But more than in the case of most other professions the engineer personally has to carry the responsibility for the results of his work. His mistakes are very evident to the layman, especially when the lights go out.

No wonder the engineer and his Council must operate as a team. Due to the very specialised nature of electrical engineering, the engineer must be prepared to advise the Council as an ENGINEER in the real sense of the word— creator in his capacity as manager of the department and designer as technical consultant to the Council.

Maar die ingenieur moet ook BEVOEG wees om hierdie dinge te kan doen.

Deur kontak met die gemeenskap buite sy werkkring moet hy kennis dra en 'n gevoel kry van plaaslike politiek en deur studie en samesprekings moet hy aan die spits wees van die nuutste ontwikkeling en praktyke.

Geen ingenieur, in die beperkte tyd tot sy beskikking en in die steeds groeiende omvang van die vinnig ontwikkelende nywerheid vir die voorsiening van elektrisiteit, kan hoop om die kennis en ondervinding self te bekom wat geput kan word uit 'n samespreking met mede ingenieurs nie.

Deur die ingenieur kan 'n plaaslike owerheid dikwels, tot groot voordeel van die belastingbetalers, inligting bekom wat oor baie jare deur ondervinding in ander sentrums vergader is. En wat kos dit? Waarskynlik niks meer nie as die ingenieur se reisuitgawe en 'n ete!

Plaaslike besture sal wyslik handel om hierdie aangeleentheid sorgvuldig te oorweeg, alvorens daar besluit word om die ingenieur af te sny van kontak met die praktiserende professie.

8.0 EENVORMIGHEID:

Geen twee persone is identies nie en plaaslike gemeenskappe wat uit lewende persone saamgestel is, is geen uitsondering op die reël nie. Die probleme verskil dus ook van gemeenskap tot gemeenskap. Elke plaaslike bestuur moet dus sy eie plaaslike probleme langs sy eie weg binne die raamwerk van aanvaarde beginsels oplos. Dit kan gedoen word deur samewerking, beplanning en bestuur; juis die beginsels waarlangs die ingenieur deur sy opleiding en professie waardevolle leiding kan gee.

Standardisasie is 'n middel om gewilliglik en doeltreffend gebruik te word in ons werk van bestuur, maar nie vir die doel om na 'n gemeenskaplike aanduier te verlaag nie.

Maar eenvormigheid en inmenging van buite afgedwing, hoe goed dit ookal bedoel mag wees, sal net nuwe probleme in sy spore laat; want dit is vreemd aan ons demokratiese beginsels.

Daar is sekerlik geen gebrek aan probleme in ons hedendaagse wêreld nie. Dit is dan ook waarom ons hier as raadslede en ingenieurs onder die vlerke van die V.M.E.O. vergader om mekaar te help om, tot voordeel van die publiek wat ons bedien, deur samesprekings die vraagstukke te ontleed en op te los, voordat dit tot probleme van omvang ontwikkel.

9.0 DIE V.M.E.O. IN DIENS VAN DIE LAND:

Die belangrike posisie wat die nywerheid vir die voorsiening van elektrisiteit in die uitbouing van die land inneem, word nie altyd besef nie.

Dr. van Eck het dit onlangs baie pittig, soos volg opgesom in sy toespraak oor die ontwikkeling van die waterbronne van Suidelike Afrika:—

"Ons kan van elektrisiteit die belangrikste enkele samesnoerende faktor in Suidelike Afrika maak. As ons graag ons bure wil help is dit die rigting waarin ons moet dink."

But the engineer must also BE in a position to do these things.

He should through his wider contacts with the community have a knowledge and feeling of local politics and through study and consultation be in the forefront of the latest developments and practices.

In the ever widening scope of this fast developing industry of electricity supply, no engineer can hope in the limited time at his disposal, to acquire the knowledge and experience alone which can be gained from a meeting with his fellow engineers.

Through the engineer a local authority can very often and with great advantage to the rate-payers, gain the benefit of the experience, accumulated over many years in other centres. And the cost? Probably no more than the engineer's travelling expenses and a meal!

Local authorities will be wise to give this matter careful thought, before deciding to cut off the engineer from contact with the practising profession.

8.0 UNIFORMITY:

No two persons are alike and local communities consisting of living persons are no different. Thus the problems also differ from centre to centre. Each local authority must therefore solve his own local problems in his own way within the framework of accepted principles. This can be done by co-operation, planning and management; the very principles where the engineer thorugh his training and profession can give valuable guidance.

Standardisation is a tool to be willingly and effectively used, not to level down to a common denominator, but to assist us in our work of management.

But uniformity and interference imposed from outside, however well intended, will only create new problems in its wake; because it is foreign to our democratic principles.

There is certainly no dearth of problems in our modern world. That is why we gather here as Councillors and engineers in the folds of the A.M.E.U. to help one another for the benefit of the public we serve, to solve by discussion and analysis the difficulties, before they develop into problems of magnitude.

9.0 THE A.M.E.U. IN NATIONAL SERVICE:

The importance of the electricity supply industry, in the development of the country, is not always realised.

Dr. Van Eck recently spoke on the production of hydro-electric power in Southern Africa and concluded:—

"We can make electricity the most important single linking factor in Southern Africa. This is the direction we must explore, if we wish to help our neighbours."

Ons nywerheid is 'n waardevolle skakel in die staatshuishouding. Dit is ons plig om volgens die status van ons rang met waardigheid op te tree, maar ook onder die volle besef van die verantwoordelikheid wat dit meebring.

Ons vereniging word wel deeglik geken en geraadpleeg deur die verskillende staatsinstansies in sake wat die voorsiening van elektrisiteit raak, maar so ook het die vereniging, en dit sluit in elke elektrisiteitsonderneming (Raadslede en ingenieurs), 'n verantwoordelikheid teenoor die land om die beleid van die staat uit te lewe.

Besluite op bestuursvlak kan nie in 'n lugleegte geneem word nie. Hulle moet verband hou met werksaamhede binne, sowel as buite 'n organisasie.

Net soos daar vroeër 'n pleidooi gelewer is vir besprekings en konsultasie op ingenieursvlak, ten einde die ingenieur van 'n onderneming beter in staat te stel om sy bestuursfunksie te kan uitvoer, so stel ek dit nou dat dit die plig van ons organisasie is om die land te help, deur ons kontakte na buite uit te bou en te verstewig.

Hierdie vereniging van ons is nie 'n instituut van professionele persone, of 'n vakunie nie maar 'n vereniging van elektrisiteitsvoorsienings-ondernemings saamgestel met die doel:—

"Om munisipale raadslede, elektrotegniese ingenieurs en alle persone met belang in die vordering en ontwikkeling van ondernemings, bymekaar te bring; om wyer kennismaking en wisseling van beskouings te bevorder"— artikel 4(ii) van die V.M.E.O. grondwet.

In 'n profetiese gesig sien die Kommissie van Ondersoek na die Metode van Opleiding vir Universiteitsgrade in Ingenieurswese, "die toekomstige toonaangewende elektrotegniese ingenieurs in Suid-Afrika as beplanners op 'n breë vlak en hulle werk sal grootliks daarin lê om stelsels te skep" — stelsels om energie te lewer deur gas- en oliepype en ekstra hoogspanningsleiding ver buite die grense van die plaaslike bestuur, die provinsie of die Nasionale grense. Die status van hierdie vereniging en dié van die samestellende lede, sal in die toekoms bepaal word deur wat ons bydra tot die bou van 'n voorspoedige en gelukkige Suidelike Afrika.

Die Presidentsrede is met groot byvalsbetuiging ontvang, waarna die Konvensie verdaag het.

Our industry is a valuable link in the economic structure of the country. It is our duty to act with dignity and in accordance with the status of our position, but also with full appreciation of the responsibilities associated therewith.

Our association is recognised and always consulted by departments of state in matters associated with the supply of electricity. But the association, and that includes every electricity undertaking (Councillors and engineers), has a duty to support and live up to state policy.

Management decisions cannot be made in a vacuum. They depend on activities that occur within an organisation and also on those outside it.

Earlier a case was made for consultations and discussions at engineers' level in order to provide better equipped engineers to carry out their function as managers of the undertaking. Now I put it to you that it is the duty of our organisation to serve our country by developing and fostering our outside contacts.

This association of ours is not an institute of professional persons or trade union, but an association of electricity supply undertakings constituted with the object:—

"To bring together municipal councillors, electrical engineers and all persons interested in advancement and development of undertakings; to promote wider contact and exchange of views" — clause 4(ii) of the A.M.E.U. constitution.

In a prophetic vision the Commission of Enquiry into the Method of Training for University Degrees in Engineering "sees the leading electrical engineers in South Africa as planners on a broad scale and their work will largely be concerned with organising systems" — systems of supplying energy by gas and oil pipe lines and super tension cables far beyond the boundaries of the local authority, the province or the National borders. The status of this association and that of its constituent members, will be determined in the years ahead by our share in the building of a prosperous and a happy Southern Africa.

The Address was received with acclamation and the Convention then adjourned.

FIRST DAY, AFTERNOON.

In opening the session, the President welcomed delegates and gave various announcements including the fact that for the first time the Association was trying out a method of simultaneous translation from English to Afrikaans and from Afrikaans to English for the benefit of those who wished to utilise it. At this stage, Mr. R. M. O. Simpson, Durban, interjected and proposed a vote of thanks to the President for his most interesting address made at the conclusion of the morning session. On the proposal of the President, it was unanimously resolved to ratify the actions of the Executive Council as follows, this being due to circumstances beyond the control of the Association and relating to rulings concerning the holding of conventions bienially:

(1) In not holding a convention the previous year and in place thereof, holding a Technical Meeting in Bloemfontein,

(2) In remaining in office as an Executive Council for two years instead of one.

The President then called for nominations for the office of President-elect.

Councillor Jamneck, Vanderbijlpark, addressed the meeting as follows:—

Mnr. die President, voordat ek aangaan met die voorstel wil ek u ook, as verteenwoordiger van Vanderbijlpark, ná die Burgemeester vanmiddag, baie geluk wens met u keuse en u instelling as President van hierdie Vereniging. Ons het 'n paar jaar gelede in Port Elizabeth met hierdie voorstel gekom vir die vise-President en ek het die stoute skoene aangetrek om u te nooi as Konvensie na Lourence Marques namens Vanderbijlpark en ek kan u die versekering gee dat dit soveel byval by my Raad gevind het dat ons Burgemeester en sy gade albei vandag hier teenwoordig is. Ons wil vir u sê baie geluk met u benoeming en ek hoop en vertrou dat u Konvensie een van die uitstaandes sal wees in die bestaan van u Vereniging. Vir die amp van aangewese President is dit vir my 'n aangename voorreg om 'n voorstel hier in te dien. Mnr. Turner is sedert 1931 lid van hierdie Vereniging en Mnr. Turner, sover ek weet en hom ken, is een van daardie persone wat groot respek, groot agting by sowel Afrikaanssprekende as Engelssprekende lede van hierdie Vereniging afdwing. Hy is nou wel 'n Rhodesiër, 'n goeie Rhodesiër, 'n bekwame een, maar ek dink hy gaan net so 'n goeie Republikein ook wees as hy, indien moontlik, in die Republiek van Suid Afrika kon woonagtig wees. Ons weet Mnr. Turner doen geweldige groot werk in Rhodesië, hy is standvastig, hy is onverstrokke in sy standpunt en hy lewe daardie standpunt uit en dit is daarom vir my 'n groot voorreg om Mnr. Turner van Umtali voor te stel. Ek wil nou eintlik Mnr. Turner se „ testimonials " in Engels gee, dit is eintlik tegnies en ek is nie bekwaam genoeg om dit in Afrikaans oor te dra nie.

Mr. Harry Turner from Umtali, Rhodesia, was born and educated in Johannesburg, where he received his Technical Eduction at the Witwatersrand Technical College, and practical training with Messrs. Hubert Davies & Co. He never allowed the grass to grow under his feet but moved about to accumulate experience in electrical engineering appointments in Blanco, Port Shepstone and Springs until he was appointed Town Electrical Engineer of Umtali in 1939. Not only is he one of the members with the longest membership, having been a member since 1931, but his qualifications are well spread over Southern Africa, the area of our coverage. He is a member of the Institute of Certified Engineers of South Africa, a Chartered Electrical Engineer, an Associate Member of the S.A. Institute of Electrical Engineers, Member of the National Apprenticeship Committee for the Electrical Industry of Rhodesia, Member of the Federal Ministry of Power Working Party on Electrical Distribution in Rhodesia and a Charter Member of Umtali Rotary Club. Mr. Turner has served on the Executive Council of your Association for many years and is well qualified to foster the close ties between the Republic and our friends up north.

Mr. President, I nominate Mr. Turner of Umtali as President-elect.

EERSTE DAG, NAMIDDAG.

Nadat hy die sitting oop verkaar het, het die President die afgevaardigdes verwelkom en verskeie aankondigings gemaak, met inbegrip van die feit dat die Vereniging vir die eerste keer, by wyse van proefneming, 'n stelsel van gelyktydige vertaling van Engels in Afrikaans en van Afrikaans in Engels ingestel het vir diegene wat daarvan gebruik wil maak. In hierdie stadium het Mnr. R. M. O. Simpson van Durban tussenbei getree en 'n mosie van dank aan die President voorgestel vir die besonder interessante toespraak wat hy net voor die beëindiging van die oggendsitting gelewer het.

Op voorstel van die President, is daar eenparig besluit dat die volgende handelinge van die Uitvoerende Raad, wat aan omstandighede buite die beheer van die Vereniging en aan die beslissings aangaande die hou van tweejaarlikse konvensies te wyte is, bekragtig word:-

(1) Die feit dat daar die vorige jaar nie 'n Konvensie plaasgevind het nie, dog dat daar, in die plek daarvan 'n Tegniese Vergadering te Bloemfontein gehou is;

(2) Die feit dat die Uitvoerende Raad vir twee jaar as sodanig gedien het, in plaas van slegs een jaar.

Hierop het die President nominasies gevra vir die amp van Aangewese President. Raadslid Jamneck van Vanderbijlpark het die vergadering soos volg toegespreek:—

The President responded to the previous speaker's remarks in connection with the morning's preceedings and called for a seconder to Cr. Jamneck's proposal.

Alderman Morris, Umtali, then addressed the Convention.

Mr. President, at the outset I would like to congratulate you on your election to the high office of President of this Association. Secondly, it gives me very great pleasure to second the proposal of the last speaker. I have known Mr. Harry Turner for the last 28 years, both as a friend and as the town's Electrical Engineer, and I can honestly say he is a man of the highest integrity, a man who is not afraid to do a job and who will always do it to the best of his ability. I am sure that it is a job that he would fulfil very well if he should be elected as President of this Association. In seconding this pro-

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The President proceeded :—

Thank you, Alderman Morris, we much appreciate your words and the invitation to Umtali. At this stage, this being a democratic organisation, we must ask if there are any other nominations. Well, Gentlemen, I think this is quite unanimous. There are no other nomi-

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Mr. Turner responded as follows :—

Mr. President, Ladies and Gentlemen, I am greatly honoured today to be President-elect of this Association. Not only is this an honour to me personally and to the town of Umtali which I represent here today, but to that newly independent, much maligned, but still very stout-hearted country, Rhodesia. I would like to thank my sponsors, Councillor Jamneck of Vanderbijlpark and my

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Referring to the invitation to hold the 1969 Convention in Umtali, the President made the following statement :—

We have an invitation from Alderman Morris for the holding of the next convention in Umtali. That, as things are going at the moment, will be two years hence. Now, much has taken place in a short time and a lot

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The President introduced discussion on the amendment of the Constitution. Councillor Meyer, Welkom, on behalf of the Sub-Committee responsible for the proposed amended Constitution, addressed the Convention as follows :—

Mr. President, Ladies and Gentlemen, I have been asked to propose the amendments to the Constitution. These amendments have been circularised and I hope that they are all acceptable. I would like to express my thanks to you, Mr. President, to Mr. Leishman and to Mr. Ewing for the work that you have done in order to bring them about. I will shortly state the reasons for these amendments. We have from time to time received

Die President het geantwoord op die vorige spreker se opmerkings insake die oggend se verrigtinge en het toe 'n sekondant vir Raadslid Jamneck se voorstel gevra. Raadsheer Morris van Umtali het die Konvensie soos volg toegespreek:—

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posal, I would also like to let you know that we are holding the Town Clerks' Conference in Umtali in 1969, and I would extend a very warm invitation to you to hold your Convention in 1969 in our town of Umtali. Some of you may think that this is a tall order to have two conferences in one year is Umtali. Well, Mr. President, Ladies and Gentlemen, we can beat sanctions and this will be chicken feed. Accordingly, Sir, I formally second Mr. Turner's nomination as President-elect and extend a warm invitation to you to hold your Convention in Umtali in 1969.

Die President het voortgegaan:—

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nations and the acclamation has already indicated the election of Harry Turner as President-elect. Thank you very much indeed. Mr. Turner, you have heard the results — I must ask you to kindly take your seat in the dais, if you will come up, please.

Mnr. Turner het sos vlg geantwoord:—

Councillor, Alderman Morris of Umtali. I only hope that I will be worthy of this high office. Ten slotte, Mnr. President, ek is bevrees dat my kennis van Afrikaans met verloop van tyd verswak het. As ek in die opsig nie so vlot soos u is nie, hoop ek nogtans dat my poging by u byval sal vind. Dankie Mnr. President, Dame en Here — Ladies and Gentlemen, once again, I thank you.

Met verwysing na die uitnodiging om die 1969-konvensie in Umtali te hou, het die President die volgende verklaring gemaak:—

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more can happen in two years. I must therefore ask you not to take a decision this afternoon, but to leave a final decision on this matter to the Executive when the time is more appropriate and nearer to the due date.

Die President het die besprekings oor die wysiging van die Grondwet ingelei. Raadslid Meyer, Welkom, het die Konvensie soos volg toegespreek namens die Subkomitee wat vir die voorgestelde gewysigde Grondwet verantwoordelik was :—

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suggestions and proposals for amendments to the Constitution. The Executive carefully considered all these proposals and the necessary amendments have been made and we trust that they are acceptable.

Vir eers het dit, as gevolg van die besluit van die Verenigde Munisipale Bestuur, noodsaaklik geword dat daar nou nie elke jaar 'n Konvensie gehou word nie maar 'n Tegniese Vergadering moet tussenin kom. As

gevolg daarvan moes die doelstellinge van die Vereniging gewysig word om ook voorsiening te maak vir die hou van Tegniese Vergaderings in daardie jaar wat daar nie 'n Konvensie plaasvind nie. Die nodige wysigings is dwarsdeur die Konstitusie aangebring.

Then, furthermore, Mr. President, at the Windhoek Convention, it was decided to have a President-elect and as a result thereof we had to amend that portion of the Constitution dealing with the Executive. We now have quite a number of regional branches, the chairmen of which are serving on the Executive. This position also makes changes in the Constitution desirable.

Nou wil ek, wat die Afrikaans betref, voorstel dat ons vir „President-elect" gebruik „Inkomende President" of „Aanstaande President." Dit dui daarop dat hierdie persoon die aanstaande president of the persoon sal wees wat die Presidentstoel sal inneem en aanvaar wanneer die tyd kom om 'n verandering te maak. En dit het sekere tegniese probleme teweeggebring. Nou ek is nie voornemens om al die verskillende artikels wat gewysig is, te behandel nie : ek sal net wys op die vernaamste. Daar is 'n fout in die Engelse paragraaf 14(2). It should read :—

" In terms of (i), (ii) and (iv)," — not (iii).

Discussion on the proposal continued as follows :—

President : Baie dankie Raadslid Meyer vir die breedvoerige en duidelike manier wat u vir ons die wysigings voorgedra het. Voordat ons dit oopstel vir bespreking wil ek net graag die prosedure soos in die huidige grondwet vasgelê is, vir u uitlees. The procedure for amending a constitution is set out in Clause 24 of the existing Constitution.

(1) This Constitution may be amended by decision of the Convention and after the Executive Council has reported to the Convention on the proposed amendment.

(2) The proposal for amendment of the Constitution must be contained in the agenda of the Convention and unless proposed by the Executive Council, must be received in writing by the Secretary/Treasurer at least three months prior to the Convention.

What you have before you at the moment are amendments proposed by the Executive, resulting from proposals and suggestions received over a number of years. It is therefore for this Convention now to discuss the proposed amendments. No amendments to the proposed amendments can be submitted, but it is for the Convention now to vote whether they accept the proposals of the Executive Council, reject them, or refer them back.

As daar nou iemand is wat graag wil praat in verband met die saak of die voorstel van Raadslid Meyer wil sekondeer is dit nou oop vir bespreking.

From the regional branches you do not have councillor representation on the Executive. In the Afrikaans it is correct. As far as the Secretary/Treasurer is concerned we have brought in an amendment that the Secretary/Treasurer shall present to the Executive a statement of accounts for each financial year — that is, in paragraph 19. In paragraph 20 we brought in the legal adviser and auditor and in paragraph 22 sub-paragraph (6) there is a new provision that each regional branch shall advise each Convention of the Association prior to the election of the incoming Executive of the name of each representative on such incoming Executive Council. In paragraph 25 we have brought in the equal recognition of the two official languages, viz., that the Convention accepts English and Afrikaans as its official languages. In die Afrikaans is dit net ongekeer i.v.m. die gelyke erkenning van die twee amptelike tale : die Konvensie van die Vereniging aanvaar nl. Afrikaans en Engels as sy amptelike tale. Mnr. die President, Dames en Here, soos ek vir u gesê het, het ek vir u die vernaamste wysiginge op gewys en ons vertrou dat ons al die voorstelle behoorlik behandel het en dat almal se wense tevrede gestel is. Ek wil dus hiermee voorstel die aanname van die Konstitusie soos wat dit gewysig en aan u gesirkuleer is.

Die besprekings omtrent die voorstel het soos volg voortgegaan :—

W. H. Milton, Honorary Member : I am sorry that insufficient time was given to enable any suggestions to be put forward to the Executive prior to this Convention to meet with your requirements regarding the amendments to the Constitution. But I notice that from the printed form at least one amendment has been made in English and that is in Item 14, the Executive Council, where you have Item 1, sub-paragraph (iv), in the last two lines : there the printed version says " two of whom." Speaking from the pulpit, if I may describe it as such, we were told it was " two of them," not " two of whom." Because " whom " could refer to the entire number dealt with under (i), (ii), (iii) and (iv) inclusive, whereas I think it is quite clear that it is the six engineers, two of which six shall be from . . . etc. So the "two of them " is correct. Whether the word " hulle " in the Afrikaans conveys exactly the same sense, I don't know. But that confusion, Mr. President, has occurred over the years. Whereas certain Executive members were elected to specific offices had been taken into account when it comes to a question of representing the various provinces. That is avoided in the present amended constitution if you may say " two of them," that's two of the six. The other point, Mr. President, I don't think you will record this quite in the manner in which I will put it to you, and that is the age-old question under Clause 7, Qualifications.

In paragraph 1, in the last line you refer to the election of member undertakings to this organisation.

And you say in the end "who shall have such experience and hold such qualifications as may be acceptable to the Executive Council and who is himself an engineer member or an associate." But before a man becomes a member or an associate the undertaking must be a member of this organisation in terms of sub-paragraph (v) and sub-paragraph (ii), so how a man becomes a member or an engineer member of this organisation before the Council becomes a member undertaking, I don't know, and yet the Council cannot become a member undertaking until they have an engineer who is himself an engineer member or an associate, so I think some change should be made there before this is finally drafted, otherwise you have two conflicting paragraphs in your constitution and you may make it impossible to apply. Again, in paragraph (2), sub-paragraph (v) of Clause 7 you refer to "professional engineer." You have avoided the use of the word "professional" everywhere else and merely describe the engineer as one who has qualifications acceptable to the Executive and I don't see why there should be a differentiation between member undertaking Engineers and Technical Associates on the grounds as to whether one is a professional engineer or not. I think you should adhere to your description of qualifications acceptable to the Executive. I think the use of the word "professional" may present difficulty in the future.

R. M. O. Simpson, Durban: Mr. President, there are just one or two little points I would like to raise here. Dealing with Section 10, you say in paragraph (1): "The Association, except where in the opinion of the Executive Council there are exceptional circumstances, shall hold bi-ennial Conventions or Technical Meetings of members." Now by the word "or" I presume there it can only be a bi-ennial Technical Meeting or a bi-ennial Convention. It may lead to a bit of confusion and the intention should be clarified. Dealing with the next point, Section 14, I'm a little worried about this. I can quite appreciate the Executive's concern and their attempt to reduce the numbers, but there are difficulties. To start with, there is no guarantee of continuity — it is quite possible with this constitution as it stands for the complete Executive, President-elect and everybody, to be voted off the Executive. It can happen, so there is no guarantee of continuity which, I think, is a very serious weakness. I feel in an organisation like this with its very wide national responsibilities, that continuity in the Executive is of great importance. Up till now we have had it with the past presidents. The other point is the wording of sub-paragraph (iv) the wording there, whether it's "them" or "whom," I quite agree with Mr. Milton on that particular point. Also, the position here is that there shall not be more than two for every province, but you are only allowing a total of six, which means that it is possible for two provinces or other areas to have no representation at all. You might say that they can be looked after by the branch representative, but that is only an engineer member.

I think with the conversion from annual to bi-annual conventions the amount of work that is going to be thrown on the Executive must increase and I feel that it is cutting it a little too low to have six members. I would like to see that number increased, possibly to about eight. I think there should be another clause providing that at least one representative should be elected from each province or other area. I think these are very important points and that the Convention will make a mistake if it allows them to be over-ruled.

E. de C. Pretorius, Potchefstroom: Mnr. die President, ek wil net een ding duidelik kry — u het gesê ons mag nie wysigings voorstel nie maar dit is tog gewone redelike prosedure dat 'n mens 'n amendement op 'n voorstel kan voorstel. Sal u daardie punt duidelik kry?

President: Mnr. Pretorius, die huidige grondwet lê dit neer dat wysigings moet ingedien word drie maande voor 'n konvensie, sodat dit deur die Uitvoerende Raad behandel kan word, dis die bedoeling daarvan en wanneer die voorstelle van die Uitvoerende Raad kom na die Konvensie, soos vanmiddag die geval is, dan moet dit aanvaar word of terug verwys word na die Uitvoerende Raad. In ander woorde as die Konvensie vanmiddag nie gelukkig is in verband met die voorstelle van die Uitvoerende Raad nie, dan moet dit terugverwys word.

P. J. Botes, Roodepoort: Mnr. die President, vergun my eers hierdie geleentheid om u en u gade geluk te wens met u instelling as President van hierdie Vereniging. Ek vertrou dat u en u gade 'n gelukkige twee jaar sal hê. Mnr. die President, in verband met die wysigings is daar net een puntjie wat ek graag opgeklaar wil hê. Klousule 14 praat van die voorsitters van behoorlik saamgestelde streekstakke, dan kom ons by Klousule 22(6) „elke streektak moet die Konvensie van die Vereniging voor die verkiesing van die inkomende Uitvoerende Raad inlig aangaande die naam van sy verteenwoordiger." Now die kwessie is dit, daar is by streektakke probleme in verband met die vraag of dit nou 'n verteenwoordiger moet wees of die voorsitter van die tak. Ons wil graag daardie punt opgeklaar hê. Dan insake die voorgenome veranderings aan die Konstitusie voel ek dat hierdie veranderings aangeneem moet word dat ons volgens mnr. Simpson se voorstel moet handel. Ek hou baie van mnr. Simpson se voorstel en ek voel dat dit miskien met die volgende konvensie bespreek kan word

President: Dankie mnr. Botes, ook vir u vriendelike woorde. Net om hierdie punt in verband met die streektakke te verduidelik, dit is verteenwoordigers wat op die Uitvoerende Raad dien en is nie noodwendig die voorsitters van die takke nie. Dit mag die voorsitters wees. As far as the representation of the Regional Branches is concerned the proposed Constitution pro-

vides for their representatives from the Regional Branches to be nominated to the Executive Council. These people may also be the Chairmen but not automatically as in the previous Constitution. Mnr. Botes ek glo u is heeltemal reg, die punt is so gestel in die Engels maar in die Afrikaans het 'n fout glo ingegly. Is u tevrede met die interpretasie daarvan ?

J. J. Barrie, Edenvale : As proposed by the Executive and I think that we are all in favour of streamlining and bringing our proposals up to date so I, under the circumstances not being able to achieve any change, have great pleasure in seconding Councillor Meyer's proposals that we formally adopt this Constitution and that we use the interim period to weigh up the proposals and that we formulate posible further changes for the next Convention.

President : Thank your, Mr. Barrie.

E. B. Martin, Alcan Aluminium of S.A. Ltd. : Mr. President, if I may make a suggestion, looking at Clause 24 of the amendments before us this afternoon. Subsection (2) says " The proposal for amendment of the Constitution must be contained in the agenda of the Convention " — I think that has been done, but then it says " and, unless proposed by the Executive Council, must be received in writing by the Secretary/Treasurer at least three months prior to the Convention." So if the Executive Council were to propose amendments, then surely these could be accepted during this Convention, so I wonder if it would be possible for the Executive Council to consider the suggestions which have been made here this afternoon and then if they are prepared to propose these amendments the matter can be voted on and finalised now, instead of waiting another two years.

President : Mr. Martin, thank you very much. In reply, however, there is no Executive Council Meeting scheduled before Friday and the position is that if we don't accept the proposals before the Convention this afternoon, then the election of the Executive Council will have to be in terms of the old constiution.

R. Leishman, Johannesburg : You have taken the words out of my mouth, Mr. Chairman. We have to get on with this Convention and we cannot wait to amend the Constitution before we can elect our incoming Council. I think it should be said to members that one of the motives behind the drafting committee in restricting the number of Engineer Members elected results from the representation of Branches. You will notice from the Constitution that an area branch may be as small as three towns and it is possible that the Executive Committee will grow to perhaps an unwieldly state. Another point is that this Association has not got a bottomless purse. We have to have a mid-year meeting of our Executive and the Association pays the travelling expenses not only of the Engineer Member, but the Councillor Member who has to come to that mid-year Executive meeting. We feel that with a committee involving over 20 people it is rather a big strain on this Association's finances. There will come times when we have amending legislation when we may have to meet two, three and four times a year and I feel if there is anyone here who feels that there is not a large enough Council they should take those facts into account.

Mr. Chairman, I would appeal to the members present here this afternoon not to rewrite this Constitution. It is a good Constitution — there may be typographical and translation amendments which are minor and I think we should confine ourselves to those.

R. M. O. Simpson, Durban : Mr. Chairman, I can see difficulties. However, I don't think we can overlook the points that I have raised and I feel very strongly that the Executive should take these into account. I think it was Mr. Berrie's suggestion that this Constitution be adopted and the Executive go into this matter and make adjustments in the light of what has been said this afternoon. On that basis I would be quite prepared to support it, and I think Mr. Milton would probably do the same, but I am not prepared to support it unless the Executive will reconsider the points that have been raised at this meeting today.

E. de C. Pretorius, Potchefstroom : Mnr. die President, voordat u die saak tot stemming bring, wil ek u net daarop wys. Mnr. Leishman het gepraat van drukfoute en tekfoute, maar dit is die minste. Daar is heelparty plekke waar die Afrikaans glad nie met die Engels korrespondeer nie. So as ons vanmiddag die Konstitusie aanneem sal ek nou voorstel dat ons die teks soos hy in Engels verskyn aanvaar en laat die Afrikaans behoorlik vertaal word.

President : Dankie, mnr. Pretorius, ons waardeer u voorstel. Replying to Mr. Simpson, I want to give him the assurance that all points raised here this afternoon will very definitely go to the Executive for a proper restudy and submission of any further amendments. At the next convention, that will be two years hence, we will reconsider the position.

Gentlemen, we have had a proposal and a seconder for the adoption of the amended Constitution. I think the views have been adequately voiced and I now ask you to indicate whether you propose to accept this or whether there are any contrary proposals. Is u tevrede daar is geen teenvoorstelle nie? Die Engelse teks is dan die offisiële een en die Afrikaans sal hersien word. Tevrede? Baie dankie Menere. Dan is die Konstitusievoorstelle soos deur die Uitvoerende Raad aan u voorgelê nou aanvaar en dit vorm die basis van ons Konstitusie van nou af. Thank you.

The English text of the Constitution as adopted is appended to these Proceedings as is also a corrected translation thereof into Afrikaans.

The Convention proceeded with the election of the Executive Council.

Branch representation was announced as follows :—

Natal Regional Branch — R. M. O. Simpson.
Cape Eastern Regional Branch — V. Barratt.
Highveld Regional Branch — E. de C. Pretorius.
Rhodesia Regional Branch — H. T. Turner.
Good Hope Regional Branch — J. L. Lategan.

It was recorded that the President (Mr. G. C. Theron) and the President-elect (Mr. H. T. Turner) were members of the Executive Council and election of the remaining six Engineer Members resulted in those listed below being appointed :—

R. W. Barton, Welkom.
J. C. Waddy, Pietermaritzburg.
P. A. Giles, East London.
A. C. T. Frantz, Cape Town.
R. Leishman, Johannesburg.
G. Lombard, Germiston.

The result of tais election was announced on the following morning. In addition, it was announced that the Executive Council had unanimously resolved to co-opt Mr. J. K. von Ahlften specifically in connection with representation on sub-committees.

Die Engelse teks van die Grondwet, soos aanvaar, is by hierdie notule aangeheg, tesame met 'n gekorriseerde vertaling daarvan in Afrikaans.

Die Konvensie het voortgegaan met die verkiesing van die Uitvoerende Raad. Daar is aangekondig dat die takke soos volg verteenwoordig sal word :—

Natalse Streekstak — R. M. O. Simpson.
Oos-Kaaplandse Streekstak — V. Barratt.
Hoëveldse Streekstak — E. de C. Pretorius.
Rhodesiëse Streekstak — H. T. Turner.
Streekstak Goeie Hoop — J L. Lategan.

Daar is aangeteken dat die President (Mnr. G. C. Theron) en die Aangewese President (Mnr. H. T. Turner) lede van die Uitvoerende Raad is, en die volgende persone is as die orblywende ses Ingenieurslede verkies:—

R. W. Barton, Welkom.
J. C. Waddy, Pietermaritzburg.
P. A. Giles, Oos-Londen.
A. C. T. Frantz, Kaapstad.
R. Leishman, Johannesburg.
G. Lombard, Germiston.

Die uitslag van hierdie verkiesing is die volgende oggend aangekondig. Daarbenewens is aangekondig dat die Uitvoerende Raad eenparig besluit het om Mnr. J. K. von Ahlften te koöpteer, meer bepaald in verband met verteenwoordiging op sub-komitees.

SECOND DAY

The proceedings began with the consideration of the Anual Report of the Secretaries and the following discussion took place :—

H. G. Kipling, East London : Mr. President, the Annual Report and Accounts of the Association are presented for your consideration. As the last Convention was held in Port Elizabeth two years ago, I feel sure that you will agree with me, the Association's affairs have been handled with efficiency and despatch by our Secretaries during the period under review. Mr. Ewing and his staff ought to be commended for the excellent work performed during a most difficult period. The pattern of organisation has been changed over the intervening two years, from an annual to a bi-ennial convention. This has had the effect of the lengthening of the intervals at which the Association's business can be presented and discussed. As a result, a strain has been thrown on the secretarial office to maintain the initiative and these difficulties have been complicated by the holding of the Technical Meeting in the alternate years when the conventions are not held. It is clear to all of us that the work of the Association is steadily growing, particularly the dealings with Government departments, where matters requiring immediate attention arise fairly often these days. The burden of dealing with these matters is thrown upon the shoulders of the Secretaries and the Action Committee and has involved a considerable amount of work by these two parties on behalf of the Association. In regard to the Balance Sheet and Income and Expenditure Account, these reflect a consolidation of financial operation over a period of two years and, in my opinion, disclose a satisfactory position. Notwithstanding that it was necessary to write off an amount of R412.00 as costs against the Convention due to be held in 1966, which we were obliged to cancel, it is pleasing to note that a shortfall of R1,015 in the 1966 accounts has been converted this year to a surplus of R546. In other respects, the accounts show relatively little change over preceeding years. Mr. President, I now formally move the adoption of the Balance Sheet, the Income and Expenditure Account and the Secretaries' Report for the year ended 28th February, 1967. Thank you, Mr. President.

TWEEDE DAG

Die verrigtinge het begin met die oorweging van die Jaarverslag van die Sekretarisse en die volgende besprekings het plaasgevind :—

REPORT OF THE AUDITORS TO THE MEMBERS OF THE ASSOCIATION OF MUNICIPAL ELECTRICITY UNDERTAKINGS OF SOUTHERN AFRICA

We have audited the books of Account and examined the Securities of the Association. We have obtained all the information and explanations which to the best of our knowledge and belief were necessary for the purpose of our audit. In our opinion proper books of account have been kept as far as appears from examination of those books and we certify that the attached Balance Sheet and Income and Expenditure Account are in Agreement with the books of account. We further certify that the Balance Sheet gives a true and fair view of the state of the Association as at the 28th February, 1967 and the Income and Expenditure Account gives a true and fair view of the results ended on that date.

OUDITEURSVERSLAG AAN DIE LEDE VAN DIE VERENIGING VAN MUNISIPALE ONDERNEMINGS VAN SUIDELIKE AFRIKA

Ons het die rekeningboeke en die sekuriteite van die Vereniging geouditeer en nagegaan. Ons het al die inligting en verduidelikings gekry wat, na die beste van ons wete en kennis, vir die doeleindes van ons oudit nodig was. Na ons mening is behoorlike rekeningboeke gehou vir sover dit uit ons ondersoek van daardie boeke blyk, en ons sertifiseer dat die aangehegte Balansstaat en Inkomste- en Uitgawerekening met die rekeningboeke ooreenstem. Ons sertifiseer verder dat die Balansstaat 'n juiste en redelike oorsig verstrek van die toestand van die Vereniging se sake soos op 28 Februarie 1967, en dat die Inkomste- en Uitgawerekening 'n juiste en redelike oorsig verstrek van die resultate vir die jaar wat op daardie datum geëindig het.

LAZARUS BROTHERS & BARR,
Chartered Accountants (S.A.)
Geoktrooieerde Rekenmeesters (S.A.)

Auditors/Ouditeure

EAST LONDON/OOS-LONDEN,

19th March, 1967/19 Maart 1967.

Association of Municipal Electricity Undertakings of Southern Africa
Vereniging van Munisipale Elektrisiteit Ondernemings van Suidelike Afrika
BALANCE SHEET — 28TH FEBRUARY, 1967
BALANSSTAAT — 28 FEBRUARIE 1967

1966 £	1966 R		£	£	R	R
		ACCUMULATED FUNDS/				
3,336	6,672	**OPGEHOOPTE FONDS**		3,691		7,383
		Balance at 1st March, 1966				
3,843	7,687	Balans soos op 1 Maart 1966	3,336		6,673	
		Add Excess of Income over Expenditure for the year/				
		Plus Oorskot van Inkomste				
- 507	- 1,015	oor Uitgawe vir die jaar	355		710	
		CURRENT LIABILITIES/				
310	620	**BEDRYFSBATES**		531		1,061
		Sundry Creditors/				
—	—	Diverse Krediteure	531		1,061	
		Subscriptions in Advance				
310	620	Voorskot van Subskripsies	—		—	
3,646	7,292			£4,222		R8,444

DAVIDSON & EWING (PTY.) LTD., Secretaries/Sekretarisse
per R. G. EWING

1966 £	1966 R		£	£	R	R
		PRESIDENTIAL BADGE/				
1	2	**PRESIDENTS KENTEKEN** .		1		2
		Nominal Value/ Nominale Waarde				
		FURNITURE & FITTINGS				
29	58	**MEUBELS & TOEBEHORE** .		26		52
		At Cost less Depreciation/ Teen Kosprys min waarde-vermindering				
2,577	5,154	**INVESTMENTS/BELEGGINGS**		2,500		5,000
		Indefinite Period Shares and Fixed Deposits with Building Societies/Onbepaalde termyn aandele en Vaste Deposito				
3,604	7,208	by Bouverenigings	2,500		5,000	
		Less Loan against pledge of Fixed Deposit/ **Min** Lening teen Verpanding				
1,027	2,054	van Vaste Deposito	—		—	
1,039	2,078	**CURRENT ASSETS/ BEDRYFSBATES**		1,695		3,390
		Sundry Debtors/Diverse				
—	—	Debiteure	564		1,127	
		Payments in Advance/Vooruitbetalings —				
180	360	1968 Convention / Konvensie	156		313	
		— Hotel Accommodation Deposits (including Debtors)/ Hotel Akkommodasie Deposi-				
—	—	tos (ingesluit debiteure)	85		170	
26	52	— Meetings/Vergaderings	—		—	
		Provision for Profit on 1965 Proceedings/Voorsiening van				
76	152	Winste aan 1965 Verrigtinge	—		—	
		Savings Account/Spaar-				
565	1,131	rekenings	590		1,180	
10	20	Deposit/Deposito	10		20	
182	363	Cash at Bank Kontant by	290		580	
3,646	7,292			£4,222		R8,444

D. MURRAY-NOBBS, President

Association of Municipal Electricity Undertakings of Southern Africa
Vereniging van Munisipale Elektrisiteit Ondernemings van Suidelike Afrika

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 28th FEBRUARY, 1967
INKOMSTE- EN- UITGAWE REKENING VIR DIE JAAR GEËINDIG 28 FEBRUARIE 1967

1966 £	1966 R		£	£	R	R
35	70	Audit Fees/Ouditgelde 1966		60		120
16	32	Bank Charges/Bankkoste		26		52
—	—	Commission on Advertising/ Advertensie Kommissie		87		174
956	1,911	Convention and Technical Meeting Expenses/Konvensie en Tegniese Vergadering- koste Port Elizabeth	63	705	125	1,409
		Lourenco Marques .... —cancelled, now written off/ gekanselleerd, nou afgeskryf	206		412	
		Bloemfontein (including Printing/Drukwerk inge- sluit)	436		872	
891	1,783	Banquet/Banket	—		—	
3	7	Depreciation—Furniture and Fittings / Waardevermind- ering—Meubels en Toebehore		3		6
522	1,044	Executive Council Expenses/ Uitvoerende Raadkoste ..... —Mid-year Meeting/Mid-jaar Vergadering		535		1,071
2	5	Insurance/Assuransie		2		4
77	155	Postages & Telegrams (Gen.)/ Posgeld en Telegramme (Alg.)		88		175
213	426	Printing & Stationery (Gen.)/ Drukwerk en Skryfbehoeftes (Algemene)		246		492
900	1,800	Secretarial Fees/Sekreta- rielegelde		900		1,800
20	40	Subscriptions/Subskripsies ..		20		40
7	13	Sundry Expenses/Diverse Uitgawe		40		80
43	85	Telephones/Telefoon		71		142
273	546	Travelling Expenses (Gen.)/ Reiskoste (Algemene)		36		72
—	—	Excess of Income over Expenditure/Oorskot van In- komste oor Uitgawe		355		710
		Transferred to Accumulated Funds/Oogedra na Opge- hoopte Fonds				
3,958	7,917			£3,174		R6,347

1966 £	1966 R		£	£	R	R
180	360	Income from Investments/ Inkomste uit Beleggings		197		394
207	414	Interest Received/Rente Ont- vang	215		431	
27	54	**Less** Interest paid on Secured Loan/ **Min** Rente betaal aan Ver- sekerde Lening	18		37	
3,236	6,472	Subscription and Attendance Fees/Subskripsie en By- woningsgelde		2,950		5,899
35	70	Profit on Production of Pro- ceedings/Wins by Produksie van Verrigtinge		27		54
507	1,015	Excess of Expenditure over Income/Oorskot van Uitga- wes oor Inkmste		—		—
3,958	7,917			£3,174		R6,347

President: Thank you, Councillor Kipling. Anybody who wants to second the report? Mr. Frantz. Thank you.

A. C. T. Frantz, Cape Town: Mnr. die President, dit doen my goed om die mosie van dank wat voorgestel is deur mnr. Kipling te sekondeer. Gedurende die afgelope twee jare sedert die 1965-Konvensie in Port Elizabeth het daar heelwat veranderinge in ons Vereniging plaasgevind. Ons het nou 'n nuwe Konstitusie, ons het twee nuwe streektakke en ons hou 'n konvensie net elke tweede jaar. Boonop het ons Vereniging ook nog 'n bietjie meer geld. Vir ons Sekretarisse het al hierdie nuwe dinge meer werk tot gevolg gehad en veral die besluit om die Konvensie hier in Lourenco Marques nie in 1966 nie maar eers in 1967 te hou, het vir mnr. Ewing seker baie kopseer veroorsaak. Ten slotte wil ek graag vir mnr. Dick Ewing my persoonlike dank uitspreek, vir al sy hulp gedurende die afgelope twee jaar, veral met die stigting van ons nuwe streektak, Goeie Hoop in die Kaap.

President: Dankie mnr. Frantz. Die Sekretarisse se verslag: die aanname daarvan is vorgestel en gesekondeer en dit is nou oop vir bespreking.

P. J. Botes, Roodepoort: Mnr. die President, oor die verslag van die Sekretarisse wil ek net graag die volgende kommentaar lewer. Gister is die veranderings aan die konstitusie aan ons voorgelê in 'n uiters swak vorm. So swak, mnr. die President, dat sekere regstellings in die Engelse teks gedoen moes word terwyl die Afrikaanse teks, as gevolg van teenstrydighede met die Engelse teks, nie aanvaar is nie. Dit sal onder die pligte van die Sekretaris om hierdie werkstukke van sub-komitees so te verwerk dat dit in 'n ordentlike vorm aan hierdie vergadering voorgelê kon word. Die wysigings aan die Konstitusie is ook nie in die voorgeskrewe tydperk gesirkuleer onder lede nie, sodat die aanvaarding van die veranderinge eintlik ultra vires is. Dit alles, mnr. die President, lê ek aan die voete van die Sekretaris. U sal met my saamstem, mnr. die President, dat indien ek so 'n verslag soos wat gister aan ons voorgelê is in verband met die veranderinge in die Konstitusie, aan my Raad moes voorlê, sal ek sekerlik moeilikheid vir myself op die hals haal.

President: Mnr. Botes, in verband met die tydperk wat u genoem het vir die voorlê van die Konstitusie, moet ek het daarop wys dat die drie maande periode waarna in die grondwet verwys word, betrekking het op wysigende voorstelle wat van lede kom en nie juis op dié wat van die Uitvoerende Raad afkomstig is nie. Is daar nog iemand wat wil praat in verband met die Sekretaris se verslag? In die verband wil ek net graag my eie waardering aan mnr. Ewing uitspreek vir die groot mate van sukses wat hy behaal het in sy pogings om die absolute gelykheid van beide landstale uit te bou in ons Vereniging. Ook die metode van vertaling wat nou hier by hierdie Konvensie gebruik word, is geheel en al ingestel op die inspirasie van die Sekretaris, mnr. Dick Ewing, en ek dink, van die kommentaar wat ek gehoor het, is dit 'n reuse-sukses en sal seker in die toekoms ook weer voortgesit word.

We now have had a proposer and a seconder for the adoption of the report—is that unanimous? Thank you.

Mr. D. R. Duffield then presented his paper entitled "High Voltage Circuit Breakers as applied to the National 400 K.V. Transmission System," which was published in Volume 1 of the Association's 1967 Proceedings.

Mr. J. M. Magowan, Electricity Supply Commission, Rhodesia, in introducing discussion on Mr. Duffield's paper, said:—

First of all I wish to thank and congratulate the author on behalf of the Association, on the high standard of this paper, and the manner in which it was presented. It provides us with a very clear and lucid description of the concept of rate of rise of re-striking voltage and the effects of short-line faults and switching over voltages on E.H.V. switchgear under specific system conditions. Most published literature on these subjects tends to be highly complex and extremely difficult for anyone not engaged on switchgear research to understand, but the author's description and the very excellent oscillograms included in the paper clarify the problems to be faced in specifying switchgear, even for the non-specialist engineer.

2. Short-line Faults:

It is generally known that the potential severity of the short-line or kilometric fault was first recognised in

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Mnr. D. R. Duffield het toe sy referaat gelewer onder die titel „Hoogspanningsstroombrekers soos in die Nasionale 400 K.V.-transmissiestelsel gebruik". Hierdie referaat is in Volume I van die 1967 notule van die Vereniging gepubliseer.

Mnr. J. M. Magowan (Elektrisiteitsvoorsieningskommissie van Rhodesië) het, ter inleiding van die bespreking oor Mnr. Duffield se referaat, gesê:—

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the mid 1950's as, prior to that, switchgear designers utilised high frequency low amplitude components of re-striking voltage to study the recovery characteristics of circuit breakers. This practice, however, drew attention to the fact that such conditions could impose a severe duty, and when high fault currents were applied to overhead lines it rapidly became apparent that the short-line fault represented a serious problem in the design of circuit breakers.

The short-line fault condition was not previously obtrusive because fault currents were relatively small, they were often on cables and they were cleared in most cases by oil circuit breakers. The smaller power systems inherently generated lower fault currents and also because of the relatively small transmission distances in-

volved, cables were installed instead of overhead lines. The frequency of the line side "recovery" voltage, to which the author has referred, in a cable is lower than that likely to be encountered with overhead lines.

The recovery of dielectric strength in an oil circuit breaker characteristically increases to a maximum as contact separation progresses, whereas the dielectric strength in the contact gap of an blast circuit breaker is established and constant very rapidly after initiation of the air-blast.

Hence these factors tended to shroud the possible severity of short-line faults until the inception of present-day large fault levels, high voltage overhead lines and earlier failures of air-blast switchgear.

The need for active attention to the short-line fault condition arose later in Britain, than in some other countries, as for many years the rates of rise of re-striking voltage specified in Britain were relatively high, e.g. 2000—4000 volts per microsecond at full breaking capacity rating, on the 132 and 275 kV systems.

Such rate of rise of re-striking voltages were thought to be high for the practical supply side re-striking conditions then foreseen, and undoubtedly lead to the use of circuit breakers which were generously designed for terminal faults. As a result, circuit breakers in Britain have generally performed satisfactorily under conditions which must have included some interruptions of short-line faults.

The increasing levels of fault current to 50 kA three phase which become apparent in planning the next stage of the British Grid, accentuated interest in the short-line fault problem, and British work on the subject, until very recently, has comprised an investigation to ascertain the transient response of an overhead line under the various conditions of fault clearance, and the provision of test plant facilities for circuit breaker development and testing, under short-line fault conditions.

A paper on this work was read at the CIGRE meetings in June, 1964 and one of the conclusions reached was that there is an urgent need to standardise test values and the procedure in short-line testing to reduce the present labour and expense of this form of test.

Thus the very severe interrupting duty imposed by the short-line fault is due to three factors, the type of circuit, the type of circuit breaker, and the magnitude of the fault current.

The air-break circuit breaker, because of its relatively slow arc extinguishing mechanism, which damps out any high frequency effects, is generally insensitive to the short-line fault.

Oil circuit breakers and the recently developed sulphur hexafluoride circuit breaker are intrinsically sensitive to r.r.r.v. and have an extremely rapid extinguishing action. They are generally designed for very severe fault conditions and the extinguishing action provides a margin in hand to deal with the condition associated with the short-line fault.

It has been reported, however, that whilst the air-blast breaker has also a very rapid extinguishing action, is basically sensitive to r.r.r.v., and is also generously designed to meet other severe fault conditions, it can in fact be affected by the short-line fault-involving currents up to 30 kA and special design requirements may be necessary for the higher fault current levels.

The author's views on this matter would be very much appreciated, and it would also be of interest to hear of typical values of r.r.r.v. which have been specified for the circuit breakers on the National 400 kV system.

3. Switching Over-voltages:

The author has referred to the generation of over-voltages due to current-chopping and has remarked that surge divertors relieve the resultant voltage stresses that would be applied to high voltage transformers. Is it fortuitous that the use of surge divertors will also eliminate the possibility of flashovers resulting from the over-voltages and the application of an evolving fault to the associated circuit breaker?

The question of switching over-voltages on very high voltage networks with service-voltages of 500 kV and above has been the subject of considerable work by CIGRE Study Committee No. 3 and a number of papers on the subject were read at the 1964 Session. This Committee has noted a definite tendency towards reducing insulation levels at these high voltages for economic reasons, and a consequent necessity for limiting switching over-voltages to a compromise level. As any compromise between insulation level and admissable over-voltages will inevitably require special precautions and protective devices, the Working Group of CIGRE Study Committee No. 3 has now instituted a study programme to investigate this matter.

This Committee is also very interested in the work of a group called the "Current Zero Club", who are studying the phenomena appearing during current interruption at or near the natural current zero, and are hoping to obtain the results of investigations by this "Club".

It is interesting to note also that in another paper presented at the 1964 Session of CIGRE on Switching surges on the Italian H.V. network, the maximum over-voltage factor recorded during 7,187 tests was 6.0, and only a total of 6 out of the 7,187 tests — or less than one in a thousand — exceeded 3.2.

This appears to justify the adoption of a maximum over-voltage factor of between 2.5 and 2.8 which, as the author states, is normally specified and guaranteed for a circuit breaker in respect of this duty.

Two of the conclusions reached as a result of these tests on the Italian H.V. network were that in this field of work it is almost impossible to reach any definte conclusion, and that the problems of dealing with switching surges which can be encountered in practice, must be based on probability of occurrence and economics.

4. Circuit Breakers for the National 400 kV System:

The author has indicated some of the problems to be borne in mind in specifying circuit breakers for the National 400 kV system, and it seems that the specification for equipment for a given locality must emphasise the characteristics particularly required.

In accomplishing this, one is impressed by the bewildering variety of circuit breakers either on order or already installed on the 400 kV system-breakers with rupturing capacities from 17,500 MVA to 30,000 MVA; of British, French and Swiss manufacture; air blast; permanently pressurised air blast, and low oil volume — in fact the only thing these breakers appear to have in common in their operating voltage.

This has certain disadvantages such as loss of interchangeability between installations, additional spares requirements, varying maintenance techniques, and, of even more importance, possibly higher capital expenditure.

I wonder whether the author could advise us if the possibility of standardisation was considered and whether, as a result of the decision to specify breakers for each locality, it was necessary to call for special testing by manufacturers in order to demonstrate the particular capabilities required of the switchgear.

Also, I would be pleased to know whether the author has found the various National and International standards of assistance, when specifying the breakers required for the 400 kV system.

Replying to Mr. Magowen, Mr. Duffield indicated that air blast breakers are considered to be the most sensitive to rate of rise of striking voltage.

In reply to the question concerning rates of rise figures, Mr. Duffield said: We specified for 100% duties for the breaker, and rates of rise of 1,000 volts per micro second. Then this rises rapidly to a figure of 9,000 volts per micro second at 10%. At 30% I think the figure is 5,500 volts and at 60%, 3,500 volts. Referring to lightening arrestors, he said that :

To do the duty of discharging the longest length of line, the 265 mile Droërivier-Muldersvlei section, for instance, would impose a tremendous duty on a lightening arrestor if it had to discharge the fully charged line. However, suitable arrestors are available and will, we hope, look after the lines should we get over voltages higher than our specified figure of 2.5. That takes me to your next question. We did in fact drop our permitted levels on the 400 kV from 2.8 in switching transformers down to 2.5 which is a figure we have always used when switching lines. The types of breakers are certainly bewildering in their variety; we have not made any attempt to standardize as we are quite prepared

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Mr. J. D. N. van Wyk presented a paper by himself and Mr. R. B. Anderson on "Research into Electrical Power Engineering and Related Subjects at the C.S.I.R.", which was published in Volume 1 of the Association's 1967 Proceedings.

Mr. Van Wyk amplified aspects of his paper and illustrated certain points with slides.

At the conclusion, the President thanked Mr. Van Wyk for the presentation of the paper and expressed appreciation of the work being undertaken by the C.S.I.R.

Mr. A. A. Middlecote (S.A.B.S.) opened discussion as follows:

In antwoord of Mnr. Magowan, het Mnr. Duffield aangedui dat blaaslugstroombrekers as die mees gevoelige vir die verhogingstempo van die ontsteekspanning beskou word. In antwoord op die vraag aangaande verhogingstempo-syfers, het Mnr. Duffield gesê:- Ons het vir die stroombreker 100% doeltreffendheid en 'n verhogingstempo van 1000 volt per mikro-sekonde gespesifiseer. Daarna styg dit vinning tot 9000 volt per mikro-sekonde teen 10%. Teen 30% is die syfer, na ek meen, 5500 volt en teen 60% 3,500 volt. Met verwysing na blitsafleiers het hy gesê:-

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to buy the lowest offer that we receive against any enquiry that complies fully with the specification. We naturally take into account the cost of testing and the cost of supplying spares into account. We always insist on full type tests either being available or being done once an order has been placed. Usually they are not done to our satisfaction unless we have previously purchased that type of breaker in which case we insist that short circuit tests are redone for us. In reply to your last question, our specification is IUC and only on minor points do we vary therefrom and introduce our own requirements.

Mnr. J. D. N. van Wyk lewer 'n referaat wat deur homself en mnr. R. B. Anderson voorberei is, onder die titel „Research into Electrical Power Engineering and Related Subjects at the C.S.I.R.", wat in volume I van die Vereniging se 1967-Verrigtinge gepubliseer is.

Mnr. Van Wyk brei verskeie aspekte van sy referaat verder uit en lig sekere punte met behulp van skyfies toe.

Na afloop hiervan bedank die President Mnr. Van Wyk vir die referaat wat hy gelewer het en spreek sy waardering uit vir die werk wat deur die W.N.N.R. gedoen word.

Mnr. A. A. Middlecote (S.A.B.S.) open die bespreking soos volg:—

Mr. President, it gives me great pleasure in thanking Mr. Van Wyk and Mr. Anderson for this very informative paper, regarding the work they are doing. I think in his usual quiet manner Mr. Van Wyk really hasn't probably stressed the real problem he and Mr. Anderson have been faced with, and that is actually the management of research. Research management is so important these days, it is engaging the attention of international bodies, such as O.E.C.D. because research is such a vital factor in economic development of any country that it must be done in a very intelligent and responsible manner. The Organisation for Economic Co-operation in Europe is in fact holding many discussions on this very point. Research must be managed so that in the years ahead, when they are needed, their results will be available when the country needs them. Many developing countries don't become quite aware of the value of research, because they are concerned with becoming productive and it is really a matter of applying known norms to industry to develop products at a cost which will establish the country's industries, but it was very interesting, it was just last week I was discussing this matter with some Japanese and discussing the slow off that's tending to come in Japanese industry there, and I said well look here, I think this is the world trend at the moment, they are all sort of recovering from the post war build-up again, and he said, no, but I also think that Japan is paying the price of not having done enough research, and and she is almost competing with America, she is competing with Europe, at a very high level, she feels in many respects her research is not there to carry her that further. Known results have brought her where she is, and he feels that possibly the research is not developed enough to take them further, as they must go once they reach the top, and that's the one thing we must bear in mind, and I know it's the problem which Mr. Van Wyk and Mr. Anderson are aware of, and they are doing everything they can do to make sure that they are planning their research so that it will do the country a lot of good.

Just a few words on some of the items Mr. Van Wyk has discovered. I think the work they are doing on the lightning counter is a very important bit of work, it is a pity the data which they will collect when they have once developed their lightning counter satisfactorily, would be very helpful to this country, particularly for instance in the layout of transmission line routes. There is no doubt about it, the differences in the physical condition of the ground as well as the terrain itself, caused lightning to strike at certain spots, more than other spots. By counting and locating no doubt a survey could be made and power supply authorities could much more easily design their lines so as to not have a minimum lightning incidence.

The other thing is that it is interesting to note that they are concentrating on the very fundamental work on the good earth, in other words the physical properties of earth as it affects the Engineer. The earthing we are still aware of, we know how important it is for safety, and we know it's important for the good operation of protective equipment, such as lightning arrestors. A lightning arrestor with a bad earth is a useless bit of apparatus, it has no meaning whatsoever. With regard to the thermal conductivity of soil, as you know, we in the Bureau have done a lot of work on actually measuring the thermal conductivity of cable routes, projected cable routes, and we await with great joy the development of a quicker reading and more simple apparatus which I think Mr. Van Wyk is trying to develop. It would make the job much cheaper and much more easy. But I think we must all remember, and just note that the main problem with thermal resistivity, is not so much the measuring of the ground, but the treatment of the cables, particularly when they have been laid in the ground. In other words, the Thermal rise of cables depends upon just those first few inches away from the cable up to about 12" they take arbitarily but it is unfortunate, that the soil that you put back there is usually broken up, less compact, too fine, got too many air-voids within the granules, and you cannot do anything even if you start off with reasonably good soil, you start off poorly by having the worst condition round the cable itself. I think the work that remains to be done here is rather a series of work, possibly the use of some waste product which you could pour over the back floor to compensate for this, shall we say deleterious effect of sieving and aerating the soil — I know in America, I think they are tending to concrete round the cable for the first few inches, but I'm sure one could develop or one could modify for use some waste product to do it at a much cheaper cost. The High Voltage research is a very important feature, here again Mr. Anderson and Mr. Van Wyk are attempting to sort this out and intelligently plan ahead by holding a symposium on High Voltage research and testing. This is a symposium actually jointly planned by the Universities, the C.S.I.R. and the Bureau of Standards, and it's going to come under the aegis of the Institute of Electrical Engineers in October, and we hope it will stretch over two days, and we hope that the papers will help pinpoint where the work should be done. The 400 kV Paper this morning shows how important the matter of High Voltage insulation is, the study of the insulation, for I think the one point that holds a very nice future in this line, I have said this before and I say it again, is in the more complete study of the ionisation in voids in insulation from two points of view, with the economic design of insulation on the better, shall we say application, so as to deal with flash-over and short term insulation failures, one has accentuated the failure due to ionisation which can occur in voids, in incompletely compressed or applied insulation. Research work here that lies ahead is to a degree and probably manufacturers would do this to a larger extent, is the development of better methods of applying insulation but the other field is the development of non-destructive methods of testing. It is quite interesting to note that E.R.A. in England have a mobile

test set going round the country doing certain amount of testing on voids, I believe that if you apply an X-ray across the area where voids are, it alters the pattern of discharges and by the application of the two methods they can even locate to a certain degree. Finally I just like to again stress one part that Mr. Van Wyk says, almost included as a side line to the power engineer but I think he should have included it in the power engineering and that is his work on computation and automation. A very good level work has been done and the C.S.I.R. already in this line and I think it is going to offer something to boast of the practising engineer and also to industry. I think it has an increasing use as Mr. Van Wyk mentioned in the design of apparatus programme especially shall we say quickly turning over apparatus like, motors and things like that and the other thing is that I think will come in is both from a computer point of view and also from an automation point of view is the application of quality controlling automatic means to produce production costs. Well Mr. President, with those few words may I again say thank your Mr. Van Wyk.

Questions asked by other speakers were whether the C.S.I.R. has a standard programme for putting the question of group replacement in street lighting through the computer and whether the C.S.I.R. had a programme in developing tele-metering.

Mr. R. B. Anderson, Pretoria, replied to discussion as follows:

Mr. President, I would like to thank Mr. Middlecote for his very kind remarks and I think Mr. Middlecote is one of the few people who really know something about our problems and I think he has great sympathy for us and I think this was out of kindness of his heart that he didn't ask any difficult questions today. I am very glad that he did stress some of the points which I had to gloss over and in particular the one about insulation and studies of insulation materials which we think all believe that is something that has got to be done in South Africa because very often you encounter local materials and you can't really have it done overseas and this is something as Mr. Middlecote knows which is dear to his heart and which we are hoping to do something about in the future but we would like to make it part and parcel of our planned programme which includes the study of our sub-committee of the high voltage co-ordinating committee. One of our difficulties of course at the C.S.I.R. is obtaining the right sort of staff. You know that that in particular is just not a matter of intelligence it is also a matter of ability to be kept to grips with problems and in our particular field as you have said these are very practical problems. The man must have a special knack for tackling these and those sort of people are not readily available, they go to municipalities where they get greater salaries. One other thing which has been hampering a lot of our work at the C.S.I.R. is lack of capital funds in particular for building, for putting up buildings, and we hope that this will be alleviated in the future but it is something which means we must make haste slowly. Coming to Mr. Simpson's question I am not aware of a particularly generalised programme which can do the work that he has in mind but there are the computer sub-routines available for doing the type of mathematical analysis which is necessary and is a matter of putting them together and I would like to take that one up and see exactly what we have available and let him know about that. Mnr. Van der Merwe van Witbank, you mentioned two things really that one is centralised control of a distribution network—we are not doing anything about that in our studies. There has been quite a bit of work done overseas on this, I think that Dr. Straszacker will forgive me but with Escom they have such a good load factor on the reef that there is not very much incentive to do much in this direction. Coming to the telemetry side there are two things really involved, the one is to get your means of communication and maybe radio links, maybe telegraph lines, things like that, and as you know we have an institute of telecommunications research. It is one of the three that is in Johannesburg so there is a lot of work been done on the propagation of signals by radio means or otherwise.

The other problem involved there of course is one of getting your information correctly across from one end to the other. Power engineers cause all sorts of transients which disturb the poor communication engineer's circuits and you get all sorts of interference problems so it is a matter of having automatic error correction techniques. This is part and parcel of a very much wider field of information theory and a difficult one in fact. There are not many engineers who have the mathematical ability to get to grips with these problems. We are doing a little on a small scale there. We have one person who has or does his personal interests field of information theory and in particular the use of error-correcting codes. So we would certainly be able to let Mr. Van der Merwe have some information on this. There are quite a number of devices appearing on the market now and this is mainly due to the efforts of the computer engineers. They are now tying up computers over long distances with some computers acting as satellites to the larger computers or just for pure data transmissions and it is absolutely essential that you have confidence in the data that you get at the other end so there are devices on the market now that you can in fact connect to telephone lines and the transmission speeds will depend to a certain extent on the quality of the line. If it's a bad line the thing has to do a lot of correction and time is spent on

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Tydens vraetyd vra sprekers onder andere of die W.N.N.R. 'n Standaardprogram het om die kwessie van die groepsgewyse vervanging van straatligte deur die rekenoutomaat te sit, asook of die W.N.N.R. 'n program vir die ontwikkeling van tele-metering het.

Mnr. R. B. Anderson (Pretoria) antwoord soos volg op die bespreking:—

that; if it is a good line, well the messages will go through much quicker, so we would be very pleased to let him have some information on that. I would just like to say one last word of thanks to Mr. Middlecote. You know I was very scared to even talk about computers for the power engineers here and therefore I sort of pulled it in through the back door and I am very pleased that, coming from a power engineer, he really felt that that should have been part and parcel of the power engineering research work.

Greetings to the President and the Convention were at this stage conveyed by:

Dr. Straszacker, on behalf of the Electricity Supply Commission of South Africa.
Mr. J. E. Mitchell.
The President and Council of the South African Institute of Electrical Engineers.
The General Manager and staff of the South African Railways.
The Principal of the University of the Witwatersrand.
Mr. Clarence Kinsman.
The Institute of Electrical Engineers, London.

In hierdie stadium word die groete van die volgende persone en instansies aan die President en die Konvensie oorgedra:—

Dr. Strazacker, namens die Elektrisiteitsvorsienings-kmmissie van S.A.
Mnr. J. E. Mitchell.
Die President en Raad van die S.A. Instituut van Elektrotegniese Ingenieurs.
Die Hoofbestuurder en personeel van die S.A. Sporweë.
Die Prinsipaal van die Witwatersrandse Universiteit.
Mnr. Clarence Kinsman.
Die Instituut van Elektrotegniese Ingenieurs, London.

SECOND DAY, AFTERNOON SESSION.

Discussion proceeded on "Instant Water Heaters and the Power Supply Authority" based on the information submitted to members in Volume I of the 1967 Proceedings of the Association, and the following are the contributions to this discussion:—

Mr. R. Leihman, Johannesburg:—

This morning you have been in the fields of Micro watts and megawatts. This morning you were down to Milli milli volts and kilo volts and today I have got to bring you on the end of a water tap. I think in bringing this subject forward it is a good opportunity to find out what various members here today think about these instant water heaters, if in fact they do treat them seriously. You will all know, that it is a World Trend to conserve the demand of amperes, we try and spread amperes over time in order to get a storage principle, and the kinds of water heaters we have known until now in fact do just this. We even are attempting in England and other places on the continent, to store space heating by warming up very large slabs of material. But this latest Commercial Gimmick found on the word "instant", has now caught up with water heaters, somebody wants to have a supply from a Cold Water Tap converted into Hot Water in two seconds flat. The way they decide to do it, is to have a device which is switched by turning on the tap and a line of cold water, and remember it can be very cold water, to flow over either a Calrod-element, or to be a conductor between electric poles. In a very short time contact indeed, if you want to fill a hand-basin, it is a sort of four second job. The fact that it takes 14 minutes to fill a bath, will only put the watts up to bring that down to 4 minutes one day. I want to point out to this meeting Mr. President, that for many years passed we have limited the single phase motor, to one horse

TWEEDE DAG, NAMIDDAGSITTING.

Die bespreking word voortgesit oor „Blitswaterverwarmers en die Kragvoorsieningsowerheid", wat gebaseer is op die inligting wat in Volume I van die 1967-Verrigtinge van die Vereniging aan lede verstrek is, en die volgende bydraes tot die bespreking word gelewer:—

Mnr. R. Leishman, Johannesburg:—

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power direct on start on the mains. A one horse power is only three quarters of a KW or three amp. at 220 Volt, and that will give you about 7 times the load current as a starting kick say about 20 amps. We have thought fit just to take a few cycles of kick of an electric motor starting direct on at the limit of 20 amps, what we are afraid of is a voltage flicker on adjoining consumers lamps, that is standing for three or four decades to my knowledge, but here we have a new kind of hot water heater which is going to give us something over these 20 amps at single phase because the majority of these units are about 7KW, the three KW is inadequate and we are now faced with three phase units, round the 20 — 30 KW Range, so we are getting in a little bit out of focus I think. The other thing I think is germane to this, is that we have settled on 15 amp socket outlets other than four cookers so 15 amps seems to be a good steady load current, I think that these kind of heaters exceed that. Another aspect of them, you all know that a firm will demand meter as something like a thirty minute time lag. These instant heaters would only register something of the order of 30% of its demand for as long a draw off period of three or four minutes. I have put a curve in here which you can read on page 28 in that context, this is in fact then an evasion of a demand meter, and I think that any appliance that evades the metering set down to measure it, is not a very good thing from the Power Supply Engineer's point of view. The demand charge is a

charge we gather to amortize our capital. Capital is scarce and it is a pity if there is any kind of appliance that can avoid paying it's share to the Capital we have to invest in the mains and sub-stations to supply. If you did have a very large installation of instant hot water heaters, say in a medical suite which had 50 or more doctors, it wouldn't be so serious there if the metering was for the whole building, because you would get diversity all behind the one meter, but it can be a lot more serious if one water heater is behind one meter, and you don't have any diversity. Another inclination of these things, is to put them into existing installations without much cognizence of the overload fusing, and I think that there will be cases where people will be meddling with their fuses, and circuit breakers, having put these in. Still another aspect, how many years have we been struggling with the "six feet rule" of socket outlets and water taps, here we are now putting the domestic appliance slap onto the water tap, well I don't want to be non-progressive and at the same time I like to be realistic. It takes an awful lot of water-proofing, a water heating device on a tap supplied at 220 Volts, it takes an awful lot of earthing precautions, some of these units have got some plastic components, you all know what your Bantu servants do with their buckets when they are filling it with hot water at the sink, forcing it under this water heater or bumping the rim of the bucket on it's way in, if these things are damaged, they don't get quick attention, we all know how remiss people are, to have damaged components put right, despite the fact that the new wiring regulations require double earthing. Another thing Mr. President I think I should say to this meeting, is that people must not imagine that because an appliance has been approved as suitable for use by the recommendations Committee of this Association concerning new electrical commodities, that committee is not recommending you to use it, it's merely recommending that if you wish to use it, it is suitable, largely on the basis of SABS Tests. The committee is not called upon to express it's opinion on the prospective effects of this kind of appliance to the power supply authority. I would like to hear in the course of any discussion that arises from this what Mr. Middlecote may say, regarding this aspect it is only in July 1966 that the Bureau dropped the shutters on 12 months' notice on approved appliances within the defined ranges. They banned in short anybody from selling an appliance which was potentially dangerous. I don't say that an instant water heater is necesarily potentially dangerous, excepting in so far, that it is dangerous if it is applied on a very large scale to the supply authority, and I wonder whether this Bureau of Standards, would think beyond the safety measures within the appliance to the effect that it may have on the power supply mains, we don't want a lot of voltage drops that cause flicker. In Johannesburg we have offered three of the various manufacturers of these water heaters, our co-operation if they will install a complete single block with these water heaters and we will do some field tests, but unhappily none of them have accepted our offer, to co-operate in finding out what the real background snags or advantages of these units are. We all know that Electric Space heaters are very unprofitable things for the supply authority using them in the way we do in this country for perhaps three or four months a year, using them right on peak using 3KW of capacity right back to the Power Station, and getting very little revenue for them. The Space Heater is only a winter load, the Water Heater is an all year load, but only for a couple of minutes at a stretch and nobody yet has assessed whether or not these water heaters are worse or better in their characteristics then Space Heaters. I'm not going to go through the appended odd information I tacked on here for the sake of completeness Mr. President, and I only wish to say to the floor here that I would be very interested indeed to hear other views than I have expressed here this afternoon.

President: I want to read out from an article in the South African Digest of March, 1931 — 1967, it accompanied on top is the heading hot and cold water from one tap, and is a big picture of a model standing on the shower bath all ready to take the hot and cold water, but unfortunately the shower curtain is held up a bit high, but this is what the article says: It was designed by the South African Bureau of Standards in conjunction with the Municipal Safety test union whoever that may be and has been approved by the Union of Electrical and Municipal Undertakings. I would like to know who gave that approval? Gentlemen, I leave it to the floor to express your opinions.

A. A. Middlecote, (S.A.B.S.): I'm sorry I am getting up so early, but that last one made me get up quicker, because now I am committed. Actually, about one month ago I think, I had a lovely holiday. I went down to Fishhoek and I bathed on the beach and I came back with a beautiful tan and I was greeted by an in-basket of many dozens of letters wanting to know more trade details about this mythical bit of apparatus designed by the Bureau of Standards, and I spent the first part of my leave answering the letters and stating we had nothing to do with the matter at all, and that the report was a completely erroneous report, and I have an idea it was unfortunately a journalist and we all know what they are like, journalists build up on a trade pamphlet, which didn't make any of the extravagant claims that you read out there. We wash our hands of it and we have written accordingly to everyone concerned, because Mr. Leishman sort of did throw the ball at my feet, I have to try and evade it because it is an awkward question, we want to keep out of the responsibility, it reminds us one of the games that's played between the Bureau of Standards and Recommendations Committee, and the Wiring Regulations Committee, the SAIEE whenever a problem is a little ticklish, but all I would like to say is, the advantages of the quick-hot are only to the consumer, those that you can list, and if you list them, they are: that it is cheaper, there is no standing loss, now that means you don't have to keep the water available and there is no leakage

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Supplement to the Proceedings, Volume 2, Association of Municipal Electrical Undertakings of Southern Africa.

through the lagging to the atmosphere. Now at a conservative estimate for an average sized heater, this is about 100 watt hours, now that means that you lose about three units per day just to have hot water available, that's on a reasonably good heater, now here let me solve something because I think one of the advantages of dealing with this matter is of course to buy a hot water cylinder, which bears our mark, because then it doesn't have a lot of losses and they won't lose much money, so I think if you all went back to your Municipalities and insisted that they have hot water cylinders only with the mark, you would probably do very well. The only other advantage is that there is a better reserve, if you want to draw a lot from the small article, and the final one I think is the cheap and more convenient method of installing it. Now the disadvantages are A, Mr. Leishmann's concern and not mine, and that is the economics of Power Generation and supply, and I'd throw the ball back at him and you, but B, I think he is quite right in sort of questioning the safety, I think basically we got over this to a degree and the recommendations committee by insisting that it must be wired in accordance with the wiring regulation, so we attempted to get over shoddy workmanship that way, but we are perturbed at least some of us, of the fact that there is an increasing tendency to use these small portable units for showers, now that is a little bit tricky because should something go wrong, it is a matter of a stream of water to a body which is well earthed, and it is a very inconvenient method of sort of subjecting oneself to a possible fault which we must expect will always arise, we don't like that but generally speaking, I suppose it is a little more vulnerable and I must agree with Mr. Leishmann there.

C. G. Lombard, Germiston: I am afraid that I am going to disagree with Mr. Leishmann, we do not permit these water heating units in Germiston as far as domestic and smaller business undertakings are concerned, we limit them to three KW. The safety aspect can be taken care of by making it compulsory to install them in conjunction with earthleakage protection. As far as the metering aspect is concerned we are probably more fortunate than Johannesburg, in that all demand meters are of the intergrating type, and we don't use the Thermol type. For industrial installations, we rather think that there is an advantage in having them. It has been our experience that where a large unit is installed, the load comes on during that particular industries off load period during the lunch hours or after 5 o'clock when they knock off. I don't think that this load is any worse if anything, it is probably better than welding loads. We permit and we cannot get away from welding loads which as you all know that we are poor power factor, and I therefore cannot see why this type of heater cannot be used in industrial installations. This is about the lot Mr. Chairman.

Mr. President: Ja, daar het ons nou twee heeltemal uitlopende opmerkings gehad in verband met die nuwe apparaat. Mr. Frantz — Cape Town, will give you Goodhope impressions.

A. C. T. Frantz, Cape Town: I would like to support Mr. Lombard to a certain degree on this question. In Cape Town, we are more or less obliged to allow the installation of these things, technically we could find nothing wrong with them, we were pressed by conultants and contractors and consumers, who wanted these things and we, I would say we reluctantly agreed to them being installed, but our view is that although it may be desirable from the "undertakings" point of view that these things should not be installed and I think it gets back to the old saying that the customer is always right. If the consumers insist on having these sort of things then how are we going to stop them? If they for instance insist on putting ordinary electric radiators in their houses or flats, we can't stop them, it's up to us engineers to so arrange things that we can supply them and that we can cope with the effects on the systems. The loading is high I admit, and it will probably go higher still, but if you realise that some ordinary electric ranges nowadays can go up to 14KW they could impose quite sever voltage drops on the system as well, they won't be on for a long time, admittedly but a housewife coming home and switching on the oven and all the hot plates on high could create an equal voltage dip. As regards the effect on the ampere demand meters or thermol demand meters there again I think if these things come into common use, and any undertaking has this type of meter, it will be up to them to so arrange the tariff that there will be no evasion, or at any rate the consumer will pay a fair share of the demand costs. The effect on the fuses or circuit breakers; that I think is again up to the wiring regulations, to cater for this type of load, similarly the difficulty with the 6 foot rule, if the appliance is installed as a fixture, as we do insist in Cape Town, it is installed as a normal fixed water heater, and there is no difficulty after all it is no worse than an ordinary storage water heater where you have the elements in the water, it is just the same also connected to a water pipe. Finally I think Mr. President, we see from the annexure that the times involved and the costs are considerable and those of you who have storage water heaters with multiple outlets and long pipe runs can realise you get impatient even after turning on the hot water tap, and waiting for that water to come from the storage cylinder and that takes perhaps a few seconds, are you going to wait minutes before you can get hot water sufficient into a basin to have a wash or a shave, and I can't for the life of me see anybody waiting 14 minutes to have a hot bath, because the water will be cold by the time it is half way up, and as I said before we have allowed these things in Cape Town and we have found however, that the demand is very small and I think we won't run into many difficulties, we are just letting the thing run and see how it develops.

R. M. O. Simpson, Durban: We have tackled this problem very much in the same way as Cape Town did, when we were approached about permission to install these units, we really couldn't find any serious reason why they shouldn't be installed, and one is always a little worried when you come up against the problem of high demand and short period units, and sometimes one is rather keen to avoid the use of them, we didn't forsee a complete swing-over if you had very large swing-over to these units, the effect is a little problematical, because we haven't made a study of diversity and just what the diversity of the use of one of these instant hot units would be, as compared to diversity of the Thermol Automatic on and off switches of a normal water heater, I wouldn't hazard a guess just at the present time. But safety you can protect yourself by earthleakage units, we haven't at the moment been particularly in favour of the very large units, but here I couldn't really give any reason why one shouldn't have them, because we do in our electrode boilers. You can put in a 50KW electrode Boiler, and we won't have any objection to that, so I can see no reason why you shouldn't have the 20—30KW Instant hot heater, I can't see much difference between the two, so I have the feel here that, provided it is electrically sound, correctly installed and complies with your requirements in the wiring regulations and all that type of thing, and the ultimate effect is not going to be too detrimental, I think it is very hard to say no you can't use them, I can't really produce a first class argument to a consumer, why he can't make use of the unit of this type if he wants to, as you see in Durban, we have about 100, they are mainly in the commercial, you'd say dentists and doctors have got them as well there, that's probably quite a reasonable approach because they are not wanting hot water all the time, only at certain particular times, so we have allowed them to go if quite frankly we started to get a lot of them, I think I would carry out a careful check, I would try and get them into one particular area if possible, or in one particular building as Mr. Leishmann has asked them to do, and just see what this diversity fact is, because after all it may not be very much, and one might say, well what's going to happen when the power goes off, they are better in that point of view than a normal water heater, because the power goes off for a certain length of time, you can rest assured that practically all your thermally controlled water heaters will all come on at the same time in the area and probably blow the low tension fuse on the circuit. Here you haven't really upset the diversity from that point of view, because there is no thermal storage, but it is a point. I suppose if I were personally given the choice I would favour the normal conventional water heater from the supply point of view, I would favour that because I think that it would be more economical from the supply authorities point of view, but I can't see any sound reason why I must tell a consumer, you cannot have one, if they do start to affect costs, then I think it is up to us to make some adjustment in our tariff and maybe cater for this particular type of unit with a special tariff.

President: It is rather interesting to note, that the views expressed so far are from those people apart from Mr. Leishmann's introductory remarks, are from the people who are taking supply from Escom and I wonder whether they intend if there's any slip past the meter they'll also slip past Escom's side.

L. J. Hooley, Salisbury, Ministry of Transport and Power: Not guilty for the previous charge. I've just made a few of the cuff notes here. I have been interested in these water heaters probably as long as most people here. Confirming what you said a little while ago, you read an article dated 1931 which is probably true, just about that time the "Sadia" Water Heater Company were then developing one of these instant hot water appliances at about 9KW loading, and then as now everybody rubbed their hands and said they didn't want to know, but I think we should give it more thought actually as already has been said particularly by the last speaker, there are good reasons for not rejecting this type of water heater out of hand, the first point that was made by the original speaker was about the evasion of maximum demand, but this type of water heater mainly is most useful to the domestic consumer, and I wasn't aware that you had max. demand heaters in the domestic consumers premises, but even if you do reference was made so that the thermal ampere type, and I believe if I remember rightly that these particular type of thermal max. demand meters, they don't register as a straight line (at the end of the first) if there is a thirty minute interval it is registering that the end of the first 15 minutes, it's probably at about 85% of it's maximum, so I think the point there isn't a good one, if we have got to knock these water heaters for six and personally I don't like them, let me say that now then let us do it for the proper logical reasons, on the basis of maxdemand, if the thing is going to be in use for 2 or 3 minutes only, then I think we must accept as a proportion of the total demand made on the system the 3 or 4 minutes the thing is on is probably not worth worrying about. Now the second point made by the first speaker was in connection with insulated water heaters, well my opinion (I will speak now). I have had a good deal to do with the Administration of electricity supply regulations, the preparation of them and their administrating wiring rules, and it's my belief that we are getting to the point, now where we should think more and more about all insulated appliances and double insulated appliances, and let us dig ourselves away from this old fashioned idea of having to earth everything in my opinion, and all insulated water heater in which the current, the useful current, not the leakage current passes from the incoming or the phase conductor to the neutral conductor, to its completely shrouded in insulation I see nothing wrong with that at all, the danger of course arises if that current from the phase conductor passes to the earthing of the system, but if the system isn't earthed it can't do that, it must pass to the neutral anyway the neutral conductor providing far the best type of security if you are worried about earthing, in any case in Salisbury I can

quote an example, when we commissioned the new airport at Salisbury we put in a 750KW electrode boiler. Now I'm not advertising Salisbury's water, I'm a Salisbury consumer, but when we came to commission the thing we didn't get one milli amp between the electrode and fully ampusition, we in fact had to add salts to that water to make the thing start, having added the salts in the electrode boiler, it stayed put, the complete cycle of evaporation condensation left the salts there, but in my experience with this type of water heater we are talking about fixed to the tap to the domestic consumer, and I must say Mr. President, that I have used one, I usually try all the appliances as a responsible engineer, I think it is necessary that we all should do that. I find it very disappointing because if the water is in fact too soft then this conductivity would not withstand in the common belief that water is a perfect conductor, water is not a perfect conductor unless it has got something in it, some impurities then to make it a perfect conductor, then this type of water here is very very disappointing and if we are going to knock it for six at all, I think we should knock it on the grounds of inefficiency, the suppliers, I hope there are some here that can answer this one will probably tell you that the raise of water to a certain temperature in so many seconds or minutes but it depends entirely on the quality of purity of the water. I think if you want quick shaving water or if you want to fill the kettle up quickly so that it will boil half a minute quicker, then this appliance has probably got some use, but if one is going to confine it to say, three KW loading, and that is what most people have in mind, and three KW loading for 2 to 3 minutes will give you a pint of water fairly quickly, but who wants a pint of water, I would rather have a pint of beer, now in addition Mr. Chairman, even if we are talking about 9 KW loading, and the ones that I have seen up to now except in the early days, thirty or fourty years ago which were 9 KW, the present ones seem to be about three KW, which seems to be the idea, you just plug it into your 15 or 30 amp plug, I accept the point but if one is worried about the demand, I am talking on the suppliers' point of view, now then all you need do is you add a double pill point cooker switch, the average cooker these days is at least 9KW(someone mentioned 14KW, I agree, 14KW cooking, you prepare to put on with a bang all your hotplates, your oven and your grills and your warming oven all at once, yet we're worried to death because somebody wants to put a 3 KW water heater on. Mr. President, if you want to use it, this type of water heater, you put a changeover switch on your cooker while the consuming water heater in your cooker, and vice versa, as simple as that, now in any case coming back to the safety requirements of these water heaters as mentioned already in the industrial installation, the electrode water heater, whether it is raising steam, or raising water, it is an accepted appliance, in Rhodesia we have provided the regulations for the necessary safety requirements for operating electrode water heaters, and if they applied for the 750KW, 1000KW, 2000KW installations, why can't the same regulations (I'm talking about safety, and nothing else now, Mr. President), why can't the same safety regulations apply to the little 2 or 3 KW water heater off the tap. Now the other thing too which Mr. Simpson mentioned, I'm very glad to note that alternating current, this is childish Mr. President, is not storable, we can't put it in batteries, you can't do much with it, you use it off the tap as it were. Having turned the tap on you use it when you turn the tap off that's the switch at the wall. The only generally used facility for storing electricity is the water heater, so let's not run away with the ideas that these quick tap whatever we call them at the tap to replace what is the supply engineers main purpose of keeping his demand down, after all if you're going to pay £50 per KW for generating plant or even £100 in some areas why should you let a consumer use a 9KW water heater, 9 x 50 your paying in fact £450 to provide a facility, that's not really necessary, and certainly from a maxdemand point of view, you've got to come back to this one, why put a 9KW, and I say a 9KW is advisable Mr. Chairman, and nothing less is any good, 9 KW at the tap, which is going to put on the supply undertakings, if he is buying his bulk power from Escom, or Rhodesia in Kariba, about 9 or 10 pounds a KW, why encourage these things, let us be commercial about this, it might give the consumer the idea it's getting quick hot water, but it doesn't work like that, he's being sold a pup, in the broadsense, actually he has already got what he wants he has got instant hot water from his water heater, a thermal storage water heater which serves the maxdemand and it also enables someone to take, and I can quote Salisbury on this one, to reduce the maximum man charges on the power corporation every time the peak load starts coming up they push a button in the power station, in fact it switches out all the water in return, I think if one is going to spend capital both in Rhodesia and South Africa on new ideas, at least let's confine it to this sort of thing, let's save the maxdemand, let's save the nation's money by keeping the plant cost down by doing this.

F. Stevens, Ladysmith: Ladysmith practices load control in that domestic water heaters are switched off at peak periods, that is where consumers agreed to this, and in turn they receive a discount, but to qualify they can only use storage heaters, where they do not wish to be inconvenienced they pay more, approximately R1.50 but can then use any type of water heater. Commercial consumers are supplied through circuit breakers and pay so much per ampre rating plus a flat rate per unit. This automatically discourages the instant type heaters on account of the low ampere loading. They have to pay so much more for a suitable circuit breaker, and this very much bigger breaker more or less automatically discourages the use of the instant type heater, so from that you will see that we don't debar their use, but the consumer has to pay for the privilege.

E. de C. Pretorius, Potchefstroom: Ek wil 'n beswaar maak namens die klein ondernemings. Mnr die President, die aspek van veiligheid is nie genoeg beklemtoon nie.

Wat ek al kon aflei, is dit veral die 3KW verwarmer, asook waar van 'n verplaasbare toestel gebruik gemaak word (portable appliance), beteken dit dat hy van 'n stopkontak gewerk kan word, en dit is waar ek dink die S.A.B.S. werklik nou moet inkom, die toestelle wat as sulks gebruik kan word, behoort heeltemal verbied te word. Die ander aspek is dat enige informasie oor die instandering van so 'n toestel en die lewensdier.

H. E. Summers, Bulawayo: You've already mentioned that in Rhodesia we have been able to fix this problem, and if I can let you into a little secret, I would like to tell you how it is done, because the last Rhodesian speaker was with the ministry, and I'm representing a power undertaking. Firstly in the Central African Standards Association's code of practice for the wiring of buildings, we have clause one thousand one hundred and ten which states that a fixed water heater shall be in the circuit or circuit's separated from other circuits of the installation, and in domestic premises shall have a control switch mounted on the main switch board and readily accessible, so that is one hurdle you have got to get over first. Now in the same standards code of practice which I have referred to, there is then clause 703 which states that except for electrode water heaters, water shall not be in contact with a live element, so that knocks out one type, so you are left with the electrode type. Well then we've got in Rhodesia the electrical wiring regulations which is statute law, and in section 2 of the regulations states that if an electrode boiler is used, you have to get written permission from the Post Master General in terms of the line protection regulations, they are promulgated by the Post Master General, and if it happens to be a single phase electrode boiler then you have got to install a double wound transformer adjacent to the boiler, now I would suggest gentlemen that we buttoned this up very effectively. I would point out the necessity for it, because most of our power comes from a hydro-electric source, which has relatively high capital charge compared with the running charge and therefore in demand charge, and unit costs, and therefore if the cost per unit is to be kept at a reasonable figure it is essential that we operate at a high load factor, I would like to make one concluding remark, when the previous speaker referred to the fact, well, why not use these things they are no worse than welders, well I would suggest to you gentlemen, that there is another way of producing hot water at domestic premises mainly that authordox thermal storage device. All I suggest is that for welding if you are going to have an alternative there, it seems to me that you are just going to force handigas over.

L. Lewis, Windhoek: We are continually talking about these various appliances which add to the demand, and that is the aspect on which I wish to talk—not the safety or any other. One wonders if the time hasn't really come for us to consider perhaps even if it's just in the new houses, the installation of the separate circuit which in fact can be used for the control of such things as these water heaters or any other large demand consuming device. This separate circuit could be controlled by a cheap clock which is accurate, or even through the injection type of equipment and which can then be used only during the off peak periods when it is allowed by the "undertaking" and of course it may, I would hardly like to suggest that it should be metered under separate tariff, but at any rate the consumer would no doubt have to understand that they could use such equipment only during those periods allowed.

E. L. Smith, Boksburg: I think before the last world war, Johannesburg had quite a lot of a similar type of water heaters as now being discussed, that was the "Hocking" three phase element electrode type, drawing 30 amps per phase. I would like to know from Johannesburg what was their experience in those days with these "Hocking" geysers. I understand the market was pretty well credit at that time, now since then of course it died a natural death, because in the course of time, it became very inefficient, the elements began to fir up and the result was that hot water took a long time to get through, and I would like to know what Johannesburg's experience was in those days, and if there are any records of what took place with regards to demand and so on in those days.

President: Gentlemen, Mr. Leishmann has been taking notes here, and I feel he would probably like to reply to all of these remarks which have been made.

R. Leishmann, Johannesburg: This is a democratic institution that's why I brought the subject up to see how other people felt about it, I think that the thread of the discussion has been the expectancy that there is not going to be a very large demand for this type of water heater. I hope these concepts are true, I do know one instance of a 3 phase 30 KW job that is being built to try and fill a bath full of water in less than 14 minutes, but I don't want to see many on the mains. Mr. Summers makes an excellent point, that there is no alternative to welding inside our industry, but there is an alternative to heating water. Regarding Mr. Smith's last remarks about the Hocking 30 amp three phase jobs, I have no statistics, they were installed rather before my time, but it looks to me as if Johannesburg has gone rather more subtly than Rhodesia in finding ways why they shouldn't install these (we merely chuck some more rain in our water at the waterworks). I can say that firring up was the basic trouble there. Mr. President, I don't think I want to come forward with any specific recommendation or motion in this matter. I think we have ventilated it, we know how one another think but I do say this that if anybody sees the proliferation of these things, well those in charge of Power Supply Undertakings look out there's trouble coming.

President: Thank you Mr. Leishmann, we certainly are much obliged to you for raising this question, and

I think probably those who had doubts about it, and having heard all the views, are probably feeling much better now and will go home and re-think this whole issue.

W. H. Milton, Hon. Member: Mr. President, lady and gentlemen, we must thank Mr. Leishmann for bringing this matter forward for discussion. The opinion has been expressed that these "instant" water heaters are undesirable because their load is very intermittent and may be a nuisance to neighbouring consumers, also their use may be regarded as avoiding maximum demand measurement by thermal meters at present in use.

If the supply mains are designed to cope with consumer loading including stoves and space heating, a 7kW heater should not be objectionable. A 3kW heater would have the same effect as many Storage geysers.

The reference to demand metering requires amplification in my opinion. Many years ago I suggested that some steps should be taken to apply domestic tariffs with some regard to individual domestic consumer maximum demand. In my opinion electricity is being supplied too cheaply to many domestic consumers (and I am probably in that category at the present time), with detriment to others. For this reason there are other domestic appliances, the use of which also calls for strong criticism on the grounds of avoiding maximum demand measurement (another aspect of this I want to deal with later). The appliances I have in mind are the stoves and geysers as well as space heating equipment.

This may appear to be a digression from the subject, but I feel it is advisable to draw the attention of our non-technical councillor members to the reality of the situation so as to avoid creating a false impression of the financial aspects under discussion, and to place the problem in its correct perspective.

The blame for the present situation rests on us, and not the manufacturers and suppliers of the equipment. We did not have sufficient foresight when we encouraged the development of the domestic load, and when the danger signals became evident, we were loath to take the required steps to ensure adequate financial return from the users.

When almost the entire load on supply systems was for lighting, the resultant peak load (which dictated the capital investment in plant and equipment) was of very short duration. This meant that there was a deep and long time "valley" — the "off-peak period" during which capital equipment was almost idle. It followed that there was every justification for the endeavour to encourage further use during the off-peak period, so as to relieve the financial burden on "peak period" users, and accelerate development. It was realised that this could not be achieved unless the additional units were offered at a lower charge per unit than that applicable to sales during the peak period. In some cases, the supply for space heating and water heating was given through separate circuits, separately metered, in order to apply a low unit rate for this use. In other cases, a block of units was assessed as being sufficient to cover probable use during the peak period, being charged at a high unit rate, and any additional units were then supplied at a lower rate or rates. The basic charge for the estimated peak period use was later graded, some being on rateable value of the premises supplied, others on the number of rooms, or floor area. In later cases, a standard unit rate has been applied, the basic costs being recovered largely from a specific charge based on the number of rooms (regardless of use), or some equivalent.

Although the charge for additional units exceeded the additional cost of producing those units so long as extra capital equipment was not involved, the margin was (and still is) small, and insufficient to compensate for additional capital equipment when that becomes necessary. Thus the additional use encouraged by applying a low unit rate without a specific contribution to meeting fixed costs is only satisfactorily (financially) if the valley is not filled. The filling of the valley obviously depends on the magnitude of the additional off-peak load developed on the system, in relation to the prevailing capacity of the several sections of the system supplying the load.

The total load is not the aggregate of the individual loads supplied, because use takes place a different times and they do not all coincide. This diversity of time of use results in a lower "after-diversity" maximum demand which the system must be capable of supplying. The shorter the period of use of individual appliances, the greater the probability of diversity, provided it is coupled with infrequent and irregular use. In such circumstance a greater total installed capacity of consumer appliances can be effectively supplied from an existing system.

Because the simultaneous use of equipment by consumers establishes the demand to be met from the sections of a system and the system as a whole, from time to time, short time loads coupled with a difference in habits provides for the greatest aggregate of connected load being supplied from the system. If we consider the electric range, this load is far more formidable than the "instant hot water" appliance, because of our fairly regular habits as to meal hours. The hot water storage geyser may also be criticised, because its recovery time is prolonged though at a lower loading than the "instant" variety. As the author has stated he has not had an answer as to diversity in this regard, but it is not unlikely that the after-diversity load may be smaller.

It seems to me that the most important aspect of supply which the author has exposed is that present day charges to the class(es) of consumer whose demand is not measured may be too low in many cases. Surely the time arrived a long time ago when the size of a consumers premises ceased to be a satisfactory criterion for assessing his demand on the system, and hence his reasonable responsibility for meeting capital investment in the system supplying his retirements.

Some authorities have adopted the method of applying "demand availability" by using load limiting circuit

breakers to limit the demand a consumer can impose on the system at any time, and some by using "ampere demand metering." In both cases a "time element" for averaging the demand of the appliance in use by the consumer is involved. The time element in relation to the problem posed by the author because, even is important consumer is involved. The time element is important when "demand availability" or actual measurement is involved, the short time of use given by the author is such as to enable the consumer to make use of the device within the capacity of an existing installation under normal circumstances. If this were not so, the present day electric kettle with its 1,500/2,000 watt element would not have a sale!

When the maximum demand is measured for the purpose of charging for demand, it is common practice to measure an average rate of demand. This is sometimes done by measuring the arithmetic average of the instantaneous demands over say half hour blocks in sequence, and in other cases by measuring the heating effect. In the latter case the instrument is designed to indicate the heating effect of a load with due regard to the duration of that load. If the load is maintained for long enough the total load is indicated, as shown by the author. He has stated that he has taken a half hour loading time to register the total load because it is generally agreed that this corresponds to the thermal capacity of the system. This being so it seems that his curve is at fault, because it is characteristic of such a meter that in one third of the time interval the meter will indicate 90% of a steady load, at the end of the next third it will be indicating 99%, and after 30 minutes it will indicate 99.9% of the steady load. The author's curve shows only about 70% in 10 minutes (not 90%) and about 94% in 20 minutes (not 99%). The author has stated that the demand of an instant water heater would only register about 30% of its demand for a three or four minute draw-off and it constitutes a "demand-evading" appliance. If a correct curve of response is used, I would expect the meter to register between 50 and 60% in the time he mentions. Further as it is the thermal effect on the system that is the cause for concern in such cases, I consider that the indication is fair, particularly when it is borne in mind that the meter will take 30 minutes to recover, and any additional load following within that time will reach steady indication in less than 30 minutes. Surely this cannot be reasonably described as "demand evasion". To complete the picture, the 3kW heater would register about 2 kW in 5.3 minutes (not 1.5 as on the author's curve), the 7kW heater would register about 2.8 kW (not about 1.6 as the curve), and the 10 kW heater would register well over 9kW (not about 8kW as on the curve in the paper).

If the consumer's demand is being measured on such a meter, it is my opinion that he is fairly registering the average effect of his use of the appliance, and would be fairly charged accordingly — it is not fair to say he is avoiding his obligation.

If objections are to be lodged against the use of this type of appliance, it is my opinion that we should raise them on the grounds of other aspects than those of financial detriment to the supply authority — unless the use of other appliances is also dealt with (when demand is not charged for specifically) — rather we should object in defence of the consumer if we are not satisfied that they will give continued effective service.

I would much appreciate the author's views on the aspects of the problem I have mentioned. In conclusion I congratulate the author on the publicity he has given to the pros and cons of the use of these water heaters by those who may be considering installing them.

R. Leishmann, Johannesburg: The AMEU is indebted to Mr. Milton for his having troubled to submit a written contribution on this subject. On the basis of what he has said I wish to make the following comments in reply since the brevity of the points raised for discussion has not conveyed a complete impression of all the background thoughts I had in mind for consideration by supply authorities.

(1) Hot water storage constitutes a happy counterbalance to the preceding large-scale adoption of electric stoves whose on-peak, spasmodic-use characteristics afford marginal payability. The arch-fiends in this direction are space-heaters and electric kettles now that they have grown from 300/500 watts to 2 or 3 kilowatts. It alarms me that we are now asked to permit the addition of even more spasmodic characteristic "instant-heaters" whose sizes can range from 3 to 7kW single phase up to 20 and even 30kW 3 phase. To do so strikes insidiously at the storage principle of supplying valuable electric energy at a low rate of demand in order to minimise the present fantastic rate of increase of capital outlay.

(2) Heat storage constitutes our sole recompense for not being able to store electricity itself as is possible with other forms of energy such as coal, oil, gas and water. A world-wide endeavour is being made to extend the "storage-principle" by shifting bulk water heating, floor-heating, etc. in the night-valleys. "Instant heaters" run directly counter to such endeavours and consumer-convenience is not the sole criterion, any more than a newly-arrived commercial gimmick may be, if it negates policy in the consumer's and supply-authority's ultimate interest.

(3) With our crude electro-mechanical meters versus prospective more sophisticated electronic devices, I remain in opposition to Mr. Milton regarding proposals to apply demand-metering to domestic consumers, so enmeshing those utilising "unpayable" appliances. The lesser reasons are cost, maintenance and administration versus any additional revenue accruing. The major reason is that "demand metering" normally fails to take account of day and time of day and season (viz. "the system or adjoining network demand at the time of consumer demand") and is fallacious in principle by registering 24 hours/day,

7 days/week however convenient for practical reasons. It is absurd to charge say an ice-rink or bulk hot-water-storage full demand charge for heavily drawing electricity from lightly-loaded power stations, substations and mains at 3 a.m. in the morning if they elect to co-operate with the supply authority by making ice or hot water "off-peak" rather than "on-peak" when the demand charge has full justification. This may apply with equal force at 10 a.m. on Sunday or 4 p.m. on Saturday or other times. Yet the demand meter keeps on registering without the means of discriminating whether or not the load being registered is contributing an intolerable system or area peak which will involve more capital soon.

Johannesburg has 15 years of highly successful experience in bridging out the "day time" kWhr. and demand meters and substituting "night time" kWhr. (but no demand) lower rate meters for a 12 hr. period starting at a time determined by the loading on the supplying network. This practice is based on the concepts that peaks are certainly over between 6 and 9 p.m. depending on district and capital recoupment is satisfied by "day time consumers". Those willing to use energy at night may just as well use the spare mains capacity (but no more) paying a unit charge only to meet fuel costs and profit and contribute to load factor improvement. Such could not rationally be applied domestically.

(4) It must not be overloked that an initial 4kW shower or handbasin "instant heater" can encourage several such units in one luxury home, plus some 15 to 20kW units for baths and laundries — shall we say some installations approaching 50kW installed! And, moreover, without any storage units at all in new homes! Shall we extend our vision to the efflorescence of new flats, hotels and motels in this country and the refurbishing of the old in line with star-gradings.

I merely seek to alert the electricity supply industry before matters go too far to retrace our steps. Mr. Milton is with me when he says in respect of other appliances "The blame for the present situation rests on us . . . We did not have sufficient foresight when we encouraged the development of the domestic load . . . and were loath to take the required steps to ensure adequate financial return from the users". I maintain that no present metering system is capable of giving us "adequate financial return" for the instant-demand of non-storable electricity and brand such devices as being against the interests of supplier and consumer alike.

(5) I agree with Mr. Milton's comments concerning high-demand short-time appliances versus low-demand long-time appliances in relation to diversity but have a predilection for selling units to the latter. Clearly, if there was a water heater capable of evenly demanding just enough amperes 24 hrs./day to satisfy the consumer's hot-water needs, this would be preferable to the supply authority versus "instant heat" unless a large number of such units completely diverse were in use. This can never be the case. Indeed they are suspect of coinciding with breakfast/lunch/dinner cooking peaks in principal use.

(6) Regarding the time lapse/percentage registration of the thermal demand meter as published, I can assure Mr. Milton that this is confirmed to be the correct calibration curve for the meters we use. I am not familiar with his premise that the demand meter characteristics he refers to will register 90% in the first ten minutes and 99% within 20 minutes. After careful investigation I am only able to surmise that Mr. Milton is referring to a 15 to 20 minute lapse to 99.9% registration, such meters being available in the U.S.A., whereas I am refering the meters of Canadian origin having a 32 minute time interval to 99.9% registration. The only commercially-available thermal meter I can trace locally which registers 90% in 10 minutes is that used for "alarm" purposes in warning a consumer to reduce load or suffer high-demand registration. All locally sold demand meters take 16 minutes to register 90% and 32 minutes for 99.9%, as shewn on my published curve. Accordingly I am unable to accept Mr. Milton's criticism against my claim that an instant heater only registers some 30% of its demand during a 3 or 4 minute use-time on a supply system accepting 30 minutes as its thermal time limit.

Moreover, while I probably side with his reasoning concerning their diversity in relation to the power system as a "thermal sink", I remain concerned about the effects on the consumer's wiring-installation, especially an old installation to which instant heaters have subsequently been added. If wholesale adoption of these units were to emerge, ultimately replacing a large proportion of storage units, it would surprise me if the supply authority did not have to reinforce the street-mains supplying such consumer and his neighbours at times of peak demand.

May I conclude by saying how appreciative I am for Mr. Milton's views which illuminate those brought to the forum. It is my hope that supply authorities generally will become more discriminative regarding the types of appliances put into use on their mains so adding their quota to the endeavours of the S.A.B S. Safety Codes and Approvals marks besides contributing towards the building of certain disciplines as between the supply authority, the manufacturer and the consumer. It is this that will ensure our continuing to display one of the best electricity administrations to be found anywhere.

The Convention proceeded to consider Reports of Sub-committees and Representatives which were

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Die Konvensie oorweeg voorts die verslae van Subkomitees en Verteenwordigers wat in Volume I van die

published in Volume 1 of the Association's 1967 Proceedings. Arsing therefrom:

(1) Following discussion on the report on the Training of Engineers and Technicians, the Convention unanimously resolved in relation to the Traszacker Report on the Training of Engineers and anticipated State action on the training of apprentices with particular reference to differentiation between artisans and technicians and also the memorandum submitted by Clr. H. G. van Zyl to the Municipal Association of the Transvaal:—

> that the appropriate authorities be requested to establish a National Committee representative of the A.M.E.U., technical colleges, government departments concerned and other interested parties with power to guide and direct but flexible to approve the service conditions and training according to individual circumstances.

E. de C. Pretorius, Potchefstroom: Ek het orals gesoek vir 'n aanknopingspunt vir wat ek nou wil sê. Ek dink die naaste wat ek kan kom is miskien item vyfteen van die verslag oor die opleiding van Ingenieurs en Tegnici. Spesiale aandag moet geskenk word aan die personeel van kolleges en ook in die praktyk. Ek praat as 'n verteenwoordiger van 'n klein munisipaliteitjie, ons het nie die fasiliteite van tegniese kolleges nie en ons is aangewese op die Witwatersrandse Tegniese Kollege se fasaliteite. Ek het nou die dag net terloops gekyk na die elektrisiëns se een, dit is die eerste, tweede of derde lesing, en ek stel dit sag as ek sê ek was geskok gewees met die standaard wat aan die jong seuns opgedis word.

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(2) **Annual Report on the Activities of the Physics and Electrical Engineering Department of the S.A. Bureau of Standards:—**
The following discussion took place:—

A. A. Middlecote, Pretoria: Thank you Mr. President, both as the head of your organisation and also for your help to us as the co-ordinating representative. I would like just to direct attention at several of the items in the report, firstly of the compulsory safety specifications, we would just like to point out to remind you that this whole system was drawn up at the request of the A.M.E.U. and at first it was desired that all equipment should be covered by compulsory specifications, but we trod the weary way by concentrating on ten, which were considered the most important. We have found that it has been a relatively easy task, industry and commerce has co-operated very very well with us and it is running very smoothly, except as has been pointed out, there are a few anomalies which are difficult to overcome, and we would like the A.M.E.U. as a body concerned with it very much to consider the proposal that perhaps a further four could be made compulsory, that is washing machines, toasters, irons, and soldering irons, we find that there are

Vereniging se 1967-Verrigtinge gepubliseer is, en die volgende spruit daaruit voort:—

(1) Na bespreking van die verslag insake die opleiding van Ingenieurs en Tegnici, besluit die Konvensie eenparig in verband met die Straszacker-verslag oor die Opleiding van Ingenieurs en die verwagte optrede van Staatsweë insake die opleiding van vakleerlinge, met spesiale verwysing na die differensiasie tussen vakmanne en tegnici, sowel as die memorandum wat deur Raadslid H. G. van Zyl aan die Munisipale Vereniging van Transvaal voorgelê is:—

> dat die betrokke owerhede versoek word om 'n Nasionale Komitee in die lewe te roep, wat verteenwoordigend sal wees van die V.M.E.O., Tegniese Kolleges, die betrokke Staatsdepartemente en ander belanghebbendes, met bevoegdheid om te adviseer en te lei, dog met die nodige buigsaamheid, om die diensvoorwaardes en opleiding ooreenkomstig die omstandighede van elke geval, goed te keur.

Dit is, om mee te begin verouderd, daar is baie dinge wat aan die seuns geleer word wat ingevolge die Fabriekswet onwettig is. Ek noem u een ding: die invoering van bogrondse geleidings. Daar word nog verwys na Britse Standaarde, byvoorbeeld houtpale. Blykbaar het die mense nog nie van die S.A.B.S.-spesifikasies vir houtpale gehoor nie. Daar is talle sulke byvoorbeelde, ek kan nie almal noem nie, dit sal die hele middag neem, maar ek voel werklik, Mnr. die Voorsitter, van hierdie Vereniging behoort daar vertoë uit te gaan na die Witwatersrandse Tegniese Kollege wat verantwoordelik is, dat hulle 'n bietjie die kursus opknap.

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(2) **Jaarverslag oor die bedrywighede van die Departement Fisika en Elektrotegniese Ingenieurswese van die S.A. Buro vir Standaarde:—**
Die volgende bespreking vind plaas:—

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anomalies because these are not covered, and it is not a difficult task to make these compulsory. I would also as a matter of fact remind you that over the recent conversation on water heaters that seeing these other ones coming along as problems, as quick heating ones, it might well be considered making water heaters a compulsory specification, it was never considered previously because storage water heaters were the only ones concerned, but the safety specification does really cover the other types and it might be a good precaution to consider that. The other one that I would like to mention briefly, the code of practise for lighting of streets and highways, Mr. Smit will be telling you all about that at the end of this conference. The ballast fluorescent lamps will be ready very soon, and it is a, I might say an exceedingly good specification, and I think the first of its type in the World, it's covering every aspect. The distribution transformers is one that we must mention, it is just being issued and it covers distribution transformers up to 1,000 KVA, it has

been welcomed by the Industry as well as those members of the Supply Industry that served on the committee. The Electricity Supply Commission were particularly helpful and we followed many of their trends due to the experience. It includes standard losses and has, or will result in quite a considerable saving in cost of transformers. Now another advantage is that it is hoped that soon transformers could be ordered bearing our mark. Now the big value of this mark to the manufacturer is that he won't have to hold up the works for witness testing, it will be a continuous process and the control on the test day will be more, shall we say, close than under non-mark scheme under witness testing, in as much as the Bureau will at regular periods have to satisfy themselves with the meters and the measuring methods are right up to standard. I think the supply industry will see quite a considerable saving in costs if they work to this specification which I think is a very good job of work. Finally I would just like to mention a point that is not in the report and that is the formation by my council of a Standing Advisory Committe on Electrical Safety. I think this will appeal to many of you here, I mentioned this morning that we often have the ball passed from the Bureau to the A.M.E.U. Recommendations Committee, to the Wiring Regulations Committee and then the Chief Inspector Factory, Mr. Wannenburg has a lot to say often, and even the Mining Engineer. Now what have we done here, is formed a Standing Advisory Committee on Electrical Safety which will advise on all the points which cross the functions of all those people I have listed, it is representative of very senior people on all those organisations and will deal only with policy not specific clauses or detail, but policy on the general principles of Safety in Electrical Engineering.

President: Thank you very much Mr. Middlecote.

P. J. Botes, Roodepoort: Ek verwelkom hierdie Spesifikasies van Distribusie Transformatore. Ek het onlangs 'n tender aangevra wat reeds nou voor die raad dien en ek het Transformatore gekry, hulle dra nie die S.A.B.S. merk nie, soos Mnr. Middecote nou reeds gesê het, maar daar is sekere limiete neergelê, vir die grootte van die Transformatore. Ek het gevind dat meeste van die verskaffers die bly nie binne daardie limiete nie. Byvoorbeeld daar is een vir 'n 750kW Transformator en die hoogte mag nie groter as 90 of 96 duim wees nie, ek kan nie nou onthou nie en ek het ander gekry van party mense van 115 duim. Nou is daar by die lengte en breedte ook verskille en ek wil net graag weet wat die posisie op die oomblik is tot tyd en wyl hulle met die S.A.B.S. Merk verskyn, wat sal die probleem wees, hoe moet ons dit, dit is nie onder die vereistes wat jy moet spesifiseer nie, kyk, jy neem aan dat as jy vra vir S.A.B.S. sal dit binne daardie limiete gedoen word, maar nou kry jy tenders in op hierdie stadium sonder dat die merk daar weergegee word, en in hierdie stadium word daar nie voldoen aan die vereistes van die lengte en so aan nie.

A. A. Middlecote, Pretoria: I hope I have got the problem right, but all I can say is that transformers at the moment aren't supplied with the mark, but if they are ordered to be in accordance with the S.A. Standard specification, then the person selling it must be prepared to make a sworn affidavit that it does comply or else he cannot claim his supplying it in accordance, because of that approach he is subject to the court of a law making a false claim, if he is found not to comply, so if in the case of non mark bearing stuff, someone claims to compliance he can be charged if the product does not comply. Now our specifications covers what everyone considered that what users and manufacturers considered the essential controls. My own memory is not too good, but I think there are limits to dimensions, there are no lower limits but upper limits so as not to take up too much space, then of course there are standard bushings, I didn't stress that but one must realise that the standard specification for distribution transformers has standard bushings and it means from now on whoever the manufacturer is, you will only have to carry one type of bushing for each size of winding or on a transformer in other words, the different manufacturers will use the same type of bushing, I hope that answers Mr. Botes question.

E. de C. Pretorius, Potchefstroom: Die V.M.E.O., deur sy takke, ek dink veral die Hoëveld takke, is aan heelwat wysiginge van die oorspronklike konsep spesifikasie voorgestel. Is daar enige notisie geneem van daardie wysigings?

A. A. Middlecote, Pretoria: I think the point is about various changes which were recommended in the specification. In the case of distribution transformers we must mention that we circulated the A.M.E.U. very very closely, more closely than any other specification we have ever drawn up before. I think we arranged for additional copies to be sent to you, and to be distributed and all the comments of the A.M.E.U. delegates were received, were considered by the Committee strongly debated and some were excepted and some weren't, I think it is a matter of majority opinion in the committee.

President: Vir die inligting van Mnr. Pretorius, die verteenwordiger was afgevaardigde van Pretoria gewees, Mnr. Stofberg is nou hierso, maar ek glo nie hy het persoonlik op daardie komitee gedien nie, maar dit was Pretoria wat ons daar verteenwoordig. Nog iemand wat wil praat in hierdie verband? Gentlemen, the question was put whether the convention is in approval that further compulsory specifications should be issued. Ons wil graag u gevoelings kry in verband met die uitbreiding van die verpligte veiligheidspesifikasies waarvan reeds twaalf bestaan. Almal tevrede. Dankie. Thank you. Mr. Middlecote, now you have got the answer. Gentlemen, the next report is a very short one, on the work of the C.S.I.R. you have got the report on page 49, wil Mnr. Van Wyk miskien iets in hierdie verband toelig, as u nog hier is Mnr. Van Wyk.

J. D. N. van Wyk, W.N.N.R.: Daar is nie eintlik iets wat ek wil byvoeg nie, net om te bevestig dat dit vir ons 'n baie groot voorreg is by die W.N.N.R. om 'n verteenwordiger van hierdie organisasie van u op ons advieskomitee te hê, die funksie van hierdie advieskomitees is 'n tegniese een, naamlik om die direkteur van die insti-

tuut waar die werk gedoen word te adviseer, raad te gee oor prbleme wat ons ondersoek, en veral onder ons aandag te bring die soort van dinge wat in die nywerheid behoefte aan is, en wat ons in ons navorsingsprogramme kan insluit. Ons verwelkom dus om deur hierdie kanaal enige gedagtes van u kant af te kry, veral aangesien ons soos u seker opgemerk het, uit die referaat vanoggend baie na aan die grond probeer beweeg en dit is een van die maniere om kennis te neem van 'n praktiese probleem.

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(3) Annual Report of the Electrical Wiremen's Registration Board.

The following discussion took place:

C. G. Lombard, Germiston: Hierdie verslag is gesirkuleer. Soos u kan sien het die raad gedurende die afgelpe jaar, soos in die vorige jaar, weer 'n groot aantal aansoeke afgehandel. Daar is net een regstelling wat ek hier wil doen. Ek het melding gemaak in die verslag dat daar tot dusver net een Advieskomitee tot stand gekom het, naamlik in Durban. Sedert die verslag opgestel is, het die Raad 'n mededeling van 'n Advieskomitee wat in Kaapstd tot stand gekom het, ontvang, maar daar is geen offisiële mededeling in verband met die totstandkoming van hierdie komitee aan die raad gerig nie. Miskien kan Kaapstad ons daaroor toelig. Mnr. Wannenberg, die Voorsitter van hierdie Raad is teenwoordig en sal miskien 'n paar woordjies wil sê.

G. J. Wannenburg, Departement Arbeid, Pretoria: By wat mnr. Lombard gesê het, wil ek net graag byvoeg wat ons doen vir die immigrante wat taalmoeilikhede het. Ons het 'n spesiale eksamen gereël, soos wat u miskien in die verslag gesien het, waar selfs die eksamen-vraestelle oorgeplaas word in die taal van die persoon wat moeilikheid het met die taal. Nou die vier tale waarin ons die eksamen-vraestelle opstel, is Italiaans, Duits, Grieks, en Portugees. Ons het ongelukkig groot moeilikheid gekry deurdat ons nie behoorlike vertalers kan kry nie. Nou hierdie eksamen is op besluit spesiaal om te kyk of ons die mense miskien kan help op daardie manier, want ons kry so baie dat die persoon kom om die eksamen te kom doen en dan kan hy nie eers lees wat op die vraestel geskrywe staan nie. Nou kan u self verstaan dat as hy die regulasies moet leer, dan gaan dit vir hom nog baie groter moeilikheid afgee. Dit is een aspek van die saak. Dan wil ek graag namens die mense by die Cots Training Centre by Olifantsfontein net aan hierdie vergadering sê dat enige persoon wat enige tyd geinteresseerd mag wees om soontoe te gaan en te gaan sien hoe die eksamen afgeneem word, baie baie welkom daar ontvang sal word. Dit is iets wat baie mense sekerlik nie weet dat hulle soontoe kan gaan, om self te gaan sien hoe word hulle vakleerlinge, of wie dit ook al is van die werksmense, daar deur hulle toetse gesit nie. Wat die Adviesraad betref, wil ek graag nou vir mnr. Simpson van Durban baie hartlik bedank (ek dink ons het reeds so gedoen per brief), maar ek wil hom baie hartlik bedank vir die baie nuttige hulp

President: Soos u waarskynlik sal onthou as een van die aangeleenthede wat die W.N.N.R. ondersoek het, 'n punt wat Mnr. Stephens verlede jaar gemaak het, en dit is die kwessie van aarding onder die geboue. One of the points as you probably realised this morning was the item which Mr. Stephens raised last year, and that was the question of the earthing of buildings under the foundations now that has already been picked up by the C.S.I.R. for further investigations.

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(3) Jaarverslag van die Registrasieraad vir Elektriese Draadwerkers.

Die volgende bespreking vind plaas:

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wat hulle ons gee in Durban. Ek sal graag wil weet wat gebeur het in Kaapstad. Ek het ook nou die dag verneem van mnr. De Villiers van Bloemfontein, dat hulle van voorneme is ook daar 'n Adviesraad in die lewe te roep. Dan wil ek net graag sê dat Pietermaritzburg ook aansoek gedoen het om 'n Adviesraad daar in die lewe te roep, maar ons het gevoel dat die twee sentra so ná aanmekaar is dat dit nie betalend sal wees om twee in te stel nie. Ons moet liewers net by die een bly, en dit is Durban. Ek sal net graag van mnr. Frantz verder verneem.

A. C. T. Frantz, Cape Town: It is true that in Cape Town we have not got one of these advisory committees. We were approached by, if I remember rightly, it is The Electrical Contractors Association I should say, it was more than twelve months ago, whether we would be prepared to join such a committee. We made some enquiries and we gathered that the object of this committee was to examine and interview prospective applicants for the Wireman's Registration Certificate, and if we felt that they were worthy of being registered to recommend accordingly to Pretoria. Now we discussed this very thoroughly, our Deputy Mayor, Councillor Ferry was quite keen on this, but my installation engineer and I and our Deputy, we had long discussions on this and we felt that it was wrong for us to be represented on such a committee at all. Because we were after all sort of policemen, our inspectors go around the town, we sometimes catch unlicensed Wiremen from working and we felt that it would be completely wrong for us to sit on the advisory committee and have before us somebody coming along and claiming that he had sufficient experience, he had no Wireman's Registration Certificate, but he had worked for so and so, and he'd worked for so and so and he had been working for so many years as a wireman, but without a wiremen's certificate, he would immediately be laying himself open to a charge of having broken the Wiremen and Contractors Act, and for that reason we told Mr. Ferry that we felt that it was entirely wrong for us to join this committee. For a long time then I believe that no committee was formed, but I understand that one has now been formed without us being represented on it, which I think is the correct way.

(4) Report on the Standard Regulations for the Wiring of Premises.

Amplifying his report, Mr. R. Leishman (Johannesburg) said:—

R. Leishmann, Johanesburg: I don't want to make much comment on this, I think I can tell the meeting that the several thousand copies which have been issued since September, 1940 when it was first promulgated is an understatement—over 53,000 have been sold. The other point that I think I should draw to your attention is that since the committee decided upon the 1966 amendments which have all been issued now, there has appeared the 14th edition of the London Institute's Wiring Regulations. This, Mr. Chairman, is a very considerable work that is being done in London comparative to their 13th edition. They have been through the entire Wiring Regulations and they have now become a very very formidable set of regulations of great detail indeed, and has been a very fine piece of work. I do not visualise personally that we out here will be too rapid in attempting so ambitious a set of wiring regulations as they have over there. I say this for two reasons, the one reason is that I find that there is a large number of contractors up in our end of the world anyway, I don't know whether they deliberately misunderstand the regulations, or whether they can't read but certainly they are not going to be able to understand the London Regulations, and I think our motive in this country, especially now that we are getting Bantu Electrical Wiremen becoming qualified, I think we have got to keep our feet on the ground and stay down to a bit of simplicity. I would, however, take this opportunity of appealing very sincerely to the Branches of the Standard Wiring Regulations Committee, particularly the Natal and Cape Western, to start feeding forward material for the main committee to consider because it takes a long time to build up towards any future amendments and we've got a lot of work ahead of us during the next three years.

(4) Verslag oor die Standaardregulasies vir die Bedrading van Persele.

Ter uitbreiding van sy verslag, sê mnr. R. Leishman (Johanesburg):—

(5) Report of the Co-Ordinating Committee for High-Voltage Facilities.

Mr. R. Leishmann (Johannesburg) reported his incorrect designation in the "Proceedings" as Convenor and also advised that the symposium referred to in the report would be held in October and not August.

(5) Verslag van die Koördinerende Komitee vir Hoogspanningsgeriewe:—

Mnr. R. Leishmann (Johannesburg) vestig die aandag daarop dat hy in die Verrigtinge verkeerdelik as Sameroeper aangegee is, en sê voorts dat die Simposium waarna in die verslag verwys word, in Oktober gehou sal word en nie in Augustus nie.

(6) The following report on the "South African National Committee of the World Power Conference" by Mr. R. W. Barton (Welkom) was tabled:

(6) Die volgende verslag oor die „Suid-Afrikaanse Komitee van die Wêreldkongres oor Krag" deur Mnr. R. W. Barton (Welkom) word ter tafel gelê:—

SOUTH AFRICAN NATIONAL COMMITTEE OF THE WORLD POWER CONFERENCE

The objects of the World Power Conference are the peaceful use of energy resources to the greatest benefit of all, both nationally and internationally by:

1. Considering the potential resources and all the means of production of energy in all their aspects.
2. Collecting and publishing data on energy resources and their utilisation.
3. Holding conferences of those concerned in any way with surveying, developing or using energy resources.

The South African National Committee consists of representatives from:—

The Electricity Supply Commission, Johannesburg
South African Railways
The South African Institution of Mechanical Engineers

DIE SUID-AFRIKAANSE NASIONALE KOMITEE VAN DIE WÊRELDKONGRES OOR KRAG

Die doelstellinge van die Wêreldkongres oor Krag is die vreedsame gebruik van kragbronne tot voordeel van die mensdom op beide nasionale sowel as internasionale vlak deur:

1. Oorweging te skenk aan alle potensiële kragbronne en alle middele om energie te ontwikkel en al die verskillende vertakkinge daarvan.
2. Gegewens in te samel en te publiseer in verband met energiebronne en die gebruik daarvan.
3. Die hou van kongresse van al diegene wat enigsins belang het by die opmeting, ontwikkeling of gebruik van energiebronne.

Die Suid-Afrikaanse Nasionale Komitee is saamgestel uit verteenwoordigers van die volgende:—

Die Elektrisiteitsvoorsieningskommissie, Johannesburg.
Die S.A. Spoorweë.
Die S.A. Instituut van Meganiese Ingenieurs.

The South African Institute of Electrical Engineers
The Associated Scientific and Technical Societies of South Africa
The Association of Municipal Electricity Undertakings of Southern Africa
The Fuel Research Institute of South Africa
The South African Atomic Energy Board
The Department of Labour
The Department of Mines
The Transvaal and Orange Free State Chamber of Mines
The Council for Scientific and Industrial Research
Chairman: Dr. Strazacker.
Secretary: Mr. G. R. D. Harding.

World Power Conferences are held every sixth year, the last having taken place in 1962, in Melbourne, Australia, while the next is due in 1968, the venue being Moscow, U.S.S.R.

Sectional meetings are held every alternate year. The 1966 meeting took place in Tokyo, Japan, from the 16th to the 20th October.

Meetings of the Executive Council are held every year, the next, in August, 1967, having Accra, Ghana, as the venue.

Meetings of the South African National Committee are arranged annually in Johannesbug. At the last meeting of this Committee, held on the 14th April, 1967, Dr. Strazacker reported briefly on the Tokyo Sectional Meeting as follows:—

The total number of participants, accompanying persons and representatives was no less than 1,396, representing 54 countries and 13 international agencies.

The official delegates from South Africa were:—

Dr. R. L. Strazacker, Chairman of ESCOM, representing the Government of the Republic

and

Mr. G. R. D. Harding, Commissioner and General Manager of ESCOM, representing the South African National Committee of the World Power Conference.

Other South Africans who attended were Dr. A. J. A. Roux and Dr. W. L. Grant, Director-General and Deputy Director-General respectively of the South African Atomic Energy Board; Mr. N. T. van der Walt, Chief Engineer (Mechanical) of ESCOM and Mr. H. H. W. Behrens, Development Consultant, Vecor Projects and Construction Holdings (Pty.) Limited.

The theme of the Sectional Meeting was "Problems of Future Years in Energy Utilization", the aim being to study new developments in energy utilization and its structural changes, as well as to examine the important problems in the national utilization of energy in the future.

The matter was handled in three divisions as follows:-

Division 1: General Aspect

(1a) New developments in methods of forecasting demands for energy.

Die S.A. Instituut van Elektrotegniese Ingenieurs.
Die Vereniging van Wetenskaplike en Tegniese Genootskappe van Suid-Afrika.
Die Vereniging van Munisipale Elektrisiteitsondernemings van Suidelike Afrika.
Die S.A. Brandstofnavorsingsinstituut.
Die S.A. Atoomkragraad.
Die Departement van Arbeid.
Die Departement van Mynwese.
Die Transvaalse en Oranje-Vrystaatse Kamer van Mynwese.
Die Raad vir Wetenskaplike en Nywerheidsnavorsing.
Voorsitter: Dr. Strazacker.
Sekretaris: Mnr. G. R. D. Harding.

Die Kragkongresse van die Wêreld vind elke sesde jaar plaas, die laaste een was in 1962, in Melbourne, Australia, terwyl die volgende een in 1968 in Moskou sal wees.

Streeksvergaderings word elke tweede jaar gehou. Die 1966-vergadering was in Tokio, Japan van die 16e tot die 20e Oktober.

Die Uitvoerende Raad vergader elke jaar. Die volgende een is vir Augustus 1967 belê in Accra, Ghana.

Die Suid-Afrikaanse Nasionale Komitee kom jaarliks byeen, gewoonlik in Johannesburg. Met die laaste vergadering van die Komittee, wat op 14 April 1967 gehou is, het Dr. Strazacker kortliks soos volg verslag gedoen oor die Tokio-Streeksvergadering:

Daar was nie minder nie as 1,396 deelnemers, metgeselle en verteenwoordigers wat 54 lande en 13 internasionale agentskappe verteenwoordig het.

Die amptelike afgevaardiges van Suid-Afrika was:—

Dr. R. L. Strazacker — Voorsitter van EVKOM, wat die Regering van die Republiek van Suid-Afrika verteenwoordig het.

en

Mnr. G. R. D. Harding — Kommissaris en Algemene Bestuurder van EVKOM, wat die Suid-Afrikaanse Nasionale Komitee van die Wêreld-Kongres verteenwoordig het.

Ander Suid-Afrikaners wat teenwoordig was, was Dr. A. J. A. Roux en Dr. W. L. Grant, Direkteur-Generaal en Adjunk Direkteur-Generaal onderskeidelik van die Suid-Afrikaanse Atoomkragraad, Mnr. N. T. van der Walt, Hoofingenieur (Werktuigkundige) van EVKOM en Mnr. H. H. W. Behrens, Ontwikkelingskonsultant, Vecor Projects and Construction Holdings (Eien.) Beperk.

Die tema van die streeksvergadering was „Probleme in die Toekoms in die Aanwending van Energie".

Die aangeleentheid is in drie afdelings behandel.

Afdeling 1: Algemene Gesigspunt:

(1a) Nuwe ontwikkelings in die voorspelling van die aanvraag vir Energie.

(1b) Co-ordination of the Energy Industries.
(1c) Future problems in regard to Internation Exchange of Energy.

Division 2: Future Problems in the Conversion, Transportation and Storage of Energy.

(2a) Electricity.
i. New Systems of Power Generation Hydro, Thermal and Nuclear.
ii. Interrelation of Power Systems.

(2b) The Comparative Position of Main Fuels.

Division 3: Future Developments in Energy Consumption.

(3a) Industry.
(3b) Commerce and Residence.
(3c) Agriculture and Rural Development.
(3d) Transportation.

No less than 163 technical papers were presented. Having been circulated beforehand, none of these were read, the time of the Conference being devoted mainly to discussion.

The South African delegation presented the following papers:—

(1) "Power Generation in South Africa with special reference to the Introduction of Nuclear Power" by R. L. Strazacker, A. J. A. Roux, G. R. D. Harding and W. L. Grant.
(2) "The Production of Gas, Synthetic Oil and Chemicals from Low-Grade Coal in South Africa" by P. E. Rousseau.
(3) "The Growth of Railway Electrification in the Republic of South Africa" by A. J. G. Gosling.

In general, Dr. Strazacker thought that the Conference had been very successful. He had himself occupied the position of First Vice-Chairman of one of the sessions and found that the organisation and arrangements were particularly good.

It was of course, not possible for such a small delegation to cover all sessions of the Conference, and he could at this stage only record what had impressed him most.

In the field of transportation these were the lively discussions on Electricity versus Diesel and D.C. versus A.C., and also the rapid development in the use of natural gas as a fuel for transport.

The methods of forecasting future demand were becoming very sophisticated, the growth in the gross national product and in investments being used as a basis.

Advances in the nuclear power field had been very marked over the past two years and costs were now becoming more realistic and comparative. No definite type of reactor had yet emerged as the best. The United Kingdom was in the lead with the development of the advanced Breeder Reactor and Dr. Strazacker felt that signified

(1b) Ko-ordinasie van Energie-Nywerhede.
(1c) Toekomstige probleme in verband met die uitwisseling van energie tussen volke.

Afdeling 2: Toekomstige probleme in die Omsetting, Vervoer en Opgaar van Energie.

(2a) Elektrisiteit.
i. Nuwe stelsels van Kragontwikkeling — Hidro, Termès en Kern.
ii. Onderlinge verhouding van Kragstelsels.

(2b) Die vergelykende stand van die Vernaamste Brandstowwe.

Afdeling 3: Toekomstige Ontwikkeling en Energie Verbruik.

(3a) Industrieel.
(3b) Handel en Huishoudelik.
(3c) Landbou en Landelik.
(3d) Vervoer.

'n Totaal van 163 tegniese referate is gelewer. Aangesien almal voor die tyd uitgestuur was, is nie een op die Kongres gelees nie, en al die beskikbare tyd op die Kongres kon dus aan besprekings gewy word.

Die S.A. Afvaardiging het die volgende referate gelewer:—

(1) „Die Ontwikkeling van Krag in Suid-Afrika met besondere verwysing na die inleiding tot Kernkrag" deur R. L. Strazacker, A. J. A. Roux, G. R. D. Harding en W. L. Grant.
(2) „Die Ontwikkeling van Gas, Kunsmatige Olie en Chemikalieë van lae-gehalte Steenkool in Suid-Afrika" deur P. E. Rousseau.
(3) „Die groei van Spoorwegelektrifikasie in die Republiek van Suid-Afrika", deur A. J. G. Gosling.

Dr. Strazacker het gevoel dat die Kongres as 'n geheel besonder geslaag was. Hy het self by een geleentheid opgetree as Eerste Vise-Voorsitter en gevind dat die organisasie en reëlings besonder goed was.

Dit was vanselfsprekend dat so 'n klein afvaardiging onmoontlik alle sittings kon dek en hy kon vir die huidige slegs noem wat hom die meeste be-indruk het.

Op die gebied van vervoer was daar lewende beredenemings oor Elektrisiteit teenoor Diesel en Direkstroom teenoor Wisselstroom en ook oor die vinnige ontwikkeling wat plaasvind in die gebruik van natuurlike gasse as brandstof vir vervoer.

Die metodes om toekomstige aanvraag te voorspel is besig om baie verfynd te raak; die aanwas in die totale nasionale produksie en beleggings word as uitgangspunt gebruik.

In die afgelope twee jaar was die vooruitgang op die kernkrag-gebied baie merkbaar en kostes begin nou meer realisties en vergelykbaar te word.

Geen besondere reaktor het tot so ver as die beste te voorskyn gekom nie. Die Verenigde Koningryk is voor met die ontwikkeling van die gevorderde „Broei"-reaktor

improvement in this direction would occur in the not-too-far-distant future.

Experience in the operation of nuclear power stations showed that plant availability was very good and that many existing units could be safely uprated.

The tendency towards increased unit sizes in turbo-generators was continuing, with liquid-cooling of rotors being applied.

The use of gas turbines for peaking and for emergency supplies to power station auxiliaries was coming to the fore.

It was noted that fossil fuels would be important for electricity generation for many years to come, and that oil was increasing in significance as new fields were uncovered.

It was also noteworthy that the economic desalination of sea water using nuclear power would require very large units.

A rather unexpected development was the tendency towards lower boiler maximum steam temperatures. These appeared to be stabilising at about 1000 deg. F.

With regard to magnetoplasmadynamic and other advanced forms of electricity generation, progress was very slow due to the very great difficulties involved and development would probably take many years.

Dr. Strazacker mentioned that the printed proceedings of the Tokyo Sectional Conference should be available in the Republic during June, 1967.

The South African Nation Committee resolved that delegates would attend the next Plenary Session of the World Power Conference to be held in Mocow in 1968 and that technical papers would be prepared for presentation at this Session.

The theme of this Conference will be "World Energy Resources and the Utilization for the Benefit of Mankind."

R. W. BARTON,
Representative.

en Dr. Strazacker dink dat verbetering in hierdie rigting binnekort sal plaasvind.

Ondervinding in die gebruik van kern-kragsentrales het bewys dat die beskikbaarheid van toerusting baie hoog is en dat die vermoë van baie bestande eenhede hoër gestel kan word.

Die neiging om groter turbine-ontwikkelaars te bou gaan voort. Die verkoeling van rotors geskied nou deur middel van vloeistowwe.

Die gebruik van gas-turbines gedurende spitstye en noodgevalle word meer algemeen.

Kennis is geneem van die feit dat fossiel-brandstof nog belangrik sal wees vir die ontwikkeling van elektrisiteit vir baie jare en dat olie in belangrikheid toeneem na gelang meer velde ontgin word.

Dit blyk ook dat die ontsouting van seewater deur middel van kernkrag baie groot eenhede sal vereis.

'n Taamlik onverwagte ontwikkeling is die neiging na laer maksimum-stoomtemperature in stoomketels. Dit wil voorkom sof temperature op ongeveer 1,000 grade F. stabiliseer.

Met verwysing na die magnetoplasmadinamiese en ander gevorderde vorms van elektrisiteitsontwikkeling, was vordering baie stadig as gevolg van die baie groot probleme wat daar bestaan, en die ontwikkeling sal moontlik baie jare duur.

Dr. Strazacker het genoem dat afskrifte van die verrigtinge by die Tokio-Streekskongres in die Republiek beskikbaar sal wees in Junie 1967.

Die Suid-Afrikaanse Nasionale Komitee het besluit dat afgevaardigdes die voltallige sitting van die Wêreldkongres oor Krag in 1968 in Moskou sal bywoon en dat tegniese referate opgestel word vir voorlegging.

Die tema op hierdie Kongres sal wees „Energiebronne van die Wêreld en die benutting daarvan tot voordeel van die Mensdom."

R. W. BARTON,
Verteenwoordiger.

THIRD DAY

MORNING SESSION

The President opened the proceedings by referring to a communication received from the Department of Education, Arts and Science relating to a short course in "Management for Engineers" which it was proposed to organise in January or February, 1968. The Convention expressed interest in this course and it was agreed that the Department be advised accordingly.

Explanatory talks followed on technical installations which would be visited during the afternoon.

The first of these, illustrated by slides, was presented by Mr. W. U. Snell of Rolls Royce Ltd. and dealt with gas turbine installations with particular reference to the unit installed at the Power Station of Sonefe. A précis of this talk is as follows:

DERDE DAG

OGGENDSITTING

Die President open die verrigtinge deur te verwys na 'n brief wat van die Departement van Onderwys, Kuns en Wetenskap ontvang is in verband met 'n kort kursus in Bestuurswese vir Ingenieurs, wat in Januarie of Februarie 1968 georganiseer staan te word. Die Konvensie dui aan dat hy in dié kursus belangstel en daar word ooreengekom dat die Departement aldus in kennis gestel word.

Hierna volg daar verduidelikende praatjies oor die installasies wat gedurende die namiddag besoek sou word.

Die eerste hiervan, wat met behulp van skyfies toegelig is, word gelewer deur mnr. W. U. Snell van Rolls Royce Bpk. en handel oor gasturbine-installasies, met spesiale verwysing na die eenheid wat by die kragsentrale van Sonefe geïnstalleer is. 'n Samevatting van die praatjie is soos volg:—

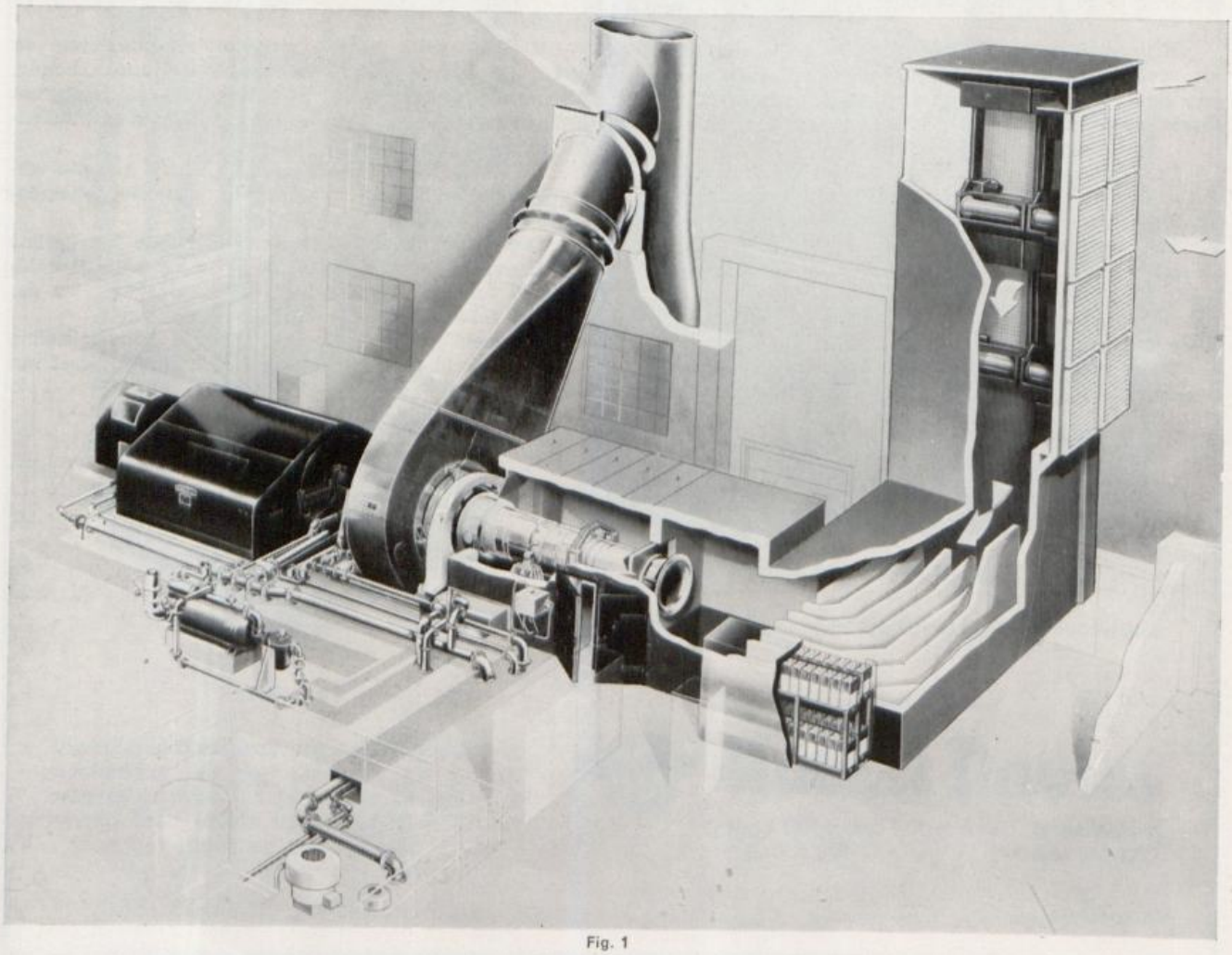

Fig. 1

Developments in the Jet Type Industrial Gas Turbine

This paper was to have been an exposition of the 17½ MW turbo generator installation operated by Sonefe in Lourenco Marques but as we shall see the power station later today and as the technicalities have been published in great detail in the South African Press, I propose to confine my remarks to the gas generator and the means found necessary to ensure its operation as a reliable piece of industrial machinery, followed by a brief look at developments which can be expected in the gas turbo generator during the next ten years.

The prototype 17½ MW industrial turbo generator, Fig. 1, installed in the loading bay of the power station at Hams Hall, near Birmingham was first run in September 1962. It is in all essentials identical to the installation at Lourenco Marques and it was this turbo generator which firmly established the gas turbine as a primemover in the more advanced electrical utilities systems.

Fig. 2, shows in detail the 24,000 shp gas turbine itself of which there are now fourteen in commercial operation. The 31,000 hp industrial gas generator developed from the two spool aero jet engine which powers the Vulcan bomber has accumulated 39,000 operational hours on thirty-eight engines in regular commercial service.

Experience has demonstrated that the difference in operating conditions between the aero engine and industrial gas turbine requires an uninhibited approach to the problems inherent in the design of industrial plant and almost all the major changes necessary were the result of differences in operating conditions between the two applications, two of the more obvious being the incorporation of a steel compressor and substitution of aluminium in place of magnesium castings.

The air pressure and density at sea level is only about one fifth of that experienced at cruise conditions in the aeroplane and this results in higher internal thrust loads in the engine which in turn requires thrust bearings of increased load carrying capacity as shown in Fig. 3. The

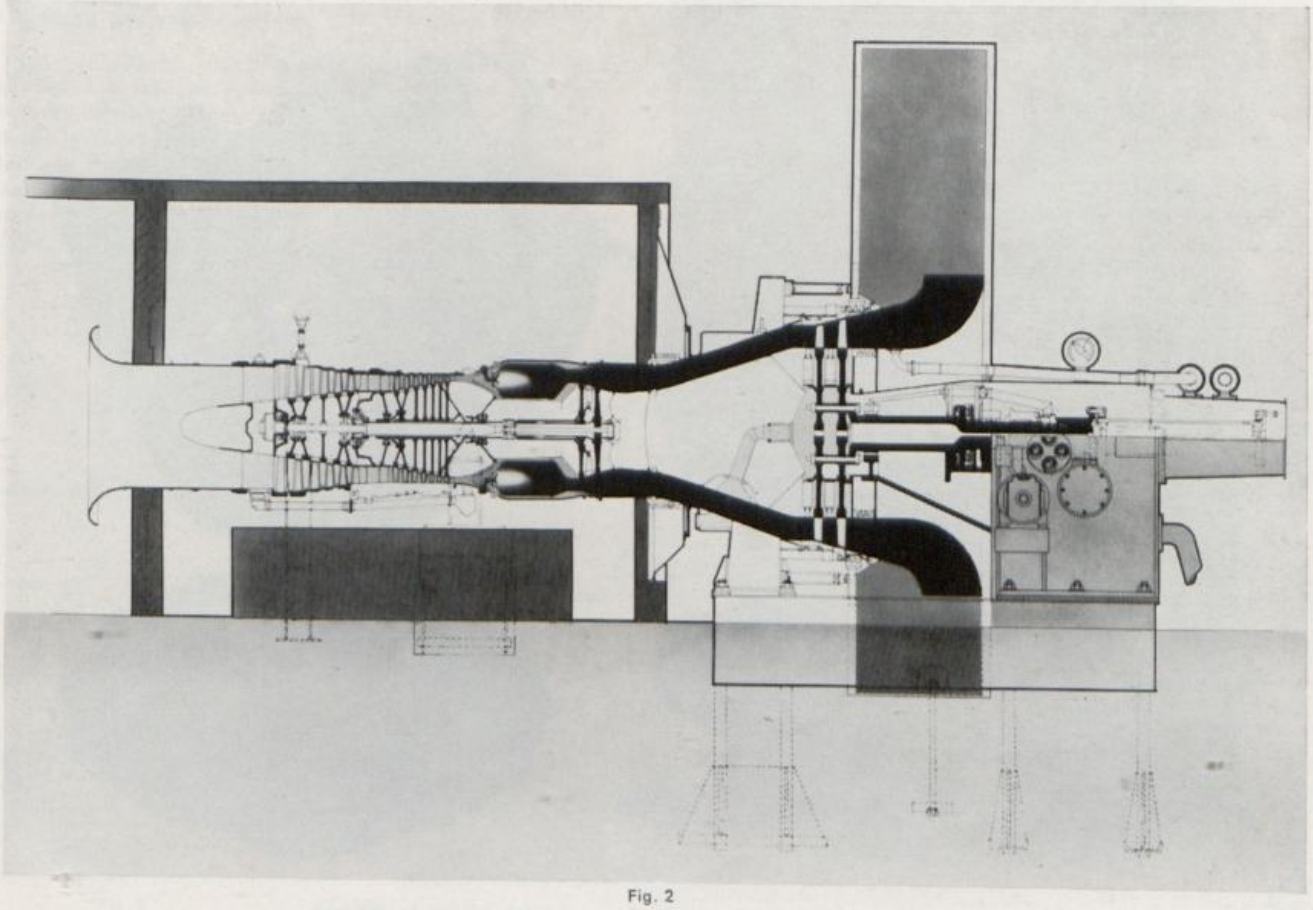

Fig. 2

demand for smokeless combustion in peak load stations situated in built-up areas and the change from aviation to diesel fuel necessitated changes to the burner system.

This imposed severe thermal loads on the combustion system and it was found that the aero engine type flame tubes were unuseable as they broke up after 200 hours industrial duty, Fig. 4. By quite minor, but important, modifications these were made to last quite satisfactorily for at least 1000 hours at maximum operating conditions without distortion, Fig. 5.

These were perhaps the more important design changes required and an engine incorporating these was built and tested for 1000 hours at the full operating load of 17½ MW, including 300 starts. At the termination of the run the engine was dismantled for detailed inspection and all major parts found to be in excellent condition, Figs. 6, 7, 8.

There were still further certain items of a minor nature found to be troublesome. The vibration level of the industrial engine was sufficient to cause general wear and abrasions between various components which was corrected either by tungsten carbide flame hardening the mating surfaces or introducing a degree of flexibility in the mounting or a more secure location to the engine carcase. The engine was rebuilt and performance curves, Fig. 9, show no loss in performance since new, testing continues and a grand total of 2700 hours has now been completed at full load rating.

Fig. 4

This establishes the soundness of the basic design and any troubles which can be expected in the future will be insignificant and easily corrected as part and parcel of normal development towards an even more reliable and longer life engine.

As the reliability of this gas turbine is increased and time between overhauls extended compatible with the requirements for continuous operation fuel costs become of greater relative importance, and while it is to be expected that the performance of the Olympus could be improved by the use of cooled turbine stator and rotor blades there is obviously a limit to the development potential of this engine and more spectacular advances and much larger units are required before any material contribution can be made to the connected systems of the large modern electrical utilities.

The next generation of Rolls-Royce large industrial gas generators will be based on the jet engine for the Anglo/French Concord supersonic aeroplane. This is a direct descendant of the present Olympus engine Fig. 10, and when coupled to a suitable two stage power turbine will drive a 40 MW alternator at a terminal efficiency of 30% compared with the 26% of the existing Olympus 17½ MW turbo generator.

It so happens that the operating conditions of this jet engine at cruising speed and altitude in the aeroplane are very similar to those of a stationary engine operating on the ground. At 55,000 feet and a forward speed of Mach 2.2 the pressure on the face of the compressor being one atmosphere. However the ram effect raises the temperature of the air intake to about 160°C which is higher than the hottest day in the tropics. Also, as this is a civil aeroplane it must be designed with a very high reliability factor so this sophisticated engine can be expected to meet the requirements for industrial duty without major modifications. There will be the usual alterations necessary due to the different application which can only be corrected by running the engine under actual industrial conditions.

The best heat engines are more efficient as gas stoves than primemovers and a simple cycle gas turbine even of the most advanced type cannot achieve an overall thermal efficiency attainable by a diesel engine or steam turbine.

The heat rejected by the gas turbine is more than double that converted into useful work and can be used effectively as a source of auxiliary heating or power in

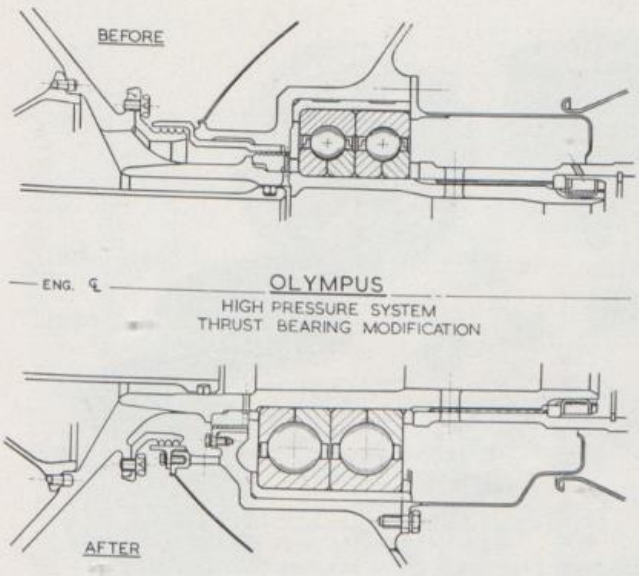

Fig. 3 INDUSTRIAL & MARINE ENGINE

Fig. 5

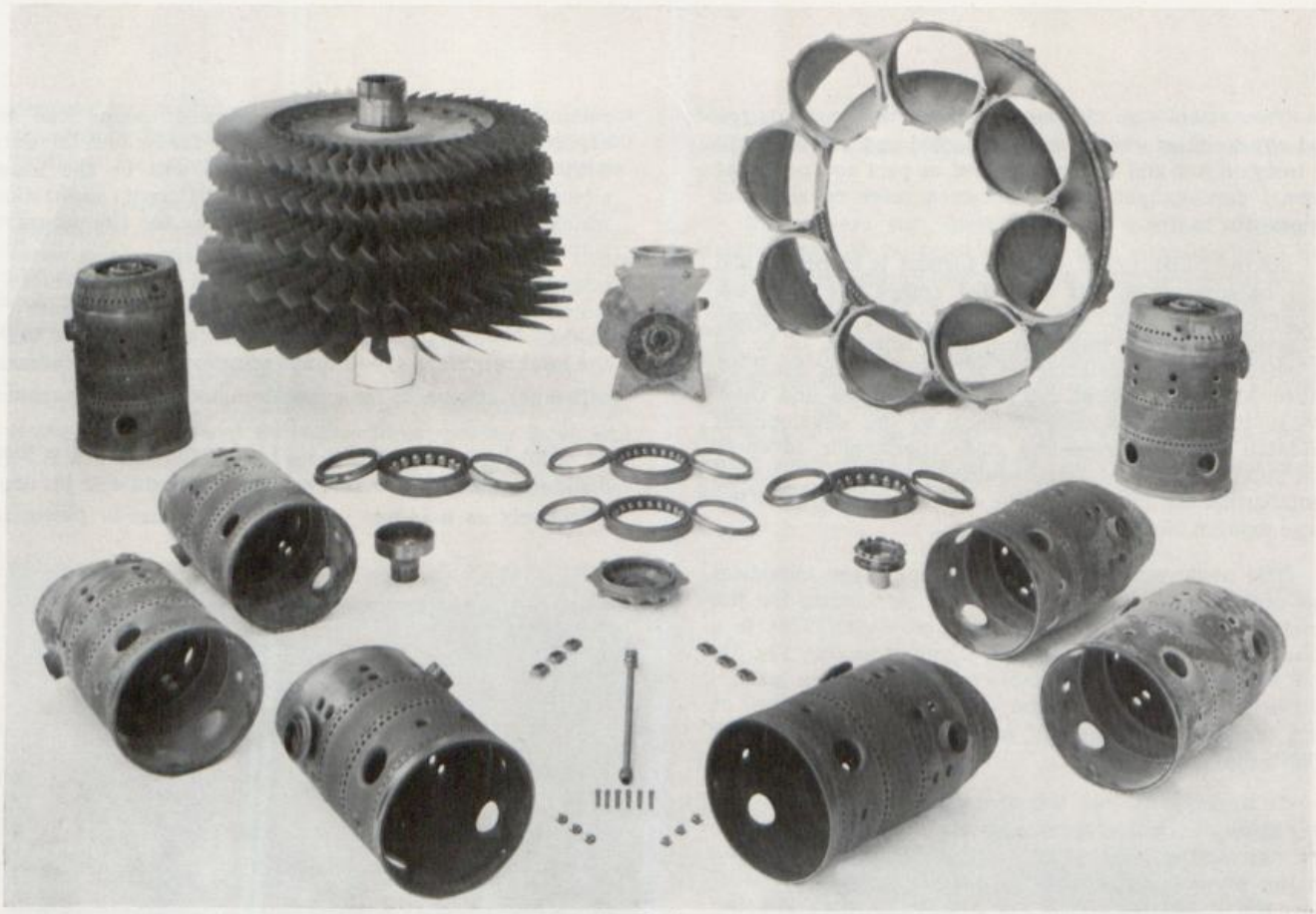

Fig. 6

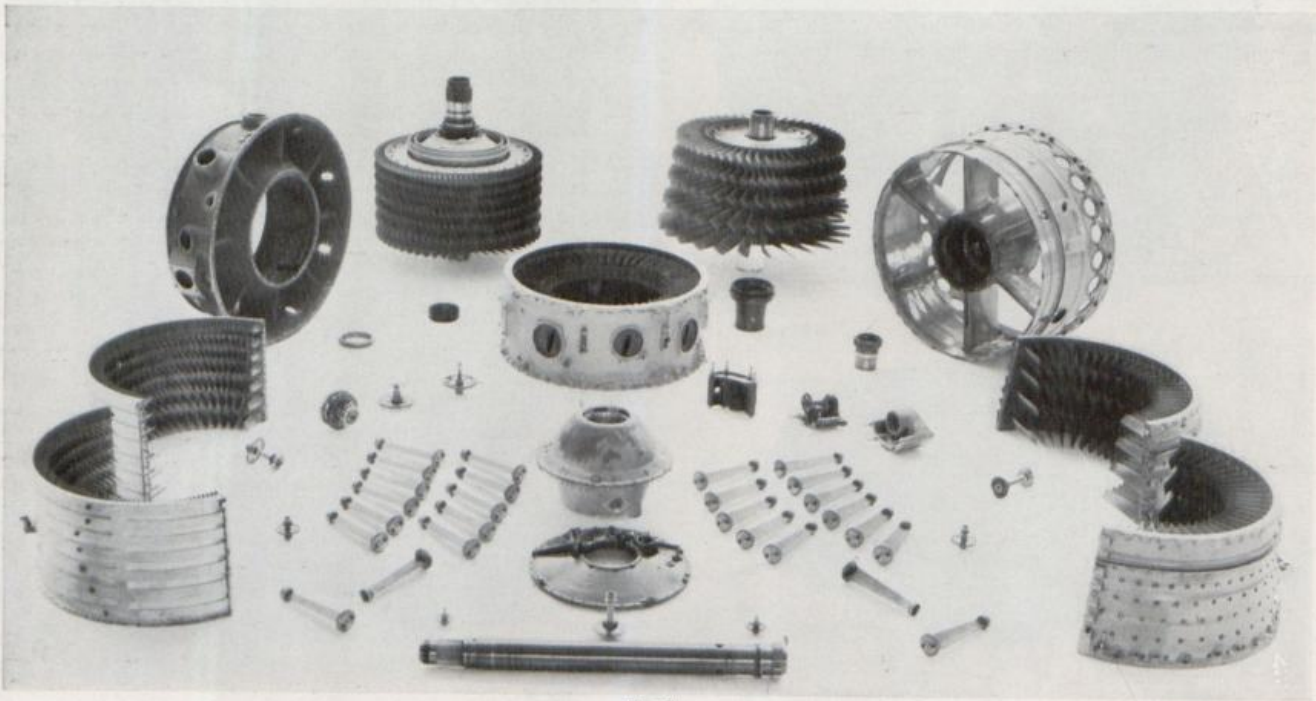

Fig. 7

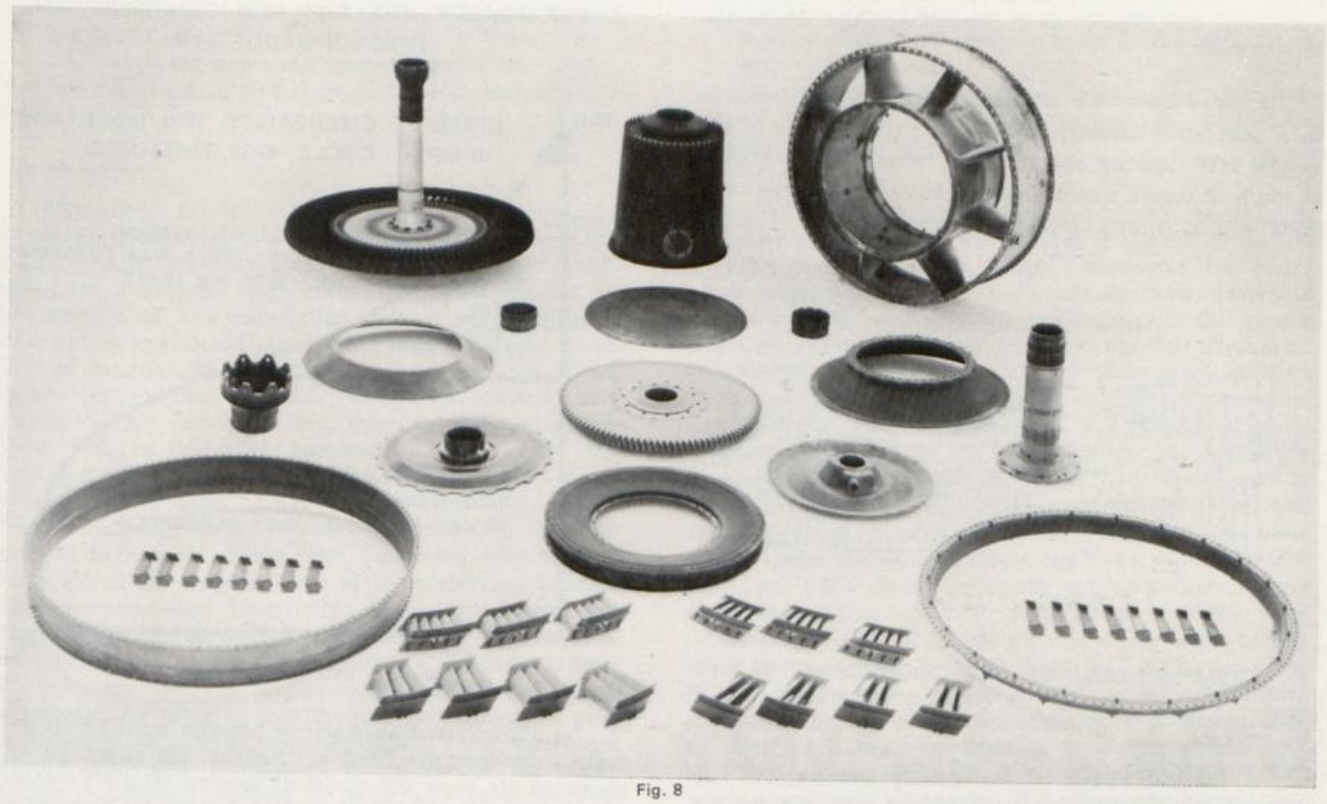

Fig. 8

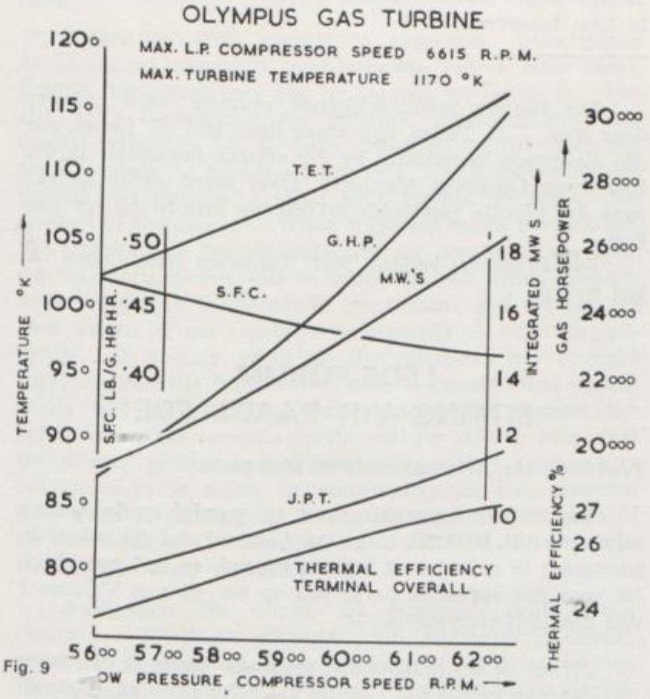

Fig. 9

what has become known as the total energy concept. However, electricity is still the most commercially valuable form of energy and efforts to improve the overall performance of the gas turbine as a primemover for the generation of electricity are worthwhile.

As no means can be used to reduce the back pressure of the gas turbine below atmospheric pressure some method of transferring heat from gas turbine exhaust into a secondary condensable working fluid must be explored. A suitable medium would be by means of a heat exchanger with say .75 thermal ratio and a combined steam gas turbine cycle could be constructed to produce an overall efficiency of 45% at a cost of about £20 per kilowat installed.

Rapid progress in nuclear plant engineering, a limited supply of cheap coal, the availability of natural gas in commercial quantities and the acute shortage of capital are all factors which are influencing the future energy policy in Great Britain and forward thinking beyond 1970 suggests that the pattern for electrical generation will be as follows:—

500 — 600 MW AGR nuclear reactors interconnected through the 400kV supergrid to carry the base load and amounting to about 50% of the total capacity but generating about 75 — 80% of the output.

At the other extreme simple gas turbines of 17½ MW or 35 MW capacity operating on diesel oil amounting to

about 5 — 7% of the total capacity will be used for emergency and standby duty, generating about 2% of the total output.

Between these two and embracing 40 — 45% of the total generating capacity binary cycle gas turbines of 150 — 200 MW capacity operating on natural gas and sited at the load centre would generate 20 — 25% of the total units sold on a semi-base load or seasonal basis, Fig. 11.

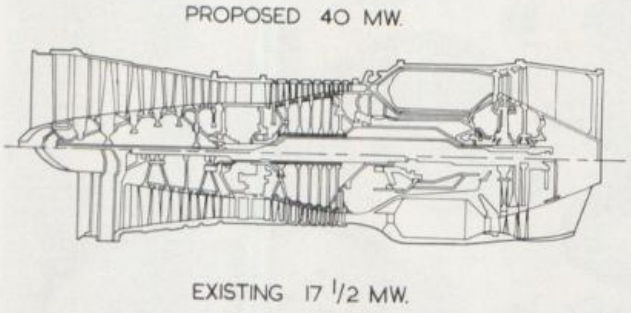

Fig 10

OLYMPUS INDUSTRIAL GAS GENERATORS.

DIAGRAMMATIC PATTERN NEW CONSTRUCTION 1970 ONWARDS

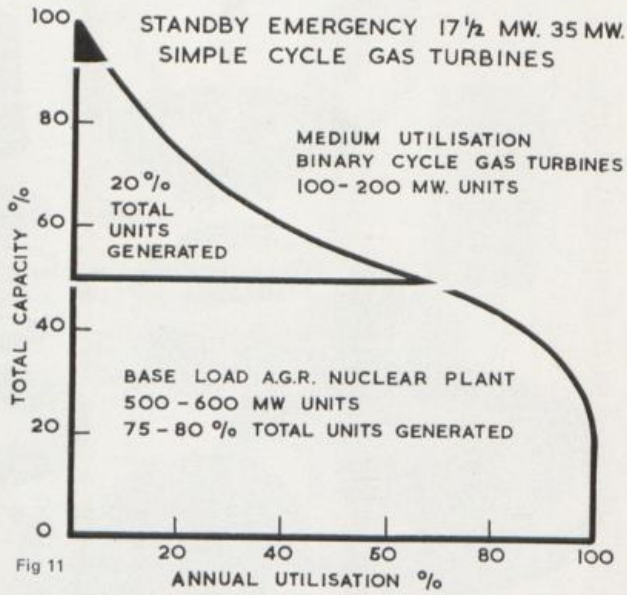

Fig 11

At the conclusion of Mr. Snell's address, he was appropriately thanked by the President, not only for his address but also for coming to South Africa from the United Kingdom especially to address the Convention.

The second explanatory talk was given by Mr. J. R. Telles, assisted by Mr. E. Lopes, on the electrical installations at the ore-loading plant, Lourenco Marques Harbour. This plant, it was stated, loaded 60,000 tons of ore in 30 hours.

The President thanked both Mr. Telles and Mr. Lopes for their contribution.

MEMBERS' FORUM COUNCILLORS' SESSION

Administration and Delegation Problems.

Introducing discussion on his published contribution, Clr. H. G. Kipling (East London) requested an addition to his paper as follows, immediately before the penultimate paragraph on page 61 of Volume I of the 1967 Proceedings:—

> "In expressing my personal opinion, I am fully conscious of the fact that the revolution of these suggestions cut right across existing municipal

Na afloop van Mnr. Snell se praatjie word hy op gepaste wyse deur die President bedank, nie alleen vir sy toespraak nie, maar ook omdat hy spesiaal uit die Verenigde Koninkryk na Suid-Afrika gekom het om die Konvensie te kom toespreek.

Die tweede verduidelikende praatjie word gelewer deur Mnr. J. R. Telles, bygestaan deur Mnr. E. Lopes, oor die elektriese installasies by die ertslaai-installasie in die hawe van Lourenco Marques. Daar word onder andere gesê dat hierdie installasie 60,000 ton erts in 30 uur kan laai.

Die President bedank Mnr. Telles en Mnr. Lopes vir hul bydrae.

LEDE-FORUM SITTING VIR RAADSLEDE

Probleme van Administrasie en Delegasie.

Toe hy die bespreking oor sy gepubliseerde bydrae inlei, vra Rdl. H. G. Kipling (Oos-Londen) dat die volgende paragraaf in sy referaat ingevoeg word, en wel onmiddellik voor die vorlaaste paragraaf op bls. 61 van Volume I van die 1967-verrigtinge:—

> „Waar ek my persoonlike menings lug, is ek ten volle daarvan bewus dat hierdie vorstelle rewolusionêr van aard is en heeltemal afwyk van bestaande munisipale

procedure. In setting it out I realised a change was indicated to obviate a great deal of frustration in the municipal set-up."

The President expressed appreciation to Clr. Kipling for his contribution. Discussion thereon proceeded as follows:—

prosedures. By die uiteensetting daarvan het ek besef dat daar sekere veranderinge nodig is ten einde 'n aansienlike mate van frustrasie in die munisipale opset uit te skakel."

Die President spreek sy waardering teenoor Rdl. Kipling uit vir sy bydrae. Die bespreking oor hierdie referaat gaan soos volg voort:—

Councillor D. H. White-Cooper, Pietermaritzburg: Councillor Kipling is to be congratulated on writing this paper, which not only gives other councillors, council delegates, a welcome opportunity, of participating in the proceedings of this association, where previously they have sat in bewildered silence, but also introduces a subject of considerable importance to municipalities. Councillor Kipling, has said that councillors generally, are aware of their responsibilities; they are also aware, that their lack of technical knowledge, makes them less valuable, as members of this association, than they would otherwise have been. I feel I must confine, this statement to myself, as there may be councillor members present here today, apart from Councillor Kipling, who have solved the deep mystery of the difference between amperes and volts. Electricity supply departments are tended to be run as trading undertakings, and councillors, with business experience, are therefore probably, at least as well qualified, as engineers, to lay down general principles, for insuring that the undertakings, will be administered, on sound business lines. This experience, should also enable councillors, to ensure that the undertaking is properly adapted, to cope with rapid development.

Estimates: With regard to estimates, departments do of course, generally over-estimate, but in most cases, I don't think that they can be blamed for doing so. The electricity department for instance, when drafting it's capital estimates, has to make provision for the electrical requirements, of numerous projects, which have been included in estimates of other departments, usually at the request of the council. When these estimates are drafted, the engineering departments, are not aware of the total capital funds, which will be available, nor which projects have priority in the minds of the council, and neither are they aware of the capital requirements of other departments. It is only when all the estimates are brought together, and the treasurer is able to report what capital funds will be available, and what capital charges the rates, and other revenue funds, will be able to bear, that the overall picture can be seen. Invariably expenditure cuts have to be made, by eliminating the less essential items, but in putting up these items in the first place, I do not think it can fairly be said, that the departments, were deliberately overestimating.

Autonomy: No doubt, all engineers will favour Councillor Kipling's proposal, for engineering departments, to be separate, from the normal municipal set-up. In order to enable departmental functions, to be streamlined, however, as a councillor, I feel that such a scheme, could involve many difficulties and would require unnecessary duplication of staff, which is not really necessary. In the municipality, which I represent, the heads of the engineering departments, already have the power to instruct, and control their own staffs, and this power is not the function of the Town Clerk, and City Treasurer. The employment of consultants and contractors, is often advantageous to the council, particularly in connection with projects, which only have to be undertaken, at infrequent intervals. If the council were to engage the necessary special staff for such projects, it would have to retain their services after each project was completed, and keep them marking time, until the next one came along. Under the present set-up, the Town Clerk's Department, and the treasury undertake various accounting and secretarial duties, for other departments, but the work involved, in connection with any one department, seldom takes up the full time of the employees doing the work. If the engineering departments, undertook these functions, themselves, there might not be sufficient work to justify full time employment of clerks, accountants, etc. Although no doubt, the operation of Parkinson's Law would soon make it appear that these employees were fully occupied.

Precedents, Principles and Policies: I do not consider, that councillors should feel themselves, bound too tightly by precedent. No council can be bound by the decisions of previous councillors. Changing circumstances require the reviewing of policies, and these should be changed, if it appears advantageous to do so. Decisions in principle, are sometimes well worth while, and of course they can enable more information to be gathered, without involving a great deal of detailed work, which might be wasted, when this additional information is available.

Delegation of Powers: During the last few years, my own council had delegated to some of its members, and to heads of departments, numerous matters, which previously took up a considerable amount of time of committees, and council. Contracts up to R10,000 in value can be dealt with by the town clerk, and the head of the department concerned, bi-annual contracts for any amount, can be dealt with similarly, providing that the lowest tender is accepted. We also have an emergency committee comprising the Mayor, chairman of finance committee, and chairman of the committee concerned, who can take immediate action in matters of urgency, all these delegations of power have been carried out within the controlling ordinances, and the arrangements are working very well. What I have said, must not be construed as

criticism of Councillor Kipling's address. It is obvious to me, that he has made a number of remarks with the intention of being provocative, and evoking useful discussion. Mr. President, matters such as those touched upon, by Councillor Kipling, are of great importance to councils, and I hope that they can be dealt with more fully, at future conventions. In breaking this new ground, Councillor Kipling has rendered the association a valuable service, and it therefore gives me great pleasure, to propose a vote of thanks to him, for his valuable paper. Thank you.

Councillor B. D. Eager, Johannesburg: In the first instance, I would like to start my comments, on Councillor Kipling's paper, by endorsing the sentiments he has expressed, in the two concluding paragraphs of his paper. To those of us who like myself are laymen, and find ourselves gaping at a diagram, or figures predicting asynchronous conditions, or switching over-voltages, due to current chopping—and trying to look intelligent about it, all at the same time, it is indeed heartening, to think that those responsible, for drawing up the conference program, recognise the technical if not other limitations, of councillors, thus making it possible for us, to take part in the proceedings of the conference, by providing this opportunity, to discuss a paper, more in keeping with our responsibilities, as councillors, and certainly more in keeping with our familiar role — of talking about what other people, such as engineers should or should not do—for, this opportunity I feel sure, that I am voicing the appreciation of all my fellow councillors, attending the conference. It is also a matter of pride, Mr. President, that in the ranks of councillors, we have a man of the calibre, of Councillor Kipling, who is a highly qualified electrical and mechanical engineer, and he has so ably represented us today, by the contribution he has made to the conference in the presentation, of his excellent paper, the administration, and delegation problems. It has been my experience, that in many councils, we have a fair sprinkling of legal men, and even doctors, but it is not very often, that we find engineers entering public life. Perhaps it is, that they have too much of more importance to do, with their time. Yet, when one considers, that in these modern times, engineering affects the every day living, of every member, of any well organised and established community, it is rather surprising, that we do not have more members, of the engineering profession, representing public opinion, in the councils of the nation at every level. This indicates to me, that E.L., at any rate, is right up-to-date, in it's approach to matters of public importance, not the least of which is engineering, I am grateful, also to Councillor White-Cooper, who has covered the paper, in his comments, very adequately, and very well. I did just want to comment, on one or two aspects, which were of particular interest to me, that is in dealing with the estimates. Now one realises, that all that Councillor Kipling said in this connection, is perfectly true, but at the same time, I think that the engineer, the manager of the department concerned, the electricity department, in this case, also has a very important function, to perform, when considering the estimates, and while we realise, that very often, items are included, which are really over-estimates, not always necessary, and therefore find ourselves, in the position as councillors, where we have to cut back, nevertheless, I feel that this is quite important, because to the councillor, who is a layman, who is not well versed in all the technicalities, and the planning, and the modern trends, which change, almost from day to day. The head of a department, in making recommendations, to the council, or to the committee concerned, I think does have a duty, to indicate what the requirements of his department, are, and even though he knows perhaps at the outset, that some of it, or much of it will have to be cut back. Nevertheless, it is a red light, it is a warning, indicating to the council what the requirements of that department are likely to be, in the light, of progress, and advance, which as I said a little earlier, in these times in which we live, is so rapid, and develops so quickly. In listening to our friend earlier this morning, when he was talking about gas turbines, and so on, I noticed that he spoke of 1970, this and that in 1970, and then into 1975. Now, 1970, is not an awful long way, Mr. Pres., for that matter neither is 1975, the years get by so quickly, developments take place so rapidly, and so I think, that the head of a department, has to take into account the needs, and the aspirations, of other departments, associated with him, in the local authority, and he has to bear these developments in mind, in formulating his estimates. Nevertheless, he provides a very useful service, when he pinpoints the requirements that are likely to take place, and knowing full well, that he may not get authorisation for all that he has asked for. Dealing with the question of autonomy, we in Johannesburg, have been perplexed about this, and a good deal of unofficial discussion, has taken place. I think there is much to be said, for the ideas which Councillor Kipling has propounded in his paper this morning, and I am sure that it will provide food for thought. One has of course, just to be very careful, as Councillor White-Cooper has indicated, that in the democratic society, in which we move and operate, that the electorate are very very jealous, of the powers, which they wish us to delegate, shall I say, to departments, particularly, when it comes to the question of autonomy. In the third point, that I would like to perhaps talk on, for a moment or two, Mr. President, is this question of delegation. In one particular aspect, for the past 6 years, the Transvaal has been working under a new Local Government ordinance. We in Johannesburg, were in the beginning, very suspicious of this new system, and indeed afraid that it's introduction would bring about a diminution of the rights of individual councillors, AND LIMIT THEM, in their contribution, in the formation, of council policy. For this, and many other reasons, we resisted the management committee system. However, in due course this system was imposed, and we had to find ways, and means, of making it work. Fortunately, we made use of the provision in the ordinance,

which enables us, in addition to the establishment, of the management committee, to also establish, what are known as section sixty committees. One of the members of the management committee who is elected for five years, is chosen as chairman of one of the section sixty committees. On these committees councillors, are voted to serve for a period of one year. From their ranks, a deputy chairman is elected, who likewise serves for a year, so for the five year period, each councillor, with the exception of those five elected to the management committee, can offer himself, for election, to one of the committees, each year, and thus can if he chooses, be closely associated with all aspects, of council policy, and administration, over the five year period. In practice however, councillors tend to specialise in the work, of one particular committee. In this way, all councillors, along with the departmental heads, are very much involved, in shaping policy, and almost in the day to day, administration of the city. While the decisions are not binding on the management committee, it is seldom, that the senior committee, ever reverses the recommendation, of the section sixty committee, and when it has reasons to differ the matter is referred back. There is much more Mr. President, that one could say, about this particular system, and I have heard a good deal of criticism of it, but I do want to say this, that it has had the effect, of streamlining administration, in the city of Johannesburg, and while we did have our doubts about it, I think by and large, any councillor who desires to, and wishes to play a conscientious role, as a councillor in his town or city, can well do so, under this system. There is ample provision, for him, to play a very full and major role in the running of the city. May I congratulate you Mr. President, on your election to office, and that of the vice-president, and may I also take this opportunity, of thanking you sir, for making it possible for councillors, to join in the deliberations, of this conference, and at the same time thank you tremendously for the wonderful hospitality, which in one way or another, seems to have been laid on, and arranged for us. We are deeply grateful to you.

H. J. C. K. Erasmus, Port Elizabeth: Mr. President, it is rather significant to me, that the executive consisting mostly or shall I say dominated by engineers, choose an engineer, to talk or speak on behalf of councillors, but I am assured by someone very near, and very dear to Councillor Kipling, who is with him here at the conference, that in this respect, and let me say in this respect only, Councillor Kipling is what we would call technically, as something of a hermaphrodite, he has a leg in both camps. But Mr. Pres., I do want to disagree with him on one aspect, in fact, I am forced to do so. He stated in his paper, that it is a very expensive way of doing things, is the engagement of consultants. Now having in the past few years, pursuaded the city council of Port Elizabeth, to engage consultants, I have to defend that policy and I do not agree, that it is an expensive way of doing things. That may be the case, in an established and a progressive and private enterprise, but in the municipal set-up, different circumstances obtain. Now when a municipality hires a man, be he an engineer, or a clerk, that man is hired for life. He cannot be discharged, unless of course, he is habitually drunk on the job, or embezzles sizeable chunks of the petty cash. You have to keep him, until he reaches the fixed pensionable age. He cannot be discharged in the meantime. The result, is, that we engage an engineer, for a specific purpose, but when that job is done, be it so long, either have to find him another job, or pay him forever and a day, for doing nothing or very little, certainly not commensurate with the salary which we fixed when we engaged him initially, and the various raises and adjustments, which are made from time to time. Now of course, it is not always as simple as that, it is only when such an official retires, or is pursuaded to take long leave, that the secret of his superfluity leaks out. That is, his colleagues become aware of the fact, but such is staff loyalty, that the council very rarely knows of this man of leisure, in their midst. Now the solution is, that consultants be engaged, to tackle any non recurring job. Now in municipal electric generation I am afraid, very many of our projects, are non recurring, that is in the municipal field. We may still be building power stations, we may still be adding on to them, but sooner or later, that shadow of Escom, descends upon you, and you are faced with the problem, of either absorbing, or dispersing that particular planning, and construction division, which you built up carefully, over all the years. Now naturally, Escom never leave a municipality in the lurch, they do absorb these men, but I can imagine, and so can you Mr. President, imagine very many a case, where even Escom would say their staff is full, and couldn't you do something else, are your gutters or streets alright, couldn't you engage this man somewhere else. I therefore submit Mr. President, that in these times of staff shortages, and the trend of the policy of electric generation, in our country, that a municipality, will be well advised, to engage consultants, instead of creating and expanding their own design departments. I may say that these consultants, in case anyone thinks so, they do not work for nothing. You should see some of their accounts, and you talk about estimates, I defy any electrical engineer, to draw up estimates, when there are consultants accounts to be paid during the same year. But perhaps Mr. President, the most important aspect of the system of consultants, is that every year, some of the best brains in our industry retire, and are relegated to the background, their knowledge and experience, should be available to all, this can be effected, via the medium of consulting firms, and I sincerely trust, that proper encouragement, will be afforded to these experienced and tested engineers, to still play their part, and still make their contribution to the advancement of our country, even in their retirement.

Cr. W. Steer, Salisbury: I would like to congratulate Mr. Kipling, on his very excellent and controversial

paper. I would also like to congratulate you sir, on your election, and may you have a very happy year of office, and Salisbury, being in Rhodesia, are proud, indeed, to think that you have elected Mr. Turner, this year. Certainly, we should go back from this conference, the Rhodesians here, very happy indeed, to think that Mr. Turner was elected. Now sir, talking, and we have had all sorts of jabs and jibs, about the engineers, and staff, I have had a good many years, experience as a councillor and now I have been through the whole gambit, but what I say Sir, is firstly there should be some form of training, for a councillor, I feel that there should be a very useful textbook. I have seen councillors come and go, in fact I have seen, except for two, the whole of my city council change, and I have seen them come in, and seen them go out, I have seen them upset, and I have seen works go out one year, and come back about three years later, merely because we have got a change of councillors, but I think, if I was writing a text book for councillors, the first thing I should say, is you were elected last Wednesday don't forget, you are the same man today, with the same mental powers and the same ability, as you had before your election, you are not suddenly turned into a business tycoon, and electrical engineer, and everything rolled into one. I find sitting back, that in council, that is one of our biggest bug bears. I am a civil engineer who wasn't long on council before I was in the public works department. Now when I joined council, my idea of a councillor was, he had a very happy time, he looked after the parks, he swept the streets, saw the drains ran, and that kind of thing, but before long, when I got on council, I found that as chairman of the public works, I was responsible for the policy for something like spending six thousand pounds an hour. That is our ratio. We have a total of 15½ million pounds in Salisbury, of which less than 2 million is rate fund, and the other is trading organisations. Now I give an instance, not long ago I was talking to my committee, and it was on a power station problem, and I deliberately talked about cusecs, and not one of my committee asked me, what I was talking about. I did this on purpose, I am strongly of the opinion, that when a council's turnover in trading organisations get to a certain size, then that trading organisation, should be turned into a utility company, it should be run by men, who are paid to run it, men who know their business. I hear all sorts of talk about management committees, in fact, we have studied management committees, in Rhodesia, and we studied all sorts of other ways of running council, but I believe Sir, that a professional man, for a professional job. We have a turnover in the electricity department, of something like, speaking roughly, 4½ million a year. Who am I, to dictate the policy, for running an electrical undertaking, of that immensity. Who am I, and what experience have I had? Turning again Sir, to our water undertaking, that has a turnover of well over a million a year. That Sir, should be turned into a utility company, and run by water engineers, to directing the policy. You have the same thing when it comes to sewerages. As a matter of fact, I was reading a most interesting account of where a borough authority in the U.K. had turned their fire fighting, ambulances, and crematoria services, into a utility company that not only covered the town, but the urban areas around the town. I feel sir, that when it comes to delegation, of council, should be that their trading undertakings, become companies, the matter of what the council should take out of those companies, with regard to the benefit to the rate fund, is a matter for the councils to decide themselves. But I do maintain Sir, that if we, I was going to say, if a councillor, if we reduced his job, not exactly reduced it, but if a councillor was put on council, and did the job he was put there for, and that was to run the amenities, for the city, to look after the people, look after the amenities, and run the rate fund, leave the trading organisations to the professional men, and leave it to the utility companies, I heard of reference, (I am not sure how they work), to Escom, taking over the electricity, running management, in South Africa. Well we are at the moment, in the process of seriously considering an amalgamation, or call it what you like, between our electricity undertaking in Salisbury, and the Electricity Supply Commission. I am quite sure, that having the right men to run the job, and to produce our electricity, or distribute it, run by professional men, with a professional board, will be much more advantageous to the consumers, than it being run, by a number of laymen. Don't forget Sir, these laymen change every year, and I feel, that any development project, should have once it has been established should have legislative protection. I have seen a case in Salisbury itself, where over some ten years, we have had a project, and every councillor, elected each year it has always been a one or two majority of councillors, has always have been defeated by about one vote, and that is usually one or two of the new councillors that has come on, we have spent something like £70,000 in architectural fees, and this battle has gone on, as I say, since I joined council in 1958. I do feel sir, that firstly we should put, our trading undertakings, where they rightly belong, in to utility companies, and I feel that for any undertaking, starting a development program, that is going to last for more than one year, there should be some form of legislative protection, very much in the same way, as you have a town planning court, when you wish to change your town planning. When you start on a development program, this is going to be spread over several years, it should not be left, to the whim of the winds of every new councillor, that comes in. Thank you, Mr. President.

J. F. van Loggerenberg, Town Clerk/Stadsklerk, Randfontein: Ek is bly dat ek die geleentheid het om die konferensie by te woon as Stadsklerk. My Raad het dit goed gevind dat ek 'n breë grondslag moet kry van ander departemente. Ek het 'n paar notas uitgeskryf, maar soos goeie Raadslede, het hulle meeste van my skietgoed

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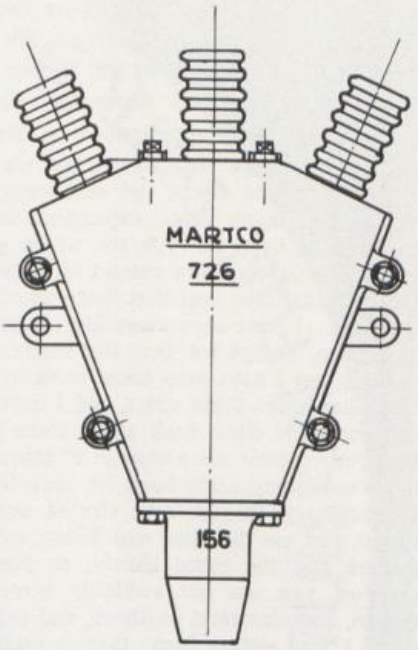

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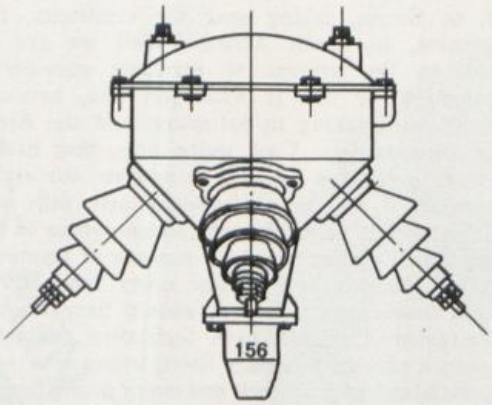

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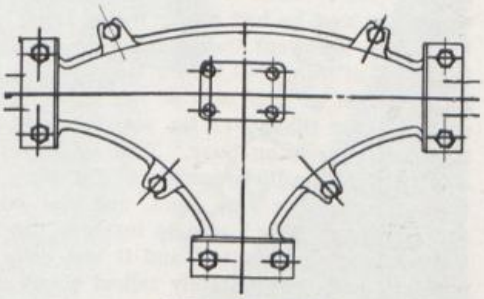

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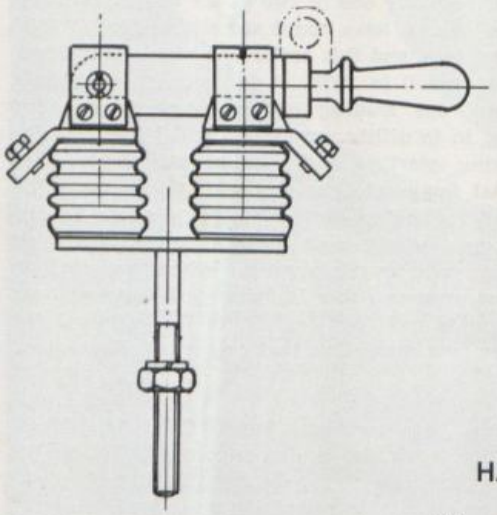

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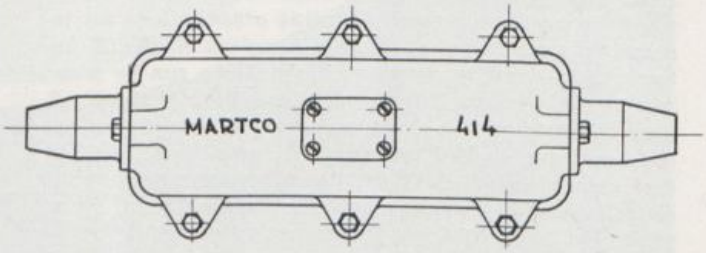

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alreeds weggeneem. Mnr. die President, ek gaan 'n paar van die punte wat mnr. Kipling gemeld het, behandel waar ek nie met hom saamstem nie. Sover as dit die begroting aangaan voel ek dat 'n verantwoordelike stadsklerk en ingenieur, saam met die stadstesourier, sal toesien dat slegs die belangrikste en noodsaaklikste sake op die begroting verskyn. Ons vind gewoonlik dat amptenare 'n objektiewe benadering het en hulle gaan kyk na die noodsaaklikste en die mees doeltreffende vir die Munisipaliteit, maar in die laaste instansie is dit die Raadslid wat die beleid moet bepaal. Nou ons vind dan ook dat ons die twee bymekaar gooi, en op dié manier 'n begroting opstel. Gewoonlik kom die items wat op 'n begroting moet verskyn, van twee rigtings. Gedurende die jaar voel sekere raadslede, as 'n beleidsaak wil hulle seker dinge gedoen hê, dan word dit bespreek op die Komitees, deur die Raad in beginsel aanvaar en na die begroting verwys sodat daar gesien kan word, ten tye van die begroting, of daardie saak uitgevoer kan word, met ander woorde of daar genoeg fondse is. Die tweede een, soos ek reeds genoem het, van die amptenare se kant af, wat weet wat is absoluut noodsaaklik om op 'n begroting te plaas. Ek dink maar nou byvoorbeeld aan kapitale begrotings sowel as jou inkomste-begroting. Daar het 'n mens 'n sekere onderhoudswerk wat nie meer beleidsake is nie, maar wat absoluut noodsaaklik is, wat gedoen móét word, en wat deur amptenare op die begroting geplaas word. Nou, ek gee toe, dit mag seker gebeur in baie plekke dat 'n begroting wat opgestel is, baie gesny word deur 'n Raad. By ons werk ons die stelsel so dat die stadsklerk en die stadstesourier, saam met die betrokke hoof van die departement, die begroting of die items deurgaan, met in aanmerkingneming van wat gedurende die jaar deur die Raad besluit is. Dan word die begroting opgestel en gekyk of dit binne die Raad se finansies inpas. Daarna word dit bespreek met die Bestuurskomitee. Nou wil ek net op hierdie stadium sê, mnr. die President, dat in die Transvaal (die Vrystaat kom, Suidwes het dit alreeds) fungeer die Bestuurskomiteestelsel wat natuurlik, ek kan amper sê lynreg, teenoor die komitee-stelsel staan, soos wat mnr. Kipling genoem het. My aanmerkings wat ek gaan maak, is dus gebaseer op die posisie soos dit die afgelope ses jaar in Transvaal werk. 'n Ander saak in verband met die begroting, wat van die amptenare se kant af gesien word, is om na 'n lang termyn te kyk, met ander woorde 'n vyf-jaar-plan wat weer met die raadslede bespreek word, of met die Bestuurskomitee en dan kan uitgevind word wat sal nodig wees oor drie of vyf jaar, sodat dar nie nou wild spandeer word aan geld en miskien oor twee, drie jaar wanneer 'n groot projek (miskien 'n groot kapitale elektrisiteitsvoorsieningskema) moet gedoen word, daar dan nie geld gevind kan word om 'n baie noodsaaklike beleidsaak uit te voer nie. Die Ordonnansie in die Transvaal bepaal ook dat die Bestuurskomitee, natuurlik in samewerking met die hoofde van departemente en die stadsklerk, die begroting opstel, dan word dit op 'n vergadering bespreek waar al die raadslede uitgenooi word om teenwoordig te wees, waar hulle hulle sê kan sê en die nodige veranderings aanbring wat nodig geag word. 'n Mens kan nog eintlik verder gaan en doen wat ons vanjaar gedoen het, nl. om 'n informele vergadering vooraf te hou tussen die hoofde van departemente, die Bestuurskomitee en al die raadslede, en ná daardie besprekings jou syfers te hersien en dan die werklike begroting op te stel en 'n begrotingsvergadering te hou.

In verband met die outonomie van 'n elektrisiteitsdepartement, wanneer 'n dorp ongekende ontwikkeling deurgaan vind u dat die ander departemente ook uitbrei en groei en dienste moet voorsien word (ek gee toe nie in dieselfde verhouding as jou ingenieursdepartement nie) en dan mag 'n mens in die posisie wees dat jou geld wat die ekstra ontwikkeling daarstel gespandeer word voordat die ander essensiële dienste in aanmerking geneem word. Dan kry 'n mens bv. 'n baie goeie elektrisiteitsstelsel, baie goeie dienste soos water, paaie, en so meer, maar jou gesondheidsdienste het agter gebly, jou verkeer bly agter en baie van daardie ander sake. Die tekort aan personeel moet eerder op 'n ander manier aangevul word as soos deur mnr. Kipling voorgestel. As daar slegs 'n sekere aantal gekwalifiseerde mense in jou land beskikbaar is, dan moet hulle die werk in die privaat sektor sowel as in die munisipale sektor doen. U sal dus vind dat, indien die munisipaliteite dan heeltemal genoeg personeel het, in 'n tyd wanneer daar 'n tekort is, jou privaatsektor met die tekort gaan sit en die privaat-sektor al die mense neem. Dan sit die munisipaliteite met die tekort, en uiteindelik sal 'n mens, indien die personeel met outonomie beliggaam word, soos voorgestel, vind dat jou salarisse in die ingenieursdepartement opgaan sonder inaanmerkingneming van die privaat-sektor. Nou sal die privaatsektor hoër salarisse moet aanbied om die mense weer terug te neem van die munisipaliteit. Die munisipaliteit sal weer hoër moet gaan om hulle weer terug te neem van die privaatsektor, en so sal die spiraal opgaan, sodat 'n mens lateraan nie meer sal weet waar jy gaan halt roep nie. Ek dink om die saak as een geheel te sien, maak dit 'n beter proposisie. Ek dink nog verder aan personeel: die kwessie van 'n aparte salaris-skema vir jou ingenieursdepartement. U weet, en nou praat ek as amptenaar en my medeamptenare moet nou maar vir my hier verkwalik as ek sê dit is maar ons munisipale amptenare se manier: ons gun darem nie die ander man beter nie. As die elektrisiteitsdepartement 'n hergradering kry, dan voel die ander departemente: maar hoekom kry ons dan niks nie?; wat het hulle dan nou meer as wat ons het? en so gaan dit maar altyd. Gevolglik vind u dat 'n hergrading in die elektrisiteitsdepartement ontevredenheid in die ander departemente meebring tensy daar 'n algehele hergradering is. U sal ook vind dat u personeelvereniging nie met daardie aspek gaan gediend wees nie. Ek stem saam dat 'n verantwoordelike Ingenieur beheer or sy departement met uitoefen, en die nodige dissipline moet handhaaf. So is dit seker vandag die posisie in die meeste departemente. Daar is een stel regulasies of diensvoorwaardes vir al die amptenare en die ingenieur moet toesien dat hy

binne daardie voorwaardes optree. Wanneer 'n personeellid onder die regulasies aangekla word, gaan dit gewoonlik gepaard met regsprobleme, en dan vind u dat die ingenieur buitekant sy professie moet gaan en ook 'n regsverteenwoordiger moet wees, tensy daar natuurlik voorsiening gemaak word dat sy departement sy eie regsafdeling of senior administratiewe personeel het. Ek stem ook saam dat die ingenieur verantwoordelik moet wees vir die spandering van geld, maar hy kan slegs geld spandeer waarvoor voorsiening gemaak is in die begroting. So die Stadstesourier kan op daardie stadium nie meer as adviseur optree nie, tensy weer in hierdie geval die ingenieursdepartemente gekwalifiseerde rekenmeesters en senior rekenpligtige klerke het. Mnr. die President, verder, sover dit die kwessie van presedente, beginsel en beleid aangaan, stem ek saam met die vorige spreker dat 'n Raad nie aan presedente gebonde is nie. Daar by ons werk die stelsel só en sover ek weet is dit ook elders die geval dat wanneer 'n item wat beleid raak en waarvoor 'n vorige besluit geneem is, op die agenda kom, dan word daar nie net gesê ons besluit só nie; die Raad word ten volle ingelig wat was die vorige besluit, wat was die motivering vir die besluit, en as omstandighede verander het, dan staan dit die Raad vry om daardie presedente oorboord te gooi. Natuurlik u sal weet dat 'n presedent nie sommer maklik, vir 'n geringe rede, oorboord gegooi word nie want dan sal daardie sekerheid wat in 'n munisipaliteit heers en wat die belastingbetalers graag daar wil sien, ook oorboord gaan.

'n Munisipaliteit kan nie vandag byvoorbeeld gaan goedkeuring gee aan 'n saak en môre oormôre, wanneer identiese omstandighede heers, dit afkeur nie, want dan wil die persoon weet nou maar wat is ek beter of slegter as die ander manne? In verband met die besluit in beginsel, stem ek met mnr. Kipling heeltemal saam, dat oor die algemeen 'n besluit in beginsel nie veel werd is nie. 'n Raad moet besluit hiernatoe of daarnatoe en u vind gewoonlik dat die beginselbesluit miskien geneem word om die saak verder te ondersoek, maar in die meeste gevalle omdat die raad nie 'n definitiewe besluit wil neem nie, 'n mens kon sê hulle is miskien bang om in hierdie stadium 'n besluit te neem. Delegasie van bevoegdhede, mnr. die President, ek gaan nie langer meer wees nie — die Ordonnansie in die Transvaal, en ook nou in sekere ander provinsies, maak voorsiening dat sekere sake soos deur die Raad besluit, met goedkeuring van die Administrateur aan die Bestuurskomitee gedelegeer kan word, soos byvoorbeeld die aanstelling van personeel behalwe hoofde en onderhoofde van departemente, verlof, afdankings ensovoorts. Die Raad bly egter die beherende liggaam, en sy magte word nie ingeperk of ingekort, as hy nie gelukkig voel met 'n besluit van die Bestuurskomitee wat gedelegeerde magte het nie. Die ordonnansie bepaal dat die Bestuurskomitee maandeliks aan die Raad moet rapporteer, oor die sake waaroor hy gedelegeerde magte het. Dit staan elke raadslid wat nie op die Bestuurskomitee is nie, vry om die Bestuurskomitee aan te val oor 'n gedelegeerde mag wat na hulle mening nie reg uitgeoefen is nie. As die Raad voel hierdie Bestuurskomitee voer 'n sekere spesifieke gedelegeerde mag nie ordentlik uit nie, dan kan hy daardie gedelegeerde mag terugroep en sê: ek behou dit nou voorin die toekoms sal die Raad oor die saak besluit, en nie meer die Bestuurskomitee nie. Ek wil net graag aanvul by wat mnr. Kipling gesê het in verband met gedelegeerde mag — en voel die delegasie van magte kan verder uitgebrei word, soos die Ordonnansie voorsiening maak, om ook aan die Stadsklerk en Hoofde van Departemente sekere gedelegeerde magte te gee. Ek dink byvoorbeeld aan gedelegeerde magte soos die aanstelling van junior klerke, vragmotorbestuurders of ander junior personeel en die teoekenning van verlof sowel as 'n hele paar ander dinge om nog die verpligtinge van 'n Bestuurskomitee te verminder. Ek voel nie dat 'n delegasie heeltemal onherroepbaar is nie, soos ek reeds aangedui het. Mnr. die Voorsitter, bie dankie vir die geleentheid; ek is bly, en dit was vir my 'n baie interessante konferensie. Dankie.

Dr. J. A. Ellis, Springs: It is not easy to take up a debate after five or six speakers have already spoken and probably stolen your thunder. I only want to refer to certain things that Mr. Kipling has mentioned in his particular paper. The overestimating we know, that's common in all councils, particularly in the electricity departments. I don't know why they are a band of eager people, they want to do a tremendous amount of work, they don't realise that they haven't got the staff, and therefore they overestimate, and when they have to do the work they find they can't get through with it. But we have a way. We have only just now received our estimates, and most of the councillors, they are lazy as it is, haven't even looked at them as yet they send them back to the departments, and say, as far as we are concerned, you are overestimating, start cutting right now and that goes back to the various departments, and they cut and they cut, and they find that they still sending us out with a tremendous deficit, and we say look, we haven't time to talk about it ourselves, we don't know much about it any way, so we send it back to you again, and see if you can't cut it, and bring down the deficit to something reasonable. What I call reasonable, when we go forward, with a deficit, of say thirty or forty thousand, we know that at the end of the year, they have overestimated anyway, and we'll finish up with a big surplus, as we usually do. Now that is the position with estimates, so we don't even worry a great deal about that, we will meet one of these days, and we'll discuss them in detail. But now this question of consultants, another thing the electricity deparment seems to favour. I don't know if its a question of calling, passing the buck you know, but whenever we have a big job on hand, they usually decide, that it would be wise to call in consultants. We haven't had a consultant for the last five or six years, probably we must compliment Mr. Von Ahlften on that, but before that we used to have a spate of consultants, and what we did find as you said Mr. Kipling, was that it was a tremendous cost

to the council, additional cost, and usually we found we lost some of our best men as a result of pirating by these various firms, and we then were left with the maintainance, to be done by the men that we had left over. We don't favour consultants, we have very good departments, and we prefer to do the job ourselves, and we find that when any job is done departmentally, we found it even in our housing schemes, the houses done, the same plans given to the outside men, we found that departmentally our houses were done far better than those done by outside concerns, and therefore I say I perfer to dispense with consultants. Now this other point Mr. Kipling you spoke about is autonomy. Don't you think we have enough autonomy as it is. Now if you are going to start with autonomy, I always contend, the chain is as strong as its weakest link, and after all, a council consists of various chains, of various departments, or one chain consisting of various links, or various departments, as they keep those links strong enough, to form this formidable chain. Once you break it up, once you take one link out of that chain, you haven't got the same chain. Now if you are going to give autonomy to a particular department, you introduce the same question again I notice, of giving, allowing a separate salary grading scheme, as one of the speakers already said, that we only cause a certain amount of acrimony, and dissension. If you started giving to one department, put them on a different salary scale, from another department, now the old story arises, the old chap in the town clerk's department, the clerk, he thinks that he is just as good as the clerk in the engineers department, and should get the same salary. We have the same in medical today, it is all a question of supply and demand there is a great shortage today, of medical men in our departments, we can't get them because of the laid down salary scale, and it's all the same in the electricity department, and the engineer's department. What we do today in order to overcome this salary grade position, we have what is known as a professional allowance. We give a certain allowance, it is only basic. But an allowance is made in order to overcome the shortage of supply of a practical engineer. But I don't think that it would work, first of all we have a grading committee, we go into it thoroughly, and when we feel that a higher grade is necessary, then that grading system is done on a scientific basis, and is done as a complete whole throughout the department and so far we have had very little dissension, in our particular town. There is one little point though, I would like to take up, the autonomy that you talk about I think would be overcome, by a little system that we have started in Springs, I don't think any town, any city in the Republic, or elsewhere, has adopted the system that we have adopted, and it was devised actually, by the electrical engineer, strangely enough, who happens to be our town clerk.

He has introduced into our town, a triumvirate. He has introduced the triumvirate which actually works very well. It does create a better liaison between the departments, and liaison between the department and the management committee, that triumvirate is formed in this way, that he, as the town clerk, has two deputies, one deputy town clerk is the deputy town clerk finance. He was our town treasurer, under him, he has the town treasurer, and then on the other hand he has another deputy, town clerk, called deputy town clerk technical. He is, or was our town engineer, and under him he has a town engineer, and the electrical engineer. In other words, you have a step up, you have the electrical, or the engineer, or the treasurer able through the triumvirate to discuss all the little problems, all their technical difficulties and so through them, bring them to the Management committee through this particular form of liaison. I think it works very well, but I don't like the Management Committee system . . . my view is based on what happens in Springs. Now the only difference between my point of view, and Mr. Eager's, is this, that Mr. Eager's, and the Johannesburg council, have been able to overcome the ordinance itself, or not over come it, but they made use of that section sixty committee system. In other words, they have almost reverted, probably even in a better way, they have reverted to the old committee system by using the Section Sixty committee. They still have five committees. The councillor still has a chance to serve on a committee for a year, or on several other committees. That councillor is not frustrated, the work of the council is not in the hands of a committee of three. They still have the liaison, between the chairman of the various committees and their management committee, through their departments. But the other towns, who still seem to be satisfied with the position as it is. They have a committee of three. We take our own town again. I have no grouse against the management committee. I think they do a wonderful job of work, I take off my hat to them. And the only thing that they do, do really, the fact is, they give me a salary at the end of the month, for no work at all, of course I love that. As long as I attend one meeteing a month, the council meeting at the end of the month, I get my cheque the following day, but what I know about the work of the council, is dangerous. You know, that I only meet Mr. Von Ahlften at conferences, or at social functions, when we are all invited by the mayor. I never see the man, I wouldn't recognise him, if I saw him in the street. When ever I see Mr. De Jonge our non-European affairs manager, I would say to him, hello, still here. I haven't seen him, haven't met him, I hardly ever see our Town Engineer. In fact I have to look very clsely, not to mix him up with the other man. But what is the position of the managemente committee today. Now my point is this, that 3 men, or five men, can run a town. I have got no grouse, I always found in the past, that even if you had a committee of twelve, four or five did most of the work, and the others only turned up sometimes. But those four or five, or six, or any for that matter, of the twelve, would go to any committee. They could be on that committee, of works for instance, and they could attend, whether they had a vote or not. They were allowed to attend. They could

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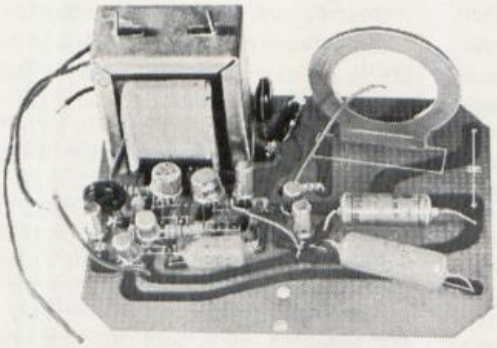

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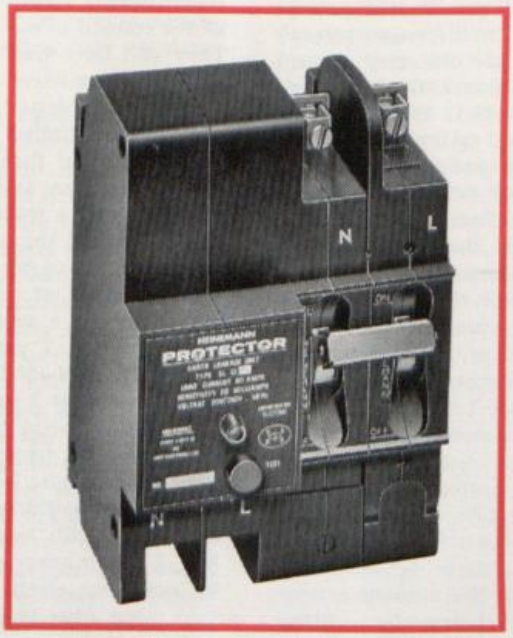

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take an interest in the job. They could then go on to the sundry services committee. They might be a member of that committee, or not. They could argue. They could hear the debate. They could even discuss it, and work it at the council. But at least they could take an interest, and then they went to the general purposes, which was a policy committee, and then they would see the policy of the council and from there on to finance, and then it come to the full council. That to me was the idea. If you had an enthusiastic councillor, who wanted to know what was going on around him, he could attend any committee meeting. He could be a member of such. He could vote, or not, but he could debate, and then finally in the open council he could if he didn't get his point during committee stage, he would definitely be able to get at it at the council stage. But what have you got today. You know that according to the ordinance, you have got to get special permission, to attend a management committee meeting, and you have then got to say to the chairman, or the town clerk, I want to talk on a particular subject, and you are only allowed to talk on that subject, and I remember, that when this first started, I remember standing, after been twenty-two years on the council, I remember having to stand in the passage, with cap in hand, waiting for the chairman of the management committee, to tell me to come in, sit down, and then take my turn, when he arrived at that particular item that I wanted to talk on, and then say, alright, what have you got to say, or what is your interest in it, and God help you, if you answer that, because your interest sounds terrible, you might have some financial interest, or friendly personal interest, and want to know, what you are doing here, what you want to do at this committee, you could be playing golf, so you turn up at the committee, and you state your interest, and you were not even allowed to wait until the discussion took place, when a conclusion was arrived at, and you said is that all, and you walked out, cap in hand. That was the management committee system. Today thank goodness, we have got a new chairman, who says well look, I am not going to make it as difficult as the ordinance makes it out, you can come, with my permission. The Administration didn't give it to him, but still he is taking it on. You can come with my permission, and attend the management committee, whenever you like, sit there, I don't even have to wait outside, come inside with us, and sit there, and listen to what goes on. He has condescended to do this after six years. I am rather pleased about that and you know, that, despite the fact, that he says now, you can come along to the managemente committee system, I give you permission, I promise you that out of twelve, of the other nine, councillors, I doubt if there are more than one, or two, who even take advantage of that invitation. Because why should they. They can attend one meeting, at the end of the month, and they get their salary. Now that is the management committee system. There is nothing wrong with the system, but my own point is this, what are the other nine men there for? Nine frustrated councillors, who get paid for nothing.

President: Thank you Councillor Ellis: Time is slipping past Gentlemen, and we must give Councillor Kipling an opportunity to reply. I am sure, that with this response for the floor, it is ample compensation for the hard work, and lot of time he spent on this paper.

Councillor H. G. Kipling, East London: First of all, I would like to thank Mr. White-Cooper and Mr. Boyce Eager, for the encouraging remarks, and useful criticism in proposing, and seconding the paper. As one of the senior officials, of my company, is present at the convention, and at present, sitting in this hall, I take strong exception to Councillor Erasmus' remarks, because I am quite satisfied, having said, that engineers are useless individuals, when I return home, my salary grade is either going to be lowered, or I am going to get a month's notice. As regards the remarks by Mr. Steers, Salisbury, he came all the way with my paper, which to me, was a great surprise, and I am going to suggest, that he be given an honorary degree, in electrical engineering, by this association, Gentlemen, having put the cats among the pigeons, it would be presumptious, on my part, had I for one moment, suggested, that the subject under review, would receive general approval, I realised, in setting out the paper, that in sticking out my neck, I was liable to be axed, I certainly was, eminent councillors, and many of long standing, have participated in the debate, I appreciated the candour with which they have expressed their constructive criticisms. If one could express, in sine wave form, the frustration, experienced by councillors, on occasion, due to procrastination, caused by delays, in the average municipal set-up, it would make the fault peaks depicted in the slides presented by Mr. Duffield, resemble a minor disturbance. A change is definitely indicated but how far, one may proceed, is a point debatable. I do not claim to be a Jules Verne or an Eienstein, but I will predict, that the change in the existing set-up, will eventuate in the next two decades, and having come to the end of what has been a very serious debate, I think I will conclude, by telling you how, I feel, now that it is all over. It concerns Abie Cohen, who appeared in court, suing the accused for the loss of his cart the loss of his horse, and personal pain and suffering. So the magistrate says, Mr. Cohen proceed, He said: "Vel, Your Honour, it ees like thees, I am coming down the road, mit mein horse and cart, and he said, the swine in the dock, flies out of a side street, met a great big motor car, and vot was more, it was a stop street, and wot happened? he smashed into me. The cart is in smithereens, and the poor horse is lying in the gutter met four broken legs, and there is me Cohen, lying on de curb wit two broken legs. The Magistrate says, hold on, Mr. Cohen, we sent a sergeant to the scene of the accident, you are quite right, your cart was in smithereens, your horse had four broken legs, but when the sergeant asked how you were, you said "fine". Now how can you claim personal pain and suffering?" "Your honour give me a chance," Cohen said, "you are quite right, the Sergeant came, he walked over and he

looked at the smash, and he walked over to the cart, and said, what a smash, he said, then he walked over to where the horse was lying mit de four broken legs, and he said poor so and so, and he pulled a revolver out, and shot the horse dead, then he walks over to me, lying on the curb mit two broken legs, and he said 'how are you Mr. Cohen,' and I said ruddy fine thanks, what do you tink. Well Mr. President, and Gentlemen, that is how I feel now, fine, after having come through this difficult ordeal.

President: Thank you very much Councillor Kipling: I think we all enjoyed that.

FOURTH DAY

MORNING SESSION

Presentation by Mr. J. W. Smit of his paper "Some Aspects of Street Lighting" as published in the 1967 Proceedings, Volume I.

The President thanked Mr. Smit for his very interesting paper and discussion proceeded as follows:—

L. O. Foster, Johannesburg: I am indeed honoured by being given the opportunity for opening the discussion on Mr. Smit's paper. For the occasion may be regarded as unique and historical, seeing that it had been presented at a time when South Africa is on the threshold of a new era in Road Communication. The paper explaining the code of practise, has been presented when many of our cities are actively engaged in changing their topography and we can soon expect to see more and more concrete structures of expressways, weaving their way above the roof tops. We can expect to see a new fantasy amidst this pattern, the multi level complex junction with its high masts standing like sentinels, each playing a necessary role in the illumination of this new shape of things to come, we can also expect to see the introduction of under passes, over passes and tunnels, each playing an important part in the nation's obligation, providing adequate road amenities in a modern dynamic society. The changing scene, the emphasis on speed, supersonic transports, the 1500 miles an hour linking continents, faster passenger cars, faster highways, linking cities, the tempo increasing with increasing vehicular traffic, all this multi million grant expenditure to keep the traffic moving safely and expeditiously from one point to another. This is the feature, Mr. Smit has made an invaluable contribution to our society with the introduction of this document which details in a concise manner, methods of ensuring that capital funds expended on streetlighting will be used to best advantage so we are indeed indebted to you Sir, for presenting us with a very fine tool which will make our job somewhat easier, when we sit down to plan these new installations. The document itself has been clearly explained by Mr. Smit so all that is really necessary is for me to comment on certain aspects of it, but before I do so, I would remind you that our code is not a copy of that used in another country. Admittedly, knowledge gleened from other codes has been used in the preparation of ours, but by and large, it is purely a South African effort,

VIERDE DAG

OGGENDSITTING

Mnr. J. W. Smit lewer sy referaat oor „Enkele Aspekte van Straatverligting", soos gepubliseer in Volume I van die 1967-Verrigtinge.

Die Pesident bedank Mnr. Smit vir sy besonder interessante referaat en die volgende bespreking vind plaas:—

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of which we can be proud, for example it differs considerably from the British code which merely provides a number of tables to meet a variety of conditions with which the particular road under consideration may or may not line up whereas the South African Code enables the engineer to consider any road, whatever its characteristics, apply the formula and be reasonably certain that the resultant installation will be satisfactory. However a calculation by itself is inconclusive unless applied with experience, good judgement and knowledge of all the factors affecting the result, so I would strongly recommend that any new installations whose pole and lantern orientations have been determined by the code, should be evaluated and assesed to assess it's effectiveness, and the results submitted to the South African Bureau with comment, this would enable the Bureau to judge the code and it's effectiveness in relation to the installation. Gentlemen, it is our duty to ensure that this code of practice is adopted and complied with, not as far as possible but all the way. Strict regulations are enforced for the reticulation of electric energy in buildings, so why not strict regulations for the installation of street-lighting installations. A poorly lit inter-section is far more dangerous to many citizens than a faulty earthed electrical appliance to one user, your assistance therefore in making the code work is of paramount importance. It has been suggested by some engineers that the values in the code are too high, and to meet these values municipalities will be faced with considerable expenditure. Possibly so, but even the British Code of Practice published four years ago is now being considered on the low side, apart from the fact we have observed from the figures given in the paper that 53% of road fatalities in the United States occur at night, so if we assume that the same percentage applies to road fatalities in South Africa then roughly 1700 hundred lives are lost during the hours of darkness, what are these lives worth, to consider a value of a human life, I doubt if there is anyone capable of doing this but

supposing it is a low figure of R20,000, at night time road accidents are costing South Africa a conservative R34 million annually without the repair bill. I could pose a question, which would you prefer to spend R34 million on improved streetlighting and reduce the national slaughter or be satisfied with mediocre lighting installations and know that sooner or later you may contribute to the national death toll. Mr. President, as a citizen of Johannesburg or Durban or Port Elizabeth or Cape Town, or any town or village in the Republic, I have the right to expect from this august gathering of Town Electrical engineers that they will apply their skill and this code conscientiously, if only to minimise the accident rate and to keep death off the road. Mr. Smit, I regret I have not been the usual controversial speaker to open the discussion for the simple reason I can only fault the section of the code dealing with road surface classification. As I feel depending upon the choice of the road surface this single factor could vastly effect the answer from the basic calculation, I think that this could be a weak part of the code and perhaps you would care to give us the benefit of your knowledge in this respect. Mr. President, I believe that the municipal Engineer in particular and the South African public in general are greatly indebted to Mr. Smit for his work and the impact it is likely to make in improving the conditions of our Society. On behalf of the Association of Municipal Electricity Undertakings I wish to thank you Sir, for your very fine effort.

R. M. O. Simpson, Durban: I would like to also join Mr. Foster in thanking the speaker very much indeed for a most interesting paper, and also to further thank the Bureau and Mr. Smit in particular for the very fine work they have done in producing the code of practise, it is a very good one. One or two little comments I do think are necessary and a comment has been made, I think this paper was based on endeavouring to arrive at a good light emission from luminaires. Now that is one aspect that I do think we still are short of and I am very pleased to see the Bureau has led the field to some extent in South Africa, or mainly in South Africa, in producing a laboratory where these units can be tested to see exactly what a purchaser is buying, we can if they have been tested in the Bureau be sure that we can get a fitting that will do the job that we want it to do. That I think is most important and really before we will go very far with lighting, that aspect has got to be further developed in this country. You do get cases where lamps are provided, luminaires are provided that to all intents and purposes, similar to those designed and manufactured in the U.K. or in other countries, but the results or the lighting from some of those don't compare and they don't appear to be the same, so there would appear to be some differences in their light emission and that is one aspect I think we must proceed further. The bureau in its attempt to improve lighting in South Africa, I think can do well by producing a code of practise to help in the design of luminaires, and another factor in dealing with accidents that I don't think we should overlook. I fully support lighting of roadways, we have got to improve our lighting in this country. There is a terrific amount to do, it is going to be a very costly job, but I also feel that this must be done in conjunction with the designer of the roads. Now a lot of our accidents can be traced to poor road design, or I won't say, that is probably a wrong statement, the particular design of a road, you can have the bend just at the wrong position; they can be confusing and that alone is a potential source of accidents. Now you can spend quite a lot of money on lighting, but you won't get the best results, so here again I think the lighting engineer and the electrical engineers of the towns must work more closely with the design of the roads. Very often your civil engineers would design a road they give no thought whatsoever to lighting it and when you come along, finally see their plans you find yourself in a position that you can't sight your poles properly, you can't get a proper layout and if that was considered in the design stage of the roads we could cut our costs considerably in lighting, and we could also make a very much better job, both aesthetically and from a lighting point of view. Road surfaces I think are another thing that are very important, I know I have raised this point with the city engineer in Durban and it is an economic problem, he would tell you or quite a few civil engineers would say. They all become the same after a little while. Well, I dispute that they don't, and if you drive around your town, you can find where asphalted roads have been made up of different aggregates, and you find that the lighter the aggregate you have a very much improved surface illuminince in the surface and here it is an economical problem, because after all you have got to get your stone, the stone that you can get it is dependend upon your quarry, you may not have the quartz, the lighter stones available. I don't know whether the Bureau is considering doing any further research into this aspect, I know I have seen it in Sweden and in Holland where quite considerable work is being done into scintered glass, the Road Research Institute in Britain at Slough have treated stone to try and make it lighter, and I would like to know if the Bureau is taking any steps in that regard, this particular point shows up so clearly, when you go over a black asphalt road and then go into a white concrete road.

A. C. T. Frantz, Cape Town: Firstly, I would like to add my congratulations to Mr. Smit on his very interesting paper, which I think we can all agree, forms what is virtually an excellent text book for engineers engaged in the design of street lighting installations. I was very glad to see that the peak intensity of the lantern is now been taken into account in determinating the mounting height instead of the average light output as previously proposed. This is more a realistic approach to the problem when one considers the question of glare elimination. However, we in Cape Town still feel that the minimum mounting heights particularly in the cases of cut-off and higher powered lanterns, having peak intensities of over

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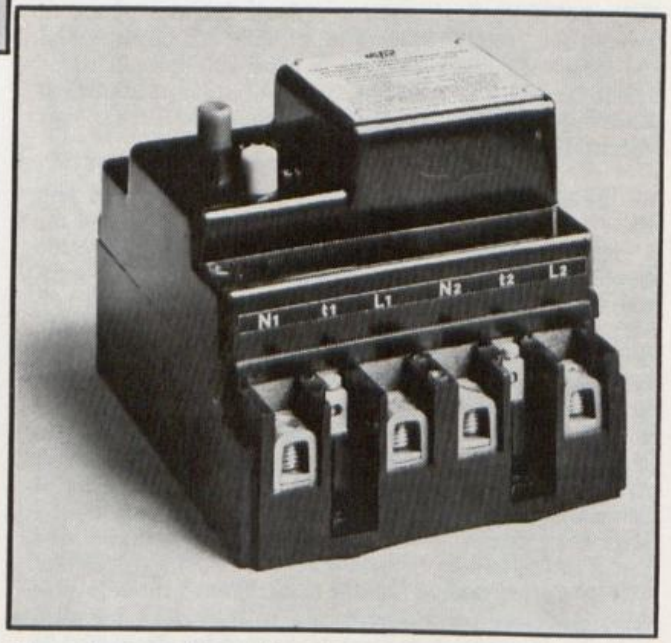

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4,500 should have been increased by at least five feet, this will probably sort itself out in the final design of the installation as we feel that it will be impossible to obtain the recommended maximum diversity factors with the recommended mounting heights, for instance on the Eastern Boulevard in Cape Town, where the lighting has been designed in accordance with the new code, thousand watt colour corrected high pressure mercury vapour, cut-off lanterns will be used. The lanterns have a peak intensity of just over 12,000 at an angle of 58 degrees and with this high light output, it is essential to design for a mounting height of 45 feet, in order to obtain the 2.7 lumins required under the code. This 45 feet is ten feet higher than the recommended figure. Mr. Smit has rightly advocated the use of the Iso-Candela Diagram which once mastered is a far more useful tool than polar diagrams, because it presents all the characteristics of the lantern. Mr. Smit's description of this diagram is most lucid and particularly interesting is the method shown for obtaining the utilisation curves. For some unknown reason, manufacturers seem reluctant to supply these curves which are essential in applying the figures to the code, one question I would like to ask Mr. Smit is the definitions given in the paper, for the factor K in figure 12, there seem to be two definitions, surely the factor K is the solid angle for each area. The vertical angles given in figure 12, we refer only to the centre of the points of the areas under consideration. In determining the intensity of the illumination at various points, on varying widths of roadways, these angles have to be circulated or measured from drawings at each point, and this can become very tedious and we in Cape Town have consequently developed an instrument which we call the "Iso-Candela Diagram protractor" which enables the angles at any point to be determined very rapidly. The instrument merely simulates the well known constructional drawing of a triangle and is adjustable for various mounting heights between 25 and 45 feet and if anybody is interested, I have a drawing here showing how this thing has been made. The figures also stress an important point namely that the luminance uniformity is better than illumination uniformity. In the code no differentiation is made between these two. If this were generally the case and if the luminance uniformity value was given in the code is unacceptable there seems to be a case for relaxing the illumination uniformity values when designing installations in accordance with the code, which must necessarily be carried out on a illumination basis. Difficulties arising out of using the same maximum diversity factor for cut-off and semi cut-off lanterns is something which we feel must still be seriously considered. It has been our experience in Cape Town that larger diversity factors may be permitted with semi cut-off installations without undue patchiness. Finally I would like once again to add my thanks to Mr. Smit for a most interesting and enlighting paper.

D. W. Young, Johannesburg: Mr. President, there is the aspect which Mr. Smit brought out, of the value of the code to councillors and two further facts have recently come to knowledge which might be resistance to them. At the last conference of the association of public lighting engineers in Britain, the ministry of transport tabled two figures for accident rates, the cost of accidents to vehicles, one was the cost when an accident was under 30 miles an hour and this was costing something in the order of 600 pounds sterling, at over 30 miles an hour the cost was just over 900 pounds sterling, again, so the cost of an accident is directly relatable to the speed of the accident at the time the collision occurs. The second point is Mr. Smit clearly showed the method of calculation in the code to do with utilisation factors and I would like him to illustrate that this is not the only matter or method which calculation can be done for street-lighting, there are other ones and perhaps he would like to mention some of these and thirdly, he very carefully, I think, probably deliberately, and I want to bait him on this, kept away from part two of the code which deals with quite a number of other things, mounting heights doing special applications and perhaps he will give some passing reference or some comments on the areas that part two will cover.

E. de C. Pretorius, Potchefstroom: Wat ek nou gaan sê, nadat u geluister het na die vorige geleerde vriend, sal seker my onkunde aan die kaak stel maar ek beroep my op my vriend Mnr. Smit. Ek wonder of hy ook 'n raad het as 'n mens bietjie lig in die kop voel. Mnr. die President, figuur twee, die tabel by figuur twee, minimum monteerhoogtes vir armature, behoort daar nie toegelaat te word vir 'n lyn-ligbron nie? Ek veronderstel hierdie tabel is vir punt-ligbronne bedoel. Die spits intensiteit in kandelas kan miskien 'n bietjie gerek word, of 'n bietjie gerek word vir lyn-ligbronne. Die „Iso-Kandela"-diagram is 'n baie handige stukkie gereedskap maar wat my bekommer is dat die diagram gewoonlik bedoel is vir 'n lig-armatuur wat in die horisontale posisie gemonteer is. Nou ek weet nie of die montering van ligbronne teen 'n klein helling (tilt), tot soveel as 15 grade, of dit aanbeveel of afgekeur word nie. As so 'n armatuur gemonteer word teen 'n klein helling, dan het ek probleme met die gewone die „Iso-Kandela"-diagram. Wat betref die ongeluksyfer in Potchefstroom, dis 'n klein dorpie maar ons probeer ook maar ons bes daarso. Ons het in die afgelope ses jaar seker omtrent R15,000 spandeer aan verbetering van straatverligting, en ek kan vir u sê dat die aantal ongelukke, nie net die "rate van accidents" nie, maar die aantal ongelukke, het tussen die tydperk sewe namiddag tot sewe voormiddag met meer as 50 persent afgeneem. Daar is een sakie wat ek mis in die gebruikskode, en dit is dat daar nêrens 'n aanbeveling is op watter stadium of by watter lig-intensiteit straat-ligte aangeskakel behoort te word nie. Ons het toetse uitgevoer in Potchefstroom en dit is merkwaardig hoe vinnig lig-intensiteit afneem ná sononder. Dit neem af binne 'n tydperk van 'n kwartier tot so laag as (ons het gemeet in lumens) tot so laag as vyf. Ek noem hierdie feit omdat ons ook toetse uitgevoer het op natriumdamp-lampe, wat die lig intensiteit van 'n natriumdamp lamp is en waar dit 'n armatuur (ek

is jammer om te sê, maar dis in Suid-Afrika vervaardig) negentien minute geneem het om sy volle lig-uitset te bereik, het dit 12½ minute geneem voordat dit 80% bereik het. Ek wonder of Mnr. Smit vir ons 'n bietjie kan toelig omtrent hierdie sakie: of dit ondersoek is en of dit gaan ondersoek word, want ek dink dit is 'n baie belangrike puntjie.

P. A. Giles, East London: I would like to add my congratulations to the other speakers on the excellent paper that Mr. Smit has put forward. We know that he was the Architect of the South African Bureau of Standards code of practise, he was the man who co-ordinated all the thoughts and this extension of the information previously given is very welcome. As a user, I find a bit of difficulty in appreciating the difference between a dark, a medium and a light road, there is no information in the original code and Mr. Smit has indicated today that a concrete road shall we say is a light surface road, an asphalt road is a medium surface and of course a dark road. I am completely in the dark, I would be very grateful if Mr. Smit could enlarge or comment on that particular aspect. It is very important because it affects the diversity factor, Mr. Smit hasn't mentioned diversity factor in his talk today but the diversity factor I know for asphalt roads as defined by Mr. Smit is 12 and I think a dark road is 18, well obviously the costs of lighting a dark road, are going to be very much higher than that of a medium surface road, and is very important for us as the users to know what is required.

H. T. Turner, Umtali: While we have Mr. Smit here today it does occur to me that it might be a good time to give us a brief resume of the various merits of the different light sources, the main three of course being Fluorescent, Sodium and Mercury Vapor. In designing a new installation, one has to make their minds up, which is the most suitable type apart from the cost and get Mr. Smit today to give the merits of the various three sources that I have mentioned.

Mr. Smit replied to the discussion as follows:

Mnr. Smit antwoord soos volg op die bespreking:

Mr. Smit: I didn't expect to be bombarded by questions as you did. I am afraid I missed one or two of them and I have to call on some of you to repeat your questions. Mr. Foster first of all thank you very much for your very kind remarks about the code and also about the paper, I do appreciate it and I think the same holds for every other speaker, thank you very much Gentlemen. Mr. Foster as far as I can see it you raised only one question and that is in connection with the road surface, you feel that the code does not adequately cover this variable in street lighting, I think I can only agree with you that I would like to see it more fully covered it is however very, very difficult. In replying to this question I want to start off by saying that the International Committee on Illumination has a sub-committee which now works permanently on road surfaces. I am expecting that they will shortly give us a better classificaion which we can use. What we have at the moment in the code is we have classified road surface in three groups, medium, light medium and dark, we cannot go further at this stage. This means that a dark surface needing twice as much light to get the same luminance as the light surface, it means that it will be twice as costly to light a dark surface than to light a light surface, on the other hand, it means that if one does not specify only illumination with luminance, you can also score because if you light a light surface now, then you are not going to put too much light on it. You can rather distribute your funds according to the road surface, I think that the method that we have given in the code, I must admit lacks completeness, but I think it is a very very great step forward and I can assure you that this is one of the things of which we are well aware at the Bureau, and I think we will do some work in the future and in fact we are doing this work and we will probably at some stage come out with a much better classification of road surfaces, does that answer your question Mr. Foster? Gentlemen, coming now to Mr. Simpson. Mr. Simpson mentioned the intensity distribution of the luminaire and he gave me the impression that he felt that he agreed with me that there is room for improvement, I say this rather with my tongue in my cheek Gentlemen, but I feel it is not wrong to say it we can improve Mr. Simpson, I may just mention here that I have planned the next move from a specification point of view, in the Bureau, would be to provide a specification not a code, but a specification for luminaires, and I can asuure you that if I get the support from my committees that I always get, that we will make a code, a spec. which will be chiefly concerned with intensity distribution. The way that we will make it, I think we have already more or less planned that the code gives certain recommendations and starting from those overhang and so on, we shall calculate the most useful, the most appropriate distribution on the road, surface at least the most appropriate and luminance distribution from the luminaire when using this code, and we shall then frame in various planes I think intensity distribution requirements. I think we shall have to allow ample limits for compliance, but I think it will be a very, very great improvement. Now this is, as I said, the next step in the Bureau spec., and then tied in with that of course is the matter of controlled gear for street lighting fittings, chokes for ballasts for mercury as well as sodium, I have an idea that we will very shortly embark on those projects too, and as you probably know we have just recently completed a specification for fluorescent lamp ballast and having done this, I think we have now really done the most difficult part of the job. The spec. for the other two ballasts wouldn't be at all as difficult although I don't think we must underestimate the difficulty. Mr. Simpson you made the points about accidents

due to wrong layout of the road and so on. I must agree with you, I think that it is true, we all know it, it is one of my old favourite hobby horses really you will always see accidents happening in the same spot, and one naturally wonders why. It is not always due to lack of concentration on the part of the driver, there is I am sure in some cases much to be said as Mr. Simpson said, but it is a thing about which we could do nothing. The statement that I made is that whatever the position on the road, or whatever the layout of the road, street lighting on any road can only improve conditions, it will result in lower accident rates at night, and I think we must not overlook that point, although I agree with you Mr. Simpson, there is a lot that can be done about that and the same of course holds for surfaces, am I overrunning my time Mr. President? Now stones used in road surfaces. Mr. Simpson mentioned that he asked really whether the Bureau plans to do anything about it, I think this can be classified a research, I would love to do it, I don't know whether I would be allowed to do it, it is rather a delicate question, we have some friends of the C.S.I.R. here and I don't want to commit myself in front of them Gentlemen, it can be rather dangerous so let me just say this Mr. Simpson, I said earlier we are aware of the problem and I think we will give you all the assistance we can. This ties in with better classification for road surfaces of course. Mr. Frantz, you made the point that you think the mounting heights are too low, especially where the peak intensity exceeds 4,500 Candelas, and you advocate a five foot increase. I am in agreement with that, I think it is necessary at the moment we cannot do that I think because of the lack of suitable luminaires for such high mounting heights really. I probably bring myself very wide open now that I think that was one of the things we had to consider, can we do the job. When we started calculating worked examples in the code, we found extreme difficulty to meet the requirements with a reasonable installation. It is always uniformity that leads to the difficutly, Mr. Young knows very well about this, I complained at every committee meeting that we cannot find luminaires which will do the job, I think in time to come Mr. Frantz, this will come, we will increase the mounting heights, I agree the higher you mount, the less the glare and the better uniformity distribution, I think it is a matter of really knowing what we are aiming for in terms of this code as Mr. Foster said, this code is, it has a new approach, and the gear for this code is not really available at this stage, we have to provide it and the moment it becomes available and is made in terms of the requirements of a spec. based on this code, I think then we will solve the problem and we will very soon implement it in the code. Your next point that you made Mr. Frantz and which I want to comment is reluctance to supply utilisation information, I just want to stress here, that we can now at the Bureau do this job. I think the consumer should insist on it, I think it's all I can say about it, (but it is) it can be done in South Africa now, and we should make use of it. Mr. Frantz the protractor you mentioned, I would very much like to see that, but I think we can leave that for discussion later. You mentioned your last point was the differentiation between luminance and illumination uniformity. This is one of the amendments to the code which I did not mention in my paper, there were so many of them, I couldn't mention them all, the point is this, that we have found in practise on almost all installations that the luminance uniformity is normally better than the illumination uniformity. I have done tests on quite a number of installations and all our results point to this fact, we have therefore in fact done what you recommend us to do, I can show you the new code, I have only one copy here, but I can show it to you in the new table 12, we don't recommend anymore that the uniformity should be assessed in terms of illumination, we recommend that it should be assessed in terms of luminance, and we have added a footnote to this table, we have amended the figures. For instance for an A1 road, we now insist on a luminance uniformity of 3.5 and A2, four to one, A3 five to one, A4 six to one, and class B road 6 to 1, this is luminance uniformity, and we have added this note to the table, it has been found in practise that if certain perometers of the installation are controlled as recommended in this code, the illumination uniformity ratio now illumination uniformity ratio does not exceed and this ratio does not exceed approximatey 1.5 times the appropriate value, given for luminous uniformity then a satisfactory installation will result, I think that answers your question Mr. Frantz.

MEMBERS' FORUM SECOND SESSION

The second and third sessions of Members' Forum were conducted by Mr. P. A. Giles, East London, as Quizmaster.

Dealing with his paperette "Portable Appliances fed from Socket Outletes", Mr. A. F. Turnbull, Vereeniging said:

A. F. Turnbull: We have ranged from 400kV circuit breakers, instant waterheaters, scientific research, gas turbines, oil loading, administration, street lighting, and now at the lower end of the scale, portable appliances fed from socket outlets.

As a previous speaker remarked, this is tricky, I do not propose to read the paper but rather enlarge on some of the aspects. The subject is really an abstract of the discussions frequently raised whenever engineers meet. The annexure concerns swimming baths and bore-hole pump installations. The wiring of premises and the operation of machinery is adequately covered by stringent

LEDE - FORUM TWEEDESITTING

Die tweede en derde sittings van die lede-forum is gelei deur mnr. P. A. Giles, Oos-Londen, as Vraesteller.

Toe hy sy referaatjie oor „Draagbare Toestelle wat vanaf Kontaksokke gevoer word", behandel, sê mnr. A. F. Turnbull, Vereeniging:—

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regulations. The use of portable appliances is generally conceded to be the responsibility of the consumer and it may be wise to let sleeping dogs lie. In 1966 however, there were 57 electrocutions and 166 casualties from electrical accidents in the Republic. This does not include the mines, railways and harbours. The majority of these accidents result from portable appliances fed from socket-outlets. Every person, young or old, believe they are capable of connecting a plug, to a flexible cord, yet it is often here where tragedy originates. What engineer has not shuddered at electrical work proudly displayed by a neighbour. This convention has supported compulsory safety specifications for domestic washing machines, electric toasters, electric irons and electric soldering irons. The safety and quality of these appliances is thus ensured. It will not prevent an unskilled person from incorrectly connecting these appliances to a socket outlet. Local authorities who have made the installation of an earth leakage device compulsory, should by now be able to contribute a valuable contribution to these discussions. The istallations of earth leakage protection are not popular especially where consumers have deep freeze units, and the earth leakage relay operates for no apparent reason when the consumer is absent for a week end. In conclusion users of portable earth leakage units, used with portable tools must maintain and frequently test these units. If there is any portable appliance that needs earth leakage protection it is the portable earth leakage unit itself. Thank you.

Discussion proceeded as follows:

Mnr. E. de C. Pretorius, Potchefstroom: Die aantekeninge wat u gemaak het en my kommentaar is gebaseer op die geskrewe stukke wat ons van mnr. Turnbull gekry het. Ek het 'n taamlik lang stukkie maar ek sal net hier en daar stukkies daarvan lees. Wat mnr. Turnbull hier gedoen het, was eintelik 'n kort referaat wat hy gelewer het en ek weet nie of ons hom daarvoor moet bedank of verwens nie, want u weet dit is 'n kwessie van „town electrical engineers rushing in where machine inspectors fear to tread". Alhoewel mnr. Turnbull sake opper wat beslis kommer wek, gaan dit my verstand te bowe hoekom ons aljimmers verantwoordelikheid soek wat ons nie toekom nie. Ons taak is immers om elektrisiteit te voorsien, so ekonomies, betroubaar en veilig as moontlik. Ek sê voorsien, want nadat ons dit voorsien het, maak dit nie 'n dooie duit saak wat die gebruiker daarmee doen nie, solank hy natuurlik daarvoor betaal. 'n Interessante aspek wat pertinent voorkom, mnr. die President en mnr. die Vraesteller, is die skynbare sowel as feitlike verwarring in woordgebruik in die betrokke wetgewing en die regulasies. Dit wys net hoe versigtig die wetgewer of regulasiemaker moet wees. Die twee woorde wat veral in gedrang kom, is „portable" (dis die Engelse woord) en „huishoudelike" toestelle. (Engels „household appliances".) „Portable word in die Oxford Dictionary gedefineer as "that can be carried about, that is not a fixture or inconveniently large or heavy or shaped." Gelukking het ons in Afrikaans twee woorde vir „portable", naamlik „draagbaar" en „verplaasbaar." Die handboek van die Afrikaans Taal (die H.A.T.) defineer „draagbaar" as „dit wat gedra kan word," (maar die sê ongelukkig nie deur hoeveel persone nie), en „verplaasbaar" as „verskuifbaar, oorplaasbaar" dis natuurlik ook draagbaar. Nou word daar in regulasie 759 van die Fabriekswet gepraat van „draagbaar" in die sin van draagbare Landgereedskap (wat waarskynlik draagbaar is volgens H.A.T. se definasie) maar in regulasie 788 word gepraat van draagbare gashouers, wat eintlik verplaasbare gashouers is. Interessant is dit ook dat by die definisie van draagbare elektriese handgereedskap in die betrokke wet gepraat word van elektries-aangedrewe en in Engels van „electrically operated",

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Die bespreking gaan soos volg voort:—

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wat beslis nie dieselfde betekenis het nie. Neem die begrip huishoudelike toerusting („household appliances") die definisie van H.A.T. „wat betrekking het op 'n huishouding" — Oxford:- „of or belonging to the home, house or household". As u miskien wonder wat dit nou alles met die prys van eiers te doen het, vra ek dit: is 'n huishouer se elektriese grassnyer verplaasbaar, draagbaar, draagbare handgereedskap of 'n huishoudelike toestel? In die jongste Encyclopedia Britanica word 'n grassnyer terloops nie as „a domestic appliance" geklassifiseer nie. Net so is 'n elektriese vloerpoleerder draagbare handgereedskap. Nie dat ek as 'n ingenieur my daarom bekommer nie, maar as huishoudelike gebruiker wel seker. Daarom onder andere dat ek in my eie huis reeds lank gelede 'n aardlegtoestel geïnstalleer het. Dit bring my tot die vraag: wat kan ons doen om die huishoudelike en kommersiële gebruiker te laat besef dat hy sekere wetlike verantwoordelikhede het ten opsigte van die gebruik en verbruik van elektrisiteit op sy perseel? Hier kan die pers opgeneem behoort te word. 'n Bietjie persoonlike inmaand of wat gelede 'n insiggewende en werklik prysenswaardige artikel gepubliseer en dit was geskryf deur iemand wat weet waarvan hy praat. Die tyd is ryp, myns insiens, vir 'n referaat oor die wetlike verantwoordelikhede van die privaat elektrisiteitsverbruiker, wat in die pers pgeneem behoort te word. 'n Bietjie persoonlike inligting doen ook wonders. Ek wil ook noem dat vervaardigers en verspreiders gans en al te min doen om die gebruik van aardlek-relê's to propageer. Hulle wil hê ons as Munisipale Elektrtegniese Ingenieurs moet dit vir hulle doen—verniet. 'n Gedrukte advertensie het weinig indien enige waarde. Feitlik elke gemeenskap hou jaarliks 'n landboutentoonstelling. Dit is hier en by soortgelyke geleenthede, kongresse van vrouevereenigings ensovoorts, wat die vortreklikhede van hierdie veiligheidsapparaat gedemonstreer behoort te word. Ons as Munisipale Elektrotegniese Ingenieurs moet nie die probleem, (dit is 'n werklike probleem), probeer oplos met wetgewing n geregtelike stappe nie. Munisipale departementshoofde dra al klaar, reg of verkeerd, die stigma ban burokrasie. Daar is reeds te veel regulasies en verordeninge

en dit is myns insiens die Staat se plig en verantwoordelikheid om toe te sien dat die betrokke bepalings van die Fabriekswet nagekom word. 'n Ander aspek wat uit die referaat na vore kom is die regsgeldigheid of wetlike afdwingbaarheid van die Standaardregulasies vir die Bedrading van Persele. Potchefstroom, soos baie ander plaaslike besture, veral in die Transvaal, het destyds om baie goeie redes die regulasies afgekondig slegs as 'n gebruikskode en nie as verordeninge nie. Dit kan wanpraktyke of liewers ongewenste praktyke in die hand werk, soos die volgende: Nadat 'n installasie goedgekeur is, het ons geen houvas op 'n persoon wat byvoorbeeld 'n waterverwarmer by 'n los kontakdoos aansluit nie. Dit sal egter nie die geval gewees het as die regulasies verordeninge was nie. Mnr. Turnbull het dus nie heeltemal gelyk as hy sê 'n gebruiker is vry om enige apparaat wat hy verkies, in die kontakdoos te stop nie. Hier is 'n interessante sakie in verband met buskontakdose, nl. dat regulasie 703 sê die buskontakdoos moet in dieselfde kamer wees as waarin die toestel gebruik word. Ek weet nie hoe gaan 'n mens dit van toepassing maak op 'n grassnyer nie. Mnr. Turnbull beweer dat die meeste ongelukke op verplaasbare apparate voorkom. Bedoel hy nie draagbare apparate nie? Mnr. Turnbull spreek die gedagte uit van dubbelpolige skakeling op alle stroombane. Hierdie gedagte moet ons sommer net hier vandag nek-omdraai. Die koste van elektriese huisbedrading is alreeds hemel-hoog. Ek sien nie die nut daarvan nie. In die praktyk sal nie eers 5% van die verbruikers (ek stel dit hoog) nie eers 5% van die verbruikers sal in elke geval weet wat om te doen nie. Die res sal in elk geval 'n elektrisiën inroep, wat baie maklik die neutrale geleiers op die hoofverdeelbord kan ontkoppel vir toetsdoeleindes. Die aanhangsel van die referaat (ek weet nie of dit ook oop is vir bespreking nie) ek wil net noem dat mnr. Turnbull laat die pantser vir PVCK was toe as aard-kontinuteitsgeleier. Daar is natuurlik 'n verskil van opinie of dit toelaatbaar is of andersins of dit goeie praktyk is. In Potchefstroom laat ons dit toe. In hierdie verband is dit my vreemd dat mnr. Turnbull die Britse Standaardspesifikasie 3346 raadpleeg vir weerstandswaardes van die pantserdrade. Ek gee toe dat S.A.B.S. 51 nie hierdie waardes spesifiseer nie. Nietemin mnr. Turnbull penaliseer hy verbruikers daardeur. Die pantserdrade van kabels wat volgens S.A.B.S. 150 vervaardig word, se weerstand is aansienlik laer as dié van die B.S. kabels. Ek het 'n tabel waaruit ek dit kan bewys. Die storie van die hoër kapasitansie-lekstrome in paragraaf 9 van die aanhangsel: ek glo hom nie. Dit moet 'n allemintige lang kabel wees wat 'n lekstroom van 20 milli-amp-ere kan veroorsaak. Net een laaste opmerking: dis miskien 'n bietjie akademies, mnr. die Vraesteller en mnr. die President en dit is die liewe woord by-wette. Dit is tog verordeninge. Dit lyk vir my al asof 'n mens weet nie waar die woord by-wet vandaan kom nie. Dit kom van „Bye-law" en dit is afgelei van b-y-e law — B-y-e, bye is 'n oud-Engelse woord wat oorspronklik 'n klein dorpie, a village, beteken. Terloops, ons regsgeleerdes gee voorkeur aan die spelling b-y-e.

Senior President, Portuguese: Mr. President, it affords me great pleasure, to propose a vote of thanks to Mr. Turnbull, for his paperette, may I add, that it is my sincerest wish, that this will not be the last paper from him, and that this will not be the last convention in this lovely little bit of Europe in Southern Africa. Thank you very much.

President: Thank you.

A. A. Middlecote, Pretoria: First of all, I must repeat what I have said before, and that is we must under no circumstances, allow ourselves to over exaggerate accidents, on electrical circuits, they are far less than people taking poisons by accident, they are far less than people falling in houses, and the civil engineers certainly haven't stopped stairways, or polished floors. They have been kept at that reasonably low level, because of the work done by the engineers, and we must continue, to do that good work, and improve them, wherever possible. But I don't think we should allow ourselves to lose our heads, by protecting absolute idiots. And I think all of you will agree, that most of the accidents you analyse are due to idiots, fiddeling where they shouldn't. So this brings one to the first answer to this whole question, which is a very simple one, and that is to continue, to educate people, on how to handle appliances, and what to do, should they require a new flexible cord, on an appliance. With regard, to practical problems, seeing that flexible cords are inevitably the worse cause of trouble, as either being connected with the plug, or to the appliance, one could examine steps in this regard. It has for instance been suggested, that only flexible cords with moulded-in plugs, should be supplied, should be allowed to be sold. That could be controlled. But of course, if you look into this, this makes a very specialist trade, it will be rather a severe step to take, and also, it won't cure the matter, because there are many amateur electricians, who will still cut the existing one, and patch it, rather than buy a complete new, shall we say, intergral flexible cord. Now I think education is still the main point, the safety specifications ensure that the product is reasonable, and we are left with perhaps one further point which we could consider, and that is the supply of the earth leakage relays. We are doing a little bit of work, of investigatory work here, our sorting of figures is not complete yet, but it does look as if it could be summed up roughly like this, and that is that the so called unreliability, of most of the relays has been grossly exaggerated. We have usually found those cases we know, that again, if an earth leakage relay was giving trouble, it was somebody who put it in, incorrectly; or else we even had a case — where they operated it in water. Now the final point is the level at which you set the relay. As you know originally, in '56, I felt that it need not go below 40 or 50 milli-amps, and I still feel that that is a pretty reasonable value still, but I think the committee has sort of lowered the maximum, and after little experimentation with five milli-amp levels, the popular vote seems round to be around 20, 25 and that seems quite reasonable, because the many houses which, have been measured—the municipalities have been very

helpful to us of course, in this regard, and we hope that they will still give us more figures, shows a generic distribution, for the whole lot, round about 5 milli-amp, peak. Quite a few are one milli-amp, and you can neglect it above 25, 30, there are not many there. Then there is quite an increase, at the very high levels of leakage. Well here, is another good feature, with regard to the use of earth relays, in such a situation like that with high leakage should require someone to rewire their houses. I think things like over one amp leakage 31, houses, this is quite a serious situation, so that they will also watch the wiring of the premises. The final point, with regard to the possible use of the earth leakage relays, comes down I think, to restricting them to the plug, in the socket outlet circuits. Lighting circuits, and stove circuits, need not be protected to the same extent, because they can be permanently earthed, and well looked after, thank you.

M. M. P. Clarke, Somerset East: Mr. Middlecote stole a portion of my thunder, but basically, I am here to ask engineers, to read their newspapers more carefully, and to please maintain a sense of balance. In The Star of the 26th of January, an article appeared on the front page, it was a tragedy of a mother and a child, being electrocuted at Ventersdorp. On the 8th of February, there was a refrigerator electrocution in Durban and in the same paper, the refrigerator electrocution occupied front page news—four column inches. On page 3, occupying three and a half column inches, were two crash victims, rather one crash victim and one death in a motor car, in the newspaper, there it is, and the 29th of the fourth month, the Cape Argus had this assortment of news. There were nine deaths, one was murder, one was a child who died of Diphtheria, and since then, a second child in the same family, died of this very preventable disease, 2 children were killed, one accidently strangled itself, the other one died in a shooting accident, there were three car accidents, and deaths involving trains and motor cars. Also, in the middle of this page, was a nice black spot, which said that 33 people had died, on Western Province roads. Mr. Chairman we must keep our perspective. Thank you.

L. J. Hooley, Salisbury: It is my job, among other things, to receive reports, of all electricity accidents, in Rhodesia, to examine reports, to investigate where necessary, and when necessary, to give evidence, in the courts. I speak then, with knowledge, of electrical safety, very much in mind, and I think we have to be careful, not to over exaggerate it. Electricity is safe, we, perhaps, can make it safer. I do support Mr. Middlecote, in his point of view, that it can be over exaggerated, this danger of electricity. The two main causes of accidents, the pattern, seems to be in connection with appliances used from socket outlets, call them portable, call them movable. I don't care what we call them, they do cause accidents. They cause many deaths. The other perhaps, isn't a matter for this particular discussion, they occur outside, in the open air, in connection with overhead lines. But as far as portable appliances are concerned, we have tried to deal with this problem. We did publish regulations, not just wiring rules which we have, but we published regulations, in 1961, for consumers. We published regulations, for the supply authorities, and we have also got on the stocks, ready to publish, consumers' appliances regulations. Now we have taken the point of view, that the responsibility, for safety, the consumers' safety, is not to be vested, in the supply authority. We take the view, that his job, is to supply electricity, to as many people as possible, as cheaply as possible, and prescribe regulations, by which he should observe the proper codes, of safety rules, in his installations. We then prescribe, consumers regulations, with the same point of view, rather in more detail, and supplemented of course, by the Standards Association, wiring rules. I was concerned with the drafting of all these regulations, very much so, and I do feel, that we have got a little further along — take a rest there Mr. Chairman and our South African friends. But we have tried to legislate, broadly, not on narrow (and municipal people will forgive me) parochial lines but on national lines. In addition, in the consumers appliance regulations, we have taken the point of view, that whilst earth leakage circuit breakers, have lots of very good features, and let me say now, I have one installed in my house, it is the second one. I don't mean that the first one failed. The second one, is of a different type, and I am quite satisfied, that they have got a lot of very good characteristics, and if necessary, can be recommended, to any consumer that is prepared to pay the money for one. But on the other hand, instead of trying to earth every thing in sight, and then putting a very sensitive earth leakage circuit breaker, in the systems, so that it will trip when there is a slight leakage, that the alternative, is to prevent, too much too many masses of earth metal, all over the place, by using all insulated, or double insulated appliances, and I think that this is a major point, and once we get the portable appliance, whether its movable or not, the all insulated type, then the incidence of accidents, will fall, even if the thing is wired wrongly, there is no earth metal to conduct electricity, to the victim, that picks the thing up. I accept, that at this stage of plastics development, there is not much scope for heating appliances, being fully insulated, but everything else, particularly the biggest killer of the lot, the electric drill, can very easily, be double insulated. My own one, that I potter about with at home is fully, double insulated, in every way, it is made of a tough plastic, and can be dropped from the top of a pair of steps without damage. And I think this is an idea, that our colleagues and friends in South Africa, should think about more and more, and know firms are manufacturing these things, but we get all the time, the earth leakage circuit breaker, as the only way of finding protection. We know there are other ways too. If you can keep the electrified metal away from the consumer's hands, then of course you have gone a long way, to saving his life. I'll just round off, by

reference to the swimming pool, etc., outside in the garden. From experience of outdoor installatins, these are always dangerous Mr. President, and I do feel, that one has to be very careful, in prescribing safety rules, for appliances used outdoors. I think the lawnmower particularly and I have had to deal with three deaths in connection with electric lawnmowers, supposely expertly constructed and built, and all the rest of it, but the biggest danger, is in the facts, that the very act of cutting the grass, with moving blades, invariably, sooner or later, cuts the cable and often the cable has not got sufficient damage to disconnect the supply altogether. It often leaves the live conductor, still connected and the whole machine alive. Now there is just one point. One of the speakers, is very concerned with the reference, to double pole switching. I am surprised, that only on the grounds of costs, does he condemn it. I think on the grounds of cost, rather than have single pole switching, you should discontinue the use of the switch at all, at the socket outlet. You either have double pole switching, or no switching at all. Many deaths, and I say this from knowledge, have occurred in fact, because that switch at the socket outlet point, has been in the wrong conductor, in the neutral conductor, the appliance though ostensibly off though not in use, is still alive. And I do think that, that before we condemn double pole switches, too rapidly, we should give a thought to that one.

I. R. G. Stephens, Johannesburg: Engineers have always tried to play safe in the past, by striving for earth-free situations, as a means of protection. But, with the advent of the earth leakage relay, we now are faced with a rather special circumstance, in-as-much as the danger in certain circumstances, may come from the danger of electric shock, across the mains, and not so much from a faulty earth. If there is any difficulty, or any danger of this happening, it is in fact, advisable, not to strive for an earth-free situation at all, but rather to have just the opposite. In other words, if you have installed an earth leakage relay, you should rely on the operation of the earth leakage relay to provide protection, and you should do away with your insulating mats, and other devices, which you use, to provide earth free situations. This is just a point, which I think is worth while mentioning at this stage. It does not so much, apply to domestic installations, as to certain industrial installations, but I think the engineers' thinking, should be re-orientated in view of the increasing use of the earth leakage relay. Now Mr. President, while I am on my feet, may I change the subject just a little, and on behalf of the Institution of Certified Mechanical and Electrical Engineers, many of our members are municipal electrical engineers, I would like to wish you and your executive a very successful term of office, and formally thank you for inviting us to be represented at this very interesting congress. Thank you Mr. President.

G. R. Hain, Alberton: I think there is one definite step that can be taken in reducing the number of electrocutions, and that is by some means or other, to outlaw the sale and use of the ordinary adapter. Too much accent seems to be placed on the 3 pin plugs and everything like that, whereas there are too many portable appliances, being plugged into ordinary lamp fittings. The point about it is metal reading lamps. I have noticed and I think there are many of them being sold all over the country today, where there is absolutely no earthing on a metal reading lamp, and I do think that they should be brought into the frame-work of a compulsory specification, in that they must comply from a safety point of view.

P. J. Botes, Roodepoort: My bydrae is maar 'n kort een. Daar is so 'n duisternis van interpretasie van wat nou eintlik draagbare toerusting is. Die definisie in die Fabriekswet is vaag, om die minste daarvan te sê. Waarom bekommer ons ons, aangesien die Departement van Arbeid ook nie weet wat draagbare toerusting is nie? Laat ons maar net bly by die toets van bedrading en vergeet van wat draagbaar is of nie. Dit los egter ook nie die probleem op nie, mnr. die Vraesteller. Die vraag kom ook hier maklik voor of sekere toerusting as draagbare toerusting beskou moet word of as gedeelte van die vaste bedrading. Ek het al lankal opgehou om te besluit of iets draagbaar is of nie, en my gesondheid mnr. die Vraesteller, het baie verbeter. Dankie.

Quizmaster: Dankie Mnr. Botes: Carry on Mr. Lewis please:

L. Lewis, Windhoek: We had a problem, which I think has to do with the subject, and this is in connection with hobbies at private homes, as you know, most hobbies are carried out, by the use of so-called domestic appliances, and for many years, I have just shut my eyes to this, but I have got a very efficient inspector, at our place and he has decided, that it is time to call a halt, in fact he decided, that many of these hobbies, are small businesses, carried out after hours, and his intention, was to cut off everybody, and call a halt to everything. Being a peace loving sort of engineer, I didn't fancy this very much, and the result is that, we had to do some thinking about what is a hobby, and what is a portable appliance, and what is a business, and this might be of some interest to the convention. As you know, a lot of people work after hours, some of them are bona fide hobbies, and many of them are done with the view to augment their incomes, and this is where the problem comes in. In the factory act, I tried to study the factories act (South African act you know, being in Windhoek, we have a slightly different act over there) there is nothing, up our way, which defines, a portable appliance as such, and the nearest I could get to the South African definition, was that a business isn't an industry, or if you can say it that way, neither is an installation, in domestic premises an industry if they don't use more than one horse power, for the motive power. Now this led to a problem, because one horse power in a house, I considered, could be quite a big piece of machinery, used on dance floors, and all other wooden

floors, and in drilling machines and so on. We had another problem, in that a number of people install this type of appliance, fixed to the ground, such as a dance floor type of thing, it is actually screwed down, so it is really not portable, and I didn't know what to class that under. The other thing is that people equipped their garages with all sorts of appliances, and leave their cars outside. Now we didn't know, whether this was domestic installation or business, or what it was. Eventually, I decided to phone the receiver of revenue, and I said now, how do you people define a hobby, as opposed to a business. And we had a long talk, and at the end of it, he said, we are very nervous about this lot, we don't know, if a person is really making money, out of a hobby, of course, we are entitled to charge him, but what worries us, is that the following year, he may lose, and then we may have to make a rebate, so he couldn't help me either. But at any rate, after a lot of a lot of consideration, we decided to define a hobby, and of course a portable appliance, such that a person does not use anything driven by greater than half a horse power, in a home, and that he does not use more than himself, and one other to run this hobby shop, as I called a word to try to define this. This also led to a problem, in that some people apparently have big logs of wood, and they simply have to use a bigger saw, just to cut through the log, for a few minutes then they go onto the smaller hobby, portable type of appliance. So, the regulation now reads, subject to special permission being given by the city electrical engineer if he requires anything bigger than half horse power. Now, there is one other aspect, and oh, of course, we also said it must not be a nuisance in any way, to any of his neighbours. The thing that worries us particularly, is the number of welders, that are employed in these little hobby shops, or small industries, after hours, from a point of view, not so much (it does worry us, the fact that the lights are not steady as they should be, and various other points, of that nature) but what worries me, particularly, is the fact that many of these welders, are used by my people, who are not qualified welders, and particularly at night, and one wonders, with all the kids running around in the neighbourhoood, whether they are using the necessary screens to protect the eyes of these little children, they are bound to be looking. This point worries me, more than the inconvenience of having the lights flickering, and I wonder if one can really allow a hobby, rather a welder, in a domestic installation at all, as a portable appliance. I would like to hear some of the views on that. Now, the Rhodesian delegate, mentioned the point which is said, the duty of engineers is to supply as many consumers as possible. I wouldn't have spoken about this, excepting just to make a little point here. I found a point of view advanced, that this isn't always a good idea, especially in the case, where, the consumer lies outside the town. Apparently there is a lot of argument, against supplying consumers outside of town, in that one may promote undesirable development, where sanitation and various other services are not brought on in the correct way.

R. W. Leishman, Johannesburg: I am only standing here to make two suggestions, arising from the discussion, in order that we may go away, trying to do something. The first is, I want to suggest to Mr. Middlecote, whether he can under his safety codes, put in a prohibition, regarding Bandit type plugs. I myself can see no excuse whatsoever, for their continued existance. If anybody wants to operate a portable tool, they must use a proper 3 pinned plug, on the proper socket outlet, and not the lighting outlet, and the same applies to hair dryers, and other things that our wives desport themselves with in their bourdoirs. I think it is a serious suggestion that we should ban, the sale of two pinned plugs. The second thing I want to suggest, that this association lets it be known to the manufacturers of earth leakage relays, that we will be behind them, in a very big way, if they can get the installed price considerably below 25 pounds, 50 rand. I don't know what their production costs here are, but I have been told on several occasions, by manufacturers, that if they could only get the tooling for mass quantity, the price would come down, to probably 30% of what it stands at today, and I have the belief that we will get to pursuade lots of people, to install, earth leakage relays, on their socket circuits, provided we get the price down to reasonable levels, and I think that it is quite proper, for this association, officially, to let this be known to manufacturers.

J. L. McNiel, Empangeni: Just one query Mr. Quizmaster, I would like to know in the case of worn, and frayed flexible cords, for irons, and in the case of flexible conductors cut by a moving machine, is it still impractical to have a sheath, flexible earth, and flexible cables, with concentric sheath.

A. A. Middlecote, Pretoria: We would certainly prohibit the sale of anything by suitably naming the specification. In other words, if we had a specification, for connectors—gave it a suitable definition, then we could say, only three pinned ones could be sold—but the only thing, is in my unfortunate position, where I do have sort of to deal with consumers, industrialists, supply authorities, etc. I would welcome guidance from the municipalities. The point is, normally, raised, that if such a prohibition came in, there are many many people, particularly in the best districts, of big cities, like Johannesburg, who wouldn't be able to have a heater, or anything in their house, and they would complain violently, that they were being deprived of their rights. So I think, that if the municipalities are prepared to face up to that, it could be done quite easily, and we would welcome guidance, from the A.M.E.U. Thank you.

Summing up the Quizmaster said:—

It looks as though the municipalities, have got to find the enemies then Mr. Middlecote.

Well, we take the opportunity in asking Mr. Turnbull, to quickly reply to the queries. The matters that has been raised by Mr. Middlecote and Mr. Leishman, will be referred to the executive committee for discussion. I was wondering about the questions of what are portable appliances, as mentioned by Mr. Pretorius, and Mr. Botes,

In reply to discussion, Mr. Turnbull said: Mr. Quizmaster I can't answer all the questions, because at the moment, I don't really know what side I am on. I gather though, that judging by the opening speakers, that we are not doing too badly, by killing only 57 people a year, and we shouldn't really worry unduly about that. The other point is of course, that if all the other accidents were pursued with the same diligence, as the electrical accidents, we would be back in the competition. We have endeavoured, to bring this subject, before the members, because it does concern us all really, and we have actually, deliberately, put some baits there, to try and induce some speakers, to give their honest opinion, in the practical

The next paperette to be considered was on "Earth Leakage Protection applied to Overhead Lines and Domestic Installations" by Mr. H. P. Smith.

Discussion ensued as follows:

G. R. Hain, Alberton: A senior representative of the department of labour, has at a previous convention of the organisation, quoted quite emphatically that the problem of a falling conductor, on an outside distribution system remaining alive, and being touched by the public, is a real danger, which merits all the attention that electrical engineers, can provide in solving. As also stressed by Mr. Groenewald, the chief inspector of factories, at the Margate, convention, 1963. Considering all the problems, and variables involved however, it is not surprising that such protection, has been left, probably with deliberate intent, in the state of semi darkness, and little positive action taken in the past, in finding a solution. It can be said with certainty, that existing equipment cannot cope, and it seems very often, it is only installed to satisfy present rules and regulations. The paper presented by Mr. Smith, is of particular interest therefore, in that he quotes results of practical investigations, carried out to obtain at least some of the parameters, involved in the problem. With this in mind, I have no doubt, that all in attendance at this convention, will join me in extending congratulations to Mr. Smith for his efforts, in contributing, to the meagre knowledge available in the field, and especially for the clear concise manner, in which it has been presented. Modern means which are now at our disposal, enable us to improve earth leakage protection considerably. However, any such attempts should not try to achieve, unreasonable perfectionism so that the results

By wyse van opsomming sê die Vraesteller:—

if the difficulties they have encountered, could be enumerated, in other words, there are large number of portable appliances which are acceptable as such, but where the difficulty comes is in the definition of whether lawn mowers, are portable domestic appliances or something of that nature, if the special cases could be drawn to the attention of the executive, then we can take the matter further, with the appropriate authorities.

application of these things. If some of these accidents occurred, on the premises, as defined in the factory act, we would be on the wrong side of the law, in no manner, and here I speak, with practical experience. The point is this, that we are gathered here, and we should even if it is a fairly relatively simple matter, I did mention when we started, we were up with the highly technical matters, and not many engineers, have the opportunity, of experiencing those, or would have the nerve to get up, and speak, but I do think that the engineers should make more of an effort, to speak on these items, of every day concern. Thank you.

Die volgende referaatjie wat oorweeg word, handel oor: Beskerming teen Aardlekke, soos in Bogrondse Lyne en Huishoudelike Installasies toegepas", deur mnr. H. P. Smith.

Die volgende bespreking vind plaas:—

obtained, are of an academic value. The target must be to achieve a means of protection, which (1) is a distinct improvement on existing equipment, (2) can be installed as an addition to existing protection, (3) It must be reliable, (4) It must also be adjustable in current setting, and operating time and thus adaptable to varying conditions, i.e. it must not have to be tailor-made for one particular application. (5) Impulse test levels, must be satisfied, and last, but not least, it must be reasonable in cost. As the author indicates, the sensitive core-balance relay is the answer, and fulfills most satisfactorily, all the above requirements. On overhead lines, earth faults are responsible for a high degree of power failures, some supply authorities, put this as high as 90 per cent. Since one can hardly speak of an overload on an H.T. Transmission, line, and since such protection should be provided elsewhere, we have only to do with phase faults, i.e. short circuits, or earth faults. Phase faults are easily detected because of fault currents carried by conductors, and therefore are a high magnitude. Existing equipment, seems to be adequate. Earth faults on the other hand may attain magnitudes between zero, and full fault current, depending upon various constructional characteristics such as ground, or ungrounded systems whether an earthing conductor is run, what the conductivity of the surface is like, etc. It is this last factor which is the one about which least is known. Contactors resistance between a fallen line and ground. The other extremes

are of course steady state leakage and transient stability, which dictate that normal sensitivity of equipment that can be stalled. At this stage, there is a point of interest worth mentioning, and borne out by experience, and that is the exaggerated idea, held in the past, by many engineers, on steady state leakage currents, on systems, where sensitive core balance is now being successfully applied. Levels of nominal sensitivity, established, have disproved such notions, and I do feel that the same will be found in over-head lines. This is clearly brought out in the Author's paper, and where 25 milliamp level of standing leakage was found both in three and six mile lengths of 11kV line. Conversely however, a 2.2kV line, only 2½ miles long, contributed 100 milli-amps. From an overall point of view, the application of sensitive core-balance, to high-voltage over-head lines will have to be treated with greater care and selectivity than other applications by virtue of (A) where operating in conjunction with main feeder breakers, greater inconvenience can be caused by nuisance tripping in view of the amount of power being transmitted. This is particularly so where a relatively large number of small consumers are involved. (B) Main lines usually traverse open and relatively unpopulated country, where the consequences of a dropped line need not be as serious as on spur lines which follow side roads in continual use by the consumer. Furthermore, positive protection against a dropped line is a must, where such lines traverse densely populated areas and the question arises as to whether low voltage lines should not be given priority, for the same reason.

(C) Not all systems are so solidly earthed and there is no regulation which stipulates that an H.T. System must be operated with an earth neutral or must be fitted with an earth wire. The idea is of course sensitive core balance in conjunction with recloses for main and spur feeders, but economics obviously dictate the issue. In South Africa it is customary practise to earth the neutral and to use induction relays with an inverse function which can generally be set as low as 10 per cent. Such relays can only be operated in conjunction with transformers, however, and if we assume a 50 to 5 current transformers however, then the lowest response possible is 50 x .1 or 5 amp. primary current. It is extremely doubtful where after such long dry periods, the ground return will pass such a current. If not there is no earth fault protection. Herein lies the most important advantage of a core-balance relay, in that it senses primary currents directly, and its current sensitivities can be set to any level that satisfies other conditions.

Discriminaion: With regard to discrimination I am inclined to disagree a little with the authors' suggestion of an inverse and definite minimum current — time characteristic for these relays, but rather favour a fixed current response, sufficient to accommodate steady state and transient leakage aspects and with adjustable times settings for discrimination purposes. I see no advantage in the inverse characteristics which is designed to cope for short time over-loads, and which are in respect of earth faults, and to all intents and purposes non-existent. Relays having such characteristics have been applied in a number of kiosk installations feeding 11kV lines in various parts of the Republic. Sensitivity is of three amp. for the fixed time response for 10 cycles were used and this was found quite adequate in dealing with switching insurges and steady-state leakage conditions. No reports of a nuisance tripping have been received. Higher values of course could have been used, but in these cases the specification had to be complied with. The relays are tripping gang operated, trip-free isolators, with relays operated from either battery or capacitor storage. The example of a typical 11kV rural system as analysed by the author, is to my mind not necessarily completely typical in that fuse protection on spur lines is too high relative to the recloser rating of 50 amp within the minimum trip point of roughly 100 amps, in clearing time .3 sec. With such a line I would expect many relatively small spur lines probably protected with anything from two to ten amp fuses, and plotting the performance of these on figures 15 of the author's paper rather changes the picture somewhat. In doing so the spur line fuses perform their legitimate functions mainly that of beating the recloser or instantaneous trip over the full range of current and in the levels between zero and 100 amps, main line protection is also completely inoperative. In applying core-balance to such a scheme, the performance of the relay itself can be related to the spur fuse rating which of course should preferably be kept to the least number possible and in doing so, establishing a minimum point of spur discrimination it being accepted that the complete system will have to be isolated for lower current levels. The minimum value, of which is indicated by the highest sensitivity of core balance and that can be fitted and commensurate with standing leakage. Graded time protection with recloses in series in the sectionalising and on the main line itself also becomes more feasible. No guarantee can ever be made on any lower or even higher voltage line on the contact resistance or total earth circuit impedance that will arise in the "under-drop" line conditions. And I cannot see the problem been solved completely, while extreme variables of earth resistance have to be contended with. I would like to suggest therefore, that protection should become more independent in this respect, by insuring that a reasonable fault current aises even under adverse conditions. To this end I would suggest the compulsory fitting of neutral earth crossbow on each pole side, to low voltage lines with the crossbow as close to the underside of phase conductors as possible, and with reference to HV lines, a single earth conductor located underneath and crossing transversely between poles over the full length of the line. In conclusion, I would like to thank you Mr. Quizmaster, and the Association, for the honour accorded, in opening the discussion, on Mr. Smith's paper, and I would like to extend a vote of thanks, for the interesting information, which he has submitted.

R. B. Anderson, Pretoria: I thought it might be, of some interest to the convention to know that we have in the power electrical engineering division of our institute (ASIR), a project, recommended by our advisory committee to look into the question of protection against broken conductor conditions. I myself had experience of this also in Rhodesia. There are quite a number of systems available, and are been used by various municipalities and one of our tasks would be, first of all, to try to evaluate this. I don't think that we can do very much with this, without the assistance, of the municipalities and I think that it would be of very great help, if municipal engineers could provide statistics, as to the mal-operation of existing earth leakage protection systems, or to give experience on their system, when not fitted with such protection, or with imperfect protection. We are also looking into the possibility, of using electronics for this protection. It will be I think in the end a question of economics, entirely. But we hope that this work will be of some interest to you. Any help that we can get from the convention and from municipalities, will be very welcome, and we would be pleased to do what we can, to help out, on this problem.

A. A. Middlecote, Pretoria: The tests on the steady-state leakage on lines, were these done in dry weather, or under variable weather conditions? Because I think in certain situations, especially, I think Durban, or the coast, where there is a little bit of salt deposition on the insulators, I suspect, the steady state, if you can call it that under certain weather conditions, might be considerably higher. I don't think this wipes us out, this is against the whole system which I think is very good, has great promise, but their 25 milli amps, as a general rule, seems a bit low, and I would just like confirmation there. The other point is, is it not possible perhaps, to have a form of long term adjustment to basic buyers. In other words, couldn't you have a slow development, of increased leakage, on a line taken up by a readjustment, in the circuit, leaving shall we say, an almost long term greater rise response. In other words, if your conductor breaks, you get the sudden increase, say from 250 to 275, that could pull it out.

R. M. O. Simpson, Durban: I also want to join the other speakers in thanking Mr. Smith very much indeed, for raising this very interesting problem. I think it is one that worries all supply engineers, and something that we have got to master, in due course. And I think Mr. Hain's point of view there, in the idea of more of a fixed time, in other words to remove the inverse definite feature, on earth leakage, needs very careful thought, I think it probably would be the right idea, and one always has got the problems, on overhead lines, particularly on the say 6.6 or the high voltages, where you go to automatic recloses, that if you work on a very light inverse feature, you can have many outages. I appreciate, if you have your fixed time too long, you would probably burn your wire down, and I think it does require quite considerable research, but something must be produced on these lines in due course, and I am quite sure, by working between the switch gear manufacturers, that we should be able to incorporate some, very useful earth leakage feature, with these recloses, that will enable them to operate satisfactorily. Referring to Mr. Middlecote's point on, let's call it residual current, and following on this paper, I did check up on a couple of lines, we have in Durban, and one coastal line, it is a 6.6kV, it is a wood pole line, earthed construction, it included about 1.8 miles of under ground cable, three transformer kiosks, and about 23 pole-type transformers. The residue current flowing in the neutral, at the 33 to 6.6 stepdown, transformer was .83 amps. Unfortunately, I didn't have suitable recording equipment to do it, for a longer period, but it's just a guide, and it might give some indication, of moist conditions, that exist along this particular route because it is right near the sea front. In the inland area, which is about 1500, to 2,000 feet above sea level, not so humid of course, and I had to do it there at the star point of the transformer again, the step down transformer from 33 to eleven kV and it of course covered quite a big area, in fact the total length of the circuit, was very near 60 miles, with a considerable length of underground cable, probably working up to somewhere round 20 odd miles, at that. A large number of pole type transformers, 188, now we have got a residule current there flowing in the neutral of 1.74 amps, so I just quote those figures, as a figures of interest, from those tests but I would like to congratulate, the author, on a very valuable contribution, I hope a lot comes from it. Thank you.

J. I. Inglis, Pietersburg: The danger is, I think, more acute where there are Low Tension systems and in areas of greater density of population with children running around. It is a question of education of, primarily, our linesmen who tend to over-tension conductors.

Replying, Mr. Smith said: Firstly I would like to thank Mr. Hain very much, for his contribution, I feel that it will add greatly, to acknowledge on this subject, and it will assist, in no small measure, with future work to be undertaken, as to which form of earth leakage protection would be the best, inverse definite minimum time, or definite minimum time this will be established, after more extensive tests have been carried out. I would also like to thank Mr. Anderson, and note with interest, the work that C.S.I.R. intend doing, in this field, and adding to his request, for statistics from the municipalities on evidence of dropped lines. I would also appeal to municipalities at this stage, who do operate extensive rural 11kV, overhead line distribution systems, for facilities, to carry on further tests, in order to establish his various perameters for the protective schemes. In answer to Mr. Middlecote. The tests done at Grootvlei, were imperfectly in dry conditions, as I said in my paper, there hadn't been rain in that area for quite a period, before the tests. The

tests, we conducted at Van der Bijlpark, and we actually did the tests, between down pours of rain. In regard to the coastal conditions, I feel once again that these can only be established by an extensive testing. I would like to thank Mr. Simpson, of Durban, for his contribution, based on actual conditions, and thank him for the figures, he took out in his tests. I wasn't quite clear, from Mr. Inglis' contribution, whether he suggested advocating, the use of sensitive core-balance, protection, to low tension, over-head lines systems. This is rather a difficult one, firstly, our PME rules it out, and secondly with this, multitude of consumers all with parallel leakage paths, I feel we would have to have, not a sensitive relay to protect, but rather an insensitive one, which would rather defeat the purpose. In conclusion, I would like to thank all the contributors; Mr. Quizmaster, Thank you.

MEMBERS' FORUM
THIRD SESSION

Introducing discussion on general problems, Mr. C. G. Lombard (Germiston) referred as follows to Question No. 7 relating to the fundamental problem "the consideration of high rupturing capacity fuses, versus oil circuit breakers":-

C. G. Lombard, Germiston: As far as I can see the merit of the H.R.C. Fuse Gear is of course cost. That is the main consideration. The way this question is worded I am not quite sure whether it also includes fuse switches in other words HRC fuses associated with switches. One of the disadvantages of the HRC fuses of course is that you can get single phasing. That of course is not the case where the HRC fuses are used in conjunction with a switch. Another disadvantage is, of course, that the capacity of the HRC fuses is limited, normally I think the maximum rating obtainable is in the region of about 100 amps and in certain cases special provision can be made to go up to about 130 amps, so that these HRC fuses cannot be used with very large transformers on voltages of 33kV, 66kV or 11kV. That is one thing that has to be watched. Normally you also have to leave a margin when deciding on the rating of the fuses to be used in conjunction with the transformer. You have to leave quite a margin; the fuse rating should not be too close to the full load current on the high voltage side of the transformer. Another disadvantage I may mention is the fact that unless special provision is made in the case of High Voltage fuse switches, the HRC fuse protection does not provide for earth leakage protection and where such provision is made it becomes rather expensive and the cost approaches that of a circuit breaker.

H. Prins, Johannesburg: Before proceeding to the item to be discussed, it may be of some interest to the meeting to pass some remarks about the use of HRC fuses, in general specially on the low tension side of a system. I stress the words Low Tension because that is where I would like to start. In all countries of the world the demand for electricity is increasing. The world average being at a rate of approximately 8% per annum, the resultant increasing fault levels on medium voltage systems call for special attention being given to the selection of protective devices possessing adequate rupturing capacity. Not only must one consider the fault level obtaining at the time of installation but also the increased fault level likely to occur during the life of the equipment. The

LEDE - FORUM
DERDE SITTING

Toe hy die bespreking oor algemene probleme inlei, verwys mnr. C. G. Lombard (Germiston) soos volg na Vraag no. 7, wat betrekking het op die fundamentele probleem „die oorweging van sekerings met 'n hoë breekvermoë, soos vergelyke by lie-stroombrekers."

HRC fuses which were originally designed to interrupt an RMS, symmetrical prospective current of 33KA at 440 volts subsequently showed that they were inherently possessed of a much higher rupturing capacity. In fact these fuses have been successfully tested on a symmetrical prospective current of 118 KA at 440 volt. As an indication of modern trends a new Canadian specification on cartridge fuses calls for an HRC fuse to be capable of clearing an RMS symmetrical prospective current of 180 KA. During recent times much thought has been given to another problem directly associated with increased fault levels namely the greatly increased arcing that can occur at the seat of the fault.

If steps are not taken to limit the arcing it can cause:

(A) Increased danger to personnel,
(B) Increased damage to equipment,
(C) Increased fire risk.

HRC fuses should possess the characteristics which are essential to effectively limit arc at the seat of the fault. These characteristics being current cut-off and energy limitation dealing with the current cut-off. Tests have shown how HRC fuses cut off the short-circuit current during the first quarter of a cycle to values substantially below the peak asymmetrical current of 100 KA which may otherwise flow into the fault. This characteristic of current cut-off reduces the magnetic stresses imposed on the equipment in the circuit because they are proportional to the square of the current flowing into the fault. Other forms of circuit protective devices take at least one cycle to operate and more generally they take three cycles or longer. Thus they would let through into the fault a peak asymmetrical current of 100 KA. Taking a 200 amp. HRC fuse as an example the magnetic stress would be reduced to, I won't quote the figures, which is one twenty-fourth of which could otherwise occur, if an alternative device were used.

Energy Limitation: The amount of arcing that occurs at the seat of a fault, depends on the energy let through into the fault which is proportional to the I^2T, the energy let through also represents the thermal stress imposed

on the equipment in the circuit. Taking the short-circuit values given in tests a circuit protective device taking one cycle to operate would have an $IT^{\frac{3}{2}}$ let-through values of $122{,}000 \times 10^3$. The corresponding values of IT^2 for HRC fuses are given in a table below. Again taking a 200 amp fuse as an example the energy let-through to the seat of the fault is reduced to 250th of that which would otherwise occur if an alternative device were used. It is not generally appreciated that the HRC fuse also limits the amount of arcing at the seat of a fault when the prospective current is much lower. Whereas the previous example was taken with an RMS symmetrical prospective current of 46,000 amps, tests have shown what happened on an RMS symmetrical prospective current as low as 762 amps when three types of 15 amp protective devices were tested at 230 volts. It will be seen that the HRC fuse limited the I^2T let-through value to approximately one tenth of the let-through by an MCB and approximately one twentieth of the let-through by a rewirable fuse. I now wish to make some remarks on the question posed, namely high voltage fuse switch versus the high voltage oil circuit breaker. The use of the high voltage fuse switch in place of the conventional circuit breaker for domestic distribution is mainly a question of economics. The capital cost of the high voltage fuse switch is about a third of that of an oil circuit-breaker, and as the units can be suitable for outdoor installation, savings are also affected in the cost at the substation. The rapid fault clearance time of the fuse also permits the use of cable having smaller cross sectional area with the resulting saving in capital cost, than could be used with circuit breakers. The cost of replacement fuses is high and it is essential that the high voltage fuse switch is correctly applied, if the maximum economics are to be realised and the loss of revenue due to outages be limited to a minimum. It has been found in practice that fuse switch units connected to overhead lines were lightning is prone can result in frequent fuse replacement and installations of this type should be avoided if at all possible. The use of fuse switches to supply industrial consumers with a high voltage, directly from a high voltage fuse switch or a low voltage supply transformer fed by a fuse switch requires very careful consideration. For the consumer using large equipment in relation to his supply, discrimination in the plant with the municipal feeder, is always difficult when circuit breakers are used, and becomes virtually impossible if grading of breakers is required, with the fuse switch. Whilst a saving in cost of a fuse switch can result in lower tariff to the consumer, it is vital in certain plants, that discrimination is obtained, and strong and valid objections may be raised by the consumer, to the use of the HV fuse switch. Perhaps a system of providing consumers with a choice of either fuse switch or circuit breakers supplies could be instituted. The supply from a single feed is limited by the maximum fuse size when the high voltage fuse switch which is at present approximately 200 amps at 3300 volts, and 100 amps at 11,000 volts. With regard to metering, the fuse switch requires a separate metering panel for the mounting of the meters, current and voltage transformers. This makes the overall cost comparable with that of the conventional oil circuit breaker, on which the equipment can normally be conveniently mounted. High voltage fuse switches have been on the market for many years, but many users of this equipment are not aware of some of the features available and a few are mentioned below. The fuse switch is available as an extensible unit, which can be made into ring main units, as a non extensible ring main unit or as a unit suitable for direct mounting to the side of a transformer. The fuse switch is also available with a shunt trip release, should for instance Bucholz be required and can be supplied with earth leakage protection. British standard specifications BS2692 of 1956, covers high voltage HRC fuses for systems up to 150MVA at 3300 volts and 250 MVA at 11,000 volts, but some manufacturers have done additional tests in accordance with the provisions of the specifications for systems up to 250 MVA at 3.3kV and 750 MVA at 11kv. The importance of using fuses that have been satisfactorily tested by an approved authority cannot be over-stressed. The rating of a fuse to be used in the fuse switch requires special attention as in many instances, it is necessary to derate the fuse. For smaller transformers or a fuse switch feeding a bank of transformers, consideration should be given to the magnetising in-rush current when selecting fuses, and it should be noted that overload protection in these cases, is not really afforded. The manufacturer of the fuse switch should be consulted before any fuse ratings are selected. In conclusion whilst a high voltage fuse switch fulfils a very useful role, in domestic areas it may provide industrial consumers with considerable difficulties and the problem should be given a very careful consideration.

N. Kirschner, Affiliate: A typical 11kV ring main distribution substation consists usually of two ring main isolators and a device for controlling and protecting one or more transformers. Now the 11,000 to 380 volt transformer has proved to be a most reliable piece of apparatus, with an internal fault occurring on an average of once per twenty years: this is according to a British area board statistic. In the opinion of many authorities, the expense of an oil circuit breaker, is just not justified to protect such reliable equipment and high voltage HRC switch gear has been used to an ever-increasing extent for this duty. Consideration must however also be given to the importance of the consumer, the inconvenience of outages and the size of the transformers being used. If the protection of the transformer is of the sophisticated type, then a circuit breaker would be economically justifiable. The one disadvantage of the switch fuse gear is the cost of the fuses. Frequent blowing of these fuses can become disasterous economically. It is therefore of vital importance that the function of the fuse is clearly understood, and that a fuse of the correct size is selected. A high voltage fuse, should only serve to protect the system from the effects of internal transformer fault and to limit the damage should

such a fault occur. It cannot, indeed economically it must not, be used to protect the transformer against over-loads. Adequate protection against overload conditions and LT reticulation faults must be installed in the form of either HRC fuse switch gear, or moulded case breakers. The characteristics of this LT protection must grade correctly with the HV fuse characteristics with an adequate margin of discrimination. With the above precautions taken HV switch fuse gear can be used in domestic, commercial and industrial sub-station, and give reliable system protection and lengthy fuse life. One point mentioned by Mr. Lombard, was the question of single phasing and here I would like to mention the fact that there are switch fuse ring main gear with 3 phase tripping, despite the fact that only one fuse may blow on fault. Modern designs of 11kV ring main switch fuse gear are extremely compact; often of outdoor weather proof construction and allow most economical substation building construction.

Quizmaster: Gentlemen, you have the problem stated by Mr. Lombard, it has been answered from the point of view of the manufacturers. Can we have somebody who has had use, or give us some experience of the operation of these fuses versus oil circuit breakers.

A. W. Tomlin, Escom, Rand and Free State Undertakings: We have made extensive use of the ring main high voltage rupturing capacity fuse in Escom's reticulations. One typical example is the Isando complex near Johannesburg, where it is used almost exclusively in an industrial application with great success. We have also used it in reticulations in townships, and the one point which should has been brought forward is that the rating of the fuse must not be looked upon as an overload device, but it must be a back-up protection for transformer faults only, otherwise one would run into a high expense in fuse replacements.

D. S. van der Merwe, Witbank: Toe ek 'n rukkie gelede probleme gehad het met hierdie tipe van skakeltuig het ek ons vriend mnr. Lombard gevra wat hy daarvan dink. Hy het blykbaar baie ondervinding van hierdie skakeltuig en ek praat nou met verwysing na die kompakte tipe.

Op sy aanbeveling het ek die goed gekoop, en ek moet vir u sê, dat die bewering wat hier gemaak is, dat die koste daarvan een-derde beloop van 'n olie-skakel wat dieselfde werk doen, heeltemal geregverdig is. Dit is so, maar nou sal ek baie bly wees as sommige van die vervaardigers wat miskien teenwoordig is, vir ons kan meedeel hoe hulle die probleem van die meet van krag voorafgaande so 'n breker gaan oplos. Dit veroorsaak heelwat probleme en ek voel dat as daar 'n metode was waardeur stroomtransformators, of spanningstransformators ingebou kan word in hierdie tipe van skakeltuig, daar baie beslis 'n groot stap vorentoe en wat ook ekonomies sal wees, gedoen kan word in hierdie rigting. Verder, mnr. die President en mnr. die Vraesteller, wil ek ook net meld dat met die gebruik van sekere tipes van hierdie skakeltuig, is daar probleme wat die vervaardiger blykbaar nog nie heeltemal te bowe gekom het nie. Ek kwoteer nou van persoonlike ondervinding, en dit is dat sommige van die staal-omhulsels sowel as boute en skroewe wat die kompakte skakeltuig aanmekaar hou, 'n neiging het tot lekkasies. Ons was baie verontrus hierdeur, want by liggaamlike aanraking van hierdie blootgestelde metaaldele het ons skokke opgedoen, hoewel van 'n geringe aard. Ek het later verneem dat dit maar net 'n blote kwessie was van 'n kapasiteitsontlading en daarmee was ek gerusgestel maar die kwessie van om krag te meet, sal ek baie graag iets meer oor wou verneem.

C. G. Lombard, Germiston: Ons het die probleem opgelos (miskien nie baie bevredigend nie) maar die metode wat ons gevolg het, is om 'n klein staalraamwerk op te bou, wat, as daar 'n transformator by die toevoer betrokke is, langsaan die transformator geplaas word. 'n Kabel word dan geneem van die sekerings-eenheid na twee stroom-transformatore wat op die raamwerk gemonteer is. Van onder die stroom-transformators word daar net 'n kort verbinding na die terminale van die transformators geneem. Dit is baie kompak, dit neem nie veel plek in beslag nie, en ook deur hierdie meettoerusting langsaan die transformator te plaas, kan daar een kabel-endkas uitgeskakel word.

A. F. Turnbull, Vereeniging: There are two types of ring main isolator equipment with tee-off HRC fused feeder in common use. The one type is arranged to trip all phases on the operation of any fuse. The other type is where each fuse operates independently.

Suitable application is supply to a transformer.

The HRC fuses must be considered back-up protection and not for overloads. Efficient fuse or circuit-breaker protection should be provided, to clear overloads on the secondary side of the transformer.

HRC fuse switch units are not satisfactory for supply to overhead lines, where transient faults caused by lightning, will blow the fuses. Replacement fuses are expensive.

It has, also, been found that HRC fuses tend to deteriorate if the transformer is loaded to the full current rating of the fuses.

The trip all phases type of unit is suitable for industrial networks.

The non-tripping fuse unit, on account of its compactness, is suitable for supply to blocks of flats or residential networks.

Quizmaster: Very important experience that. I didn't realise that high rushing capacity fuses deteriorated. Theoretically, they shouldn't. Can one of the manufacturers explain that difficulty. Is that the case? The essence of the matter is of course that the high rupturing capacity fuses are supposed to interrupt the circuit on a short circuit within one or two cycles even before the

circuit breaker can operate and it's used as back-up protection, but if it is used as a simple protection device for the transformers, it shouldn't deteriorate in service.

J. Barrie, Edenvale: We have used these units quite extensively in the three-phase tripping type, but I think Mr. Turnbull's problem probably arises from a very common failure in municipal reticulations, in that transformers are subjected to cyclic overloading, and this probably does lead ultimately to fuse failure under those conditions. Although I must admit in our experience of these things which goes back now, some 2½ years, we have blown two fuses, on a ring main unit selling at approximately half the price of a conventional oil circuit breaker. For transformer protection, I think you can afford to buy a few fuses if you have a little bit of cyclic over loading.

Quizmaster: So now we can more or less resolve that these fuses cannot be used in the normal way for overload purposes, it can only be used for a back-up protection for protection of transformers. Thank you very much Gentlemen, Mr. Prins, would you like to say something before we sum up finally?

H. Prins, Johannesburg: Before proceeding to the item to be discussed, it may be of interest to the meeting to pass some remarks about the use of HRC fuses on the Low Tension side of the system — I stress the words Low Tension.

In all countries of the world the demand for electricity is increasing, the world average being at the rate of approximately 8% per annum. The resultant increasing fault levels on medium voltage systems call for special attention being given to the selection of protective devices possessing adequate rupturing capacity. Not only must one consider the fault levels obtaining at the time of installation but also the increased fault levels likely to occur during the life of the equipment.

The HRC fuses which were originally designed to interrupt an R.M.S. symmetrical prospective current of 33 kA at 440 volts, subsequently showed that they inherently possessed a much higher rupturing capacity. In fact these fuses have been successfully tested on a symmetrical prospective current of 118 kA at 440 volts. As an indication of modern trends, a new Canadian specification on cartridge fuses calls for an HRC fuse to be capable of clearing an R.M.S. symmetrical prospective current of 80 kA.

During recent times much thought has been given to another problem directly associated with increased fault levels, namely, the greatly increased arcing that can occur at the seat of a fault. If steps are not taken to limit this arcing it can cause:

(a) increased danger to personnel,
(b) increased damage to equipment,
(c) increased fire risk.

HRC fuses should possess the characteristics which are essential to effectively limit arcing at the seat of a fault, these characteristics being "current cut-off" and "energy limitation".

Current Cut-off

Tests have shown how HRC fuses "cut-off" the short circuit current during the first quarter cycle (.005 seconds) to values substantially below the peak asymmetrical current of 100 kA which may otherwise flow into the fault. This characteristic of "current cut-off" reduces the magnetic stresses imposed on equipment in the circuit because these are proportional to the square of the current flowing into the fault. Other forms of circuit protective devices take at least one cycle (.02 seconds) to operate and more generally they take 3 cycles or longer; thus they would let through into the fault the peak asymmetrical current of 100 kA. Taking a 200 ampere HRC fuse as an example, the magnetic stress would be reduced to $\frac{20.47^2 = 419}{100^2 \quad 10{,}000}$ which is 1/24th of that which could otherwise occur if an alternative device were used.

Energy Limitation

The amount of arcing that occurs at the seat of a fault depends on the energy let through into the fault which is proportional to I^2t (amperes^2 x seconds). The energy let through also represents the thermal stress imposed on equipment in the circuit.

Taking the short-circuit values given in tests, a circuit protective device taking one cycle (.02 seconds to operate would have an I^2t let-through value of 122,000 x 10^3. The corresponding values of I^2t for "T" type HRC fuses are given in the following table:

Fuse Rating (Amps)	$I^2t \times 10^3$
30	18.6
60	25.3
100	86.7
200	484.5
300	1,360
400	2,140
500	4,550
600	5,500
800	13,000

Again taking a 200 ampere fuse as an example the energy let through to the seat of a fault is reduced to $\frac{484.5}{122{,}000}$ which is $\frac{1}{250}$ of that which could otherwise occur if an alternative device were used.

It is not generally appreciated that the HRC fuse also limits the amount of arcing at the seat of a fault when the prospective current is much lower. Whereas the previous example was taken with an R.M.S. symmetrical prospective current of 46,000 amperes (46Ka). Tests have shown what happened to an R.M.S. symmetrical prospective current as low as 762 amperes when three types of 15 ampere protective devices were tested at 230 volts. It will be seen that the HRC fuse limited the I^2t let-through value to approximately 1/10th of that let

through by the M.C.B. and to approximately 1/20th of that let through by the rewirable fuse.

I now wish to make some remarks on the question posed:

HIGH VOLTAGE FUSE SWITCH vs HIGH VOLTAGE OIL CIRCUIT BREAKER

The use of the high voltage fuse switch in place of the conventional circuit breaker for domestic distribution is mainly a question of economics.

The capital cost of the high voltage switch fuse is about ⅓ of that of an oil circuit breaker and as the units can be suitable for outdoor installation savings are also effected in the cost of the substation.

The rapid fault clearance time of the fuse also permits the use of cable having smaller cross sectional area with the resulting saving in capital cost, than could be used with circuit breakers.

The cost of replacement fuses is high and it is essential that the high voltage fuse switch is correctly applied if the maxsimum economics are to be realised and the loss of revenue due to outages be limited to the minimum.

It has, for instance, been found in practice that fuse switch units connected to overhead lines where lightning is possible can result in frequent fuse replacement and installations of this type should be avoided if at all possible.

The use of fuse switches to supply industrial consumers with a high voltage supply directly from a high voltage fuse switch or a low voltage supply from a transformer fed by a fuse switch requires careful consideration.

For the consumer using large equipment in relation to his supply discrimination in the plant with the municipal feeder is always difficult when circuit breakers are used and becomes virtually impossible if grading of breakers is required with the fuse switch.

Whilst the saving in cost of the fuse switch can result in lower tariffs to the consumer it is vital in certain plants that discrimination is obtained and strong and valid objections may be raised by the consumer to the use of the H.V. fuse switch. Perhaps a system of providing consumers with a choice of either fuse switch or circuit breaker supplies could be instituted.

The supply from a single feed is limited by the maximum fuse size when the high voltage fuse switch, which is at resent approximately 200 amps at 3300 volts and 100 amps at 11,000 volts.

With regards to metering the fuse switch requires a separate metering panel for the mounting of the meters, current and voltage tansformers. This makes the overall cost comparable with that of the conventional oil circuit breaker on which the equipment can normally be conveniently mounted.

High voltage fuse switches have been on the market for many years but many users of this equipment are not aware of some of the features available and a few are mentioned below.

The fuse switch is available as an extensible unit which can be made into ring main units, as non-extensible ring main unit or as a unit suitable for direct mounting to the side of a transformer. The fuse switch unit is also available with a shunt trip release should, for instance, Buccholz be required and can be supplied with earth leakage protection.

British Standard BS2692: 1956 covers high voltage HRC fuses for systems up to 150 MVA at 3300 volts and 250 MVA at 11,000 volts but some manufacturers have done additional tests in accordance with the provisions of this specification for systems up to 250 MVA at 3300 volts and 750 MVA at 11,000 volts. The importance of using fuses that have been satisfactorily tested by an approved authority cannot be over stressed.

The rating of the fuse to be used in the fuse switch requires special attention as in many instances it is necessary to de-rate the fuse. For smaller transformers or a fuse switch feeding a bank of transformers consideration should be given to the magnetising inrush current when selecting fuses and it should be noted that overload protection in these instances is not really afforded.

The manufacturer of the fuse switch should be consulted before any fuse ratings are selected.

In conclusion whilst the high voltage fuse switch fulfills a very useful role in domestic areas it may provide industrial consumers with considerable difficulties and the problem should be given careful consideration.

Quizmaster: The inference in that reply then Mr. Prins, is that you must not load the fuse beyond 1.6, and as Mr. Barrie points out probably, the cyclic loading enters and it is quite difficult to arrange for the consumers not to do that thing. Any further contributions on question No. 7? Well thank you very much for your contribution. Gentlemen, now we have covered the councillors, the members, and the affiliates, and can we go back to question No. 1. This question associated in question No. 2, and No. 3, are all questions on the same problem, and the forum invites discussion on any aspects of any one of those questions. Would somebody make a start? Mr. Pretorius.

E. de C. Pretorius, Potchefstroom: Question number three, I might be wrong but I think the trouble arises because of the lightning arrester being connected to the wrong side; to the load side of the fuse, instead of the line side.

A. A. Middlecote: Following on Mr. Pretorius' point, I think the problem is a little deeper than that. Our own experience is that there shouldn't be a high frequency in the blowing of fuses due to a surge passing through the fuse, provided the protection is correct. But this blowing of the fuse could be due to the wrong arrester, and not only due to it being on the wrong side. I don't think this latter happens so often. But what has happened and we know by experience that buying an arrestor of the wrong flash over value without a proper specification, allows too high an impulse to get through. This can be further

aggravated and this is probably a more general reason, due to bad earthing. That has been already mentioned previously. I think I mentioned it last year or the last meeting at Port Elizabeth, but you must have a good earth otherwise a high earth will slow up the impulse going through to the transformer. Now the third reason is even, I suspect, more prevalent than one realises, and that is that many small transformers actually cannot even withstand the impulse flashover value, which you expect it to withstand. Our experience here again, is that the transformer fails, shall we say at a tap, or some projecting point in the winding, and it does not lead to a permanent failure of the transformer. You get a flash-over through the oil, which is cleared by the fuse blowing and then reseals itself. Here again we can only hope that the new specification for transformers, and we hope you are going to use the South African one, does call for more regular type testing of the impulse value of transformers. I would sum up by saying, that most of the failures are due to incorrect usage of lightning arrestors plus, perhaps, transformers, that do not have a high enough impulse withstand level.

M. P. P. Clarke, Somerset East: The members of the forum might like to know that we have a certain number of 22kV rural distribution transformers in use. These transformers were equipped by the manufacturer with liquid rewirable fuses within the HT bushings. They are half amp rating on a 15 Kva, 22 kV transformer. The manufacturer arranged for tests to be done by the Bureau of Standards on these transformers before we actually took them, and on the prototype, on a number of tests, no rupturing of those fuses took place with complete flash-over on the arcing horns on the bushings themselves.

R. B. Anderson, Pretoria: I believe our friends in Rhodesia, from where I came, have a great deal of experience with fuses at 11kV and this is not at all a simple question as far as that experience goes, and the minimum size of fuse depends I think on a great number of factors, such as the bushing flash-over characteristics, the bushing arcing horns. Somebody mentioned the question of the lightning arrestors whether they are on the load or the line side of the fuse. The type of construction Mr. Quizmaster, if it is a type of construction with overhead earth wires, the overvoltages are less, for example than an insulated type of construction. I would like therefore to emphasise one point which we made in our paper, and that is this kind of question could probably be quite not easily solved, but at least we would get some lead on it if we had statistics of fuse failures throughout the municipal undertakings. In Rhodesia for example, one found one couldn't use a 2½ amp fuse as a minimum. It had to be raised at least to 5 amp, for lightning conditions, and it may even be that fuses of even higher rating would be even more successful. Perhaps our Rhodesian friends might give us some further information on this since it is two years since I was there. But I would like to stress, that if for example the offer which we made that the faults statistics of an undertaking should be analysed, and that the fault statistics of all undertaking in South Africa, should perhaps be analysed. This would give some guide on these questions, and I would strongly recommend this. It would also help to pin point where the amphasis should be laid on some of the troubles which municipal undertakings have for example, fuse blowing in some areas may be very high, but this may be entirely due to perhaps a low rating of fuse, whereas some other undertaking may be using a better arrangement and this information would come out of the analysis. But one would have to take into account, all the different factors which I mentioned and that is the plea I would like to make.

H. E. Summers, Bulawayo: I think I must close this question I raised myself. There has been a great deal of interest in hearing the various comments, but the first point I would make, is that putting the question to you, I probably didn't make it quite clear, I should have said that there was no signs of flash-over, certainly no flash-over of the transformer bushings, nor have any internal failures been detected in the transformer. It is a fairly common phenomenon, and Mr. Quizmaster, you probably recall the United States produce a high surge fuse due to this very reason. High surge fuses usually only have ratings below 7½ amps. In Bulawayo, and I know that Mr. Anderson and his old system in Rhodesia had the same troubles, we had our surge diverters on the line side of the fuses, and not on the protected side and from examination of the fuses it was quite obvious that flash-over at power frequency had not occurred, as invariably the fuses had only just melted. In my opinion it is due to the difference in coupling co-efficients between the earth wires and the phase conductors, causing different voltages to appear between respective phase conductors, and the drainage current passes through the fuse. Incidently, I should also point out that we have had the same trouble on transformers that have not been equipped with surge divertors. So I think we can say that the cause is a travelling wave phenomenon and we have to forget the failure due to power frequency currents.

Quizmaster: Gentlemen, there are 3 questions in this overhead line section. The question No. 1 deals particularly with the design of wood pole lines and I'm certain that some of you have had some experience of the failing loads of these wooden poles and the minimum strength as mentioned by the Factories Act. Would somebody like to say something.

C. G. Lombard, Germiston: This is not my contribution, this is a contribution made by Mr. De Villiers of Bloemfontein, and I have been asked to read it out. The Factories Act, regulation C63, tables a factor of safety to apply in respect of supports for power lines. For wood

pole supports, two factors are given namely 3.5, when based on tested failing load, and 2.7 on minimum strength. For design purposes, I have always adopted the minimum strength values as given in S.A.B.S. 339 — 1951 i.e. the standard specification for creosoted wooden telephone, telegraph, electric light and power transmission poles that is a factor of safety of 2.7 is applied. When purchasing the poles required, it is necessary to refer to the specific class and size of pole as tabled in S.A.B.S. 339 — 1951, that is, tables 1 and 10. It may be required that the supplier provide failing load test certificates and consequently that a factor of safety of 3.5 be made applicable. In other words to comply with the requirements of regulations C63 the strength of supports must be within the limits of applying both safety factors given, that is, 2.7 for design on the minimum strength and 3.5 when tested for failing load. I may recommend that all the electrical engineers and in particular designers of power lines should study and make use of the newly published code of practise for over power lines, for conditions prevailing in South Africa. When purchasing line materials reference should be made to and suppliers should be tied down to the relative standard specifications.

A. W. Tomlin, Escom: I made a few enquiries about this before I left Johannesburg, and the tested failing loads I take it, are those which are covered in the new S.A.B.S. specification for wood pole structures, which is actually S.A.B.S. 753 — 1964, as amended 65, and I think those are the figures which are shown under appendix B, which give average breaking loads for poles under certain conditions, planted applied load tied 2 feet on the top of of the pole, and all the rest of it, and planted at certain depths, depending on the length of the pole, but as far as Escom is concerned, we work on the minimum strengths, given also in that same S.A.B.S. specification, Section 3, where minimum strengths are given for the various classes of poles, but unfortunately the minimum varies considerably from the maximum, so in other words we are applying probably a higher factor of safety in many cases than is absolutely necessary. Now do I understand that some investigation has been taking place into the strength of poles, bearing in mind the fact that it has been found that poles strength vary from various plantations, under various growing conditions and so on, and so forth. And I, am also given to understand, I might be incorrect that the strength can be related in some way to the distance between the annular rings. I was wondering whether Mr. Middlecote could give us any information on this.

A. A. Middlecote: Mr. Chairman, may I have recuse right now. No, I am not up to date, the Bureau are looking into it. Everything that has been said is in fact being looked into, but I am not in a position to give any guidance at all, but I think that the last speakers have really covered what is being done quite clearly. Thank you.

Quizmaster: I quite agree Mr. Middlecote, the speakers have covered it very carefully. Well perhaps if we have finished with the poles, what about the catch wires?

P. J. Botes, Roodeport:
Vangdrade onder hoogspanningslyne: Oor hierdie aangeleentheid moet eers bepaal word in elke gevalle dit verpligtend is om vangdrade onder 'n hoogspanningslyn op te rig. Dit sal gevind word dat regulasie C69 (2) van die Wet op Fabrieke, Masjinerie en Bouwerk bepaal dat, waar 'n kraglyn byvoorbeeld 'n geproklameerde pad kruis, daar aan sekere vereistes, soos neergelê, voldoen moet word. Waar 'n kraglyn egter parallel met die geproklameerde pad binne die geproklameerde grense loop, moet dit ook aldus beskerm wees, alhoewel baie ingenieurs hierdie regulasie nie so vertolk nie. Die enigste praktiese beskerming in hierdie geval is 'n vangnet. As ons aanvaar dat die hoogspanningskraglyn vir die grootste gedeelte van sy totale lengte deur opgeboude gebiede gaan en parallel binne die grense van 'n geproklameerde pad loop, is die ekstra koste verbonde daaraan om die balans van die lyn waar dit nie van 'n vangnet hoef voorsien te word nie, minimaal en is dit prakties wenslik. In Roodepoort word vangnette onder alle hoogspanningskraglyne gebruik, of dit nou vereis word of nie. Daar word verseker dat die net elektries teruggekoppel is na die toevoerpunt en dat dit op gereelde intervalle geaard is. Meer belangrik egter is dat dit elektries teruggekoppel is na die toevoerpunt. Hierdie metode verseker dat as 'n geleier onder uiters droë toestande breek en die breekpunt ver van die toevoerpunt is, daar 'n redelike foutstroom vloei om die toevoer af te skakel soos vereis word onder regulasie C56 (i) van die Wet op Fabrieke, Masjinerie en Bouwerk. In Roodepoort is gevind dat op 35 myl bogrondse kraglyne (4 myl 33Kv en 31 myl 6.6Kv) die onderhoudskoste van so 'n vangnet minimaal is en daar is bewys dat dit verseker dat die beveiliging in werking tree wanneer 'n fout ontstaan.

Quizmaster: I suppose that observant engineers have noticed that there are not many catch wires underneath the wires in this Republic Mozambique. The high voltage lines cross over the telephones quite simply without any catch wires or doubling of conductors, and I think that it gives a lot of food for thought as to whether or not we are being over anxious about the safety of the telephone lines and other lines. Have members got any comments on this matter?

H. E. Summers: I thought it might be of some interest to quote again Rhodesian practise now you've mentioned Mozambique practise. Ours is somewhat similar, we have no statutory regulations requiring us to put up guards in crossing roads of any type. If you come up to Rhodesia you may in fact see them, but they are quite inadvertently put up because the post office lines protection regulations which is promulgated in terms of the Post Office act, requires us to put guards or equivalent between power lines in communication circuits and since telephone

lines run along most of our roads, you will frequently see a cradle guard, in some cases to a very short cradle guard, just over the telephone circuit. But I think we have one regulation which is probably different to yours, which is also contained in the post office lines protection regulations, which states that for power lines crossing telephone circuits up to and including 11kV, either the post office wires may be insulated or the power line conductors may be insulated with P.V.C. thus saving the cost of the guard. For crossings with communications circuits up to and including 33kV, the power line itself may be insulated to a greater radial thickness, with P.V.C. and not vice versa as it was with lines up to 11kV. Regulations were also drafted so that apart from the use of conventional cradles of numerous descriptions you see all over the place, they were drafted to enable us to use Nylon netting as a cradle between power and telephone circuits but as far as I know, up to the present none of the power undertakings have taken advantage of the use of nylon net.

The Quizmaster concluded the session by thanking all those who had taken part and prepared answers and, in turn, the President conveyed his appreciation to all concerned, including Mr. P. A. Giles for acting as Quizmaster.

Die Vraesteller sluit die sitting af deur almal wat deelgeneem en antwoorde voorberei het, te bedank, en op sy beurt spreek die President sy waardering uit teenoor alle betrokkenes, met insluiting van mnr. P. D. Giles vir sy optrede as Vraesteller.

The President introduced the Closing Session of the Convention as follows:—

Die President lui die Slotsitting van die Konvensie soos volg in:—

Mr. Mayor, Lourenco Marques, Mr. Mayor, Vanderbijlpark, Ladies and Gentlemen, we have now reached our closing session of this the 40th Convention. Our constitution provides for Honorary Members and it reads, "Honorary members shall be distinguished persons, who or have been intimately connected with Municipal Electricity Undertakings whom the Association desires to honour for outstanding services in connection herewith. In this connection your Executive Council have nominated certain persons who have served this association in an exceptional manner and in this connection, I first call on Councillor Jamneck to speak.

Councillor L. Jamneck, Vanderbijpark: Mnr. die President, Mnr. die Burgemeester van Lourenco Marques, Mnr. die Burgemeester van Vanderbijlpark, hoogwaardigheidsbekleërs, dames en here. Alvorens ek met die voorstel aangaan, Mnr. die President, vergun my 'n paar worde van waardering. Ons wil vir u geluk wens as konvensie lede met die bekwame wyse waarop u hierdie verrigtinge die afgelope paar dae gehanteer het. Vir my as 'n Vanderbijlparker is dit 'n riem onder die hart en ons waardeer dit aangesien ons een van die jong dorp, die mees vooruitstrewende dorp in Transvaal is, met u as President van hierdie Konvensie. Baie hartlike dank, ons het dit alles waardeer, die manier waarop u die afgelope paar dae hierdie Konvensie gehanteer het. Mnr. die President, dit is nou vir my 'n voorreg om aan u voor te stel Ingenieur Jose Rodriques Telles. Mr. Teles was born in Portugal on the 30th January, 1921 where he attended the high school and engineering schools and qualified as an engineer in 1947. He underwent post-graduate training in Spain and with Messrs. English Electric Company in England. In 1948 engineer Telles came to Lourenco Marques and started as a teacher at the Technical High School and was in 1961 appointed Professor at the Technical Institute. In 1950 Engineer Telles started acting as a consultant in electrical engineering and was responsible for the design and installation of the electrical equipment at the Matola Iron One wharf. He also holds the appointment as permanent consultant to a number of undertakings. Engineer Telles is a director of S.T.O.P., an engineering firm in Lourenco Marques. He is a member of the export control board, a founder member of the chamber of industries of Mozambique and was president of the chamber in 1946. Ingenieur Telles is ook 'n gesinsman, hy is getroud met Mev. Magrietha Maldonada Telles en hulle kan spog met vier baie oulike kinders. As 'n student was hy kaptein van die skaatshokkiespan en hou ook 'n vlieglisensie. Ten spyte van mnr. Telles se drukke werksaamhede, Mnr. die President, was Mnr. Telles een van die steunpilare met die organisering van hierdie kongres in L.M. en het waardevolle hulp aan die Vereniging verleen, nie net ten tye van die kongres nie, maar ook om die Vereniging in Mosambiek bekend te stel en te vestig. I now have pleasure in proposing engineer J. R. Telles as Honorary Member of the A.M.E.U. Dankie. Applause.

President: Thank you Councillor Jamneck and for the confirmation by the convention. I now call on Engineer Telles to come forward to accept his medal and certificate please. Engineer Telles would like to have a few words.

Mr. Telles responded and thanked the Association for the honour bestowed upon him. He referred to the fact that he had accepted the suggestion that a convention of the Association be held in Lourenco Marques with enthusiasm. Co-operation between the Province of Mozambique and South Africa was, he thought, of the utmost importance and he said that whilst Portuguese-

Mnr. Telles bedank die Vereniging vir die eer wat hulle aan hom bewys het. Hy verwys na die feit dat hy die voorstel dat 'n Knvensie van die Vereniging in Lourenco Marques gehou moet word, met geesdrif verwelkom het. Hy is van mening dat samewerking tussen die Provinsie Mosambiek en Suid-Afrika van die grootste belang is, en hy sê dat, alhoewel die Portugeessprekende inge-

speaking engineers who had attended this Convention had not participated to any extent in discussion, he was confident that they would participate more in the future and that co-operation in the field of electrical engineering between the two territories would become greater and greater as time went on.

President: The other gentleman the Association wishes to honour is Councillor Dave Marais. Unfortunately he is not with us this afternoon but our Honorary member, Mr. Bob Kane, will speak on this item.

R. W. Kane, Hon. Member: I have the greatest pleasure in conveying to this convention that your recommendation that is the recommendation of the executive committee namely that Dave Marais Member of Parliament, I think I should call him be awarded honorary membership of our association. Dave, as the bulk of us knew him, first served on our executive in 1955, I think the last occasion was in 1964. It wasn't continuous because for a short period we released him from executive duties to become Mayor of Johanesburg. He is well known throughout the Republic sporting activities he was an excellent councillor, I believe he was somewhat mixed up in the Diamond "racket" and he is now gone to a somewhat higher sphere of political activities than mere council politics and I have great pleasure in recommending to the convention that your executive's suggestion be accepted.

President: Thank you Mr. Kane and thank you convention for confirming that. Mr. Kane in the absence of our new honourary member, Dave Marais, can I ask you to come to the dias to take receipt of the certificate and medal for conveying to him please. There is another engineer of long standing from a neighbouring territory, who this convention wishes to honour by conferring honourary membership on him and that is Bill Beesley. I now call on Mr. Lombard to speak on this item.

C. G. Lombard, Germiston: At this and at our previous convention we have sorely missed some of our old friends who have in previous years regularly attended our

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Mr. Giestera thanked the Association for the gift presented to him and spoke of the long ties of friendship between Portugal and South Africa.

The President continued:—

"Your Worship, President — Camara-Municipal: We from the Republic also have close associations with that great Portuguese navigator Vasco Da Gama who named our Eastern Coastlines Terro Da Natal, and they retain it to this day. With all this historical background and close associations it is no wonder that two years ago the decision to hold the 40th convention in L.M. was unanimously accepted. We consider that the close ties now re-established should be further strengthened and the Mayor

nieurs wat die Konvensie bygewoon het, nie tot 'n groot mate aan die bespreking deelgeneem het nie, is hy vol vertroue dat hulle dit wel in die toekoms sal doen en dat samewerking op die gebied van die elektrotegniese ingenieurswese tussen die twee gebiede groter en groter sal word met die verloop van tyd.

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conventions I am here referring to our friends from Northern Rhodesia now known as Zambia and for reasons known to all of you are no longer members of the Association and have in recent years been unable to attend our Convention. Your executive has resolved that one of these past engineer members be nominated for honourary membership of this Association and on behalf of the Executive Council, it gives me great pleasure to put this motion to the Convention. In this connection I refer to Mr. Bill Beesley of Livingstone. As you all know, Mr. Beesley has in the past rendered valuable services to this Association as engineer member and also as member of the Executive Council and fully deserves this honour. I am sure Mr. President, Ladies and Gentlemen, that the election of Mr. Beesley to honorary membership of this Association will be greatly appreciated by all his colleagues and all the other friends in Zambia. As a gesture of our friendship and goodwill towards them. My only regret is that Mr. Beesley cannot be present to personally receive this honour. Mr. President, Ladies and Gentlemen I now formally propose that Mr. Bill Beesley be elected an honorary member of this association. Applause.

President: Thank you very much Mr. Lombard and the Convention for confirming that. We are indeed very sorry that Mr. Beesley could not be with us at this Convention and more so this afternoon to take receipt of the medal of honorary membership. We are now asking Mr. Turner our President Elect if he will be good enough to accept the medal and pass it to Mr. Beesley when he is in a position to do so. There is another gentleman who has helped considerably and to a very large extent with the arrangements in connection with this Convention, Mr. Manuel Giestera, and as a small token of appreciation this Convention will like him to accept the small present and we ask him to come to the dias please.

Mnr. Giestera bedank die Vereniging vir die geskenk wat hom aangebied is en verwys na die bande van vriendskap wat baie lank reeds tussen Portugal en Suid-Afrika bestaan.

Die President gaan voort:—

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of Vanderbijlpark therefore wishes to ask you Mr. President Camara de Municipal, to accept a small momento from Vanderbijlpark. Mr. Van der Walt.

A. C. van der Walt, Vanderbijlpark: Your Worship the Mayor of Lourenco Marques, on behalf of Vanderbijlpark it gives me great pleasure to present to you a writing set to be placed on the desk of your mayoral office. Please accept this as a token of appreciation from Vanderbijl-

park for the fact that you agreed to hold this Convention of the Association in L.M. and also that you agreed to share the honours with us to act as hosts for this Convention. May I express the hope that many letters will be written by this writing set especially to promote goodwill between all the states represented here today.

President Camara Municipal Lourenco Marques (spoken in Portuguese and translated): President, your Worship the Mayor of Vanderbijlpark, Lady and Gentlemen, it constitutes no doubt a great honour for L.M. to be chosen for this reunion of the 40th Convention of the Association of Municipal Undertakings of Southern Africa, an honour that we took in great praise. Even with the worries no doubt that we carry on upon our shoulders by a cold war being raised against us from foreign countries, we still do our best to live in peace and collaboration with the neighbouring countries. Over the Technical aspects of this particular Convention of entities related to some part of our technical life, there are other points that strengthen further with this convention, points that I should like to point out to you. I believe from the personal contact established already among us plenty of good should come in the future in the enterprising and the intentions we have on forwarding the good relations that exist. As Mayor of Lourenco Marques I want to emphasise how much pleased and honoured I felt with this convention been held in Lourenco Marques specially from my point of view it is above all political ideas and any kind of different talks that man might have does one thing in common that combine together men everywhere they are and whatever they must think that is municipality, I feel that municipalism is a kind of institution that could establish a further and stronger link of friendship amongst people. That is the reason why this reunion of technical entities in connection with Municipal Undertakings of Electricity afforded to me a very great pleasure and I want to emphasise again that the goodwill of the people can and will always be based on the Municipal institutions that you represent. Finally I want to thank the cordial kindness and friendship extended particularly to me by the past president of the Association and now the elected president of this Association as well as from all of you gathered here today for all the courtesies and sympathy extended to me and if you allow me I want to present in the name of the city of Lourenco Marques a token of souvenir from the City to the City of Vanderbijlpark and a memento of this reunion here to the President of the Association. The first one will be a plaque in bronze with coat of arms of the city of Lorenco Marques having in the back a short history of Lourence Marques itself and for the president of the association will be a little flag of Lourenco Marques in our municipal colours and with the crest of the city. Thank you once again for everything.

Mr. President Camara Municipal, Lurenco Marques: Words indeed fail me to reply to your wonderful speech this afternoon. The Mayor of Vanderbijlpark has asked me to convey to you his thanks for this wonderful memento which you have handed to him to take back to Vanderbijlpark. This flag which you have presented to this Association Sir, I am sure will always be standing where the presidential chair will be in future, in Southern Africa, whether it is in the Republic again perhaps in Mozambique or in any neighbouring territories, to remind us of the wonderful hospitality which we received at Lourenco Marques from you Sir. Ladies and Gentlemen, I now call on Councillor Goldman from Durban to express the appreciation of this Association for the hospitality we have received in Lourenco Marques.

Councillor R. Goldman, Durban: Mr. President, Senor President, de Camara Municipal Lourenco Marques, Mnr. die Burgemeester van Vanderbijlpark, distinguished guests, Ladies and Gentlemen. I esteem it a great privilege and honour to be asked to express the thanks of delegates to our hosts both Lourenco Marques and Vanderbijlpark for the excellent arrangements for the Convention and the wonderful hospitality received. The object of a successful host is to make his guests feel at home and when this can be achieved, particularly on foreign soil, the exercise can be said to have been well and truly accomplished. I do believe that this Convention held in Lourenco Marques has strengthened the ties of our countries still further if that is yet possible. The hospitality and entertainment arranged has been of an extremely high nature and standard and greatly enjoyed by all of us and whilst not wishing to single out any particular function, I feel, Sir, that the cocktail party in the Vasco da Gama Gardens will always be remembered by those fortunate enough to have been present. The friendly atmosphere, the exotic catering and the perfect setting all made for a most memorable occasion and helped the visitors to anticipate the contents of Mr. Smith's paper presented today on yet another aspect of street lighting. I wouldn't like it to go any further than that, Mr. President. The liaison, Senor President, between your City Council and the Clerk of the Weather was stout work par exellence. How fortunate you are sir, in having such an attractive venue outdors and also a City Hall which is the envy of cities much larger than yours. The theme of this convention was "engineering knows no bounds". How well this could have been changed to: hospitality knows no bounds. Senor President Camara and your Worship, I voice the feeling of all delegates to this the 40th convention of the A.M.E.U. when I offer you our sincerest thanks for your wonderful and generous hospitality and kindness. To your respective councils please convey a sincere baie dankie and Molto obligato.

President: Thank you Councillor Goldman. I now call on Mrs. White Cooper to speak on behalf of the ladies.

Mrs. D. H. White Cooper, Pietermaritzburg: Mr. President, the Mayor of Lourenco Marques and the Mayor of

Vanderbijlpark, it is wonderful to think that when our husbands leave home and they say "what are you going to do" that we can say we would love to come with you and here we are at Lourenco Marques where we have had a delightful time. I would like to express on behalf of the ladies our sincerest thanks and great appreciation for the wonderful time we have had. There is only one thing that might be difficult: I think the husbands pockets will have suffered. Mnr. die President, Burgemeester van Lourenco Marques en Burgemeester van Vanderbijlpark, baie, baie hartlik dank vir al die plesier en wonderlike tyd wat u vir ons dames hier gegee het. Ek is seker almal van ons wat hier gewees het sal altyd onthou die plesierige tyd wat ons deurgebring het. Baie dankie.

President: Baie dankie mev. White-Cooper vir die pragtige woorde wat u vir ons toegevoeg het. Now I call on Mr. Loxton de Beer on behalf of the affiliates.

Mr. Loxton de Beer, Johannesburg: Mr. President, Mr. President of the Camara Municipal Lourenco Marques, your Worship the Mayor of Vanderbijlpark, ladies and gentlemen, we, the affiliates, congratulate you, Mr. President, on the very high honour accorded you by your fellow members and while it is somewhat late in the proceedings of this Convention it is yet quite early in your term of office and we as affiliates look forward with great pleasure to meeting you and other of your members round the committee tables where so many of our mutual problems are ironed out. We would also congratulate you Mr. President on your presidential address, both as to its subject and its presentation, and we would couple with this our congratulations to the Association as a body, on the range of subjects covered during the past few days. Right from the very excellent technical paper presented by Mr. Duffield of the Supply Commission to the very interesting and extremely valuable discussion, introduced by Councillor Kipling. This acknowledgement that engineer members have executive as well as technical responsibility is of the utmost importance and we affiliates who are, after all, also ratepayers and your consumers, are satisfied that this broadening of thought in the association can only do good to all concerned. May we now also, Mr. President, thank the A.M.E.U. for the opportunity given us of meeting under a single roof practically the whole of the heavy electrical world of South Africa, Rhodesia and Mozambique. We have not only had here the supply undertakings of the Supply Commission of another government and other semi-government bodies of the three countries, but also consultants and members of the training institutions and of course last, but by no means least, our fellow affiliates. These conventions are unique and we would assure those who are responsible for paying the bill that the information and knowledge gained by us and we feel certain by all others attending these conventions that this is of the utmost value not only to the industry in the profession but in time to every consumer and even every potential consumer. Finally we would thank the Association and through the Association the Town Council of Vanderbijlpark and the members of Lourenco Marques for their hospitality. As engineers we have long known that to live we must work and some of us feel that we have worked very hard for a very long time, but as usual there are exceptions to every rule and the last few days we have just lived, nothing else. I might even go so far as to draw attention to the fact we have even had our wives looked after for us and that, Gentlemen, we have appreciated, so while we are really looking forward to the next gathering in Umtali the hospitality of the steel town of Vanderbijlpark and the very delightful and fascinating city of Lourenco Marques will not be forgotten, and so again Mr. President we would like to say to you thank you very much I wish you everything of the best in your term of office. Thank you.

President: Thank you Mr. De Beer for your very kind words, I thought it was near the end for having rest, but you are making me nervous for the next two years now. Ladies and Gentlemen, the President Camara Municipal has expressed the wish that he wants to address you in English.

President, Camara Municipal: I am so happy with the last words I heard that I must speak in English, few words only and I beg your pardon if my grammar is not correct. I am happy with the words of the excellent councillor of Durban and the Lady that wanted to give me the pleasure of your kindness to the city and people of Lourenco Marques, I want to say to you only one thing that we feel so much happy when we can receive the people around us, we were so happy to have you with us. We thank you very much. I say we, but myself and the people of Lourenco Marques and we wish to you all the best and specially we wish you and we ask you to come again. Thank you. Dankie.

President: Thank you, your Worship the Mayor of Lourenco Marques for your wonderful words, I think we all agree they have gone very deep and they will be carried very far. Your Worships Presidente Camara Municipal, die Burgemeester van Vanderbijlpark, dames en here, ek kom nou aan die einde van ons 40ste konvensie en dit is my groot eer en plesier en genoeë om dank te betuig aan die wat ons so geweldig baie in die opsig gehelp het. In die verband is die lys lank maar ek is oortuig daarvan u sal vind dit is nog te kort vir die vriendlikheid wat ons hier geniet het en die hulp wat ons van almal ontvang het. Our sincere thanks are extended firstly to His Excellency the Secretary for Public Works, Transport and Communication for so kindly opening the Convention. I also take this opportunity on behalf of the Convention of wishing him well. We also thank Mr. G. C. Nell, the South African Consul General in Lourenco Marques, for his part in the opening proceedings. Also, through you Sir, Your Worship President Camara Municipal, we wish to thank the City of Lourenco Marques for the hospitality we received all along the stay in Lourenco Marques. We would in particular like to express our

thanks to the director and staff of Semey also our appreciation to Sonefe and the Railways for allowing us to visit the installations. Also a special word of thanks to the President, Sociadade Estudos and his staff for placing the venue and facilities here at our disposal, and while we are in the city thanks to Senor Giestear and Engineer Telles again for all their help and assistance and valued guidance during the months of preparation. I must also thank Senor Vidago for coming to our aid on many occasions. En nou, Mnr. die Burgemeester van Vanderbijlpark, ook baie dankie aan u en u Raad vir u bydrae wat dit vir ons moontlik gemaak het om die kongres in Lourenco Marques te kon hou. Ons vertrou die aangename samesyn met ons bure sal nog lank in die toekoms baie vrugte vir ons Vereniging en volk afwerk. Also our sincere thanks to the ladies for accompanying their husbands in such large numbers and their endeavours to look after them, and to the various guests from various spheres for contributing so much to the proceedings. The affiliates we thank for their share in making the Convention enjoyable and informative. And while we are looking at the good things to come we wish to thank the Metal Box Company for helping to carry the victuals and the Total Oil Company for answering all our questions and supplying the folders for keeping our thoughts together. Also our sincere thanks to the Radio Club of Mozambique and the artists for the delightful concert we had on Tuesday night. Travelling by train will in future bring back sweet memories of the Radio Club concert in Lourenco Marques. And then we also wish to thank the Museum for the wonderful exhibits and the hospitality to the ladies. Aan al die skrywers van die referate 'n spesiale woord van dank in hierdie dae van klem op groter produksie, vir die tyd wat hulle vir die taak afgestaan het dikwels na ure. Dit word hoog op prys gestel, ook aan almal wat aan die besprekings deelgeneem het, ons waardering. And when it comes to thanking our Secretaries and staff I cannot help thinking of that lovely game I used to play many years ago, "Bok, bok staan styf." During all the months of preparation for this convention, I have not only travelled with Dick Ewing but have mostly been riding on his back. He never complained but faithfully carried out a promise given many years ago. Many thanks Dick for all your assistance, guidance and help by you and your staff and what you have achieved at this convention in the field of translations. I must name in particular Miss Elaine Brewin for many hours of overtime put in behind the scenes and to Mr. Botha for the sound effects and photography en mnr. Conradie vir die vertalings en ek hoop dit was nie somtyds in Grieks nie. In die afwesigheid van my kollegas en personeel op Vanderbijlpark in besonder my Sekretaresse bedank ek vir hulle hulp en bystand. In die verband moet ek ons stadsklerk mnr. Jan du Plessis se naam noem vir al say raad en advies toe ons met moeilike probleme te kampe gehad het. En laastens trek ek die kringetjie nog kleiner en ek betuig van harte dank aan my vrou. Daar word gesê dat 'n vrou op intuisie besluite neem, maar waar dié ook al vandaan mag kom, was haar hulp en haar advies vir my baie werd. Ook haar verdraagsaamheid wanneer ek omgekrap tuis gekom het as dinge maar nie te vlot geloop het nie. Baie dankie. Presidente Camara Municipal, Mnr. die Burgemeester van Vanderbijlpark, ladies and gentlemen, I have much pleasure in now closing the 40th Convention of the A.M.E.U. held in Lourenco Marques, Mnr. die Burgemeester van Lourenco Marques en Vanderbijlpark, dames en here, hiermee sluit ek nou formeel die 40ste Konvensie van die V.M.E.U. in Lourenco Marques af, en wens u toe 'n baie aangename aand en 'n veilige reis huis toe. Thank you. Obligads. Baie dankie en totsiens.

Mr. C. Lombard, Germiston: Mr. Jamneck has already thanked you on behalf of Vanderbijlpark for the excellent manner in which you have conducted this convention. May I on behalf of all the delegates here also thank you most sincerely for the very hard work that you have had to put into making this Convention a very great success that it has been. Our sincere thanks too to Mrs. Theron. Ons weet, soos u genoem het, aan die sy van elke man staan sy gade en ons kan maar net vir Mev. Theron baie baie dankie sê dat sy gedurende hierdie tyd, toe u so besig was, u so trou bygestaan het, en vir alles wat sy gedoen het om hierdie konvensie ook 'n sukses te maak. Ons beste wense vergesel u en mev. Theron op u pad huistoe. Dankie.

President: Baie dankie mnr. Lombard en dankie aan die Konvensie namens wie u gepraat het. Dankie.

REPORT OF THE 14TH ANNUAL GENERAL MEETING OF THE SOUTH AFRICAN NATIONAL COMMITTEE ON ILLUMINATION, HELD AT BENONI, 10TH—12TH MAY, 1967.

Sixty persons attended, including 17 Municipal delegates, together with representatives from S.A.R. & H., C.S.I.R., S.A.B.S. and manufacturers of street lighting and interior lighting equipment.

At the conclusion of the meeting, office bearers were appointed, i.e. Messrs. P. A. Giles and R. M. O. Simpson.

Seven papers were read at the Congress:—

1. **Sunlight and Buildings by Mr. S. J. Richards (elected President).**

In the 1950's, development in techniques and materials resulted in large glass windows in buildings and introduced problems of glare and solar heat. Direct sunlight should not reach working areas and in South Africa sunlight should be excluded in summer months. Sun angles were discussed, the use of solar charts, calculators and tilting models was described. External shading was advocated as an effective method of controlling solar heat, as windows permit solar heat gains in the buildings. The possibility of windowless buildings was discussed.

2. **Lighting and Air Conditioning by Messrs. J. Bessant and R. Borgars.**

The paper dealt with the successful replacement of the natural environment of fresh air, stressing comfort in relation to temperature and humidity. A survey indicated that quietness and cleanliness was offset by stuffiness, lack of air movement, faulty operation and the feeling of living in a canned atmosphere. The two functions of lighting, work lighting and building lighting were examined in respect of the general increase in lighting levels, colours in decoration, use of the fluorescent tube. The induction unit system of air conditioning using a number of small units positioned around the building and the dual duct system, one duct for cold air and the other for warm air, were described. The accommodation of separate lighting fittings and air supply points in the same ceiling space was discussed, and the case for integrated fittings was given, particularly the problem of the utilisation of heat gain from ballasts and solar heat.

3. **Lighting and Aesthetics by Mr. R. S. Browne.**

This paper, presented with slides, described the aesthetics of light in architecture which has three aspects: The object (or task) lit, the observer and the architectural

VERSLAG VAN DIE 14DE ALGEMENE JAARVERGADERING VAN DIE S.A. NASIONALE KOMITEE VIR VERLIGTING, GEHOU TE BENONI VANAF 10 TOT 12 MEI 1967.

Die vergadering is bygewoon deur 60 persone, waaronder 17 Munisipale afgevaardigdes, tesame met verteenwoordigers van die S.A.S. en H., die W.N.N.R., die S.A.B.S. en vervaardigers van toerusting vir straatverligting en binnenshuise verligting.

Voor die afsluiting van die vergadering is die ampsdraers aangewys en twee lede van die V.M.E.O. is tot lede van die Bestuur verkies, nl. mnre. P. A. Giles en R. M. O. Simpson.

Sewe referate is tydens die vergadering gelewer:—

1. **Sonlig en Geboue deur mnr. S. J. Richards (verkose President):**

In die vyftigerjare het die ontwikkeling van tegnieke en materiale groot vensters in geboue tot gevolg gehad, waardeur probleme met betrekking tot skittering en sonhitte ontstaan het. Direkte sonlig behoort nie in werkruimtes in te skyn nie en in S.A. behoort sonlig gedurende die somermaande uitgesluit te word. Daar is bespreking gewy aan son-hoeke, en die gebruik van sonkaarte, berekenaars en kantelende modelle is verduidelik. Eksterne beskaduwing is aan die hand gedoen as effektiewe metode om sonhitte te beheer, aangesien vensters aanleiding gee tot 'n vermeerdering vn die sonhitte binne-in geboue. Daar is selfs oorweging geskenk aan die moontlikheid van vensterlose geboue.

2. **Verligting en Lugreëling deur mnre. J. Bessant en R. Borgars.**

Hierdie referaat het gehandel oor die suksesvolle vervanging van die natuurlike omgewing van varslug, met spesiale verwysing na gemak in verhouding tot temperatuur en vogtigheid. 'n Opname het getoon dat stilte en reinheid uitgekanselleer word bedompigheid, 'n gebrek aan lugbeweging, foutiewe werkverrigting en die gevoel dat 'n mens in 'n „ingelegde" atmosfeer lewe. Die twee funksies van verligting, nl. die verligting van die voorwerpe waarmee gewerk word en die verligting van geboue, is ondersoek ten aansien van die algemene verhoging van verligtingspeile, kleure vir versieringsdoeleindes en die gebruik van buisligte. Die induksie-eenheidstelsel van lug-reëling, waarby 'n aantal klein eenhede op verskillende plekke in die gebou geplaas word, sowel as die dubbele geleibuisstelsel, met een geleibuis vir warmlug en een vir koue lug, is beskryf.

Daar is besprekingstyd gewy aan die plasing van aparte ligtoebehore en lugverskaffingspunte in dieselfde plafonruimte en daar is 'n saak uitgemaak vir dubbeldoelige toebehore, met spesiale verwysing na die vraagstuk van die gebruikmaking van die hittewins afkomstig van ballas en van sonhitte.

3. **Verligting en die Estetiek deur mnr. R. S. Browne.**

Hierdie referaat, wat met behulp van skyfies aangebied is, het die estetiek van verligting in die argitektuur beskryf, wat drie aspekte het, nl. die voorwerp of taak

space. Where exacting conditions of task lighting or observer comfort are required, the scope for artistic employment for lighting is limited. In other conditions such as illustrated in the slides, considerable scope exists for the designer, as to the character, direction and level of lighting. Natural daylighting of churches and cathedrals was a feature in this paper.

4. Lighting and Productivity by Messrs. J. T. Grundy and L. O. Foster.

The paper dealt with lighting in an all-electric environment, in the development of the use of natural resources efficiently and economically, i.e. productivity. Comparison of natural daylight with lighting from modern lamp sources, sodium, mercury, fluorescent, Xenon etc. was made, and a plea was made for more cooperation and less individualism in design fittings. Public lighting of streets and comparison of British and South African practice was listed. Airfield lighting, marshalling yard lighting and industrial lighting was mentioned. The need for studies of the following, was stressed:— Human environment, light sources, even standards of street lighting, air transport and industrial lighting.

5. The influence of Lighting on Safety, Health and Welfare by Mr. J. Hein Kieser.

Industrial operations are dependent on an employee's ability to see. Information on lighting of factory interiors should be provided to factory occupiers. The Factories Act prescribes minimum standards which are out of step with modern standards. Poor lighting causes eye strain, manual performance improves with better lighting. A close relation between personal injury rates and illumination is mentioned. 50 per cent. of accidents showed poor lighting was a contributory cause. Congested walkways and rubbish piles are hazardous.

6. Lighting and Glare by Mr. P. Harris.

The paper dealt with the problem of glare, which reduces the full value of a lighting system, and concentrated on the aspect of direct glare causing discomfort in commercial, industrial and public buildings.

Mention was made of the control of glare by diffusion and cut-off by shielding using louvres.

The British Zonal (BZ) method of calculation for utilisation of a lighting installation was described.

wat verlig moet word, die aanskouer en die argitektoniese ruimte wat beskikbaar is. Waar veeleisende toestande van taakbeligting of die gerief van die aanskouer nodig is, is die moontlikhede van die kunssinnige aanwending van verligting beperk. In ander toestande, soos deur die skyfies geïllustreer, bestaan daar aansienlike montlikhede vir die ontwerper vir sover dit die aard, rigting en peil van die verligting betref. Die natuurlike dag-verligting van kerke en katedrale was 'n besondere kenmerk van hierdie referaat.

4. Verligting en Produktiwiteit deur mnre. J. T. Grundy en L. O. Foster.

Hierdie referaat het gehandel oor verligting in omgewing waar elektrisiteit orals beskikbaar is en oor die rol wat dit speel in die ontwikkeling van die gebruik van natuurlike hulpbronne op 'n doeltreffende en ekonomiese wyse, dit wil sê produktiwiteit. Natuurlike daglig is vergelyk met lig afkomstig uit moderne lampe, dit wil sê natrium, kwik, fluoresserend, Xenon ens., en 'n pleidooi is gelewer vir meer samewerking en minder indiwidualisme in die ntwerp aan armature. Daar is verwys na die verligting van openbare strate en die praktyke wat in Engeland en Suid-Afrika gevolg word, is met mekaar vergelyk. Daar is melding gemaak van die verligting van vliegvelde, rangeerwerwe en nywerhede. Daar is klem gelê op die noodsaaklikheid om die volgende sake verder te bestudeer: Die menslike omgewing, ligbronne, gelykvormige standaarde van straatverligting, lugvervoer en nywerheidsverligting.

5. Die invloed van verligting op Veiligheid, Gesondheid en Welvaart deur mnr. J. Hein Kieser.

Nywerheidswerksaamhede is afhanklik van die werker se vermoë om te sien. Inligting omtrent die verligting van die binnekant van nywerheidsgeboue behoort aan die okkupeerders van fabrieke verskaf te word. Die Fabriekswet skryf minimum-standaarde voor, wat egter nie aan moderne standaarde voldoen nie. Swak verligting veroorsaak oor-ooreising en werkverrigting verbeter by verbeterde verligting. Daar is melding gemaak van die noue verband tussen persoonlike ongevallesyfers en verligting. Daar is aangetoon dat swak verligting by 50 persent van alle ongelukke 'n bydraende faktor was. Oorvol looppaadjies en vullishope is gevaarlik.

6. Verligting en Flikkering deur mnr. P. Harris.

Hierdie verhandeling het gehandel oor die probleem van flikkering, wat daartoe bydra om die volle waarde van 'n verligtingstelsel te verminder, en daar is gekonsentreer op die kwessie van direkte flikkering, wat aanleiding gee tot ongemak in handels-, nywerheids- en openbaregeboue.

Daar is melding gemaak van die beheer van flikkering by wyse van diffusie en afsnyding deur die gebruik van skerms en hortjies.

Daar is 'n beskrywing gegee van die Britse Sonale (BS) metode van berekening van die benutting van 'n verligtingsinstallasie.

7. Practical aspects of Security Lighting by Mr. D. W. Young.

Mr. Young stressed the difference between emergency lighting which is necessary when the regular source fails, and security lighting which relates to anti-sabotage activity. The prime purpose of the security lighting is to reveal to the security guards the presence of intruders in a prohibited area. The function of security lighting is to deter, reveal and assist in the arrest of intruders, apart from cloaking the movements of guards and watchmen. The merits of the alarm system where the security lightings are switched off until the alarm is raised, and the permanent system in which the security lighting is switched on from dusk to dawn, were discussed. The necessity for the use of robust lighting fittings to withstand missile impact, was stressed. Lighting levels, the use of dark clothing for watchmen, underground cables for distribution lines and the visual requirements of the guards, were discussed.

P. A. GILES, Representative.

7. Praktiese aspekte van Veiligheidsverligting deur mnr. D. W. Young:-

Mnr. Young het klem gelê op die verskil tussen noodverligting, wat nodig is as die gewone bron onklaar raak, en veiligheidsverligting, wat betrekking het op die bedrywighede van saboteurs. Die hoofdoel van veiligheidsverligting, is om aan die veiligheidswagte die teenwoordigheid van indringers in 'n verbode gebied bekend te maak. Die funksie van veiligheidsverligting is om af te skrik, te ontbloot en om die inhegtenisname van indringers te vergemaklik, terwyl dit terselfdertyd die bewegings van wagte en oppassers verberg. Die voordele van die alarmstelsel, waar die ligte afgeskakel bly totdat alarm gemaak word, en die permanente stelsel, waar die veiligheidsligte van skemer tot dagbreek aangeskakel bly, is bespreek. Daar is klem gelê op die noodsaaklikheid van stewige ligtoebehore, wat die aanslae van gegooide voorwerpe kan weerstaan. Voorts is daar bespreking gewy aan die kwessie van verligtingspeile, die gebruik van donker klere vir wagte, ondergrondse kabels vir verspreidingslyne en die visuele behoeftes van wagte en oppassers.

P. A. GILES, Verteenwoordiger.

OMITTED FROM LIST OF MEMBERS.

Retired Members:

A. R. Campbell.
J. S. Clinton.
B. Marchand.

UITGELAAT VAN LYS VAN LEDE.

Afgetrede Lede:

A. R. Campbell.
J. S. Clinton.
B. Marchand.

GRONDWET VAN DIE VERENIGING VAN MUNISIPALE ELEKTRISITEITSONDERNEMINGS VAN SUIDELIKE AFRIKA

CONSTITUTION OF THE ASSOCIATION OF MUNICIPAL ELECTRICITY UNDERTAKINGS OF SOUTHERN AFRICA

THE ASSOCIATION OF MUNICIPAL ELECTRICITY UNDERTAKINGS OF SOUTHERN AFRICA

CONSTITUTION

1. DEFINITIONS:

In this Constitution unless the context otherwise indicates—

(i) "Association" means the Association of Municipal Electricity Undertakings of Southern Africa referred to in this Constitution (vii)

(ii) "Convention" means the Convention of the Association referred to in clause 10; (i)

(iii) "Councillor representative" means the voting member of the council or board of a member taking representing such member undertaking and such representative shall be White; (iv)

(iv) "Executive Council" means the Executive Council referred to in clauses 14, 15, 16 and 17; (vi)

(v) "member" and "membership" shall not include affiliates, but shall include all the classes of membership for which the qualifications are set out in clause 7; (ii)

(vi) A "Technical Meeting" is that meeting of the Association held in the calendar years when there is no Convention. (v)

(vii) "Undertaking" shall mean a local authority carrying on an electricity supply undertaking. (iii)

2. REVOCATION OF PREVIOUS CONSTITUTIONS AND DATE OF EFFECT OF THIS CONSTITUTION:

(1) The provisions of any constitution of the Association previous to this constitution are repealed, and this constitution, as from time to time amended, shall be the sole constitution of the Association: Provided that this provision shall not affect the validity of anything done or any decision or action taken in terms of any such previous constitution.

(2) This constitution shall take effect from the date of adoption by the Convention.

3. FORMATION AND NAME OF THE ASSOCIATION:

(1) There shall be, and is hereby constituted, in accordance with this constitution, a voluntary association with perpetual succession, to be styled the "Association of Municipal Electricity Undertakings of Southern Africa."

VERENIGING VAN MUNISIPALE ELEKTRISITEITS-ONDERNEMINGS VAN SUIDELIKE AFRIKA

GRONDWET

1. WOORDOMSKRYWING:

In hierdie grondwet, tensy dit uit die samehang anders blyk, beteken:

(i) „Konvensie" die Konvensie van die Vereniging, waarna in klousule 10 verwys word; (ii)

(ii) „lid" en „lidmaatskap" al die klasse van lidmaatskap waarvoor die kwalifikasies in klousule 7 uiteengesit word, maar sluit nie geaffilieerdes in nie; (v)

(iii) „onderneming" 'n plaaslike bestuur wat sake doen as 'n onderneming vir die verskaffing van elektrisiteit; (vii)

(iv) „raadslid-verteenwoordiger" die lid van die Raad of bestuur van 'n lede-onderneming, welke lid sodanige onderneming verteenwoordig, 'n stem namens sodanige onderneming uitbring en 'n blanke, is; (iii)

(v) „Tegniese vergadering" die vergadering van die Vereniging wat gehou word in die kalenderjare waarin daar geen Konvensie plaasvind nie. (vi)

(vi) „Uitvoerende Raad" die Uitvoerende Raad waarna in klousule 14, 15, 16 en 17 verwys word. (iv)

(vii) „Vereniging" die Vereniging van Munisipale Elektrisiteitsondernemings van Suidelike Afrika, waarna in hierdie Grondwet verwys word (i)

2. HERROEPING VAN VORIGE GRONDWETTE EN DATUM VAN INWERKINGTREDING VAN HIERDIE GRONDWET.

(1) Die bepalings van enige grondwet van die Vereniging tot dusver van krag, word herroep, en hierdie grondwet, soos van tyd tot tyd gewysig, is die enigste grondwet van die Vereniging: Met dien verstande dat hierdie bepaling nie afbreuk doen aan die geldigheid van enigiets gedoen of enige besluit geneem ooreenkomstig enige bepaling van so 'n vorige grondwet nie.

(2) Hierdie grondwet tree in werking vanaf die datum waarop dit deur die Konvensie aanvaar word.

3. STIGTING EN NAAM VAN DIE VERENIGING.

(1) Hierby word, ooreenkomstig hierdie grondwet, 'n vrywillige vereniging met ewigdurende opvolging gestig, wat bekend staan as „Die Vereniging van Munisipale Elektrisiteitsondernemings van Suidelike Afrika".

(2) The Association shall be capable, in its own name, independently of its members, of suing and being sued, and of purchasing or otherwise acquiring, holding and managing movable and immovable property, or any interest or right therein, and of disposing of such property whether by sale, lease or otherwise.

4. OBJECTS OF THE ASSOCIATION:

The objects of the Association shall be:

(i) To promote the interest of undertakings and to collaborate with other technical bodies.

(ii) To bring together municipal councillors, electrical engineers and all persons interested in the advancement and development of undertakings; to promote wider contact and exchange of views;

(iii) To arrange and hold conventions and technical meetings for the reading on papers, the discussion of subjects appertaining to undertakings, and to make recommendations on matters requiring common action.

(iv) To form branches of undertakings geographically so situated that they have common interests;

(v) To take such action as may be lawful and expedient for the protection and extension of the rights and interests of undertakings;

(vi) To affiliate or seek membership of such bodies.

5. PROPRIETARY RIGHTS OF MEMBERS AND LIMITATION OF LIABILITY:

(1) No member or affiliate shall, by virtue of such membership or affiliation have any proprietary right, title or claim to, or interest in, any of the property of the Association.

(2) The liability of any member or affiliate of the Association for any obligation of the Association shall be limited to the annual contribution payable by such member or affiliate.

6. MEMBERS AND AFFILIATES:

(1) The membership of the Association shall consist of undertakings and natural persons who are White and who are situated or living in the Republic of South Africa, Rhodesia, South West Africa or any border territory. All the members of the Association as at the date of the adoption of this constitution shall remain members of the Association in terms of this constitution.

(2) The membership of natural persons shall be classified as follows:—

(i) honorary members;
(ii) engineer members;
(iii) associate members;
(iv) associates;

(2) Die Vereniging is bevoeg om, in sy eie naam en onafhanklik van sy lede, te dagvaar en gedagvaar te word, om roerende goedere of vaste eiendom of enige belang daarin of reg ten opsigte daarvan te koop of andersins te verkry, om sodanige roerende goedere of vaste eiendom te hou en te bestuur en om dit te verkoop, te verhuur, of andersins daaroor te beskik.

4. DOELSTELLINGS VAN DIE VERENIGING.

Die doelstellings van die Vereniging is:

(i) Om die belange van ondernemings te bevorder en om met ander tegniese liggame saam te werk;

(ii) Om munisipale raadslede, elektrotegniese ingenieurs en alle persone met belang in die bevordering en ontwikkeling van ondernemings, bymekaar te bring; om wyer kennismaking en die wisseling van beskouings te bevorder;

(iii) Om konvensies en tegniese vergaderings te reël en te hou vir die lewering van verhandelinge, die bespreking van onderwerpe wat betrekking het op ondernemings en om aanbevelings te maak oor sake wat gemeenskaplike optrede verg.

(iv) Om takke te vorm van ondernemings wat geografies so geleë is dat hulle gemeenskaplike belange het;

(v) Om wettige stappe te doen wat raadsaam is vir die beskerming en uitbreiding van die regte en belange van ondernemings;

(vi) Om te affilieer met, of lidmaatskap te verkry van sodanige liggame.

5. EIENDOMSREG VAN LEDE EN BEPERKING VAN AANSPREEKLIKHEID.

(1) Geen lid of geaffilieerde verkry, op grond van sy lidmaatskap of geaffilieerde lidmaatskap, enige eiendomsreg, titel of eis ten opsigte van, of belang in, enige eiendom van die Vereniging nie.

(2) Die aanspreeklikheid van enige lid of geaffilieerde van die Vereniging vir enige verbintenis van die Vereniging is beperk tot die jaarlikse bydrae deur hom betaalbaar.

6. LEDE EN GEAFFILIEERDES.

(1) Die lede van die Vereniging bestaan uit ondernemings en natuurlike persone wat Blankes is en wat in die Republiek van Suid-Afrika, Rhodesië, Suidwes-Afrika, of enige aangrensende gebied geleë is of woon. Almal wat op die datum van aanvaarding van hierdie grondwet lede van die Vereniging is, behou hul lidmaatskap ingevolge hierdie grondwet.

(2) Lede wat natuurlike persone is, word soos volg ingedeel:—

(i) ere-lede;
(ii) ingenieur-lede;
(iii) geassosieerde lede;
(iv) geassosieerdes;

(v) technical associates;
(vi) retired members.

(3) The Executive Council may admit as affiliates such commercial and/or industrial undertakings or technical bodies as it may deem fit. Such affiliates shall be entitled to be represented at Convention by such number of representatives as may be fixed by the Executive Council, but such representatives shall not be entitled to vote.

(4) An authorised electricity undertaking, other than an undertaking as defined in Clause 1, engaged in the supply of electricity in the area of jurisdiction of a local authority, may be admitted to the status of associate undertaking. Such associate undertakings shall be entitled to be represented at the Convention by such a number of representatives as may be fixed by the Executive Council, but such representatives shall not be entitled to vote.

7. QUALIFICATION OF MEMBERS:

(1) To qualify for membership as an undertaking, the local authority carrying on an electricity supply undertaking, shall have as manager of the undertaking a chief engineer or other person on the permanent staff of such local authority, who shall have such experience and hold such qualifications as may be acceptable to the Executive Council and who is himself an engineer member or an associate.

(2) The membership qualifications for natural persons shall be:—

(i) **Honorary Members:** shall be distinguished persons who are, or have been, intimately connected with municipal electricity undertakings, whom the Association desires to honour for outstanding services in connection therewith.

(ii) **An Engineer Member:** shall be a chief engineer in charge of the member undertaking of a local authority, who has such experience and holds such qualifications as may be acceptable to the Executive Council: Provided that where such an undertaking has sales over 25,000,000 units per annum, the functional deputy chief engineer may, with the approval of the Executive Council, be admitted to the status of an engineer member. Such engineer thus admitted may deputise for the chief engineer at a meeting of the Executive Council where the chief engineer is a member of the Executive Council.

(iii) **Associate Members:** Where an engineer member ceases to hold a qualifying position, he may be admitted by the Executive Council to associate membership.

(iv) **Associates:** Where a member undertaking does not employ a person in charge who has

(v) tegniese geassosieerdes;
(vi) afgetrede lede.

(3) Die Uitvoerende Raad kan na goeddunke handelsen/of nywerheidsondernemings of tegniese liggame as geaffilieerdes toelaat. Sodanige geaffilieerdes kan by die Konvensie verteenwoordig word deur soveel verteenwoordigers as wat die Uitvoerende Raad vasstel, maar sulke verteenwoordigers is nie stemgeregtig nie.

(4) 'n Gemagtigde elektrisiteitsonderneming, (uitgesonderd 'n onderneming in Klousule (1) omskryf) wat elektrisiteit in die regsgebied van 'n plaaslike owerheid verskaf, kan as geassosieerde onderneming toegelaat word. So 'n geassosieerde onderneming kan by die Konvensie verteenwoordig word deur soveel verteenwoordigers as wat die Uitvoerende Raad vastel, maar sulks verteenwoordigers is nie stemgeregtig nie.

7. KWALIFIKASIES VAN LEDE.

(1) Om te kwalifiseer vir lidmaatskap as 'n onderneming, moet die plaaslike owerheid wat 'n elektrisiteitsvoorsieningsonderneming beheer, as bestuurder van die onderneming 'n hoofingenieur of ander persoon op sy permanente personeel hê, wat ondervinding en kwalifikasies besit wat vir die Uitvoerende Raad aanvaarbaar is en wat self 'n ingenieur-lid of geassosieerde is.

(2) Die volgende is die kwalifikasies vir lidmaatskap van natuurlike persone:

(i) **Ere-lede** is persone wat hulself onderskei het en wat in noue verband staan of gestaan het met munisipale elektrisiteitsondernemings en aan wie die Vereniging eer wil betoon vir uitstaande dienste in verband daarmee.

(ii) **'n Ingenieur-lid** is die hoofingenieur in bevel van 'n onderneming van 'n plaaslike bestuur wat lid is van die Vereniging, welke hoofingenieur die ondervinding en kwalifikasies besit wat vir die Uitvoerende Raad aanvaarbaar is: Met dien verstande dat as 'n onderneming meer as 25,000,000 eenhede per jaar verkoop, die funksionele adjunkhoofingenieur, met die goedkeuring van die Uitvoerende Raad, tot die status van 'n ingenieur-lid toegelaat kan word. 'n Ingenieur wat aldus toegelaat is, kan in die plek van die hoofingenieur by 'n vergadering van die Uitvoerende Raad waarneem, indien die hoofingenieur 'n lid van die Uitvoerende Raad is.

(iii) **Geassosieerde lede:** As 'n ingenieur-lid ophou om 'n kwalifiserende betrekking te beklee, kan hy deur die Uitvoerende Raad as geassosieerde lid toegelaat word.

(iv) **Geassosieerdes:** As 'n onderneming wat lid van die Vereniging is, 'n persoon in bevel

the experience and qualifications acceptable to the Exeutive Council for engineer membership, such person in charge may be admitted to the status of associate.

(v) **Technical Associates:** With the approval of the Executive Council, one or more assistant engineer on the permanent staff of a member undertaking may be admitted to the status of technical associate. Such engineer/s must be over 30 years of age, be a fully qualified professional engineer and hold a senior position in his undertaking.

(vi) **Retired Members:** Where an engineer member or an associate retires on superannuation and is in good standing and has been a member of the Association for not less than 20 years, he may be admitted as a retired member.

(3) Persons who were designated "associates" prior to the adoption of this Constitution, shall henceforth be designated "associate members."

8. ADMISSION AS MEMBERS OR AFFILIATES:

(1) Applications for admission as members, excluding honorary members, or affiliates shall be in such form and contain such particulars as the Executive Council may prescribe.

(2) The right to admit members and affiliates, but not honorary members, shall be vested in the Executive Council.

(3) Honorary members shall be elected by the Convention on the recommendation of the Executive Council.

9. MEMBERSHIP CONTRIBUTIONS:

(1) Membership contributions shall be due and payable annually in advance on the first day of March.

(2) Honorary members shall not be required to pay membership contributions.

(3) Member undertakings shall pay membership contributions on the following scale:

Quantity of Electricity sold by the member undertakings per annum	Membership Contribution per annum (Rand)
Up to ½m. kW. hours sold	15
Over ½m. to ½m. kW. hours	17
Over ½m. to 1m. kW. hours	21
Over 1m. to 5m. kW. hours	25
Over 5m. to 25m. kW. hours	30
Over 25m. to 125m. kW. hours	35
Over 125m. to 500m. kW. hours	45
Over 500m. to 1000m. kW. hours	55
Over 1000m. kW. hours	65

in diens het wat nie oor ondervinding en kwalifikasies beskik wat vir die Uitvoerende Raad aanvaarbaar is vir ingenieur-lidmaatskap nie, kan sodanige persoon in bevel tot die status van geassosieerde toegelaat word.

(v) **Tegniese Geassosieerdes:** Een of meer assistent-ingenieurs op die permanente personeel van 'n lidonderneming, kan met goedkeuring van die Uitvoerende Raad as tegniese geassosieerdes toegelaat word. So 'n ingenieur moet ouer as 30 jaar en 'n ten volle gekwalifiseerde professionele ingenieur wees en moet voorts 'n senior betrekking by sy onderneming beklee.

(vi) **Afgetrede lede:** As 'n ingenieur-lid of 'n geassosieerde by die bereiking van die ouderdomsgrens aftree, en nog 'n presterende lid van die Vereniging is, kan hy as „afgetrede lid" toegelaat word, mits hy minstens 20 jaar lank lid van die Vereniging was.

(3) Persone wat voor die aanname van hierdie grondwet „geassosieerdes" genoem is, staan voortaan bekend as „geassosieerde lede".

8. TOELATING AS LEDE OF GEAFFILIEERDES.

(1) Aansoeke om toelating as lede, (uitgeslote erelede) of geaffilieerdes moet in die vorm wees en die besonderhede bevat wat die Uitvoerende Raad voorskryf.

(2) Die reg om lede en geaffilieerdes, (maar nie erelede nie) toe te laat, berus by die Uitvoerende Raad.

(3) Ere-lede word deur die Konvensie verkies op aanbeveling van die Uitvoerende Raad.

9. LEDEGELDE.

(1) Ledegelde is **jaarliks vooruit** op die eerste dag van Maart verskuldig en betaalbaar.

(2) Ere-lede betaal geen ledegelde nie.

(3) Ondernemings wat lede is, betaal ledegelde ooreenkomstig die onderstaande skaal:

Hoeveelheid elektrisiteit per jaar deur die lid-onderneming verkoop.	Ledegelde Per Jaar (Rand)
Tot en met ½m. kW-uur	R15
Meer as ½m. tot ½m. kW-uur	R17
Meer as ½m. tot 1m. kW-uur	R21
Meer as 1m. tot 5m. kW-uur	R25
Meer as 5m. tot 25m. kW-uur	R30
Meer as 25m. tot 125m. kW-uur	R35
Meer as 125m. tot 500m. kW-uur	R45
Meer as 500m. tot 1000m. kW-uur	R55
Meer as 1000m. kW-uur	R65

(4) Engineer members, associates, retired members and technical associates shall not be required to pay membership contributions, but associate members as defined in clause 7(2)(iii) shall pay R4.50 per annum membership contribution.

(5) Members, associate undertakings and affiliates shall pay membership contributions for the whole year in which they are admitted as contribution paying members. They shall, however, be entitled to receive a copy of the Proceedings of the Convention or Technical Meeting or any other publication issued by the Association during such year.

(6) Any member, associate undertaking or affiliate whose membership contribution is outstanding as at the 30th April in respect of the previous financial year shall forfeit his membership, and the Executive Council may suspend all rights and privileges of membership or remove his name from the register of members. Such member shall, nevertheless, be liable for arrear contribution up to and including the year of his removal from the register.

(7) Affiliates and associate undertakings shall on the 1st day of March of each year pay such contributions as the Executive Council may determine.

10. CONVENTION AND TECHNICAL MEETINGS.

(1) The Association, except where in the opinion of the Executive Council there are exceptional circumstances, shall hold bi-ennial Conventions or Technical Meetings of members.

(2) The Executive Council may invite visitors to Conventions or Technical Meetings.

(3) The venue of Convention or Technical Meeting shall be as determined by the Convention, provided that, where special circumstances dictate otherwise the Executive Council may determine the venue.

(4) The Convention or Technical Meeting shall deal with such matters as are on its agenda. Any member shall be entitled to place a motion on the agenda. A motion to be placed on the agenda shall be submitted for acceptance by the Executive Council to the Secretary/Treasurer not less than two months before the date of Convention or Technical Meeting and shall fall within the objects of the Association.

(5) The Convention may decide on any matter affecting the Association, save matter delegated by this constitution to the Executive Council.

(6) The Technical Meeting may decide on any technical matter but not affecting this constitution, finances of the Association nor policy matters for which city/town Councillors are responsible.

(4) Ingenieur-lede, geassosieerdes, afgetrede lede en tegniese geassosieerdes betaal geen ledegelde nie, maar geassosieerde-lede, soos in klousule 7(2)(iii) omskryf, betaal ledegelde van R4.50 per lid per jaar.

(5) Lede, geassosieerde ondernemings en geaffilieerdes betaal ledegelde vir die hele jaar waarin hulle as betalende lede toegelaat is. Hulle is egter daarop geregtig om 'n eksemplaar van die verrigtinge van die Konvensie, of van die Tegniese Vergadering, of van enige ander publikasie deur die Vereniging gedurende sodanige jaar uitgereik, te ontvang.

(6) Enige lid, geassosieerde onderneming of geaffilieerde wie se ledegelde op 30 April agterstallig is ten opsigte van die vorige finansiële jaar, verbeur sy lidmaatskap, en die Uitvoerende Raad kan al sy regte en voordele van lidmaatskap ophef, of sy naam van die lederegister verwyder. Hy bly egter aanspreeklik vir die betaling van uitstaande ledegelde tot en met die jaar van sy verwydering van die register.

(7) Geaffilieerdes en geassosieerde ondernemings betaal op die eerste dag van Maart van elke jaar die bydrae wat die Uitvoerende Raad bepaal.

10. KONVENSIE EN TEGNIESE VERGADERINGS.

(1) Tensy daar, volgens die mening van die Uitvoerende Raad, buitengewone omstandighede bestaan, hou die Vereniging al om die tweede jaar 'n Konvensie van lede of 'n Tegniese Vergadering.

(2) Die Uitvoerende Raad kan besoekers na die Konvensie of Tegniese Vergadering uitnooi.

(3) Die Konvensie of Tegniese Vergadering vind plaas op die plek deur die Konvensie bepaal, met dien verstande dat, as spesiale omstandighede ontstaan, die Uitvoerende Raad die vergaderplek kan bepaal.

(4) Die Konvensie of Tegniese Vergadering behandel die aangeleenthede wat op sy sakelys verskyn. Enige lid kan 'n voorstel vir bespreking op die sakelys plaas. 'n Voorstel wat op die sakelys geplaas moet word, word eers aan die Uitvoerende Raad vir aanname voorgelê, en moet die Sekretaris/Tesourier tenminste twee maande voor die datum van die Konvensie of Tegniese Vergadering bereik en moet binne die bestek van die doelstellings van die Vereniging val.

(5) Die Konvensie besluit oor enige saak wat die Vereniging raak, behalwe deur sake deur hierdie grondwet aan die Uitvoerende Raad gedelegeer.

(6) Die Tegniese Vergadering kan oor enige tegniese aangeleentheid besluit, uitgesonderd sake rakende hierdie grondwet, die finansies van die Vereniging, of beleidsaangeleenthede waarvoor stadsraadslede verantwoordelik is.

11. VOTING BY MEMBERS:

(1) Each member undertaking shall be entitled to two representatives with voting rights at Convention or Technical Meeting. One such representative shall be a member of the Council or the Board of the member undertaking duly appointed as such by the undertaking. The other such representative shall be the engineer member or associate in charge of the member undertaking.

(2) Subject to the requirements of clause 12(5), Honorary Members and Associate Members have voting rights at Convention or Technical Meeting.

12. PROCEDURE AT CONVENTION OR TECHNICAL MEETING:

(1) The President of the Asociation shall take the chair at the Convention or Technical Meeting, or, in his absence, the President Elect. In the absence of both the President and the President Elect, the Convention or Technical Meeting may elect a member of the Executive Council as chairman, or should no member of the Executive Council be present, any other member. The decision of the chairman of the Convention or Technical Meeting on any point of order or question of procedure shall be final.

(2) Thirty representatives of member undertakings duly appointed with voting rights shall form a quorum.

(3) Save as provided in sub-clause (5), each decision of Convention or Technical Meeting shall be by majority vote of those present and entitled to vote.

(4) Voting shall be by show of hands, save when Convention or Technical Meeting decides that the voting on a matter shall be by ballot or by secret ballot.

(5) A representative at Convention of a member undertaking may move that a matter be decided by sectional voting as between the council/board representatives and the engineers/associates in charge of member undertakings.

If such motion is seconded, and fifteen or more representatives of member undertakings indicate that they are in favour of the matter under consideration being decided by sectional vote, then the chairman of the Convention shall call for a sectional vote, whereupon each of the sections defined above shall vote separately on the motion.
Unless a majority shall be obtained in both sections the motion shall be lost.

(6) In the event of an equality of votes on any motion, the motion shall be deemed lost.

(7) The Convention shall be open to the public, and the press shall be invited to the Convention and

11. STEMMING DEUR LEDE.

(1) Elke onderneming wat lid is van die Vereniging, is by die Konvensie of Tegniese Vergadering geregtig om twee verteenwoordigers met stemreg. Een sodanige verteenwoordiger moet 'n lid van die Raad of Bestuur van die onderneming en behoorlik as verteenwoordiger aangewys wees. Die ander verteenwoordiger is die ingenieur-lid of geassosieerde in bevel van die lid-onderneming.

(2) Onderworpe aan die bepalings van Klousule 12 (5) het ere-lede en geassosieerde-lede stemreg by die Konvensie of Tegniese Vergadering.

12. PROSEDURE BY DIE KONVENSIE OF TEGNIESE VERGADERING:

(1) Die President van die Vereniging tree as voorsitter op by die Konvensie of Tegniese Vergadering of, in sy afwesigheid, die Aangewese President. In die afwesigheid van beide die President en die Aangewese President, kan die Konvensie of Tegniese Vergadering 'n lid van die Uitvoerende Raad as voorsitter kies of, indien daar geen lid van die Uitvoerende Raad as voorsitter is nie, dan enige ander lid. Die beslissing van die voorsitter aangaande enige punt van orde is finaal.

(2) Dertig behoorlik benoemde, stemgeregtigde verteenwoordigers van lede-ondernemings vorm 'n kworum.

(3) Uitgesonderd soos in sub-klousule (5) bepaal, word elke besluit van die Konvensie of Tegniese Vergadering by meerderheidstem van die stemgeregtigdes teenwoordig geneem.

(4) Daar word deur die opsteek van hande gestem, dog wanneer die Konvensie of Tegniese Vergadering so besluit, word daar oor 'n besondere saak per stembriefie of per geheime stemming met stembriefies gestem.

(5) 'n Verteenwoordiger van 'n lede-onderneming kan voorstel dat daar oor 'n saak besluit word by deelstemming, met die raadslid-verteenwoordigers as een afdeling en die ingenieurs/geassosieerders in bevel van lede-ondernemings as die ander afdeling.

As so 'n voorstel gesekondeer word, en minstens vyftien verteenwoordigers van lede-ondernemings dit steun, beveel die voorsitter 'n deelstemming, waarna die twee afdelings, soos hierbo omskrywe, apart oor die saak stem.

Tensy 'n meerderheid in albei afdelings vir die voorstel stem, word dit verwerp.

(6) As daar oor enige voorstel 'n staking van stemme is, word die voorstel verwerp.

(7) Die Konvensie is vir die publiek toeganklik, en die pers word na die konvensie uitgenooi en

shall be given full particulars as far as may be conveniently arranged; Provided that the Convention may decide to discuss any matter before it in committee whereupon only members and representatives of member undertakings shall be entitled to be present: Provided further that the Convention may in such event, in its absolute discretion, permit any other person to be present.

13. THE PRESIDENT AND PRESIDENT ELECT:

The Convention shall elect a President of the Association and a President Elect, who shall be engineer members representing undertakings and who shall hold office until the next Convention. If either of these office bearers be not available to perform his duties the Executive Council shall be empowered to fill the vacancy until the next Convention.

14. EXECUTIVE COUNCIL:

(1) The following Engineer Members shall be members of the Executive Council of the Association:
   (i) The President;
   (ii) The President Elect;
   (iii) The representative for the time being of duly constituted regional branches of the Association;
   (iv) Six Engineer members other than those already mentioned who shall be elected by the Convention, but not more than two of whom shall be from any one province of the Republic or any other territory.

(2) The eight councillor representatives of the undertakings whose Engineer members are members of the Executive Council in terms of (i), (ii) and (iv) above shall be members of the Executive Council of the Association.

15. PERIOD OF OFFICE OF EXECUTIVE COUNCIL: CASUAL VACANCIES: CO-OPTION:

(1) The Executive Council hall hold office until the election of a new Executive Council at the next Convention has taken place.

(2) Should a vacancy occur in the membership of the Executive Council, the Executive Council shall be empowered to fill such vacancy.

(3) The Executive Council may, if it considers that the objects of the Association will thereby be advanced and by not less than a two-thirds majority of those present at the meeting, co-opt any person to serve on The Executive Council for a special purpose. Such person's membership, if not previously terminated by the Executive Council, shall terminate at the first ensuing Convention; but he may again be co-opted.

sover doenlik van volle besonderhede voorsien, maar die Konvensie kan besluit om enige saak in Komitee te bespreek, waarna slegs lede en verteenwoordigers van lede-ondernemings die reg het om teenwoordig te wees: Met dien verstande dat die Konvensie by so 'n geleentheid na goeddunke enige ander persoon kan toelaat om teenwoordig te wees.

13. DIE PRESIDENT EN DIE AANGEWESE PRESIDENT.

Die Konvensie kies 'n President en 'n Aangewese President van die Vereniging, wat albei ingenieurlede is en lede-ondernemings verteenwoordig. Hul dienstermyn strek tot by die volgende Konvensie, en as een van hierdie ampsdraers nie beskikbaar is om sy pligte te vervul nie, kan die Uitvoerende Raad die vakature tot by die volgende Konvensie vul.

14. UITVOERENDE RAAD.

(1) Die volgende ingenieur-lede is lede van die Uitvoerende Raad van die Vereniging:
   (i) Die President;
   (ii) Die Aangewese President;
   (iii) Die persone wat as dan behoorlik saamgestelde streektakke van die Vereniging verteenwoordig.
   (iv) Ses ingenieur-lede (behalwe die reeds genoemdes) deur die Konvensie verkies, met dien verstande dat nie meer as **twee** van hulle van enige provinsie van die Republiek of van enige ander gebied afkomstig is nie.

(2) Die agt raadslid-verteenwoordigers van lede-ondernemings wie se ingenieur-lede kragtens Klousule 14(i), (ii) en (iv) hierbo as lede van die Uitvoerende Raad verkies is, is ook lede van die Uitvoerende Raad van die Vereniging.

15. AMPSTERMYN VAN DIE UITVOERENDE RAAD: TOEVALLIGE VAKATURES EN KO-OPTERING.

(1) Die Uitvoerende Raad dien as sodanig totdat 'n nuwe Uitvoerende Raad by die volgende Konvensie verkies is.

(2) Indien daar 'n vakature in die Uitvoerende Raad ontstaan, kan die Uitvoerende Raad die vakature vul.

(3) Die Uitvoerende Raad kan, as hy meen dat die doelstellings van die Vereniging daardeur bevorder sal word, en mits minstens twee-derdes van die stemgeregtigdes op 'n vergadering daarvoor stem, enige persoon ko-opteer om vir 'n besondere doel op die Uitvoerende Raad te dien. Sodanige persoon se lidmaatskap eindig by die eersvolgende Konvensie tensy dit vroeër deur die Uitvoerende Raad beëindig word, maar hy kan daarna weer gekoöpteer word.

16. DUTIES AND POWERS OF THE EXECUTIVE COUNCIL.

The affairs of the Association shall be managed by the Executive Council in terms of this constitution and the decisions of the Convention or Techhnical Meeting. The Executive Council shall be empowered to carry out the objects of the Association and in particular to exercie the following powers on behalf of the Association, such powers being in addition to the powers already hereinbefore assigned to the Executive Council:—

(a) To receive, administer and apply the monies and other property of the Association, and to invest monies not immediately required by the Association, and to vary or realise any investments.

(b) To enter into any contract on behalf of the Association and to institute, or cause to be instituted, conduct, or cause to be conducted, defend or cause to be defended, settle or abandon any legal proceedings by or against the Association.

(c) To authorise signature of any document on behalf of the Association: Provided that all documents involving the finances of the Association shall be signed by the Secretary/Treasurer and by at least one member of the Executive Council authorised thereto either generally or specifically by the Executive Council.

(d) To appoint such standing or ad hoc committees of members of the Executive Council as it may determine and define their terms of reference and powers.

(e) To regulate its meetings and the meetings of its standing or ad hoc committees.

(f) To appoint and dismiss officials, the appointment being in no case subject to a longer period of notice of termination than one year.

(g) To pay travelling costs and subsistence allowances to any person where it deems it necessary to do so in the interests of the Association.

17. MEETINGS AND PROCEDURE OF THE EXECUTIVE COUNCIL:

(1) The Executive Council shall meet as often as the business of the Association may require, but at least one meeting per year shall be held at a suitable time between Conventions and/or Technical Meetings.

(2) Eight members shall constitute a quorum at a meeting of the Executive Council.

(3) The President shall preside at meetings of the Executive Council, and, in his absence, the Executive Council shall elect a chairman for the meeting from its members.

16. PLIGTE EN BEVOEGDHEDE VAN DIE UITVOERENDE RAAD.

Die sake van die Vereniging word deur die Uitvoerende Raad ooreenkomstig hierdie grondwet en die besluite van die Konvensie of Tegniese Vergadering bestuur. Die Uitvoerende Raad kan die doelsellings van die Vereniging uitvoer en kan, benewens die bevoegdhede wat reeds hierin aan die Uitvoerende Raad toegewys is, ook die volgende bevoegdhede namens die Vereniging uitoefen:—

(a) Om die gelde en ander eiendom van die Vereniging te ontvang, te administreer en aan te wend en om gelde wat nie onmiddellik deur die Vereniging benodig word nie, te belê en om sodanige beleggings te wysig of tot geld te maak.

(b) Om enige kontrak namens die Vereniging te sluit en om enige regsgeding namens die Vereniging in te stel, of te laat instel, te voer of te laat voer, of te skik of te laat vaar, asook om enige regsgeding teen die Vereniging te verweer of te skik.

(c) Om die ondertekening van enige dokument namens die Vereniging te magtig: Met dien verstande dat alle dokumente waarby die geldsake van die Vereniging betrokke is, deur die Sekretaris/Tesourier en ten minste een lid van die Uitvoerende Raad, wat in die algemeen of spesifiek deur die Uitvoerende Raad daartoe gemagtig is, onderteken word.

(d) Om na goeddunke vaste of ad hoc komitees uit die lede van die Uitvoerende Raad aan te stel en om hulle opdragte en bevoegdhede te omskrywe.

(e) Om sy eie vergaderings en die vergaderings van sy vaste of ad hoc komitees te reël.

(f) Om amptenare aan te stel en te ontslaan, mits die aanstelling in geen geval onderworpe is aan 'n langer diensopseggingstydperk as een jaar nie.

(g) Om reis- en verblyfkoste aan enige persoon te betaal, as dit nodig en in die belang van die Vereniging beskou word.

17. VERGADERINGS EN PROSEDURE VAN DIE UITVOERENDE RAAD.

(1) Die Uitvoerende Raad vergader so dikwels as wat die sake van die Vereniging dit mag vereis, maar daar word minstens een vergadering per jaar op 'n geleë tyd tussen Konvensies en/of Tegniese Vergaderings gehou.

(2) Agt lede vorm 'n kworum by 'n vergadering van die Uitvoerende Raad.

(3) Die President tree as voorsitter op by vergaderings van die Uitvoerende Raad, en, in sy afwesigheid, die Aangewese President. As hulle albei afwesig is, kies die Uitvoerende Raad uit sy lede 'n voorsitter vir die vergadering.

18. FINANCIAL YEAR OF THE ASSOCIATION:

The Financial Year of the Association shall commence on 1st March of each year.

19. SECRETARY/TREASURER:

(1) The Executive Council shall appoint a Secretary/Treasurer who shall be the chief official of the Association. His services shall be terminable by not more than one year's notice by the Executive Council. Any vacancy in this position shall be filled by the Executive Council.

(2) The Executive Council shall determine the remuneration and duties of the Secretary/Treasurer whose duties shall include the keeping of a register of members and affiliates of the Association, the keeping of the accounts of the Association, the editing of the Association's news letters, the undertaking of the headquarters organisation of Conventions or Technical Meetings, the secretarial work connected with the Convention and Technical Meeting, the Executive Council and the committees, the presentation to the Convention of the Report and Balance Sheet of the Association. The Secretary/Treasurer shall present to the Executive Council a Statement of Accounts for each Financial year.

20. HONORARY LEGAL ADVISER AND AUDITOR:

The Executive Council may from time to time appoint an Honorary Legal Adviser to the Association and shall appoint an Auditor.

21. PUBLICITY:

The President with the Secretary/Treasurer may make such statements to the press as they may consider to be in the interest of the Association or of undertakings generally.

22. REGIONAL BRANCHES:

(1) The Executive Council may authorise the formation of a regional branch of the Association on an application signed by the representatives of at least three member undertakings. Such application shall state the circumstances which make the formation of the proposed regional branch desirable and shall indicate what undertakings should fall within the region. Such undertakings shall constitute the regional branch as may be approved by the Executive Council, and no undertaking shall be added to the branch without the approval of the Executive Council.

(2) Each regional branch may draft its own branch constitution and rules of procedure, but a copy of the branch constitution and rules shall be lodged with the Secretary/Treasurer within three months of the date of the authority to form such regional branch. The branch constitution and

18. FINANSIËLE JAAR VAN DIE VERENIGING.

Die finansiële jaar van die Vereniging begin op 1 Maart van elke jaar.

19. SEKRETARIS/TESOURIER.

(1) Die Uitvoerende Raad stel 'n Sekretaris/Tesourier aan en hy is die hoofamptenaar van die Vereniging. Sy dienste kan deur die Uitvoerende Raad met hoogstens een jaar kennisgewing beëindig word. Enige vakature in hierdie amp word deur die Uitvoerende Raad gevul.

(2) Die Uitvoerende Raad bepaal die besoldiging en pligte van die Sekretaris/Tesourier. Sy pligte sluit in die hou van 'n register van lede en geaffilieerdes van die Vereniging. Hy is die rekenpligtige amptenaar van die Vereniging, en redakteur van die Vereniging se nuusbriewe, hy neem die organisasie van Konvensie en Tegniese Vergaderings uit die Hoofkantoor waar, asook die sekretariële werk verbonde aan Konvensies en Tegniese Vergaderings en vergaderings van die Uitvoerende Raad en die Komitees, en sy pligte sluit in die voorlegging aan die Konvensie van die verslag en balansstaat van die Vereniging. Voorts is dit sy plig om aan die Uitvoerende Raad 'n rekeningstaat ten opsigte van elke finansiële jaar voor te lê.

20. ERE-REGSADVISEUR EN OUDITEUR.

Die Uitvoerende Raad kan van tyd tot tyd 'n ereregsadviseur vir die Vereniging aanstel, en moet ook 'n Ouditeur benoem.

21. PUBLISITEIT.

Die President en die Sekretaris/Tesourier kan gesamentlik verklarings aan die pers maak wat na hulle mening in die belang van die Vereniging of van ondernemings or die algemeen is.

22. STREEKSTAKKE.

(1) Die Uitvoerende Raad kan goedkeuring verleen vir die stigting van 'n streekstak van die Vereniging mits die verteenwoordigers van ten minste drie lede-ondernemings skriftelik daarom vra. In so 'n aansoek word die omstandighede uiteengesit wat die stigting van die voorgestelde streektak wenslik maak en aangedui watter ondernemings binne die streek resorteer. So 'n streekstak sluit die ondernemings in wat deur die Uitvoerende Raad goedgekeur word en geen onderneming word tot die Streekstak toegevoeg sonder die goedkeuring van die Uitvoerende Raad nie.

(2) Elke streekstak kan sy eie takgrondwet en prosedure-reëls opstel, maar 'n afskrif van die tak se grondwet en reëls moet by die Sekretaris/Tesourier ingedien word binne drie maande vanaf die datum van goedkeuring om die streekstak te vorm. Die tak se grondwet en prosedure-reëls is

rules of procedure shall require the approval of the Executive Council.

(3) The minutes of the meetings of regional branches shall be sent regularly to the Secretary/Treasurer, and he may use any extracts from such minutes as he may deem fit for publication in any document or publication issued by the Association.

(4) No regional branch may bind the Association in contract without the written approval of the Executive Council first had and obtained.

(5) Notwithstanding anything in this clause contained, the quorum for regional branch meetings shall be five: Provided that representatives of at least three member undertakings are present.

(6) Each Regional Branch shall advise each Convention of the Association prior to the election of the incoming Executive of the name of its representative on such incoming Executive Council.

23. DISSOLUTION OF THE ASSOCIATION:

(1) The Association may be dissolved if at least two-thirds of those entitled to vote at Convention vote in favour of such dissolution by postal ballot;

(2) No motion for the dissolution of the Association shall be considered unless all member undertakings were advised thereof at least three months prior to the consideration of the motion.

(3) Upon dissolution of the Association, the Executive Council shall be empowered to determine the terms and conditions of dissolution and the manner in which the assets of the Association shall be disposed of.

24. AMENDMENT OF CONSTITUTION:

(1) This constitution may be amended by decision of a Convention and after the Executive Council has reported to the Convention on the proposed amendment.

(2) The proposal for amendment of the Constitution must be contained in the agenda of the Convention and, unless proposed by the Executive Council, must be received in writing by the Secretary/Treasurer at least three months prior to the Convention.

25. EQUAL RECOGNITION OF THE TWO OFFICIAL LANGUAGES:

The Convention accepts English and Afrikaans as its official languages.

aan die goedkeuring van die Uitvoerende Raad onderworpe.

(3) Die notule van die vergaderings van streekstakke word gereeld aan die Sekretaris/Tesourier gestuur en hy kan na goeddunke uittreksels uit die notule in enige dokument of publikasie deur die Vereniging uitgereik, insluit.

(4) Geen streekstak kan die Vereniging sonder die voorverkreë skriftelike goedkeuring van die Uitvoerende Raad kontraktueel bind nie.

(5) Ongeag enige andersluitende bepalings van hierdie klousule is die kworum vir vergaderings van streekstakke vyf verteenwoordigers van ten minste drie lede-ondernemings.

(6) Elke streekstak stel die Konvensie voor die verkiesing van die nuwe Uitvoerende Raad in kennis van die naam van sy verteenwoordiger op die nuwe Uitvoerende Raad.

23. ONTBINDING.

(1) Die Vereniging kan ontbind word indien ten minste twee-derdes van diegene wat by die Konvensie stemreg het, by wyse van 'n posstembrief ten gunste van sodanige ontbinding stem.

(2) Geen voorstel vir die ontbinding van die Vereniging word oorweeg tensy alle lede-ondernemings ten minste drie maande voor die oorweging van die voorstel daarvan in kennis gestel is nie.

(3) By ontbinding van die Vereniging, kan die Uitvoerende Raad die voorwaardes van ontbinding bepaal asook hoe daar oor die bates van die Vereniging beskik sal word.

24. WYSIGING VAN DIE GRONDWET.

(1) Hierdie grondwet kan by besluit van die Konvensie gewysig word nadat die Uitvoerende Raad aan die Konvensie oor die voorgestelde wysiging verslag gedoen het.

(2) 'n Voorstel vir die wysiging van die grondwet word in die agenda van die Konvensie vervat en, tensy dit deur die Uitvoerende Raad voorgestel word, moet so 'n voorstel ten minste drie maande voor die Konvensie skriftelik by die Sekretaris/Tesourier ingedien word.

25. GELYKE ERKENNING VAN DIE TWEE AMPTELIKE LANDSTALE.

Die Vereniging aanvaar Afrikaans en Engels as sy amptelike tale.

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Aluminium underground cables are down to earth!

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3-core "Solidal" cable, PVC insulated, aluminium concentric neutral.
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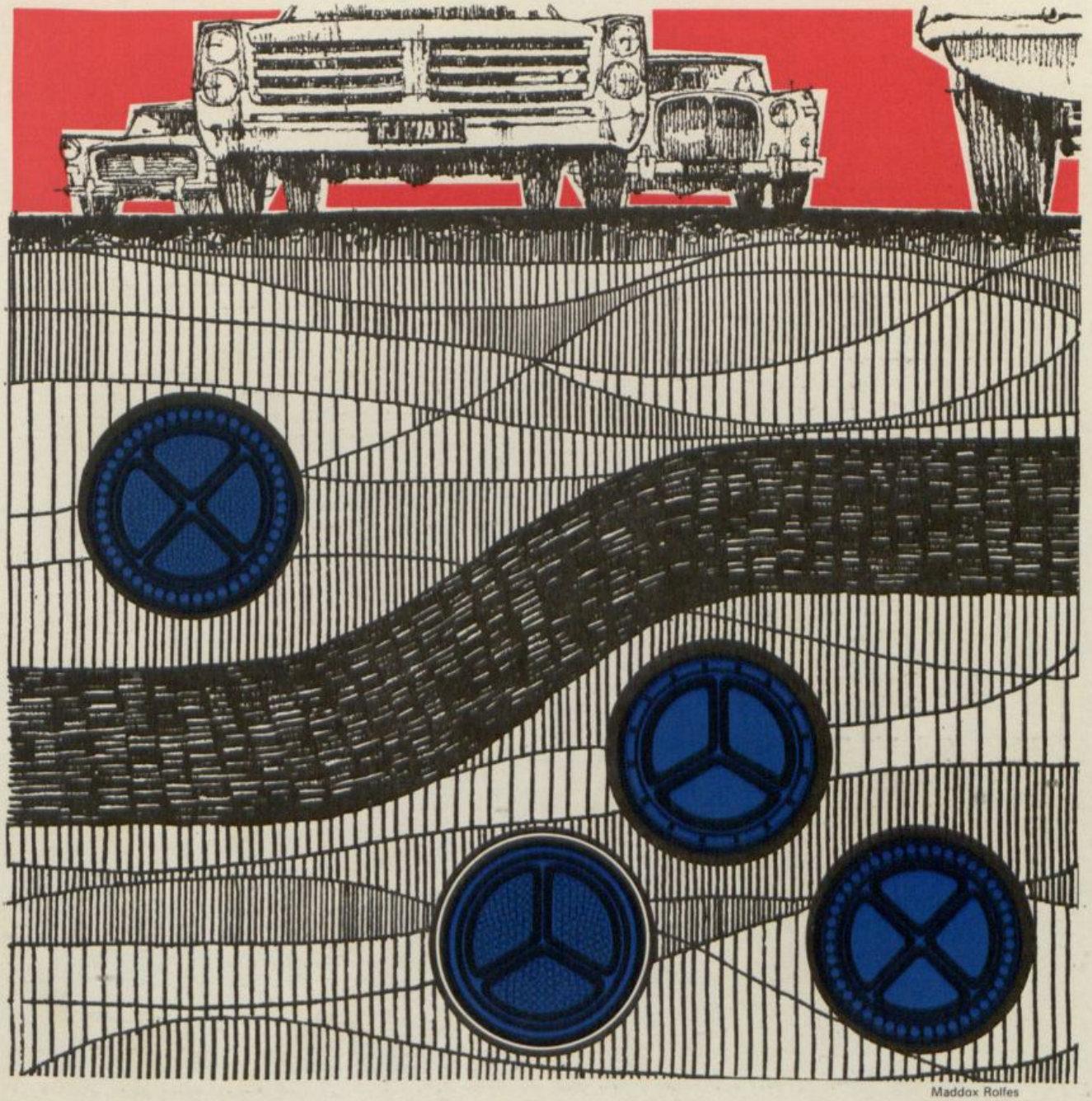

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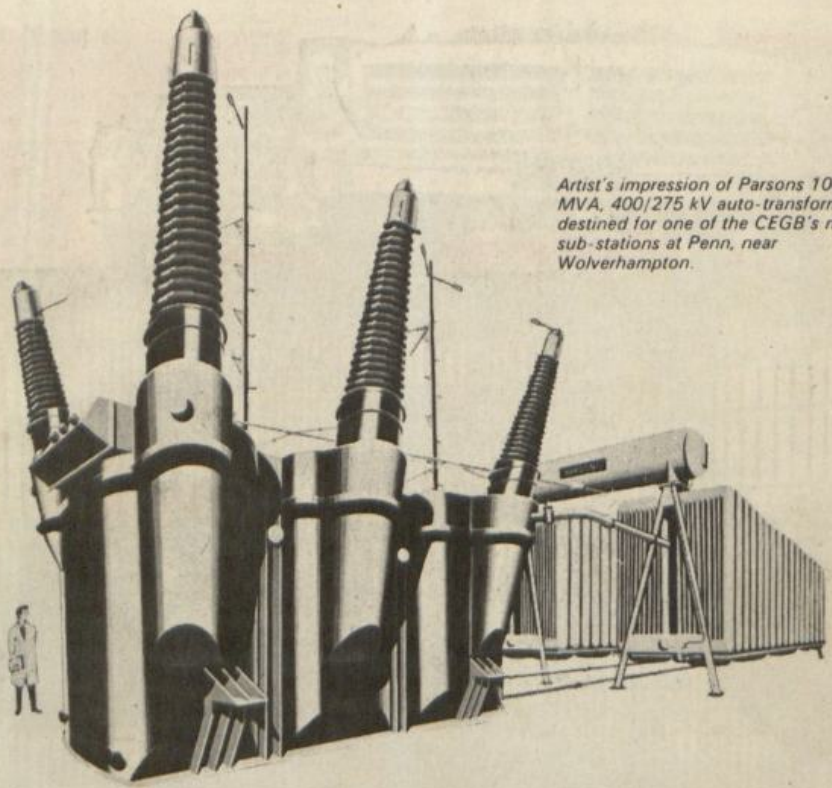
RELIABILITY

Reliability; the keyword in power transmission and distribution—is synonymous with one of the greatest names in transformer manufacture—PARSONS.

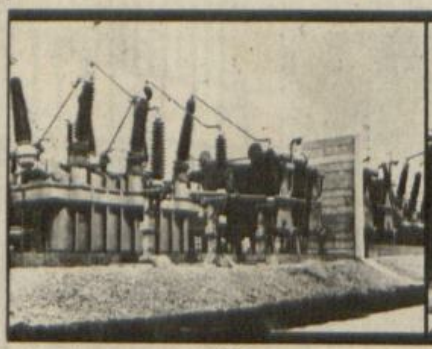
Larger and more efficient transformers are constantly being designed or are under construction at the Company's Newcastle upon Tyne Works to meet the present and future demands for electricity in all parts of the world.

With 500 MVA and 750 MVA, 400/275 kV transmission units now in service, Parsons have received orders which include one of the Central Electricity Generating Board's first 1000 MVA grid auto-transformers together with three 800 MVA, 400 kW generator transformers; the latter units being the largest generator transformers yet ordered by the Board.

These contracts mark a major advance in the size of power transformers to be used in the U.K. and re-affirm Parsons' position at the fore of international transformer development.

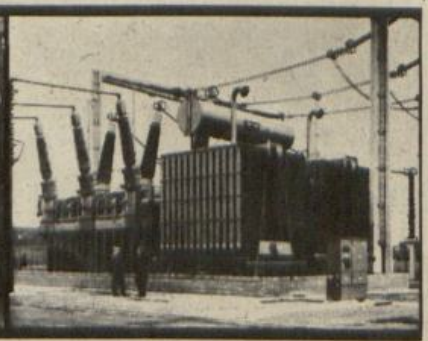


Artist's impression of Parsons 1000 MVA, 400/275 kV auto-transformer destined for one of the CEGB's new sub-stations at Penn, near Wolverhampton.



Two Parsons 500 MVA auto-transformers interconnecting the 400 kV and 275 kV grids at the Elstree sub-station, Hertfordshire.

The first of four 600 MVA generator transformers leaving Parsons Works, Newcastle upon Tyne, to be installed at Fawley power station, Southampton, connecting it to the 400 kV grid.



One of the largest rating transformers at present in operation on the British grid system, a Parsons 750 MVA, 400/275 kV auto-transformer at Monk Fryston sub-station, Yorkshire.

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