COPY FOR NAMES AND ADDRESSES OF MEMBERS. EXECUTIVE AND REGIONAL CHAIRMEN MARKED

N.B. Executive Members are correct but other membership is not up to date. Corrected list to be in 1964 Proceedings not yet printed.

VERRIGTINGS

van die

38ste KONVENSIE

19de tot 22ste Mei, 1964

te WINDHOEK

DIE VERENIGING VAN MUNISIPALE
ELEKTRISITEITSONDERNEMINGS VAN SUIDELIKE AFRIKA

PROCEEDINGS

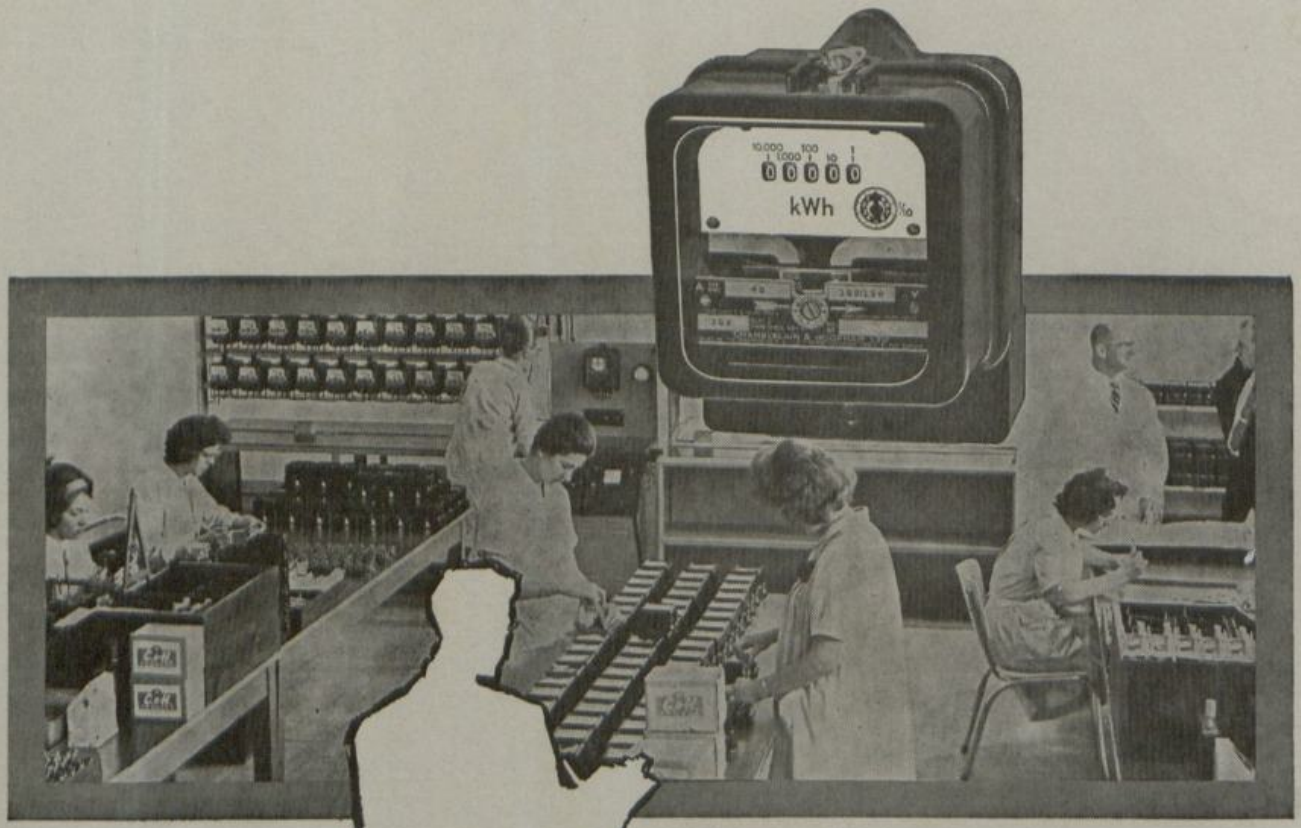
of the

38th CONVENTION

19th to 22nd May, 1964

at WINDHOEK

THE ASSOCIATION OF MUNICIPAL ELECTRICITY
UNDERTAKINGS OF SOUTHERN AFRICA



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Specially designed to withstand South Africa's severe lightning and other climatic conditions, C & H Meters offer the high standard of reliability, accuracy and serviceability that **you** demand — and still provide easy adjustment and low maintenance costs.

Manufacturing and testing potential at Wadeville has been greatly increased to meet your demand for C & H Meters rated 5/5A, 40A and 80A, while still retaining the highest degree of atmospheric cleanliness at every stage of production.

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REPRESENTING
CHAMBERLAIN & HOOKHAM LTD.

JOHANNESBURG : CAPE TOWN : DURBAN
PORT ELIZABETH : BLOEMFONTEIN

VERRIGTINGS

van die

38ste KONVENSIE

19de tot 22ste Mei, 1964

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ELEKTRISITEITSONDERNEMINGS VAN SUIDELIKE AFRIKA

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UNDERTAKINGS OF SOUTHERN AFRICA

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Middle Row: L. Lewis, Cr. R. P. Glenday, R. G. Ewing, D. Haig-Smith, Cr. D. J. Marais, Cr. J. Macgregor.
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PRESIDENT 1964-65

R. W. BARTON.

EXECUTIVE COUNCIL 1964 - 1965

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R. W. BARTON (Welkom).

President Elect:

D. MURRAY-NOBBS (Port Elizabeth).

Immediate Past Presidents:

P. A. GILES (East London);
C. LOMBARD (Germiston).

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E. E. DE VILLIERS (Carletonville);
R. LEISHMAN (Johannesburg);
G. C. THERON (Vanderbijlpark);
H. T. TURNER (Umtali);
J. K. VON AHLFTEN (Springs);
J. C. WADDY (Pietermaritzburg).

Co-opt Member:

L. LEWIS (Windhoek).

Cities or Towns Represented:

Johannesburg - Port Elizabeth - Umtali - East London - Welkom - Springs - Pietermaritzburg Germiston - Vanderbijlpark - Carletonville.

Co-opted City:

Windhoek.

Chairmen of Regional Branches:

Natal: J. L. McNEILL (Stanger) to October, 1964; J. G. F. ERIKSON (Estcourt) from October, 1964.
Cape Eastern: D. HAIG-SMITH (Cradock) to October, 1964; D. R. VERSCHOOR (Fort Beaufort) from October, 1964.
Highveld: E. E. DE VILLIERS (Carletonville) to 5th June, 1964; W. ROSSLER (Kroonstad) from 5th June, 1964.

Secretaries:

DAVIDSON & EWING (PTY.) LTD.,
P.O. Box 7462, Johannesburg.

Sub-Committees:

Papers: R. W. Barton, D. Murray-Nobbs, P. A. Giles, C. Lombard. and the President Elect.
Finance: C. Lombard (Convenor), R. Leishman.
Recommendations Committee for New Electrical Commodities: C. Lombard (Convenor), R. W. Barton (Alternate).
Rights of Supply - Industrial Consumers: C. Lombard (Convenor), P. A. Giles.

Representatives:

Electrical Wiremen's Registration Board:
C. Lombard.

UITVOERENDE RAAD 1964 - 1965

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R. W. BARTON (Welkom).

Aanstaande President:

D. MURRAY-NOBBS (Port Elizabeth).

Voormalige Presidente:

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R. LEISHMAN (Johannesburg);
G. C. THERON (Vanderbijlpark);
H. T. TURNER (Umtali);
J. K. VON AHLFTON (Springs);
J. C. WADDY (Pietermaritzburg).

Gekoöptiëerde Lid:

L. LEWIS (Windhoek).

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Johannesburg - Port Elizabeth - Umtali - East London - Welkom - Springs - Pietermaritzburg Germiston - Vanderbijlpark - Carletonville.

Gekoöptiëerde Stad:

Windhoek.

Voorsitters van Streektakke:

Natal: J. L. McNEIL (Stanger) tot Oktober, 1964; J. G. F. ERIKSON (Estcourt) vanaf Oktober, 1964.
Cape Eastern: D. HAIG-SMITH (Cradock) tot Oktober, 1964; D. R. VERSCHOOR (Fort Beaufort) vanaf Oktober, 1964.
Highveld: E. E. DE VILLIERS (Carletonville) tot 5de Junie, 1964; W. ROSSLER (Kroonstad) vanaf 5de Junie, 1964.

Sekretarisse:

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Posbus 7462, Johannesburg.

Onder-komitees:

Verhandelinge: R.W. Barton, D. Murray-Nobbs, P.A. Giles, C. Lombard en die Aanstaande President.
Finansiële: C. Lombard (Convenor), R. Leishman.
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C. Lombard.

Wiring Regulations Committee: R. Leishman.
S.A. Bureau of Standards: G. C. Theron.
S.A. National Committee of the International Electrotechnical Commission: D. Hugo. J. Wilson (Alt.).
S.A.I.E.E. Committee to revise the Code of Practice for Overhead Lines for conditions prevailing in South Africa: C. Lombard.
World Power Conference: R. W. Barton.

Bedrading Regulasies Komitee: R. Leishman.
S.A. Buro van Standaarde: G. C. Theron.
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1938-39	H. A. Eastman, Cape Town	E. Poole*
1939-44	I. J. Nicholas, Umtata	E. Poole until December, 1940*
1944-45	A. Rodwell, Johannesburg*	L. L. Horrell, January, 1941*
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	J. W. Phillips, Bulawayo	L. L. Horrell to November, 1945*
1946-47	G. J. Muller, Bloemfontein	A. T. Taylor, December, 1945*
1947-48	C. Kinsman, Durban	A. T. Taylor*
1948-49	A. Foden, East London	A. T. Taylor*
1949-50	D. A. Bradley, Port Elizabeth*	A. T. Taylor*
1950-51	C. R. Hallé, Pietermaritzburg	A. T. Taylor*
1951-52	J. C. Downey, Springs	A. T. Taylor*
1952-53	A. R. Sibson, Bulawayo	A. T. Taylor*
1953-54	J. C. Fraser, Johannesburg	A. T. Taylor*
1954-55	G. J. Muller, Bloemfontein	A. T. Taylor*
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All correspondence to be addressed to:
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LIST OF MEMBERS/LYS VAN LEDE 30-6-64.

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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., Tshayile, 5 Hillside Road, Fishhoek, C. P. (Past President).
1960 Davies, L. P., 49 Union Street, Springs.
1951 (1922) Eastman, H. A., Torwood, Parel Vallei, Somerset West, C. P.
1958 (1931) Ewer, Col. G. G., 174 Edmonds Road, Durban (Past President).
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1956 (1939) Milton, W. H., c/o Electricity Supply Commission, P. O. Box 1091, Johannesburg.
1956 Jaffray, A. Morton (Alderman), 8 Fairbridge Avenue, Salisbury.
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1962 (1949) Van Der Walt, J. L., P.O.Box 35, Vereniging (Past President).

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1948 Que Que, P.O. Box 15.

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1935 (1929) Robertson, P.O. Box 52,
1935 (1926) Roodepoort-Maraisburg, P.O. Box 217, Roodepoort.
1944 (1920) Rustenburg, P.O. Box 16.
1956 Riversdale, P.O. Box 29.

1935 (1926) Salisbury, P.O. Box 990.
1956 Sasolburg, P.O. Box 60.
1935 (1916) Somerset East, P.O. Box 21.
1948 (1927) Somerset West, P.O. Box 19.
1935 (1916) Springs, P.O. Box 45.
1935 (1931) Springfontein, P.O. Box 10.
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1938 (1916) Stellenbosch, P.O. Box 17.
1935 (1915) Standerton, P.O. Box 66.
1959 Stilfontein, P.O. Box 20.
1959 Stutterheim, P.O. Box 2.

1959 (1927) Tarkastad, P.O. Box 21.
1949 The Strand, P.O. Box 3.
1957 Tzaneen, P.O. Box 24.
1963 Thabazimbi, P.O. Box 90.
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1936 (1927) Umtata, P.O. Box 57.
1935 (1927) Umtali, P.O. Box 121.

1960 Vanderbijlpark, P.O. Box 3.
1949 Ventersdorp, P.O. Box 15.
1935 Vereniging, P.O. Box 35.
1961 Viljoenskroon, P.O. Box 37.
1955 Virginia, P.O. Box 156.
1947 (1929) Vrede, P.O. Box 155.
1935 Vryburg, P.O. Box 35.
1948 (1920) Vryheid, P.O. Box 57.

1960 White River, P.O. Box 2.
1935 (1934) Walmer, P.O. Box 5010.
1955 Warmsbaths, P.O. Box 48.
1956 Wellington, P.O. Box 12.
1953 Welkom, P.O. Box 708.
1953 Westonaria, P.O. Box 19.
1946 Willowmore, P.O. Box 15.
1944 (1919) Winburg, P.O. Box 26.
1945 (1924) Windhoek, P.O. Box 59.
1955 (1927) Witbank, P.O. Box 3.
1936 (1922) Worcester, P.O. Box 37.
1960 Walvis Bay, P.O. Box 2.
1964 Wolmaransstad, P.O. Box 17.

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Engineer Members/Ingenieur-Lede:

1947 Aalbers, G., Municipal Electrical Engineer, P.O. Box 12, Wellington, C.P.
1933 Adams, C.H., Municipal Electrical Engineer, P.O. Box 19, Somerset West, C.P.
1949 Asselbergs, P. C., Town and Electrical Engineer, P.O. Box 21, Empangeni, Natal.
1962 Baillie, T. H., Town Electrical Engineer, P.O. Box 24, Broken Hill, N.R.
1948 Barratt, V. E. O., Municipal Electrical Engineer, P.O. Box 113, Queenstown, C.P.
1964 Barrie, J. J., Municipal Electrical Engineer, P.O. Box 25, Edenvale, Tvl.
1948 Barton, R. W., Electrical Engineer, P.O. Box 708, Welkom, O.F.S.
1964 Bailey, R. V., Municipal Electrical Engineer, P.O. Box 20, Hermanus, C.P.
1957 Beesley, W., Town Electrical Engineer, P.O. Box 29, Livingstone, N.R.
1959 Billington Eales, A., Town Electrical Engineer, P.O. Box 2, Stutterheim, C.P.
1957 Booysens, L., Town and Electrical Engineer, P.O. Box 155, Vrede, O.F.S.
1960 Boshoff, J. J., Assistant Electrical Engineer, P.O. Box 3, Vanderbijlpark.
1962 Boshoff, M. H. L., Town Electrical Engineer, P.O. Box 71, Graaff-Reinet, C.P.
1959 Botes, P. J., Municipal Electrical Engineer, P.O. Box 217, Roodepoort, Tvl.
?958 Brown, D. C., Municipal Electrical Engineer, P.O. Box 3, The Strand, C.P.
1948 Cherry, J. R.,,Municipal Electrical Engineer, P.O. Box 139, Randfontein, Tvl.
1955 Clarke, M. P. P., Municipal Electrical Engineer, P.O. Box 21, Somerset East, C.P.
1956 Craig, J. S., Borough Electrical Engineer, P.O. Box 21, Newcastle, Natal.
1956 Dawson, J. D., Municipal Electrical Engineer, P.O. Box 45, Uitenhage, C.P.
1955 De Villiers, E. E., Municipal Electrical Engineer, P.O. Box 3, Carletonville, Tvl.
1964 De Villiers, S. deV., Municipal Electrical Engineer, P.O. Box 44, Ceres, C.P.
Paarl, C.P.
1957 Dreyer, H. C., Electrical Engineer, P.O. Box 12, Paarl, C.P.
1950 Dreyer, L., Municipal Electrical Engineer, P.O. Box 19, Westonaria, Tvl.
1963 Du Plooy, D. P., Electrical Engineer, P.O. Box 45, Nelspruit.
Du Toit, A. A., Municipal Electrical Engineer, P.O. Box 19, George, C.P.

MUNICIPAL POWER STATION. FORT STREET. BLOEMFONTEIN.

EXECUTIVE
REGIONAL CHAIRMEN

MINUTES.
E de C. Pretorius
Potchefstroom

1957 Dunstan, R. S. Deputy City Electrical Engineer, P.O. Box 369, Port Elizabeth, C.P.

1959 Durr, H. A., Electrical Engineer, Peri-Urban Areas Health Board, P.O. Box 1341, Pretoria, Tvl.

1963 Edwards, H., Municipal Electrical Engineer, P.O. Box 55, Middelburg, C.P.

1944 Fisher, K. M., Municipal Electrical Engineer, P.O. Box 3, Bedfordview, Tvl.

1950 Erikson, J. G. F., Borough, Electrical Engineer, P.O. Box 15, Estcourt, Natal.

1957 Fohren, H., Borough Electrical Engineer, P.O. Box 37, Eshowe, Zululand.

1961 Frantz, A. C. T., City Electrical Engineer, P.O. Box 82, Cape Town.

1952 Futcher, L., Municipal Electrical Engineer, P.O. Box 13, Kempton Park, Tvl.

1945 Gericke, J. M., Municipal Electrical Engineer, P.O. Box 99, Klerksdorp.

1939 Giles, P. A., City Electrical Engineer, P.O. Box 529, East London, C.P. (Past President).

1936 Grandin, P. C., Municipal Electrical Engineer, P.O. Box 114, Gatooma, S.R.

1944 Gripper, H. J., Municipal Electrical Engineer, P.O. Box 21, Knysna, C.P.

1954 Hafele, C. F., Deputy City Electrical Engineer, P.O. Box 288, Bloemfontein, O.F.S.

1953 Haig-Smith, D., Municipal Electrical Engineer, P.O. Box 24, Cradock.

1949 Halliday, K. W. J., Municipal Electrical Engineer, P.O. Box 5, Port Shepstone, Natal.

1927 Harvey, A. Q., Town Electrical Engineer, Warmbaths, Transvaal.

1953 Hatwich, A. H. J., Town and Electrical Engineer, P.O. Box 13, Dewetsdorp, O.F.S.

1953 Heunis, G. B., Town and Electrical Engineer, P.O. Box 66, Standerton, Tvl.

1956 Hobbs, I. L., Town Electrical Engineer, P.O. Box 156 Virginia, O.F.S.

1938 Hugo, D. J., City Electrical Engineer, P.O. Box 423, Pretoria, Tvl.

1944 Inglis, J. I., Town Electrical and Water Engineer, P.O. Box 111, Pietersburg, Tvl.

1962 Kinsman, A. D., Deputy City Electrical Engineer, P.O. Box 147, Durban, Natal.

1949 Kirberger, M. N., Town Engineer, P.O. Box 3, Bethal, Tvl.

1959 Koeslag, H. J., Electrical Engineer, P.O. Box 29, Riversdale, C.P.

1949 Kruger, M. J. C., Municipal Electrical Engineer, P.O. Box 13, Port Alfred, C.P.

1931 Lategan, J. F., Town Electrical Engineer, P.O. Box 17, Stellenbosch, C.P.

1953 Lees, D., Town Electrical Engineer, P.O. Box 45, Benoni, Tvl.

1944 Leishman, R., General Manager, Electricity Department, P.O. Box 699, Johannesburg.

1956 Lewis, L., Town Electrical Engineer, P.O. Box 59, Windhoek.

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

1944 Lotter, G. A., Town Electrical Engineer, P.O. Box 96, Louis Trichardt, Tvl.

1955 Lynch, E. C., City Electrical Engineer, P.O. Box 73, Salisbury, S.R.

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

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

1948 McIntyre, H. A., Assistant Town Electrical Engineer, P.O. Box 35, Vereeniging, Tvl.

1954 McNeil, J. L., Borough Electrical Engineer, P.O. Box 72, Stanger, Natal.

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

1952 Millen, T. J., Town and Electrical Engineer, P.O. Box 24, Tzaneen, Tvl.

1929 Mocke, T. M., Town and Electrical Engineer, P.O. Box 23, Piet Retief, Tvl.

1934 Muller, G. J., City and Electrical Engineer, P.O. Box 288, Bloemfontein, O.F.S. (Past President.)

1955 Nobbs, D. M., City Electrical Engineer, P.O. Box 369, Port Elizabeth, C.P.

1964 Odendaal, M. W., Town Electrical Engineer, P.O. Box 4, Alberton, Tvl.

1957 Paull, R. A., Municipal Engineer, P.O. Box 57, Umtata, Tembuland.

1963 Peters, A. G., Town Electrical Engineer, P.O. Box 278, Gwelo, S.R.

1952 Potgieter, N. A., Municipal Electrical Engineer, P.O. Box 106, Brits, Tvl.

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

1952 Pretorius, E. de C., Electrical Engineer, P.O. Box 113, Potchefstroom, Tvl.

1960 Pretorius, J. W., Assistant Electrical Engineer, P.O. Box 23, Nigel, Tvl.

1961 Rattey, W. P., Electrical Engineer, P.O. Box 34, Orkney, Tvl.

1957 Rautenbach, G. F., Electrical Engineer, P.O. Box 99, Klerksdorp, Tvl.

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

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

1954 Ross, J. W., Municipal Electrical Engineer, P.O. Box 34, Potgietersrust, Tvl.

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

1944 Rush, W., Town Electrical Engineer, P.O. Box 47, Mooi River, Natal.

1954 Simpson, A. C., Municipal Electrical Engineer, P.O. Box 5010, Walmer, C.P.

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

1937 Smith, E. L., Municipal Electrical Engineer, P.O. Box 215, Boksburg, Tvl.
1962 Stanton, R. J. G., Deputy Town Electrical Engineer, P.O. Box 197, Ndola, N.R.
1962 Steele, E. E., Town Electrical Engineer, P.O. Box 197, Ndola, N.R.
1934 Stevens, F., Borough Electrical Engineer, P.O. Box 29, Ladysmith, Natal.
1956 Sulter, F. J., Assistant Electrical Engineer, P.O. Box 145, Germiston, Tvl.
1962 Summers, H. E., City Electrical Engineer, P.O. Box 1803, Bulawayo, S.R.
1962 Surtees, E. H., Electrical Engineer, P.O. Box 76, Dundee, Natal.
1962 Te Brugge, E. J., Town electrical Engineer, P.O. Box 42, Mafeking.
1947 Thackwray, W. G., Town Electrical Engineer, P.O. Box 8, Kokstad, E.G.
1945 Theron, W. C., Munisipal Electrical Engineer, P.O. Box 37, Worcester, C.P.
1946 Theron, G. C., Town Electrical Engineer, P.O. Box 3, Vanderbijlpark, Tvl.
1950 Turnbull, A. F., Town and Electrical Engineer, P.O. Box 35, Vereeniging, Tvl.
1931 Turner, H. T., Town and Electrical Engineer, P.O. Box 121, Umtali, S.R.
1964 Van den Berg, A. J., Town Electrical Engineer, P.O. Box 94, Krugersdorp, Tvl.
1955 Van der Merwe, F. J., Municipal Electrical Engineer, P.O. Box 20, Stilfontein, Tvl.
1959 Van Heerden, B, G., Municipal Electrical Engineer, P.O. Box 48, Ermelo, Tvl.
1957 Van Heerden, W. J., Electrical Engineer, P.O. Box 201, Heidelberg, Tvl.
1956 Van Meerdervoort, J. K. L., Pompe, Town Electrical engineer, P.O. Box 43, Harrismith, O.F.S.
1945 Vergottini, P. L., Municipal Electrical Engineer, P.O. Box 15, Brakpan, Tvl.
1951 Verschoor, D. R., Town and Electrical Engineer, P.O. Box 36, Fort Beaufort, C.P.
1955 Vorster, P. J., Municipal Electrical Engineer, P.O. Box 3, Witbank, Tvl.
1957 Von Ahlfton, J. K., Town Electrical Engineer, P.O. Box 45, Springs, Tvl.
1954 Waddy, J. C., City Electrical Engineer, P.O. Box 399, Pietermaritzburg, Natal.
1952 Waldron, F. R., Municipal electrical Engineer, P.O. Box 86, Walvis Bay.
1952 Ward, H. V., Borough Engineer, P.O. Box 71, Greytown, Natal.
1961 Wiehahn, G. D., Town Engineer, P.O. Box 551, Bethlehem, O.F.S.
1952 Williams, A. H., Assistant Electrical Engineer, P.O. Box 45, Springs, Tvl.
1938 Wilson, J., Assistant City Electrical Engineer, P.O. Box 423, Pretoria, Tvl.
1956 Yodaiken, J., Municipal Electrical Engineer, P.O. Box 115, Que Que, S.R.

Associates/Geassosieerders:

1959 Bester, J. H., Town Electrician, P.O. Box 15, Ventersdorp, Tvl.
1959 Carpenter, B. F., Town Electrical Engineer, P.O. Box, Aliwal North, C.P.
1963 Coetzee, J. C., Town Engineer, P.O. Box 17, Wolmaransstad, Tvl.
1962 De Witt, F., Electrical Engineer, P.O. Box 38, Adelaide, C.P.
1960 Flint, V. G., Acting Electrical Engineer, P.O. Box 14, Middelburg, Tvl.
1962 Huysamen, G. A., Electrical Engineer, P.O. Box 5, Postmasburg, C.P.
1959 Jordaan, J. H., Municipal Electrical Engineer, P.O. Box 35, Vryburg, C.P.
1959 Laas, C. P., Electrical Engineer, P.O. Box 15, Kenhardt.
1959 Lochner, J. van S., Town Electrical Engineer, P.O. Box 64, Ladybrand, O.F.S.
1956 McNamara, A. B., Electrical Engineer, P.O. Box 21, Komgha.
1962 Ploos-van Amstel, W. F., Electrical Engineer, P.O. Box 37, Viljoenskroon, O.F.S.
1959 Ross, M. J., Town Electrical Engineer, P.O. Box 13, Brandfort, O.F.S.
1959 Schoombee, G. T. van W., Town Electrical Engineer, P.O. Box 61, Lydenburg, Tvl.
1962 Sweetman, A. A., Town Electrical Engineer, P.O. Box 21, Tarkastad, C.P.
1964 Van der Schyff, G. W., Town Engineer, P.O. Box 24, Carolina, Tvl.

Associate Members/Verbonde Lede:

1946 Andrew, W. M., 7 Tainton Avenue, Bonnie Doon, East London, C.P.
1951 Attridge, W. H., P.O. Box 306, Sasolburg, O.F.S.
1944 Burton, C. R., 54 Memorial Road, Kimberley, C.P.
1956 Barnard, F. J. W., c/o. Electricity Supply Commission, P.O. Box 12, Springs, Tvl.
1960 Bozyczko, W. B., P.O. Box 133, Bramley, Tvl.
1933 Campbell, A. R., P.O. Box 3, Impendhle, Natal.
1929 Clinton, J. S., P.O. Box 4648, Johannesburg, Tvl. (Past President.)
1948 Conradie, D. J. R., P.O. Box 1009, Bloemfontein, O.F.S.
1954 Coetzee, F. J., P.O. Box 21, Evaton, Tvl.
1939 Dalton, G. A., 111 Eckstein Street East, Observatory Extension, Johannesburg, Tvl.
1934 Dawson, C., Electricity Supply Commission, P.O. Box 2408, Durban, Natal.
1948 De Wit, T., P.O. Box 44, Brits, Tvl.
1960 Ford, W. P., P.O. Box 40, Lusaka, N.R.
1960 Gill, G. B., Zululand Electrical Utility Co. (Pty.) Ltd., P.O. Box 29, Gingindhlovu, Natal.
1936 Heasman, G. G., P.O. Box 77, Fort Victoria, S.R.
1962 Honiball, G. T., 35 End Street, Rowhill, Springs, Tvl.

1962 Liebenberg, S. J., Electrical and Mechanical Engineer, Department of Bantu Administration and Development, P.O. Box 384, Pretoria, Tvl.
1949 Lutsch, W. J. F., c/o. Faculty of Engineering, University of Stellenbosch, C. P.
1960 McGibbon, J., P.O. Box 92, Carletonville, Tvl.
1926 Marchand, B., P.O. Box 223, Witbank, Tvl.
1946 Mole, E. W., P.O. Box 118, Bramley, Johannesburg.
1926 Muller, H. M. S., P.O. Box 112, Upington, C.P.
1961 Magowan, J. M., Southern Rhodesia Electricity Supply Commission, P.O. Box 377, Salisbury.
1934 Phillips, J. W., P.O. Box 1731, Bulawayo, S.R.
1934 Rossler, A., 3 Greenwood Road, Pietermaritzburg, Natal.
1953 Rothman, J. L., P.O. Box 606, Kimberley, C.P.
1927 Simpson, H. G., Engineering Department, Searles Ltd., Great Brak River, C.P.
1948 Woolridge, W. E. L., P.O. Box 24, Harding, Natal.
1947 Williams, J. T., P.O. Box 1617, Pretoria, Tvl.
1946 Wylie, R. J. S., c/o. E.S.C., Rand Undertaking, P.O. Box 103, Germiston, Tvl.
1957 Zeederberg, T. D., Private Bag No. 1, P.O. Pyramid, Northern Transvaal.

Affiliates/Geaffileerders:

1959 AEG South Africa (Pty.) Ltd., P.O. Box 10264, Johannesburg, Tvl.
1957 Aberdare Cables (Africa) Ltd., P.O. Box 494, Port Elizabeth.
1957 Adams, Symes & Partners, P.O. Box 1498, Johannesburg.
1957 African Cables Ltd., P.O. Box 9909, Johannesburg.
1959 African Explosives & Chemical Industries, Ltd., P.O. Box 1122, Johannesburg.
1962 African Wire Ropes, Ltd., P.O. Box 72, Cleveland, Tvl.
1957 Allenwest S.A. (Pty.) Ltd., P.O. Box 6168, Johannesburg.
1957 Alcan Aluminium of S.A. Ltd., P.O. Box 2430, Johannesburg.
1957 Arthur Trevor Williams (Pty.) Ltd., P.O. Box 2873, Johannesburg.
1959 Asea Electric (Pty.) Ltd., P.O. Box 691, Pretoria.
1957 Aycliffe Cables Ltd., Hargreaves Works, Main Road, Eastleigh, Edenvale.
1963 A.E.I. Henley Africa (Pty.) Ltd., P.O. Box 7404, Johannesburg.
1960 African Lamps (Pty.) Ltd., P.O. Box 75, Industria.
1960 Associated Electrical Industries C.A. (Pvt.) Ltd., P.O. Box 1979, Salisbury, S.R.
1960 Associated Electrical Industries (Pty.) Ltd., P.O. Box 7755, Johannesburg.
1963 Bell, Harold E., (Pty.) Ltd., P.O. Box 6906, Johannesburg.
1957 Babcock & Wilcox of Africa Ltd., P.O. Box 4561, Johannesburg.
1957 Brian Colquhoun O'Donell & Partners (Rhodesia), 10th Floor, Chester House, Speke Ave., Salisbury.
1957 British General Electric Co. of C.A. (Pvt.) Ltd., P.O. Box 845, Salisbury, S.R.
1957 British General Electric Co. Ltd., P.O. Box 2406, Johannesburg.
1959 British Insulated Callender's Cables S.A. Ltd., P.O. Box 2827, Johannesburg.
1936 W. R. Burnett (Pty.) Ltd., P.O. Box 358, Johannesburg.
1964 Cohen, S., Ltd., P.O. Box 215, Windhoek, S.W.A.
1957 Chloride Electrical Storage Co. S.A. (Pty.) Ltd., P.O. Box 7508, Johannesburg.
1957 C.M.B. Engineering Co., (Pty.) Ltd., P.O. Box 55, Denver, Johannesburg.
1959 Construction Electric Co. (Pty.) Ltd., P.O. Box 10100, Johannesburg.
1959 Contractor (Pty.) Ltd., Zuider Paarl, C.P.
1964 Crawford, Clinkscales, Maughan-Brown & Partners, P.O. Box 196, Port Elizabeth.
1957 Davidson & Co. (Africa) (Pty.) Ltd., P.O. Box 616, Springs, Tvl.
1957 Dowson & Dobson Ltd. P.O. Box 7764, Johannesburg, Tvl.
1959 Ian Drewett, P.O. Box 35, Johannesburg, Tvl.
1959 Electrical Contractors' Association (South Africa), P.O. Box 5327, Johannesburg.
1957 Enfield Cables (S.A.) Ltd., P.O. Box 5289, Johannesburg, Tvl.
1959 English Electric Co. (C.A.) (Pvt.) Ltd., P.O. Box 2191, Salisbury, S.R.
1957 English Electric Co. S.A. Ltd., P.O. Box 2387, Johannesburg, Tvl.
1961 Farad (Pty.) Ltd., P.O. Box 220, Jeppestown, Tvl.
1957 First Electric Corp. of S.A., P.O. Box 3961, Johannesburg, Tvl.
1957 F. W. J. Electrical Industries Ltd., P.O. Box 58, Alberton, Tvl.
1958 George Kent S.A. (Pty.) Ltd., P.O. Box 7396, Johannesburg, Tvl.
1957 W. T. Glover & Co. Ltd., P.O. Box 1386, Johannesburg, Tvl.
1957 E. Green & Son S.A. (Pty.) Ltd., 406 Barclays Bank Buildings, Kruis Street, Johannesburg.
1957 Heinnemann Electric (S.A.) Ltd., P.O. Box 99, Bramley, Tvl.
1957 Hopkinsons S.A. (Pty.) Ltd., P.O. Box 11029, Johannesburg, Tvl.
1957 James Howden & Safanco (Africa) (Pty.) Ltd., P.O. Box 9501, Johannesburg, Tvl.
1957 Hubert Davies & Co. Ltd., P.O. Box 1386, Johannesburg, Tvl.
1960 Hawker Siddeley Brush (Southern Africa) Ltd., P.O. Box 75, Booysens, Tvl.
1957 International Combustion Africa Ltd., P.O. Box 5981, Johannesburg, Tvl.
1962 A. Jackson, P.O. Box 4814, Cape Town, C.P.
1957 John Thompson (S.A.) (Pty.) Ltd., P.O. Box 3570, Johannesburg, Tvl.

1957 Johnson & Phillips S.A. (Pty.) Ltd., P.O. Box 552, Germiston, Tvl.
1957 R. T. Jones, Esq., 43 The Avenue, Orchards, Johannesburg, Tvl.
1957 G. H. Langler & Co. Ltd., P.O. Box 3762, Johannesburg, Tvl.
1961 Lodge-Cottrell (Africa) (Pty.) Ltd., P.O. Box 6070, Johannesburg, Tvl.
1957 Harold Marthinusen & Co. (Pty.) Ltd., P.O. Box 469, Johannesburg, Tvl.
1957 L. H. Marthinusen Ltd., P.O. Box 25664, Denver, Tvl.
1957 Merz & McLellan, P.O. Box 11578, Johannesburg.
1957 Mitchell Engineering Group S.A. (Pty.) Ltd., 63 Harrison Street, Johannesburg, Tvl.
1959 N.V. Nederlandsche Kabelfabrieken Ltd., P.O. Box 3513, Cape Town, C.P.
1957 Oerliken S.A. (Pty.) Ltd., P.O. Box 132, Jeppestown, Tvl.
1957 C. A. Parsons & Co. (S.A.) (Pty.) Ltd., P.O. Box 3425, Johannesburg, Tvl.
1959 Patrick Murray (Pty.) Ltd., P.O. Box 1541, Durban, Natal.
1963 Pratley Manufacturing and Engineering Co. (Pty.) Ltd., P.O. Box 55, Luipaardsvlei, Tvl.
1957 Rhotec Sales (Pvt.) Ltd., P.O. Box 2356, Salisbury.
1957 Reunert & Lenz Ltd., P.O. Box 92, Johannesburg.
1957 A. Reyrolle & Co. Ltd., P.O. Box 9677, Johannesburg, Tvl.
1960 A. Reyrolle & Co. (Rhodesia) Ltd., P.O. Box 1975, Salisbury, S.R.
1957 Rice & Diethelm Ltd., P.O. Box 930, Johannesburg, Tvl.
1963 Rhodesia Congo Border Power Corporation Ltd., P.O. Box 819, Kitwe, N.R.
1957 Samuel Osborn S.A. (Pty.) Ltd., P.O. Box 25619, Denver, Tvl.
1957 Scottish Cables (S.A.) Ltd., P.O. Box 2882, Johannesburg, Tvl.
1960 Siemens S.A. (Pty.) Ltd., P.O. Box 4583, Johannesburg, Tvl.
1957 Standard Telephones & Cables Ltd., P.O. Box 286, Boksburg, Tvl.
1957 Stamcor (Pty.) Ltd., P.O. Box 6107, Johannesburg.
1957 Stewards & Lloyds of S.A. Ltd., P.O. Box 1195, Johannesburg, Tvl.
1957 S.A. General Electric Co. Ltd., P.O. Box 1905, Johannesburg, Tvl.
1957 S.A. Philips (Pty.) Ltd., P.O. Box 7703, Johannesburg, Tvl.
1957 Superconcrete Pipes (Pty.) Ltd., P.O. Box 92, Roodepoort, Tvl.
1957 Switchcraft (Pty.) Ltd., P.O. Box 6444, Johannesburg, Tvl.
1960 South Wales Electric (Pty.) Ltd., P.O. Box 2180, Johannesburg, Tvl.
1957 Southern African Cable Makers Association, P.O. Box 2258, Johannesburg, Tvl.
1957 Wilson & Herd (Pty.) Ltd., P.O. Box 3093, Johannesburg, Tvl.
1957 Yarrow & Herd (Pty.) Ltd., 210 Geldenhuys, 33 Jorissen St., Braamfontein, Johannesburg, Tvl.
1959 Yorkshire Transformers (S.A.) (Pty.) Ltd., P.O. Box 43, Bedfordview, Tvl.

LIST OF MEMBERS, COUNCIL MEMBERS AND VISITORS ATTENDING THE 38th ANNUAL CONVENTION OF THE ASSOCIATION OF MUNICIPAL ELECTRICITY UNDERTAKINGS.

LYS VAN LEDE, RAADSLEDE EN BESOEKERS TEENWOORDIG BY DIE 38ste JAARLIKSE KONVENSIE VAN DIE VERENIGING VAN MUNISIPALE ELEKTRISITEITSONDERNEMINGS.

Council and Engineer Members/Raad en Ingenieur-lede:

ALBERTON:
Odendaal, M.W.

BARBERTON:
Erasmus, Cr. W.A.

BENONI:
Davis, Cr. Mrs. P.E.
Lees, D.

BETHAL:
Kirberger, M.N.

BLOEMFONTEIN:
Viljoen, Cr. W.J.
Muller, G.J.

BOKSBURG:
von Oppell, H.D.O.

BRAKPAN:
Troskie, Cr. G.
Vergottini, P.L.

BRITS:
Ross, Cr. W.
Potgieter, N.A.

BROKEN HILL:
Baillie, T.H.

BULAWAYO:
Menashe, Cr. A.
Summers, H.E.

CAPE TOWN:
Ferry, Cr.
Frantz, A.C.T.

CARLETONVILLE:
Kriek, Cr. C.J.
de Villiers, E.E.

CERES:
de Villiers, S. de V.

CRADOCK:
Haig-Smith, D.

DE AAR:
van Aswegan, Cr. F.P.
Macques, J.A.

DEWETSDORP:
Hatwich, A.

DURBAN:
Warman, Cr. T.
Simpson, R.M.O.

EAST LONDON:
Giles, P.A.

EDENVALE:
Archer, Cr. R.R.
Barrie, J.J.

GEORGE:
du Toit, A.A.

GERMISTON:
Lombard, C.

GWELO:
Peters, A.G.

HEIDELBURG:
van Heerden, W.J.P.

HERMANUS:
Bailey, R.V.

JOHANNESBURG:
Marais, Cr. D.
Kane, R.W.

KEMPTON PARK:
Wright, Cr. J.N.
Futcher, L.

KIMBERLEY:
Carlstein, Cr. A.W.
Mathews, J.A.

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

KROONSTAD:
Rossler, W.

KRUGERSDORP:
Hoffman, Cr. J.J.
van der Berg, A.J.

LADYSMITH:
Cochrane, Cr. D.J.
Stevens, F.

LIVINGSTONE:
Brown, Cr. R.
Beesley, W.

LOUIS TRICHARDT:
du Plessis, Cr. S.P.
Lotter, G.A.

NEWCASTLE:
Luttrell-West, Cr. L.
Craig, J.S.

ORKNEY:
Luckhoff, Cr. H.J.
Rattley, W.P.

PARYS:
Pretorius, D.R.

PERI-URBAN AREAS HEALTH BOARD:
van der Merwe, Cr. G.J.
Cronje, W.F.
Durr, H.A.

PIETERMARITZBURG:
Waddy, J.C.

PIETERSBURG:
Knox, Cr. H.J.U.
Inglis, J.I.

PORT ELIZABETH:
Rademeyer, Cr. N.P.
Murray-Nobbs, D.

POTCHEFSTROOM:
Heyns, Cr. Dr. M.A.
Pretorius, E. de C.

PRETORIA:
Smit, Cr. E.
Stoffberg, T.C.
Regenass, F.W.

QUEENSTOWN:
Paul, Cr. M.
Barratt, V.E.O.

RANDFONTEIN:
Kotze, Cr. J.F.
Cherry, J.R.

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

SASOLBURG:
Grobler, Cr. A.A.S.
Bowden, H.R.

SOMERSET WEST:
Adams, C.H.

SPRINGS:
van der Walt, J.L.
Deysel, Cr. F.F.
Thuynsma, Cr. J.G.

STANDERTON:
Smith, Cr. E.J.
Heunis, G.B.

STELLENBOSCH:
Uys, Cr. J.F.
Lategan, J.F.

STILFONTEIN:
van der Merwe, F.J.

THABAZIMBI:
de Jager, M.J.

UITENHAGE:
Gradwell, Cr. R.D.
Dawson, J.D.

UMTALI:
Macgregor, Cr. J.
Turner, H.T.

VANDERBIJLPARK:
Jamneck, Cr. L.
Theron, G.C.
du Plessis, J.H.

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

VIRGINIA:
Baron, Cr. S.T.
Hobbs, I.L.

WALVIS BAY:
Waldron, F.R.

WARMBATHS:
Meininger, Cr. L.J.
Harvey, A.Q.

WELKOM:
Meyer, Cr. W.F.
Morrison, Cr. D.R.
Barton, R.W.
van Zyl, J.

WELLINGTON:
Aalbers, G.

WESTONARIA:
Blignaut, Cr. J.H.
Dreyer, L.

WINDHOEK:
Rossouw, Cr. P.H.
Glenday, Cr. R.P.
Lewis, L.

WITBANK:
Jonker, Cr. M.J.
Vorster, P.J.

WORCESTER:
Theron, W.

Other Members/Ander Lede:

Burton, C.R. (Associate Member), Kimberley.
Campbell, A.R. (Associate Member), Impendhle.
Dalton, G.A. (Associate Member), Johannesburg.
Ford, W.P. (Associate Member), Lusaka.
Marchand, B. (Associate Member), Witbank.
Milton, W.H. (Honorary Member), Johannesburg.
Muller, H.M.S. (Associate Member), Upington.
Van der Walt, J.L. (Honorary Member), Springs.

A.M.E.U. Officials/Beampte:

Downey, J.C. (President), Springs.
Ewing, R.G. (For the Secretaries), East London.
Brewin, Miss E.R. (For the Secretaries), Johannesburg.
Lee, Mrs. H.G. (Proceedings Clerk), Johannesburg.

Affiliates/Geaffileerdes:

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A.K. Dean, Cape Town.
Aberdare Cables (Africa) Ltd.,
C. McL. Yuill, Johannesburg.
Aberdare Cables (Africa) Ltd.,
J. C. Sutherland, Johannesburg and
E. R. Miles, Windhoek.
Adams, Symes & Partners,
K. Adams, Johannesburg.
African Cables Ltd.,
W. L. Randell, Vereeniging.
African Explosives & Chemical Industries Ltd.,
W. J. Maxwell, Johannesburg.
Alcan Aluminium Co. of S.A. (Pty.) Ltd.,
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British Insulated Callender's Cables S.A. (Pty.) Ltd.,
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Superconcrete Pipes S.A. Ltd.,
A. R. Nel, Roodepoort.
Switchcraft (Pty.) Ltd.,
G. Ludewig, Johannesburg.
Yarrow Africa (Pty.) Ltd.,
I. C. Fraser, Johannesburg.

Visitors/Besoekers:

Arnold, A.C., Town Clerk, Windhoek.
Baxter, J.D.C., Northern Cape Regional Electrification Board, Kimberley.
Bozzoli, Prof. G.R., University of the Witwatersrand, Johannesburg.
Cherry, J.R., The Institution of Certificated and Electrical Engineers, S.A., Johannesburg.
Davis, S., S.W.A. Publicity and Tourist Association, Windhoek.
du Plessis, W.A., The Hon. the Administrator of S.W.A., Windhoek.
Ewald, O., Windhoek.
Gosling, A.J.G., Chief Electrical Engineer, S.A. Railways, Johannesburg.
Groenewald, J.J., Chief Inspector of Factories (Engineering) Department of Labour, Pretoria.
Harding, G.R.D., Electricity Supply Commission, Johannesburg.
Hattingh, D., Windhoek.
Heydenrich, F.G., Windhoek.
Hilsinger, T., Windhoek.
Hinsch, H., Windhoek.
Hutter, H.R., Windhoek.
Jones, D.I., S.A. Bureau of Standards, Pretoria.
Kemmey, B.M., Windhoek.
Kriess, A., Windhoek.
Lategan, Dr. P.N., Transvaal Coal Owners Association, Johannesburg.
Levinson, J.L., His Worship the Mayor, Windhoek.
Messidet, T.F., Inspector of Machinery, Windhoek.
Molyneux, G.C., Chief Electrical Engineer Rhodesian Railways, Bulawayo.
Pakleppa, S., Windhoek.
Prins, F.J., S.A. Bureau of Standards, Pretoria.
Pupkewitz, M., Windhoek.
Rieckert, W.J., Electrical Engineer, Gobabis.
Riebold, Mr., Windhoek.
Robinson, Mr., Windhoek.
Rohe, R., Windhoek.
Rossouw, Cr. P.H., Municipality, Windhoek.
Smit, J.P., Railway Travel Bureau, Windhoek.
Straszacker, Dr. R.L., Electricity Supply Commission, Johannesburg.
Strawson, T.R., S.A. Institution of Mechanical Engineers, Johannesburg.
Theron, P.F., Windhoek.
van der Spuy, M., Council for Scientific and Industrial Research, Pretoria.
van der Walt, L.S., Windhoek.
van Wyk, J.D.N., Council for Scientific and Industrial Research, Pretoria.
Venter, L.P.V.S., Inspector of Factories, Windhoek.
Vlok, Dr. A., University of South Africa, Pretoria.
Watkins-Ball, C.G., S.A. Institute of Electrical Engineers, Johannesburg.
Woermann, A., Windhoek.
Woerner, K., Windhoek.

Ladies/Dame:

Aalbers, Mrs. G.	Wellington.
Arnold, Mrs. A. C.	Windhoek.
Barnett, Mrs. J.A.	Johannesburg.
Barton, Mrs. R.W.	Welkom.
Baxter, Mrs. J.D.C.	Kimberley.
Blignaut, Mrs. J.H.	Westonaria.
Botes, Mrs. P.J.	Roodepoort.
Bozzoli, Mrs. G.R.	Johannesburg.
Burton, Mrs. C.R.	Kimberley.
Campbell, Mrs. A.R.	Impendhle.
Davis, Mrs. S.	Windhoek.
de Beer, Mrs. C.L.	Johannesburg.
de Jager, Mrs. M.J.	Thabazimbi.
de Villiers, Mrs. S.de V.	Ceres.
Dreyer, Mrs. L.	Westonaria.
du Plessis, Mrs. W.C.	Windhoek.
du Toit, Mrs. A.A.	George.
Enfield, Mrs. E.C.	Johannesburg.
Erasmus, Mrs. W.A.	Barberton.
Ewing, Mrs. R.G.	East London.
Ford, Mrs. W.P.	Lusaka.
Frantz, Mrs. A.C.T.	Cape Town.
Fraser, Mrs. I.C.	Johannesburg.
Gericke, Mrs. J.M.	Klerksdorp.
Gibbons, Mrs. W.J.	Johannesburg.
Giles, Mrs. P.A.	East London.
Gosling, Mrs. A.J.G.	Johannesburg.
Haig-Smith, Mrs. D.	Cradock.
Heunis, Mrs. G.B.	Standerton.
Hugo, Mrs. H.J.	Roodepoort.
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Jones, Mrs. N.D.	Johannesburg.
Kane, Mrs. R.W.	Johannesburg.
Kemmey, Mrs. B.M.	Windhoek.
Kirberger, Mrs. M.N.	Bethal.
Knox, Mrs. H.J.U.	Pietersburg.
Kriek, Mrs. C.J.	Carletonville.
Langford, Mrs. J.L.	Johannesburg.
Lategan, Mrs. P.N.	Johannesburg.
Levinson, Mrs. J.L.	Windhoek.
Lewis, Mrs. L.	Windhoek.
Lombard, Mrs. C.	Germiston.
Lotter, Mrs. G.A.	Louis Trichardt.
Ludewig, Mrs. G.	Johannesburg.
Macgregor, Mrs. J.	Umtali.
Marais, Mrs. D.	Johannesburg.
Maughan-Brown, Mrs. K.R.	Port Elizabeth.
Morrison, Mrs. D.R.	Welkom.
Milton, Mrs. W.H.	Johannesburg.
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Rademeyer, Mrs. N. P.	Port Elizabeth.
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Simpson, Mrs. R. M. O.	Durban.
Smit, Mrs. J. P.	Windhoek.
Stanley, Mrs. D. W.	Johannesburg.
Stevens, Mrs. F.	Ladysmith.
Straszacker, Mrs. R. L.	Johannesburg.
Strawson, Mrs. T. R.	Johannesburg.
Sutherland, Mrs. J. C.	Port Elizabeth.
Thuynsma, Mrs. J. G.	Springs.
van Aswegan, Mrs. W. G.	Johannesburg.
Watkins-Ball, Mrs. C. G.	Johannesburg.
Williams, Mrs. A. T.	Johannesburg.

The Thirty-Eighth Convention of the Association was opened in the Arts Theatre, Windhoek, by the Administrator of South-West Africa, His Honour, Mr. W. C. du Plessis, at 9.30 a.m. on Tuesday, 19th May, 1964.

Attendance at the Convention was as follows: 65 Councils represented by 45 Councillors and 68 Engineers; 2 Honorary Members (not representing Councils or Affiliates); 6 Associate Members; 55 representatives of 40 Affiliates; 42 Visitors (representing Government Departments, Public Utilities and other organisations); 73 Ladies; 4 A.M.E.U. Officials - a total of 295 persons.

FIRST DAY

WELCOME BY COUNCILLOR J. L. LEVINSON, MAYOR OF WINDHOEK, AT THE RECEPTION AT THE ZOO.

Mr. President, Honoured and very welcome guests, ladies and gentlemen:

I find myself in a strange predicament this evening, as I am expected to welcome you officially only tomorrow. I shall therefore welcome you unofficially tonight, and so you will see that you are DOUBLY welcome.

On behalf of the Town Council and the people of Windhoek, I should like you to know how delighted we are to have you here, and to congratulate you on your wisdom in choosing Windhoek as the venue for this your 38th Convention.

Looking at your invitation cards for this evening's reception, you may have felt surprised that it should be held in the "Zoo". I can assure you that this has no reflection on you, our honoured guests, ... nor on the Town Council of Windhoek.

Allow me to give you the explanation, and also a brief history of this place. Originally in German times, this park was referred to as the "Truppengarten" or Soldier's Garden. You will find a memorial here to the German soldiers who fell during the Hottentot uprisings. This park was a very popular meeting place in those days, particularly on Sundays when music was played, and refreshments served.

Some years later, in 1920, an animal zoo was established in the park, and the name was then changed to the Zoo Gardens. However, it was found that when the train drew into Windhoek's Railway Station, BLOWING ITS WHISTLE, the hyenas would start howling, and all the other animals would join in the chorus. After complaints by residents, the Council was forced to remove these animals but the name remained.

For a while a collection of meteorites and petrified wood was exhibited here, and many old and mighty trees provided some much needed shade. The meteorites and petrified wood have since been put back here.

Therefore, ladies and gentlemen, while you are here tonight, cast back your minds some thousands of years ago and visualise elephants and other animals coming down to drink in the swamp that existed here at that time. There perhaps where the amphitheatre now stands some elephants might have got bogged down in the mud, and were killed on the spot and eaten by an unknown people using sharp stone implements. So perhaps the name "Zoo Gardens" is then not really out of place.

In 1961, the Council decided to re-design the whole park. It was then that a most interesting discovery was made. During the excavations the municipal workmen came across certain fossilised remains. Fortunately, they appreciated the significance of their find, and immediately reported it to the Museum authorities. After careful excavation by archaeologists, the fossilised remains of elephants were found ... together with some stone age implements.

After much research by various eminent scientists, it was established that these remains were 5,200 years old. Their age was determined by dating with radio carbon.

I might mention that we were tempted to re-capture some of that atmosphere, and serve elephant steaks tonight, but His Honour the Administrator would not furnish us with the necessary permit!

As most of you I think are paying your first visit to this territory, I should like to give you some facts of interest regarding South West. First of all I must confess that we are a modest people who do not like talking about ourselves ... so these will be modest facts.

To start with, we have the biggest Game Reserve in the world, some 38,000 square miles of land - our famous and unique Etosha Game Park.

South West Africa is the largest gem quality diamond producing country in the world. We also have the biggest meteorite in the world - the Hoba meteorite that fell near Grootfontein.

We have a Karakul industry that we believe is second to none, and in order to show you some of the beauty

and quality of our black diamonds we have organised a mannequin parade for Wednesday morning. We shall also be showing there some of our lovely and much prized semi-precious stones.

Our fish canning industry is the finest imaginable. If you don't believe it ask President Macapagal of the Philippines, and he will confirm this. In fact, he has just fired one of his Cabinet Ministers rather than forego the canned pilchards of South West Africa - and this was done even in spite of the fact, or so I am told, that he did NOT receive any fishing shares.

South West Africa is also a large producer of several rare metals and minerals required in this atomic and space age - it is the second biggest source of germanium in the world.

South West has the largest Anglican Diocese in the world - the Damaraland Diocese, which covers some 138,000 square miles; and the biggest Parish of this same Church comprising virtually the whole northern part of the territory.

The Namib Desert is the most complete and deserted desert in the world. I have this on the authority of Professor Logan of the University of California.

No other country lies between two deserts without any running rivers within its boundaries, and yet is so well developed and modernised.

Namens Windhoek kan ek met reg aanspraak maak op die volgende onderskeidings.

Ons het die mooiste nooiens in die wêreld ... U sal dit self opmerk gedurende u verblyf alhier.

Ons het die skoonste dorp, in die suiwerste atmosfeer waar ookal. Geen rookmis, geen koolstowe in ons wonings nie, geen rookende stoom-lokomotiewe op ons spoorweë nie en die skoorstene van ons kragstasie gee hoegenaamd geen rook af nie.

Ons het die heerlikste en aangenaamste klimaat in die Suidelike Afrika. Windhoek ondervind nooit hitte van meer as 100 grade Fahrenheit nie, en in die Winter ryp dit selde of ooit.

Dwarsdeur die jaar kan ons in die ope lug onthale reël sonder enige vrees dat dit deur reën bederf sal word!

Ten spyte van sy naam, wat as gevolg van ander oorsake onstaan het, kry Windhoek baie min wind.

Inagnemende dat die totale blanke bevolking maar slegs ongeveer 22,000 beloop, is daar meer as 10,000 motor voertuie hier geregistreer.

Die laaste maar nie die minste nie, dit sal u nie lank neem om uit te vind dat ons ook die beste bier in die wêreld het nie.

Mr. President, ladies and gentlemen, I could go on like this much longer, but as I told you we are a modest people.

All in all, I can assure you that South West Africa, and Windhoek in particular are very worthwhile places in which to live, and we have no intention of doing otherwise.

Wir sind eine sehr glükliche Gemeinschaft und Stolz auf die Tatsache, dass unsere drei Sprachengruppen ein Beispiel von harmonischer Zusammen-arbeit und dem Verstehen von wahrer Freundschaft geben. Wir sind stolz auf das, was in der kurzen Geschichte Südwests erreicht worden ist. Wir sind stolz auf unsere Vorgänger und dankbar, dass noch viele diesen tüchtigen leben. Wir sind stolz auf Das, was erschlossen worden ist und auf Das, was sich ständig entwickelt trotz vieler Schwierigkeiten.

Today we receive you in a modern city, and we can offer you every material convenience that you may desire. But what is of still greater value: we should like to offer you our friendship, and the fullest hospitality of our town, which I, as Mayor, have much pleasure in extending to you.

As you know, your Convention starts officially tomorrow, and you will then have much serious work to do, but tonight, we should like you to relax and enjoy yourselves. We should like you to forget about the cost of coal, tension cables, frequencies and voltage drops. Just earth yourselves well, and test your resistance against the calorific value of Windhoek Beer and Gluwein. Do not worry about the chemical action of the refreshments placed before you. Just be static, and allow yourselves to succumb entirely to the positive electric magnetism of Windhoek by night.

THE PRESIDENT: Good morning, ladies and gentlemen. I want to say how pleased I am to see you all here this morning. We have with us, and are greatly honoured to have them, the Administrator of South West Africa, the Honourable W.C. du Plessis, on my right; His Worship the Mayor of Windhoek Mr. J. Levinson, whom I think you met last night - on my left; and on the other side the Deputy Mayor of Welkom, Councillor Meyer, whom I think is well known to most of you.

Ladies and gentlemen, this is the first time we have been to this, what we consider a Province of the Republic, South West Africa. At the same time, we intend to honour, at this Convention, the youngest town of reasonable size in the Republic. So I think this is quite a unique occasion, and I feel that it shows that the A.M.E.U. has at last realised that they have to give the youngsters a chance!

I will now call on His Worship the Mayor of Windhoek, Mr. J. Levinson, to welcome you to Windhoek.

Mr. J.L. LEVINSON, His Worship the Mayor of Windhoek:

Mr. President, the Honourable the Administrator, Deputy Mayor Welkom, honoured guests, delegates and their wives ladies and gentlemen: It is always a pleasant task to welcome guests, either to one's home town or to one's home, and it is a great honour for me to extend to all of you a very hearty welcome from the heart of the Town Council and the people of Windhoek.

We are happy to be joint hosts with the Town Council of Welkom. Windhoek will be handling the domestic aspect of this partnership, while Welkom will be responsible for the business side. It is the hope of our partnership to make this Convention an unforgettable one, from every point of view.

Last night I spoke modestly of some of our achievements and attractions. This morning I intend to be more serious as I appreciate that conferences are gatherings of serious minded people, and a conference of electrical engineers could spark off almost anything!

We ourselves recently installed a new electronic computer, and quite by chance I overheard two of our secretaries discussing the new office machine. The one observed sadly to the other, "I know that this new electronic computer does the work of three men, but personally I'd much rather have the men".

Since you have come to deliberate electricity, may I briefly draw your attention to the fact that our electricity undertaking in Windhoek has had to be enlarged four times in the past fourteen years, during which period the town has doubled its population.

We also now supply electricity to the town of Okahandja, some forty miles away, by means of a 66 thousand volt transmission cable. We are fondly looking forward to the Odendaal day when we shall be using hydro-electric power, brought over 600 miles from the Kunene River on the northern boundary of our territory.

At present, however, we have to use coal costing R1.30 per ton at the pitheads, and on which we pay R6.36 in railage per ton.

Another municipal project of which we are proud and which you will be visiting, is our milk pasteurisation plant, which is the only municipally-owned and operated milk pasteurisation scheme in Southern Africa.

Although Windhoek is not really ideal for an establishment of heavy industry, we have a large progressive meat canning factory, supported by very modern abattoirs.

Then there is the well-known brewery, and many other domestic and light industries. A favourite question often asked by visitors is: "From where does Windhoek get its water supplies?"

The answer is that we derive our water from two dams and about forty boreholes, which tap underground artesian sources. The boreholes have an average depth of 700 feet, the deepest one at present being 1700 feet. They are arranged in groups and the furthest one from Windhoek is about 14 miles.

The interesting feature of the underground supply is that some boreholes are on the same sites as what used to be the strong fountains which were responsible for the establishment of a settlement here. These yield hot water 86°C. or only 10° below boiling point at this altitude.

Many housewives used to install electric geysers which they did not turn on, and so obtain their cold water from the hot taps and their hot water from the cold taps.

Those days, Mr. President, ladies and gentlemen, are fortunately past, and swimming enthusiasts need no longer fear being boiled alive after taking a plunge in our new swimming pool!

I might mention that the brewery has exclusive rights to the water from a borehole which has ideal qualities for beer brewing; it is not true, of course, that the finished beer is pumped from this borehole!

A further fact that might interest you is that the municipality makes extensive use of radio communications electricity, water works, sewerage, fire and also traffic departments.

You will find, Mr. Chairman, ladies and gentlemen, that there is much to visit in Windhoek and an interesting programme has been arranged for you. Our only regret is that you do not have the time necessary to see all the other parts of our territory, which are attracting increasingly large numbers of tourists.

I should like to thank Mr. Meyer, the Town Councillor of Welkom, and your Association for the part you have played in bringing this Convention to Windhoek.

I wish you a most successful congress and a very happy stay here. May your sojourn prove a memorable one, and should you wish to visit any of our municipal works, not in the programme already drawn up, or any particular place of special interest to you, please advise the Town Clerk or my secretary, who will be only too happy to arrange it for you.

I can only conclude by saying the name of the home town of our esteemed partner and joint host of this conference aptly expresses the feeling of Windhoek: "You are all most 'welkom'."

Thank you.

(Applause)

THE PRESIDENT: Thank you Mr. Mayor, for your most warm welcome.

I was rather perturbed to hear one of your remarks because I feel you may be in very serious trouble one day. You said that you have now installed a computer. If what I have heard is true, the delightful mayoress of this town, as Chairman of the Arts Theatre or some other arts organisation, will insist you keep it locked up very carefully, otherwise you'll find people will be painting by numbers!

Thank you, Mr. Mayor.

It now gives me great pleasure to call on the Deputy Mayor of Welkom, Councillor Meyer, to welcome you to the Convention. (Applause).

Raadslid W. F. MEYER (Welkom): Mnr. die President, sy Edele die Administrateur van Suid-Wes Afrika, Sy Edelagbare die Burgemeester van Windhoek, Hoogwaardigheidsbekleërs, dames en here: dit is vir my 'n besondere eer en 'n voorreg om hier vandag namens die Stadsraad van Welkom 'n paar gedagtes van verwelkoming tot hierdie kongres tot u te rig.

Ter aanvang wil ek verskoning betuig dat die Burgemeester van Welkom, Raadslid D.R. de Wet, weens ander verpligtinge dit nie kon inpas om hierheen oor te kom nie. Ek wil aan u sy beste wense oorbring vir 'n baie aangename en vrugbare konferensie. In sy plek egter het die Stadsraad 'n ruim afvaardiging gestuur, nl. Raadslid Morrison en ek self, en ons Elektrotegniese ingenieur en die Stadsklerk.

Dit stadsklerk - die enigste werkie wat hy hier in verband met hierdie kongres gehad het was vir my 'n toespraak voor te berei maar hy het dit by die huis laat lê.

Wat myself betref, sê ek vir u dit is 'n groot voorreg om u welkom te heet tot hierdie kongres, namens my Stadsraad, eerstens as burger van Welkom in die Republiek van Suid Afrika, maar dit is verder vir my 'n eer omdat ek 'n gebore burger van Suidwes-Afrika is - synde gebore te Karibib, (die Marmer dorpie hier naby u) en wat hierdie land in my jeugjare kon leer ken het.

As ek met u oor Suidwes-Afrika praat, dan praat ek as 'n seun wat hier opgegroei het, tot dat ek na die Republiek verhuis het vir hoëre opvoeding.

Hierdie kongres sou vanjaar op Welkom plaasvind maar omdat Mnr. Barton waarskynlik die President van hierdie vereeniging nou sal word, en weens akkommodasie probleem, en die vriendelike uitnodiging van Windhoek se Stadsraad, wat herhaalde male tot hierdie kongres gerig was, om alhier te vergader, en die verlange wat by ons lede posgevat het om nader met u kennis te maak, het die uitvoerende Bestuur van die V.M.E.O. besluit om nie vanjaar op Welkom te vergader nie, maar wel hier.

Ons het van Raadslid Sam Davis van Windhoek verneem dat u hier die beste Carpio koffie ter wêreld maak. Ek vertrou dat u ten spyte van die Carpio koffie 'n aangename en vrugbare kongres sal hê.

Om hierdie land en sy mense te leer ken, is 'n groot ervaring. Ek wil 'n klein vergelyking tref tussen Welkom en Windhoek in Suidwes-Afrika.

Ons dorp, Welkom, is gebou op die goud-industrie, die skaars en kosbare metaal, maar hierdie land het net so veel goud, naamlik die goud in die harte van die mense, die gasvryheid, gemoedelikheid (of te wel, beter bekend as 'gemütlichkeit'.)

Ek heet u Welkom namens die Vriendelike Stad Welkom, by die vriendelike mense van Suidwes.

Welkom het sy geharde mynwerkers, maar Windhoek en Suidwes het sy geharde boere en pioniere wat hierdie wonderlike land mak gemaak het. Om met hulle kennis te maak moet u met 'n motor deur die land reis en met die mense praat en op die boerplase kom.

Wat 'n mens dadelik tref is hulle individualiteit, wat na my mening ontstaan daardeur dat hulle plase groot is en elke bewoner daarop aangewys is, om hulle eie probleme op te los, op sy eie manier. (Ons in die stede kan baie maklik van ons bure leer). Ek sien dat daar 'n kokerboom op die wapen van die Windhoek se munisipaliteit verskyn. Daardie kokerboom wat u hier kry is vir my die simbool van daardie individualiteit. Die kokerboom vind u staan alleen in 'n klompie ysterklippe; so staan die Suidwester alleen, om sy probleme alleen te beveg.

Windhoek is die enigste groot sentrum wat die bymekaarkom plek is van die uithoeke van die provinsie, en met sy kontinentale atmosfeer, het hy vir ons 'n spesiale aantrekkingskrag; en ontwikkel hy 'n reputasie as Kongresstad.

In die platteland het u naas die boere ook die verskillende inboorlinggroepe. So het daar later die tussengroep ontstaan wat gedeeltelik die Blankes se beskawingskenmerke ontwikkel het - hulle word genoem die 'oorlams'.

Met Windhoek se ontwikkeling as kongresstad, het daar 'n ander groep ontstaan, naamlik die fräuleins van Windhoek, en die Kongresmanne wat hulle vroue tuis laat. Hierdie nuwe groep noem ons die Hartlams!

Hierdie land het 'n droë klimaat, 'n baie verfrissende klimaat; dit veroorsaak baie statiese elektrisiteit in die lug, en daarom kan 'n mens verwag dat jou battery hier beter gelaai sal wees.

Before I conclude, I would like to thank His Worship the Mayor, and the Town Council of Windhoek for their cordial welcome, last night and again today, and for the refreshments served. I noticed on the invitation card there were the words R.S.V.P. When I was younger I tried to interpret that, and I thought it meant "Refreshments Served Very Plentiful".

Ladies and gentlemen, you have already experienced a little bit of the traditional 'gemütlichkeit' of this country.

We have met Mr. Levinson and his charming wife, Olga. I must tell you that Mr. Levinson believes in the motto, "A man's home is his castle" really and truly, and I trust that we shall see more of his romantic castle at close range.

Mr. Levinson told you quite a lot about South West Africa last night, and he told you some of the history of the Zoo Gardens, but I must tell you this one about the Zoo Gardens which I experienced in my younger days.

There was a German who lived in one of the castles on the hill, and he had a son whom I shall call 'Johnny'. Now Johnny was very fond of the animals in the Zoo, and you will remember that he told you the Zoo Gardens was the place where they kept the animals. And every morning on his way down to school he passed through the Zoo and played with some of the animals. But the smell of some of these animals was not so good and so it happened that, when he turned up in the class room he had a bad smell about him.

Now it happened in those days, that the wash tub was still sometimes used to store coal and fuel. The lady teacher presumed that Johnny did not wash too well, and she gave him a note to his mother. The old German woman was furious, and she sent the school teacher a note: "My Johnny is not a rose - don't smell him, teach him!"

Wat die Administrasie betref wil ek net sê dat Suidwes 'n eersteklas Administrasie het; dis nie meer die dae toe die mense van hulle gepraat het as die 'arme-strasie' nie, toe die skole gesluit is en die magistrate op die platteland weggeneem is nie. Hulle bestuur goed en te oordeel na die goeie paaie en geboue reg deur die land, gaan dit goed.

Maar iets waaraan ons iets sal moet doen is die stof. Dis stof in jou hare, stof in jou klere, en toe ek 'n bottel Hansa oopmaak was daar ook stof in - stof tot dankbaarheid!

En sedert sy edele Mnr. du Plessis Administrateur geword het, is die Odendaalverslag uitgebring. Ek verneem dat die Administrasie verantwoordelik vir die Odendalers - nuwe soort Dollars. Iemand het nou die dag vir my een miljoen Odendalers in die hand gestop hiersô. Ek het dit vir julle om te sien, en ek vertrou dat u almal die voorreg sal hê om so 'n miljoen Odendaler in die hande kan kry voordat u hierdie kongres verlaat.

Ons Stadsraad se beste wense aan u vir 'n aangename kongres. Ons vertrou dat ook die dames iets uit hulle mans sal kan kry in die vorm van karakoeljasse, en ons wil ook die lang ry van afgetrede presidente van hierdie vereeniging 'n aangename middagrussie toewens, na hierdie kongres, en ek wil die stadsraad van Windhoek bedank vir hulle vriendelikheid tot dusvêr, en vertrou dat u 'n vrugbare en aangename konferensie sal hê.

Dankie. (Applous).

THE PRESIDENT: Thank you, Clr. Meyer, for welcoming everybody to the Convention, I always thought there was a bit of a Dr. Jekyll and Mr. Hyde about him. He never told us he came from this country, and that he was born here, until he got here.

It now gives me great pleasure to call upon the Administrator of South West Africa, the Honourable Mr. W.C. du Plessis, to address you and open this Convention. (Applause).

DIE ADMINISTRATEUR VAN SUIDWES-AFRIKA, SY EDELE MNR. W.C. DU PLESSIS:

Meneer die President, Meneer die Burgemeester van Windhoek, Meneer die Burgemeester van Welkom, Dames en Here:

Dit is vir my 'n voorreg om vandag hier by u te wees, eerstens om u in Suidwes-Afrika te verwelkom en tweedens om die opening van hierdie Konvensie van Munisipale Elektrisiteitsondernemings van Suidelike Afrika waar te neem. Dit ly geen twyfel nie dat 'n konvensie van hierdie aard 'n belangrike gebeurtenis in die lewe van ons elektrisiteitsleweringsnywerheid geword het.

Teenoor soveel onverdraagsaamheid, soveel misverstand en onversetlikheid wat vandag in die wêreld heers, is dit verfrissend om so 'n groot groep mense byeen te sien wat vergader het van heinde en verre met die uitsluitlike doel om saam te werk en om - by wyse van opbouende debat en self-ondersoek - oplossings te probeer vind vir probleme wat vir almal van hulle gemeenskaplik is.

Wesenlik hang die waarde van hierdie konvensie af van die verhandelings en referate wat gelewer gaan word en dit word verhoog deur die broederskap en die samewerking wat bereik en verkry word deur die professionele en die persoonlike bande van vriendskap wat uit so 'n byeenkoms voortvloei.

Ons lewe in 'n wêreld wat steeds krimp en dit is noodsaaklik vir 'n mens om jou buurman en sy probleme te leer ken: Met dien verstande dat so 'n kennismaking fatsoenlik geskied deur op die buurman se voordeur te klop en nie onfatsoenlik deur deur sy badkamervenster te loer soos die internasionale wêreld vandag maar alte geneig is om te doen nie. Steeds bly dit egter waar dat weens groter spesialisering op elke gebied van die menslike strewe dit nodig geword het om te waak teen die gevaar dat mense aanraking met mekaar kan verloor tot nadeel van hulleself en tot nadeel van hul beroepe. Daarom is dit gebiedend om, soos u nou gedoen het, af en toe bymekaar te kom om die skeidsmure wat moontlik ondertussen kon ontstaan het, af te breek en aldus onderlinge belangstelling in gemeenskaplike vraagstukke te bevorder en daardeur 'n gees van samehorigheid te skep wat as grondslag kan dien vir 'n konstruktiewe benadering van sodanige vraagstukke.

Die probleme verbonde aan die ingenieurswese in ons land is soortgelyk aan dié in baie ander dele van die wêreld en op 'n byeenkoms van hierdie aard is dit paslik om 'n oomblik stil te staan en na te dink oor die vraag of ons die doeltreffendste gebruik maak van die stoflike bronne tot ons beskikking asook van ons gespesialiseerde mannekrag.

Weens die steeds groeiende wêreldbevolking en die toenemende behoefte aan al daardie dinge wat 'n hoër lewenstandaard en 'n beter lewenswyse meebring, word die wêreld al hoe meer geïndustrialiseer en gemeganiseer. Dientengevolge groei die behoefte aan krag by die dag aan en sal dit heelwaarskynlik soos die jare verbygaan teen 'n versnelde tempo aanwas om met die aanvraag tred te hou.

Die afgelope 50 jaar het waarskynlik groter wetenskaplike en tegniese vordering beleef as al die eeue wat dit voorafgegaan het en die rol van die wetenskaplike en die ingenieur word al hoe belangriker, selfs lewensbelangrik, asook al hoe ingewikkelder. Sonder die vooruitgang op die gebied van die ingenieurswese van die afgelope paar dekades sou wydverspreide hongersnood en armoede bes moontlik dwarsdeur die wêreld op die voorgrond getree het. Dit is moeilik om onder woorde te bring wat die mensdom verskuldig is aan diegene wat hul verstand gebruik het - en in die loop daarvan dikwels hul harte gebreek het - om oplossings te vind van die vraagstukke wat ontstaan uit immer wisselende omstandighede.

Die rol van die elektrotegniese ingenieur en tegnikus en die nywerhede aan hierdie beroep is van die allergrootste belang in hierdie stryd om die bestaan in hierdie stryd om die bestaan en hierdie strewe om vooruitgang.

By die inspanning wat geskied om middele te vind om hierdie proses voort te help, tree die prestasies van u vakkundige werk al hoe meer en met steeds toenemende omvang op die voorgrond.

Vandag reeds kan ons nouliks een enkele ontwikkeling, al is dit op watter gebied ook al, voor die gees roep waar die tegniek van kragproduksienie in die voorste gelid staan nie. Aangesien dit so is, spreek dit vanself dat 'n groter gesamentlike poging en 'n doeltreffender aanwending van die mens se geesteskrag en skeppingsvermoë 'n

sine qua non is vir die vrede, vir die vooruitgang en die voorspoed van elkeen.

Reeds in ons tydvak word voortgesette vordering in die tegnologie minder 'n saak van individuele prestasie as van gesamentlike prestasies deur groot spanne bekwame wetenskaplikes wat hul vindingsvermoë en hul middele saamskaar. Inderdaad soos vooruitgang en prestasies toeneem word al hoe groter saamwerkende spanne of ten minste oorlegplegende spanne nodig en - uiteindelik - so kan mens dit jou voorstel, werk die grootste geeste van al die volkere ter wêreld om die gemeenskaplike beswil saam. Euratom en die Europese Staal- en Steenkool-organisasie is goeie voorbeelde van waar sowel tegnologiese as ekonomiese en staatkundige oorwegings geharmoniseer word in die hoogste moontlike mate ter bevordering van die gemeenskaplike beswil van die gemeenskappe wat daarin deel.

South Africa is a young country but with a rapidly developing economy and the shortage of man power - especially of skilled man power - is a matter of serious concern. This is also the case in South West Africa.

It would therefore be wise to encourage and attract suitable young men to enter into the engineering and other skilled professions and to make every effort to ensure that they are given the required assistance so that they can develop their talents. Ways and means must increasingly be found especially to assist those who show ability but who cannot exploit their talents, possibly because of financial considerations. It is also a great pity that men of ability are sometimes lost to the profession owing to lack of adequate recognition. The importance of the engineer must be recognised and appreciated, - which by the way, Soviet Russia has long since done - and his status must be suitably enhanced. Only then will we have young men coming forward in sufficient numbers to ease the present shortage, and to devote their lives to the profession.

In a conference of this kind our experienced engineers, and their associates, have the opportunity of coming together to discuss our problems, and to devise ways and means of overcoming them.

It therefore gives me great satisfaction to be associated with this convention which has been organised for the very purpose of co-ordinating and collating details of achievements and findings, throughout our country.

The papers to be discussed are obviously going to be of great value to all of you, and - through you - to the country.

As the leader of the South African delegation to the International Conference which established the International Atomic Energy Agency, I naturally became very interested in the use of the atom for peaceful purposes.

In this connection it is clear that atomic power stations may be the answer, at some time, to the power production problems of some countries, but with improved efficiencies in conventional coal-fired stations, the old system has not yet yielded to the new. But, of course, coal is exhaustible - although, in South Africa we are fortunately richly endowed - and as time goes on, and with other industries requiring coal for other purposes, the new developments may ultimately prove to be competitive.

I am reminded here of what happened at the International Conference which I mentioned. The leaders of the delegations didn't really know very much about the subject on which we had to speak, namely atomic energy. The real people who knew something about it, sat behind us, our advisers, but we made the clever speeches and we were what the Americans call the "wise guys".

Mr. Krishner of India I knew beforehand, wanted to debunk uranium, because India does not have uranium, but India has thorium - quite a lot of it. So I asked him, "Mr. Krishner, when are you going to speak?" He said, "Well, towards the end - you know a speech must incubate in my mind". And I said, "Well, I hope it incubates well, and what you think will be born out of that incubation will actually be the case." He said, "Don't you worry; I'm heating up slowly", so I said, "That's fine".

The day when he had to make his speech, he had lots of pieces of paper, as was his usual custom, in front of him, and when he came to that particular subject in which I was so interested, he said, "Well, from uranium you can make a hundred, and from thorium you can make a thousand..." and then he didn't know whether it was kilowatts or watts or volts ... (Laughter) ... and he could not find the piece of paper, so he said, "...something - or-other!"

Naturally the conference burst out laughing, which irritated him very much, and he glared at those closest to him, which happened to be the Soviet Union, the United Kingdom and America, and the then Union of South Africa.

So I leant over to the Ambassador of the United States and said to him, "You know, we shouldn't really laugh at Krishner. We are all out of our depth in this thing", and. Mr. Vishinsky, that very brilliant diplomat, looked up at me, and he said, "Yes, and beyond zat zere is nothing!" (Applause).

Then there is the apparently inexhaustible power supply to be obtained from harnessing the energy of water; perhaps the immediate challenge lies in this direction. Certainly - in the southern hemisphere of this continent - this potential has hardly been touched.

We have marvelled at the Kariba scheme as a wonderful achievement; the proposed Orange River scheme is awe-inspiring, and now the hydro electric scheme on the Kunene River as suggested in the Odendaal report on South West Africa is being considered. These are schemes which engineers have dreamed of for decades and I am sure they will respond to the challenge. We, in South West Africa, are of course intensely interested and vitally concerned in this source of power, for the planned development of this huge territory.

Briefly, the Odendaal Commission visualizes a power line from Matala to Ovamboland and to the Tsumeb/Grootfontein areas. Initially, production may not be to full capacity, but development of the project will increase as consumption rises. At the onset power could rapidly be

made available for pumping water at Erikssons Drift, and for use in Ovamboland and further extended to the Tsumeb/ Grootfontein areas.

When the construction of the proposed hydro-electric scheme at Ruacana and the smaller scheme at Erikssons Drift is completed, power lines will reach as far south as Windhoek and Walvis Bay - 1,200 miles in all.

The estimated cost of these schemes, - Matala, Erikssons Drift, Ruacana - the power lines to the Tsumeb/ Windhoek and Walvis Bay areas, including pre-production cost and other contingencies will amount to an estimated R49 million.

As delegates to a conference of this nature you will realise only too well, that the cost of electricity produced by conventional plants at such places as Windhoek - or places in South West Africa even more remote from the coal fields, - is necessarily considerably higher than that of those close to the coalfields, and any alternative method of providing the cheap power so necessary for development, should be fully investigated and encouraged. With power comes water, so vitally required in South West Africa. Therefore, with power and water available, economically and in sufficient quantities, we envisage exciting times ahead for this territory.

Of course there will be problems to overcome, possibly ones quite unforeseen at the moment. But the status of a profession is gauged by its ability to overcome such obstacles and I have no doubt that our engineers will meet this challenge of providing the power the country needs and the water which, for us, is the essence of life in a quite particular sense. We have ample evidence that the standard of workmanship and design in Southern Africa is as good as in any part of the world and I am therefore at ease in my mind that our engineers will not let us down.

With these thoughts, I have great pleasure in opening this, the Thirty-Eighth Convention of the Association of Municipal Electricity Undertakings of Southern Africa. I wish you well professionally, and personally, I hope you will enjoy your stay with us. (Applause).

THE PRESIDENT: Your Honour, we are indeed grateful and delighted that you could give us some of your time, to present to us this most interesting address and the opening of this Convention this morning.

From your remarks, I would gather from the feelings of the members of this Convention that they would like to have you as a member delegate in this Convention, after such an interesting address. (Applause).

I'm sure that when we leave this wonderful South West Africa, we will all go back with very happy memories of this country.

On behalf of the A.M.E.U. Your Honour, I want to thank you most sincerely for coming here, and sparing your time. We do appreciate it very much. Thank you. (Applause).

The next item on the Agenda is the election of the President, and I now call for nominations for President for the ensuing year.

Mr. Lombard would you mind coming up to the dais please?

Mr. C. LOMBARD (Germiston): Your Honour, Your Worship, ladies and gentlemen: At last year's convention it was my privilege and pleasure to nominate as Vice President of this Association, Mr. Bob Barton, Town Electrical and Mechanical Engineer of Welkom.

Today, Mr. President, it is again my privilege to nominate Mr. Barton as President of this Association for the ensuing year.

Bob, as you all know, has served this Association during the past years with distinction and credit to himself as member of the Executive Council and as Vice President, and I am confident that he will not only be a worthy holder of this high office, but that he also has the ability to guide the affairs of this Association in such a manner that it will go from strength to strength.

Bob het sy opleiding aan die Witwatersrand se Tegniese Kollege ontvang, waar hy die Nasionale Ingenieurs Diploma verwerf het. Deur privaat studie het hy homself bekwaam om die eksamen vir die regeringsbevoegdheidssertifikaat vir elektrotegniese ingenieurs met sukses af te lê.

Nadat hy aan een van die Randse myne en aan die Suid-Afrikaanse Spoorweë verbonde was, is hy aangestel as die eerste gekwalifiseerde ingenieur van die Munisipaliteit van Edenvale.

Na die ontdekking van goud in die Vrystaat, het Bob besluit om 'n blikoor te word. Hy het gedurende 1949 na Welkom verhuis om die eerste elektrotegniese en werktuigkundige stadsingenieur van die dorp te word.

Oorspronklik was hy in diens van die Anglo-American Corporation, maar met die totstandkoming van die dorpsbestuursraad het laasgenoemde die dienste van die mynmaatskappy oorgeneem en terselfder tyd op Bob beslag gelê.

Since then Welkom has grown so rapidly that it is today the second largest town in the Free State; Bob's council soon became aware of the fact that in him they had an extremely competent and versatile engineer and as usually happens in such cases he was soon burdened with additional duties and responsibilities.

Amongst other things, he is now also in charge of the passenger transportation department and the fire department.

Bob is one of those quiet types who gets through a lot of work with a minimum of fuss. I suspect that the success that he has achieved in his career can, to a large extent, be attributed to his powers of persuasion. As proof, I point to the fact that he is the only engineer who has so far been able to persuade a councillor to deliver a paper at one of our conventions. (Applause).

Mnr. die President, dis vir my baie aangenaam om Mnr. Bob Barton nou formeel te nomineer as President van hierdie Vereniging. (Applous).

THE PRESIDENT: A seconder to the nomination, please.

CLR. W.F. MEYER (Welkom): Mnr. die President, sy edele, dames en here: You have listened to me at quite some length just now, and I shall now be short and to the point.

It is my onerous, but pleasant task to second the proposal so ably put across by Mr. Lombard.

We all know Mr. Barton as a humourous and jovial engineer, who was born in Johannesburg and served a few undertakings before he settled in Welkom. Last year I provided you with full details of his biography, and I do not propose repeating those particulars.

I can say this much of him, that he is a very competent man, as you have just heard, but we do not expect him to come and tell the Town Council that he wants a rise in pay!

Our Town Council will be very proud to know that he has achieved the high honour of becoming the next President of the A.M.E.U. for the year 1964/65.

I think that he will follow ably in the footsteps of his predecessors, and I therefore second the proposal made by Mr. Lombard of Germiston.

Thank you. (Applause).

THE PRESIDENT: Mr. Bob Barton has been duly proposed and seconded. Does that meet with your approval, ladies and gentlemen? (Applause).

I now declare Mr. Barton duly elected President for the year 1964/65.

(The Chain of Office was presented to Mr. R.W. Barton).

THE PRESIDENT: Mr. Barton, I congratulate you on your election as President of the A.M.E.U. I now install you with the badge of office of the A.M.E.U. and ask you to take control of the meeting. (Applause).

Mr. R.W. Barton took the chair.

Mr. R.W. BARTON (Welkom): Your Honour, Your Worship, Mr. Deputy Mayor, Mr. Downey, ladies and gentlemen:

I thank you very much indeed for the high honour you have accorded me. With the help of every one of you I shall do my utmost to justify it.

A little while later on we shall be taking leave of Mr. Downey in a fitting manner, but at this moment I would like to say to him, on behalf of us all, "Thank you very much indeed, Jack, for the magnificent way in which you have conducted the affairs of the Association over the past year". (Applause).

Our next item ladies and gentlemen, is the venue of the next Convention.

Ek dink Raadslid Rademeyer het iets op sy hart!

CLR. N.P. RADEMEYER (Port Elizabeth): ... From the friendly city...

Mr. President, His Honour the Administrator, and ladies and gentlemen: Mr. President, may I start by being one of the first to congratulate you on being elected to this high office. I am sure it has been a wise one and under your able guidance the Association will grow from strength to strength for the next year.

Now, Mr. President, it is my very great pleasure to convey to you the invitation of my Council for you and your members to hold your Convention next year in the friendly city of Port Elizabeth.

Apart from our wonderful beaches, our climate and all the other attractions of a popular seaside resort, we have an industrious city in which all members of the Association and the ladies will find many things of interest to them.

Mr. President, I have heard so many remarks at this Convention here - "But what about the wind in Port Elizabeth?" I can assure you Mr. President, you will have no wind in Port Elizabeth ... (Laughter).

I must agree, in the past, we have had a bit of wind, but last September we had a Municipal election and we had a complete landslide there, and I can assure you under the new Council, the wind is something of the past!

Mnr. die President, ek is seker dat Port Elizabeth vir u baie dinge aanbied wat u verblyf daar, 'n baie aangename een sal maak, en wat u baie, baie lank en vir altyd sal onthou. Soos u self weet, volgende jaar is ons sestigjarige bestaan vir ons elektrisiteitsonderneming in Port Elizabeth. Dit sal saamval met u verblyf daar, en ek verstaan ook dat dit volgende jaar die viering van u vyftigjarige bestaan is, so u kan sien Port Elizabeth sien uit daarna om sommer wonderlike dinge daar te verrig.

Mnr. die President, hiermee nooi ek u vriendelik uit na ons in Port Elizabeth, en ons hoop dat u die uitnodiging daar sal aanvaar om volgende jaar saam met ons daar te wees. Dankie. (Applous).

THE PRESIDENT: Thank you, Clr. Rademeyer, very much indeed. We have all realised, I think, that the winds that blow in Port Elizabeth are merely the winds of good will, and we will look forward to it.

May I take it that you accept the invitation to hold our next Convention in Port Elizabeth? (Applause).

Thank you Clr. Rademeyer. Will you please take our acceptance back to your Council and thank them very much indeed.

The next item, ladies and gentlemen, is the nomination of Vice President.

I now have much pleasure in calling for such nomination.

Mr. R.W. KANE (Johannesburg): Mr. President, ladies and gentlemen: I have a pleasant duty to perform this morning, in proposing to you that Mr. Murray Nobbs, the City Electrical Engineer of Port Elizabeth be elected to the position of Vice President of this Association.

As you know, the City Council of Port Elizabeth has extended an invitation to our Association to hold our 1965 Convention in that city, and we in turn, in accepting would like to show our appreciation by placing a colleague in a position to be elected into the chair of President in 1965.

The year 1965 will be the fiftieth anniversary of our Association, and Port Elizabeth was one of the 16 founda-

tion members in November, 1915. As an Association, our last visit to Port Elizabeth was in 1941. (The winds must have had something to do with it)... when Dave Bradley was elected President.

Mr. Murray Nobbs has been an active member since 1955, and with one exception, namely in 1962, when he was overseas on business, he has been present at every Convention from and including 1955.

David Murray Nobbs was born in Glasgow, Scotland, which does explain the very noticeable accent that he has. He has not told me what part of Glasgow he was born in, but I do know that he went to school in Bellahouston Academy, which is on the south side of the Clyde, and alleged to be just a little better and more high-class than any other school or suburb in the city of Saint Mungo.

He served an apprenticeship in the shipyards of the Clyde, continued his technical studies at the Royal Technical College, Glasgow, followed this by further experience of some 12 years with a well known shipbuilding firm, as a marine engineer with the Union Castle Company, and finally with cable ships of the Eastern Telegraph Company, later Cables and Wireless Limited.

He deserted the sea in 1935, to join the Victoria Falls and Transvaal Power Company, serving them at Vereeniging and Simmer-Pan Power Station. Towards the end of 1936 he joined the Johannesburg City Council, serving in the City Power Station on two occasions, and transferring to Orlando Power Station in 1939, during the initial erection and commissioning stages.

In July 1947 Mr. Nobbs joined the Port Elizabeth Municipality, and in 1951 he held the dual part of generation engineer for the Council and construction engineer for Escom at the Swartkops Power Station.

In 1952 he resigned from the Port Elizabeth Municipality, and took up a full time appointment with Escom, but it was not long before Port Elizabeth sought his secondment for special duties in connection with the Mount Road Power Station. This resulted in his being appointed as City Electrical Engineer designate in June 1953, and finally City Electrical Engineer two years later.

Although I have every confidence in the ability of Mr. Murray Nobbs to successfully hold office in the Association, there is however, one slight flaw in an otherwise successful and capable person, and that, strange to say, is the selection of a birthday.

I do not suppose one can blame him for the date of his birthday, but it is a somewhat remarkable co-incidence that he and I share the same date, which I have always heard to be considered a very select period of the year.

Ladies and gentlemen, I have the greatest pleasure in finally proposing to you that Mr. David Murray Nobbs, City Electrical Engineer of Port Elizabeth, be elected Vice President of the Association for the ensuing year. (Applause).

THE PRESIDENT: Thank you Mr. Kane.

It seems, if we are lucky, we will have the touching spectacle of Mr. Kane and Mr. Murray Nobbs exchanging presents on their next birthday!

Mr. Murray Nobbs has been duly nominated, and may I now call for a seconder?

RLD. N.P. RADEMEYER (Port Elizabeth): Mnr. die President, dit is vir my aangenaam om Murray Nobbs te sekondeer as die Onder Voorsitter.

Jy weet wat Murray Nobbs vir ons in Port Elizabeth beteken het kan jy nie in woorde omskryf nie; dit is onmoontlik om dit te doen. Hy het wonderwerke in Port Elizabeth verrig, en ek is seker daarvan hy sal met hierdie vergadering dieselfde doen.

Mr. President, you know when I say that Murray Nobbs has literally taken Port Elizabeth out of the dark, I don't exaggerate. In the fifties, we in P.E. when Mr. Murray Nobbs left us and went to Escom, were in the dark. We had to cut sections of the town for four hours a day. Now you can imagine what that means to an industrial city like Port Elizabeth.

The Mayor then contacted Escom and asked them if we could make use of the services of Mr. Murray Nobbs. Escom agreed, and Mr. Murray Nobbs walked into Mount Road Power Station, and within 36 hours we were back to full power and up to this day we have never had to cut for one minute.

Mr. President, it gives me very great pleasure in seconding the motion of Mr. Kane for Mr. Murray Nobbs to be Vice President for the next year. Thank you. (Applause).

THE PRESIDENT: Are there any further proposals for the post of Vice President?

If not, I have very much pleasure in declaring Mr. Murray Nobbs duly appointed.

Raadslid F.F. DEYSEL (Springs): Meneer, ek het hier nog 'n voorstel.

Mnr. die President, ek merk hier in die Agenda van die Uitvoerende Komitee 'n brief wat ontvang is van Roodepoort, en ek wil graag hierdie brief aan u voorlees. Dit lees as volg:-

"My Council holds the view that your Institution does not ensure that the official languages are accorded equal recognition in the papers presented at its annual conferences. The Council therefore feels that if this state of affairs is allowed to continue, contrary to the provisions of the South Africa Act, 1909, now repealed, and the provisions of the Republic of South Africa Constitution of 1961, the Council could hardly be expected to lend further support to these Conventions, as the non-compliance with the principle of equal recognition and status of both official languages cannot be justified and a departure from that principle would indeed be a retrogressive step".

Mnr. die President, as gevolg van hierdie brief van die stadsraad van Roodepoort ontvang is, het ek so bietjie oor die aangeleentheid nagedink, en ek het ook die Verslag van die Sekretaris 'n bietjie deur gelees en ek het gevind dat onder die Suid-Afrikaanse Buro van Standaarde se tegniese komitees se verteenwoordigers van hierdie

instituut, 'n hele aantal name verskyn, en ek het daardie name getel en deurgegaan, en die naam van Mnr. Murray Nobbs verskyn op nie onder hulle nie; terwyl die naam van Mnr. G.C. Theron, die elektro-tegniese ingenieur van Vanderbijlpark verskyn op sewe van daardie tegniese komitees. Hy dien op die minder nie as sewe van die tegniese komitees van die Buro van Standaarde waar hy hierdie instituut verteenwoordig. Daarbenewens het Mnr. Theron etlike jare lank op die uitvoerende komitee van hierdie instituut gedien, en as ek my reg heve, dan het Mnr. Murray Nobbs nog nie een enkele jaar op die uitvoerende komitee gedien nie.

Mnr. die President, as gevolg van wat ek hier genoem het, en omdat ek die amp van president beskou as 'n beloning vir dienste gelewer, daarom wil ek nou hier formeel voorstel die persoon van Mnr. G.C. Theron van Vanderbijlpark as onder-president van hierdie Vereniging.

Dankie. (Applous).

THE PRESIDENT: Thank you Clr. Deysel. Ladies, and gentlemen, I think this must be a unique occasion in the history of the A.M.E.U. because it is always accepted and planned beforehand that where a convention is to be held in a city, in this instance Port Elizabeth, the City Electrical Engineer shall automatically be the Vice President.

However, this is a democratic institution, and I have no alternative but to ask whether there is any seconder to Clr. Deysel's proposal.

RAADSLID C. J. KRIEK (Carletonville). Ek het die eer en voorreg om Mnr. Theron as Onder-voorsitter van die vereniging soos deur Raadslid Deysel voorgestel, te sekondeer.

THE PRESIDENT: Ladies and gentlemen, you have heard Mr. Theron correctly nominated and seconded. Are there any further nominations?

If not, I will now put the question to the vote. I must ask you to remember that only delegates may vote, (in other words Undertakings), and each Undertaking is limited to two votes. One for the engineer, and one for one councillor and representative. I think we will take it by a show of hands, otherwise we will have to take a lot of time over this.

I will now put the second proposal to you, that is the proposed Vice Presidency of Mr. G.C. Theron of Vanderbijlpark. Will all those in favour, and entitled to vote, please raise their hands.

(The count of votes was taken).

We now come to the proposal for Mr. Murray Nobbs to be Vice President. All those in favour, please raise their hands.

(The count of votes was taken).

Ladies and gentlemen, I have much pleasure in announcing that Mr. Murray Nobbs has been duly elected. (Applause).

I will ask Mr. Murray Nobbs to take his place on the platform, please. (Applause).

Mr. D. MURRAY NOBBS (Port Elizabeth): Mr. President, Your Honour, Your Worships, ladies and gentlemen: I would like to express my appreciation to the members of this Association for electing me to the office of Vice President for the ensuing year.

I would also like to thank Mr. Bobby Kane for his very kind remarks in proposing the nomination, and in regard to the co-incidental birthdays - I only hope that he will not be indisposed to allowing a little of the lustre of our mutual star to light my way in this onerous office! (Applause).

To my Chairman, Councillor Rademeyer, I would also express my thanks for seconding my nomination and for his kind, but embarrassing remarks.

To you, Mr. President, I want to emphasise that I shall do all in my power to be of assistance to you during your year of office, and when you call upon me, I am sure that I shall not be found wanting.

Thank you, Mr. President.

THE PRESIDENT: Thank you, Mr. Nobbs. I can assure you that I shall call upon you - perhaps more than you realise.

The next item on our Agenda, ladies and gentlemen, is the Refreshment Interval. Somehow or other, we have managed to save five minutes on the Proceedings, and I sincerely hope we can manage to keep it that way.

We will now break for tea.

ADJOURNMENT FOR TEA.

On resuming after tea:

THE PRESIDENT: Ladies and gentlemen, I will now call upon the Secretary to read the Apologies and Greetings, which is the next item on the Agenda.

THE SECRETARY: Mr. President, ladies and gentlemen: first of all I'd like to give you some telegrams and greetings I have received.

J.C. Fraser regrets inability to attend. "Best wishes to President and members for a successful conference. Go easy on the coffee, boys".

From the S.A. Electrical Review, "Good wishes for a fruitful convention. Our representative will be with you."

From Jimmy and Peggy Mitchell. "Regret cannot be with you this year, as too involved. Also shall be very independent here very soon. Salaams to new president, Bob, and Quizmaster, Percy. Trust you have memorable convention, from your most honourable multi-membered but not yet multi-hued Jimmy and Peggy." (Applause).

From Arthur Tilley, "Sorry to have to miss such good company. Best wishes."

From P. Laas. "Best wishes for a successful convention. Regret unable to attend."

From George Honiball, whom you will recall got out of doing some work up here by taking a job on the Reef, "May South West inspire you for that successful Convention with a difference that will long be remembered. Regards."

From A. Jackson in the Cape, "Best wishes for successful convention. Regret unable to attend."

Apologies have been received from John Morrison, J.H. West, P.V.H. Lampert Stokes, Ministry of Transport and Power, Southern Rhodesia, the Town Clerk Strand Municipality, Municipality of Bethlehem, Mr. Lineker, Johannesburg, J.K. von Ahlften, Springs, H. Koerting, S.A. Philips, G.E.H. Jones, the Town Council of Nigel, the Town Council of Barberton, the Municipality of Winburg, the Chief Executive Officer Swaziland Electricity Board, H.T. Aspinall, J. Ward, (Chairman of the Central African Power Corporation), the Manager of the Natal Undertaking of Escom, Knysna Municipality, J.L. McNeill, G.B. Gill, (Zululand Electricity Utility Company), the Municipality of Kroonstad, Councillor Robby de Lange, East London, the City Electrical Engineer of Salisbury, Patrick Murray (Pty.) Ltd., Municipality of Kenhardt, the Municipality of Odendaalsrus, James Howden and Safanco Ltd., J.T. Williams, J.H. van Haarten the Deputy Managing Director of African Wire Ropes, A.E.G. South Africa, Potgietersrus Municipality, Crompton Parkinson, Municipality of Riversdale, the Borough of Eshowe, the Department of Commerce and Industries of the Republic, the Provincial Secretary of the Orange Free State Province, the Municipality of Adelaide, the Municipality of Walmer, Dr. van Eck, Industrial Development Corporation, D.J.R. Conradie, Bloemfontein, Town Electrical Engineer of Harrismith, the Municipality of Middelburg, Transvaal, J.L. Eastbrook, (now Lodge Cotterell) the Municipality of Mossel Bay, Tzaneen Village Council, the Municipality of Graaff Reinet, the Secretary of the Fuel Research Institute of South Africa, the Provincial Secretary of the Administration of the Cape of Good Hope, the Municipality of Burgersdorp, the Municipality of Viljoenskroon, the Borough of Greytown, the Borough of Vryheid, Nelspruit Municipality, Town Council of Piet Retief, Municipality of Aliwal North, the President of SEIFSA, the Borough of Estcourt, the Chief Electrical Engineer, Public Works Department, Pretoria, the Provincial Secretary, Natal Provincial Administration, the Director of Local Government Transvaal Pro-Vincial Administration, the Manager of the Transvaal and O.F.S. Chamber of Mines, the Union Steel Corporation, the General Manager of African Lamps, the Borough of Port Shepstone, the Municipality of Robertson, the Municipality of Ermelo, the Municipality of Middelburg Cape, the Village Council of Bedfordview, and lastly our old friend, Pat Middlecote, who is overseas.

THE PRESIDENT: Thank you, Mr. Ewing. Listening to that long list, I'm surprised there is anybody here at all.

Are there any further apologies or greetings from the floor?

Mr. R.M.O. SIMPSON (Durban): Mr. President, just before I left Durban, I met one of your honorary members, Clarence Kinsman, and he asked me to convey his apologies to you for not attending, and also to pass his very warm wishes on to all his old pals in the Association, and his very best wishes for a most successful Convention.

The other duty I would like to do is to pass on the wishes of the Institute of Electrical Engineers, London, for a very successful Convention.

Mr. G.C. MOLYNEUX (Rhodesia Railways): Our General Manager wishes to convey to you, Mr. President, his greetings and best wishes for a most fruitful and successful Convention.

Mr. A.J.G. GOSLING (S.A. Railways): I bring to you greetings from the General Manager of the South African Railways, who says may you have a very successful convention, and Mr. President, I should like to congratulate you on the election to your high office. May you have a very happy and successful tour of office.

Mr. J.R. CHERRY (Randfontein): Mr. Chairman, I bring you greetings and very good wishes for a successful convention from the President and Council of the Institute of Certificated and Mechanical and Electrical Engineers. The Institution is proud of the fact that yet another one of its members has been made president of the Association of Municipal Electricity Undertakings.

Mr. G.C. WATKINS-BALL (Johannesburg): Mr. President, on behalf of the S.A. Institute of Electrical Engineers, I bring you greetings from the Council and best wishes for a very successful convention, and congratulations to you Mr. President, on your election and your next year of office, and best wishes for a very successful term.

Mr. T.R. STRAWSON (Johannesburg): Mr. Chairman, for many years I have been attending these Conventions, (the first one was 1948), and this is the first time I have been able to pass on any greetings, and I now pass on the very heartiest congratulations and greetings from the Chairman and members of the S.A. Institution of Mechanical Engineers.

THE PRESIDENT: Thank you Mr. Strawson. We are very glad to hear from you at last, and we hope it won't be the last time.

Mr. V.E.O. BARRATT (Queenstown): I have great pleasure in bringing and apology, though that may sound a strange way of saying it, but I am saying it on behalf of a past president, who had the unique privilege of holding office for the longest period that any president held office, namely Mr. Ivor James Nicholas of Umtata. He also sent his best wishes for the success of this convention, and he hopes still to be privileged one day to attend another one.

THE PRESIDENT: Thank you Mr. Barratt. Please convey the greetings of the Convention to Mr. Nicholas when you see him.

If there are no further apologies or greetings, we will pass on to the next item, which is the presentation of Past President's medal and certificates. We have two certificates and one medal being presented this morning, and they are all going to the same gentleman. I think he certainly deserves them. It is, of course, none other than our

old friend Jack Downey. It is a very sad duty in a way, that we have to officially say "Goodbye" to him at this Convention. As you all know, he has already retired from his job as Electrical Engineer of Springs, and I would like to say at this stage that I think he has certainly earned his retirement. I think he spent 18 years on the Executive of the A.M.E.U. and before that he had 3 years on the old advisory committee which preceded it, and as you can now see, he has at last come of age.

I would like to clear up one other little point that has been worrying a number of delegates and that is why his rosette has three little ribbons on it, whereas other people only have one.

We'll take the first question first - the three ribbons of course are to symbolise his three president-ships. He is also president of the S.A. Institute of Electrical Engineers, and he was and still is president of the S.A. Committee on Illumination. So that rosette signifies his hat trick!

With regard to the yellow one, that we should not go too deeply into. He is at the moment a member of the staff of Mr. Ewing's firm in effect, so as a member of the secretariat he has a yellow rosette, but that is only in a very honorary capacity, I can assure you.

Mr. Downey, I would ask you to come up and receive your awards, please.

We have one certificate as President of the A.M.E.U., the other one as Honorary Member of the A.M.E.U., and then we have your medal as an Honorary Member. (Applause).

Once again, on behalf of you all ladies and gentlemen, I would thank Jack Downey for the wonderful way he has served us, not only as President during the last year, and also his previous term of President, but over the last 21 years, which I think is a very notable record. I would like you to signify your appreciation of his service in the usual way. (Applause).

Mr. J. DOWNEY (Springs): Mr. President, ladies and gentlemen, I am indeed most grateful to you, sir, for your very kind remarks, about the service that has given me such great pleasure in rendering to the A.M.E.U.

We heard this morning greetings from Mr. Nicholas, who has held office as President for the longest period as any president of the A.M.E.U. It was during that period that I acted as a member of the Advisory Committee during the war years. I take it that these certificates that I am about to receive - one is my legal and honourable discharge from the A.M.E.U., and the other one will signify that I have now come of age and I can come in after one o'clock in the morning!

Mr. President, I want to thank you most sincerely for the good will I have received from this Association. It always has been a great pleasure to do what I have done, and as you know, it has been a delight to meet members from time to time.

I do hope that in the future I will be able to attend your Conventions and enjoy the hospitality that I have enjoyed over the past 21 years.

Thank you very much indeed. (Applause).

THE PRESIDENT: Thank you, Mr. Downey.

It would be superfluous, of course, to add that you will always be heartily more than welcome at any of our proceedings.

We come to the next item on the Agenda which is the election of the Executive Council. There are vacancies for six engineer members. I now call for nominations.

I would ask you when nominating to wait for a seconder before you nominate another person, please.

Mr. R.W. KANE (Johannesburg): Before we go to nominations, Mr. President, I think there is precedence for some consideration to the immediate Past President.

As you know, we have two past presidents. When Mr. Fraser resigned as a Past President, Mr. Sibson of Bulawayo continued for a further year. In other words, when you said just now that you have six nominations, you are ignoring the possibility of the Past President's post, that should have been held by Jack Downey, being vacant. I would like to suggest that Chris Lombard extends his office as Past President for a further year.

THE PRESIDENT: Thank you Mr. Kane. That is a good point. With Mr. Downey leaving us there is an additional vacancy besides the six to be nominated, and we have a proposal that Mr. Lombard should continue as Past President - is that agreed? (Agreed).

Then I have much pleasure in declaring Mr. Chris Lombard a member of the Executive Council as Past-Past-Past President! (Applause).

The following members were then nominated and seconded:-

Mr. G.J. Muller, Bloemfontein
Mr. J.D. Dawson, Uitenhage
Mr. W. Rossler, Kroonstad
Mr. H.E. Summers, Bulawayo
Mr. R. Leishman, Johannesburg
Mr. J.I. Inglis, Pietersburg
Mr. J.M. Gericke, Klerksdorp
Mr. J.A. Mathews, Kimberley
Mr. G.C. Theron, Vanderbijlpark
Mr. H.T. Turner, Umtali
Mr. E.E. de Villiers, Carletonville
Mr. J.K. Von Ahlften, Springs
Mr. W. Beesley, Livingstone
Mr. A.C.T. Frantz, Cape Town
Mr. R.M.O. Simpson, Durban
Mr. J.C. Waddy, Pietermaritzburg
Mr. H.A. Durr, Peri-Urban Areas Health Board

THE PRESIDENT: I take it there are no further nominations, ladies and gentlemen?

There are some queries. In regard to the nomination for Mr. Muller of Bloemfontein, it may not be gen-

erally known that Mr. Muller will be retiring very shortly. I don't think that Mr. Muller is available.

Oh, I beg your pardon. Mr. Muller does not retire until September, so we will leave the nomination as it stands.

The other query is that of Mr. Rossler. I don't know whether I am out of order, but Mr. Rossler is Vice-Chairman of the High Veld Branch, and is due to become Chairman. Do you wish his nomination to remain on?

(The proposer and seconder agreed that as Mr. Rossler would be on the Executive in any case, his nomination be withdrawn).

The Secretary has requested that you vote for six vacancies.

Mr. N.A. POTGIETER (Brits): Mr. President, is it desirable that we should elect a certain number from each Province?

THE PRESIDENT: That is an interesting question. In the past we have had so much difficulty with these elections in attempting to achieve this representation of the Provinces, that in nearly every case it has defeated its own object. So the Executive feels that if you simply vote for the people you would like to be on the Executive, and the scrutineers will see to it that the Provinces are properly represented.

Are you all agreed to that? There is no problem involved. It is just the mechanics of the thing. The nomination list contains people from all the Provinces, so that there is no difficulty involved. (Agreed).

With regard to scrutineers, last year the principle was adopted of asking the Affiliates to do it, they not being emotionally involved!

I suggest Mr. Watkins-Ball and Mr. Randall this year, if they are agreeable. (Agreed).

Will the scrutineers collect the papers please? You must have the official ballot paper please.

One point, before you hand in your papers, make sure that you are either an engineer member or a councillor member. Mr. van der Walt is the only exception!

(Mr. Strawson replaced Mr. Randall as scrutineer).

THE PRESIDENT: I will now ask the Vice President to take the Chair while I inflict my Presidential Address on you.

THE CHAIRMAN: Ladies and gentlemen, I now have pleasure in calling upon our President to present his Presidential Address.

Presidential Address

by R.W. BARTON:
Town Electrical and Mechanical Engineer, Welkom.

1. Firstly, I wish to express my sincere appreciation to the members of this Association for the honour they have conferred upon the Town Council of Welkom and myself by electing me to the position of President for the ensuing year.

This is a very high honour, the highest that can be attained in the field of Municipal Electrical Engineering in this country.

Because I represent one of the smaller Undertakings, (Electrically - on the basis of maximum demand - Welkom occupies 16th place in Southern Africa), it is particularly gratifying to me to have been chosen. This undoubtedly will be a considerable encouragement to many among us who have hitherto regarded the prize as being attainable only by the engineers in charge of the larger Undertakings.

I enter my year of office with a large measure of trepidation, since it will not be easy to live up to the very high standard set by my illustrious predecessors.

All I can say to you is this - that I will give only of my very best.

2. Presidential addresses delivered to this Association in the past have, with one or two notable exceptions, dealt with some or other facet of Municipal Electrical Engineering, such as administration, efficiency, staff training, economics, and so on. However, one vitally important function of those in charge of Undertakings, which concerns us all very deeply has not apparently been dealt with. I refer to SAFETY - Safety to life, limb, and property in the Municipal generation, transmission, distribution and utilization of electricity.

3. The magnitude of the responsibility which rests on the shoulders of city and town electrical engineers and their councils in this regard, is something which warrants very serious thought. Everyone acknowledges the unprecedented industrial development in our country. Industries are dependent on power, and in modern times, this power is electricity, the control of which is largely in the hands of members of this Association. Like most things which have the capacity to do good, electricity also has the capacity to do harm, and it is unfortunate that this boon to mankind, although controlled by specialists, is used by consumers who realise very well what they can do with electricity, but in many cases are unaware of, or indifferent to what electricity can do to them.

4. The haphazard use of electricity constitutes a serious accident potential and it is the duty, both morally and by statute, of those in control to use their knowledge and authority in assisting and advising the uninformed on how to use this power to maximum advantage with minimum risk.

5. Accident prevention is not the hit and miss affair that it was a century ago, but is today accepted throughout the world as a distinct facet of efficient management. Accident prevention planning can and should be approached as systematically as planning for increased production.

6. It has been established that accidents have four basic causes. The first of these is what we call an unsafe condition, such as a floor which is slippery, wires

which are not properly insulated, a ladder that is cracked, or anything about us which is unsafe. The other three causes are those factors which tend to make us do something to commit an unsafe act and these are, firstly, a mental or physical defect. For example - a man cannot see well enough to do a job, or is not strong enough to lift what he is supposed to lift, or he has just not the mentality to cope with the particular problems of the work.

The next basic cause is a lack of knowledge. A man may have all the strength and intelligence required but would be unable to do his work properly unless he has adequate knowledge of the situation.

The fourth and last basic cause of accidents is what is known as improper attitude, where a worker does not realise the importance of working safely or for some or other reason has the wrong approach to the job.

7. Having established the four basic causes, an unsafe condition, physical or mental defect, a lack of knowledge, an improper attitude, we can now go about finding the four remedies, and it is amazing how simply the jigsaw slips into place.

8. When we find that something is unsafe or incorrect, we make it safe or correct it, that is, we apply engineering revision.

9. If a man has a physical or mental defect so that he is incapable of doing his work efficiently, we put him in a position where he can do the type of work to which he is physically and mentally suited. In other words, we do personnel placement or adjustment.

10. If there is a lack of knowledge, we educate and train our personnel so that they can acquire the necessary knowledge.

11. The improper attitude, of course, is the most difficult cause to eliminate, but it has been found that proper placement of personnel together with sufficient education and training, and control through adequate supervision, will make employees aware of the importance of working safely. As a last resort, if all else fails, we can apply discipline in various degrees.

12. Although the four basic remedies to the four basic causes could and should be applied in our own undertakings, it is not intended that members of this Association should act as prophets to educate the world or start interfering with the management techniques of the various industries. As far as our consumers are concerned, they are mentioned to draw attention to our responsibility as it affects the elimination of the unsafe condition.

13. Although the majority of accidents arise from the unsafe things we do, it has been found that the most effective first step towards accident prevention is the removal of unsafe conditions, because these conditions can be seen; when they are seen, they can be corrected, and when they are corrected, they are corrected permanently, as long as we keep an eye on them to see that the same condition does not arise again. When all conditions are perfectly safe, or nearly so, then even if an unsafe act is committed, the chances of there being no injury are so much better.

14. There can be few engineers present here today who are not familiar with the unsafe conditions which can and do arise with distressing frequency throughout industry, in our homes, and even, in spite of all our efforts, in our undertakings. Such things as exposed conductors, unearthed equipment, inadequate protective devices and many others exist and regularly take their toll of human life and property.

15. The Workmen's Compensation Commissioner's Report for 1959, which is the latest available, places the number of disabling injuries caused by electricity at no less than 579, while the number of fatalities was 39. These figures are for occupational injuries only, and do not include domestic and other accidents.

16. It is not my intention to elaborate further on electrical accidents specifically and their prevention. This has been done recently in admirable fashion by Mr. R.R. Gilmour of the Cape Town Electricity Department in his paper entitled "Electrical Accidents" which he read to this Association in Margate last year.

Rather I wish to deal with Industrial Safety in its broader aspects, and to indicate how accident prevention can and must play an important rôle throughout our municipal undertakings.

17. In a statement made a few weeks ago, the Deputy Minister of Labour, Mr. Marais Viljoen, expressed the deep concern of the Government at the loss to the economy of the Republic caused by industrial accidents. This loss now amounted to nearly 30,000,000 man-days annually, equivalent to the output of 45,000 full-time workers.

The loss in human grief, pain and suffering cannot be estimated.

18. Progressive industrial concerns try to eliminate the unsafe condition and to correct the unsafe act, because they have found that:

1. Accidents cause, or indicate an irregularity in production which results in lost time and reduced efficiency.
2. Accidents cause the temporary or permanent loss of experienced and valuable workmen.
3. Careful attention to safety, by both mechanical and educational means, raises the morale of the working force.

19. Accident prevention is a vast subject and many volumes have been written about it. However, it can be conveniently approached and applied to any undertaking, large or small, by considering three factors. These are:

1. Housekeeping
2. Safety organisation, and
3. Accident recording and investigation.

20 - 1. Housekeeping concerns buildings, machinery, safety appliances and everything relating to the safe (or unsafe) condition. Forethought in the arrangement of buildings and equipment will avoid hazards which are later impossible or difficult to remove. Buildings and equipment must be kept clean and in good state of repair.

Good lighting, whether natural or artificial is essential. Developments in light sources and the design of fittings have caused the cost of illumination per lumen to fall ever lower, so that there is no excuse for inadequate lighting in any situation.

Good ventilation is important and affects the workers' comfort and efficiency directly.

Aisles and storage areas should be demarcated and passageways between working areas well outlined by means of lines painted on the floor, preferably in yellow for good visibility.

Management should insist on good stacking practices in both stores and workshops. Here, as always, safety and economy go hand-in-hand. Neat piles of materials on adequate racks or shelves not only speed up the work of stacking, checking and issuing, but reduce the danger to personnel caused by articles heaped high with no regard to stability or littering the floor, to be trampled on or tripped over.

Elementary, one may think, but how often seen.

20 - 2. Coming now to machinery and equipment, the first and most important item is the provision of adequate safeguards to parts liable to cause injury, for example - rotating or reciprocating members. The essentials of an efficient safe-guard, according to the National Safety Council of America, are:-

1. It should be so designed and constructed that it will prevent, on the part guarded, all accidents both to the operator at his regular work and to others who may slip, fall or carelessly touch the machine.
2. It should not interfere with production. If it does it is liable to be removed. In designing a guard, it is generally wise to consult the man who will use it.
3. In general, it should be attached to the machine. If attached to the floor, use a connection which will interfere as little as possible.
4. The guarded part must be easy of access for oiling, inspection and repair, through a door or removable section hinged or fastened to the body of the guard, or to the machine. If not attached, it is likely to be left off permanently.
5. The guard should not interfere with cleaning and sweeping around the machine. It should, therefore, be kept about 6 inches above the floor.
6. The guard should be strong enough to resist injury and keep its shape. A light, flimsy guard soon becomes bent and is discarded. A substantial guard is cheaper in the end.
7. Incombustible guards are preferred; except where subjected to acid fumes, wooden guards may be necessary. Wooden guards, soaked with oil, may become a serious fire hazard. Guards may be made of cast iron, sheet metal, wire mesh, expanded or perforated metal, or slats.
8. The guard and operating mechanism should interlock, where possible, to prevent the machine operating unless the guard is in place.
9. A safe guard often can be so designed as to prevent wear on the parts guarded - for example, a solid gear enclosure.

20 - 3. The next item, dealing with machinery and equipment, is the provision of an effective lock-out system for the protection of maintenance staff working on machinery which has been shut down for this purpose. Warning, or "hold" cards should be used to warn operating staff against attempting to start the particular machine, and padlocks should be provided to lock switches or starters in the "OFF" position, the keys being retained by the men doing the maintenance work.

20 - 4. Another essential is the labelling of isolators, switches, valves and so on to avoid confusion to both operating and maintenance staff.

20 - 5. Also under housekeeping comes fire-fighting equipment, a subject worthy of a paper to itself. In fire fighting the first few minutes are generally critical, since most fires have small beginnings. If the fire can be extinguished quickly by people on the spot, little harm is caused, and that is usually the end of the story. On the other hand, any delay in tackling the fire usually results in its getting out of hand, with disastrous results. It is therefore essential to have sufficient portable fire appliances placed at strategic points. The correct types must be chosen according to the class of fire to be anticipated, for example - dry powder extinguishers for oil fires, and carbon dioxide extinguishers for electrical fires. The location of each appliance should be clearly indicated by means of a large red circle painted on the wall above it, at a height where it can be seen from a distance. Accessibility is essential. Many a fire which should have been no more than a nuisance, has developed into a conflagration because the extinguisher available to deal with it was hidden behind a pile of empty boxes or other rubbish. In spite of the multitude of types and makes of extinguishers developed over the years, water remains the most effective medium for putting out most fires, and hose reels and hydrants should not be overlooked when installing fire protection.

20 - 6. It is useless providing fire appliances unless these are kept in a state of readiness at all times. A planned

maintenance programme is essential and of course, once an extinguisher has been used, it should be recharged with the least possible delay. Many municipal fire departments undertake such maintenance for a reasonable fee.

20 - 7. An important aid to fire prevention is the proper storage of materials especially liable to catch fire, such as petrol, paint and a host of other volatile and highly flammable liquids. These materials should be segregated to reduce this exposure to accidental ignition and to lessen the damage caused if they should catch fire.

20 - 8. Another essential point in fire protection is the provision of readily visible signs showing the location of exits, stairs and alarms to facilitate the escape of staff in the event of fire.

20 - 9. Also under the heading "Housekeeping" comes electrical equipment, which, as mentioned earlier, will not be dealt with in detail here. It is sufficient to say that the electrical installation generally should be kept in good repair by qualified electricians, and that particular care should be taken with all portable equipment. The latter is involved in the vast majority of electrical accidents in industry, and in the home. Regular testing of earth continuity and insulation resistance is essential, and a record in log-book form should be kept of such tests.

20 - 10. Colour-coding is another desirable procedure in the fight against the unsafe condition. The South African Bureau of Standards in conjunction with the National Occupational Safety Association has compiled and published S.A.B.S. 08-1954 - Colour Code for Workshops and Factories - which makes recommendations for the colour identification for machinery and equipment, and the colour and lighting of surroundings in workshops and factories. S.A.B.S. 074/1961 covers a colour code for the identification of pipe lines.

20 - 11. Another aspect of "Housekeeping" is the condition of hand tools. It has been said, with considerable justification, that a workman can be judged by the condition of his tools. Many accidents have been caused by carelessness in maintaining hand tools in sound condition. A hammer-head which flies off its haft and strikes an adjacent worker, surplus metal on the impacted butt-end of a cold chisel, needing but an injudicious hammer blow to fire it into the eye of a passer-by - these are things which are elementary, but how commonplace, and there are many others. Management should insist on supervisors checking the contents of artisans' tool boxes, and ensuring that all tools are kept in good order. This will not only pay dividends as regards safety, but will also aid in raising the standard of workmanship produced by the artisan.

20 - 12. Another sub-division of "Housekeeping" is protective equipment and clothing. The requirements vary according to the particular industry, but certainly in municipal undertakings there will be need for goggles and helmets or masks for use in welding operations, and also in tool grinding. Safety shoes or boots prevent many an accident to toes, which would otherwise result in weeks of absence from work. Such boots or shoes are no longer the clumsy clodhoppers of yesteryear, but are indistinguishable in looks from ordinary good quality boots and shoes, and can be worn in the street with complete comfort.

20 - 13. Breathing apparatus and safety warning devices such as the Davey Safety Lamp also fall under this sub-heading. Municipal electrical engineers who are responsible for the maintenance of sewage disposal works and pumping stations would be well advised to consider the need for such equipment, if they have not already done so.

20 - 14. The provision of protective equipment at likely places and to personnel concerned, however, is only the beginning of the story. The next essential step is to ensure that the worker knows how to use the equipment, and that in fact, he does use it, whenever necessary. Finally it is essential that the protective equipment be inspected regularly by the supervisor, and maintained in good working order.

20 - 15. The last point to be considered under "Housekeeping" is the general cleanliness of the premises. The workshop and yard should be kept clear of all superfluous material. Adequate scrap bins and an effective rubbish removal system are prime requisites.

Not only does a neat and clean workshop improve the morale of those working in it, but the danger of fire hazard, inherent in piles of old boxes, straw and other materials, is eliminated.

21 - 1. The second of the three factors involved in accident prevention is Safety Organisation. Many industrial concerns in this country and all over the world have reduced accidents substantially and brought about considerable savings in time, money and human suffering by not only insisting on good housekeeping, but by re-design of machinery and revision of operating methods, which were inherently dangerous; by strict supervision on the part of executives, from manager to foreman, to enforce the use of safe methods of work; and by the training of workmen, both in general habits of carefulness and in the safe conduct of their particular jobs. To achieve this it is necessary to organise and maintain a continuous campaign, in which the first essential is the whole-hearted active support of the management.

21 - 2. The next step is the appointment by management of a Safety Officer, who may be a full-time official, or who may combine his duties with those of some other post, depending on the size of the establishment. He would be responsible for safety co-ordination and the conducting of the safety campaign. He would be required to make regular safety inspections, to liaise with all ranks of executives and workers, and to make recommendations to management.

21 - 3. The next step in the campaign is the formation of a Safety Committee, composed mainly of superintendents and foremen, with the Safety Officer as secretary. The

function of this committee is to establish standards for safeguards; review reports and recommendations of the Safety Officer, foremen and workmen; formulate safety rules; outline educational methods and direct safety campaigns; study accident experience tabulated by the Safety Officer; and pass on controversial matters to management.

21 - 4. Next, workmen's safety committees may be set up to establish and maintain the interest of the workers in the campaign. These committees should:-

a) Make regular inspections to discover unsafe conditions and practices;

b) Instruct and warn fellow workers regarding dangerous practices; and

c) Investigate all serious accidents and near accidents, and submit reports and recommendations.

21 - 5. Having established the safety organisation, the campaign can commence with a Safety Propaganda Programme, in which posters, bulletins, news letters, safety films and internal safety competitions may be used.

21 - 6. Next a plant inspection routine must be set up with a system of reporting faults and hazards back to management in writing.

21 - 7. One or more notice boards, depending on the size and complexity of the undertaking, should be erected, indicating safety experience, for example - the number of manhours worked without a lost-time accident, a lost-time accident being defined as an accident which results in absenteeism on the day or days following that on which the accident occurred.

21 - 8. Induction training and job instruction for new employees is essential, but this should be followed up by continuous training. The message of safety posters should be explained where necessary, particularly to Bantu workers, who very often find difficulty in appreciating what was in the mind of the compiler.

21 - 9. Fire-fighting drill should be held at regular intervals and all employees instructed in the functioning of the various appliances.

21 - 10. First Aid training and the provision of First Aid equipment is also a function of Safety Organisation. Procedure to be followed in case of emergency should be detailed in the form of concise written instructions and all staff concerned should be required to familiarise themselves with it.

21 - 11. Written safe operating practices and procedures should be drawn up and enforced. This would cover such things as the removal of bracelets, rings and loose clothing, where there is danger of these, if worn, being caught by moving machinery.

21 - 12. Finally, a comprehensive suggestion scheme should be instituted, whereby staff at all levels could be encouraged to come forward with worthwhile ideas on safety.

22 - 1. We come now to the third and last factor in accident prevention, namely, accident recording and investigation. Adequate records are essential as a check on the safety experience of the undertaking, that is, to determine whether there has been an improvement from time to time, or otherwise, and also to focus attention on areas of the plant, or on procedures which have an unduly high accident rate.

The record should commence with an internal accident report form filled in and signed by the foreman, giving full details of the accident. This should be followed up by an investigation and report to management, with recommendations aimed at the avoidance of a repetition of the accident. Finally, an analysis of the accidents occuring over a period should be prepared and exhibited for perusal by all employees.

23. To many of those present today, who are well-versed in efficient, and hence safe, management, the foregoing will seem elementary, and yet, at any given moment, as we have heard, 45,000 people in the Republic are incapacitated as the result of industrial accidents. Even sadder to relate, the record of local authorities as a group in this regard, is extremely poor. Statistics could be quoted, but it is perhaps wiser at this point to draw a veil.

24. Fortunately, the members of this Association are not alone in this campaign to achieve the maximum degree of safety economically possible.

Various bodies exist largely or solely, in some cases, for the purpose of helping us to achieve this highly desirable object. We have, to mention only two, the Department of Labour and the National Occupational Safety Association.

25. The Department of Labour, in terms of the Factories Act and Regulations, exercises statutory control over the unsafe condition throughout industry. The regulations, although the individual may find fault with one or other provision, are the result of many years of experience all over the world, and, if conscientiously applied, will go far towards the attainment of the safe condition.

Unfortunately the Departmental Inspectors, although a competent and effective force, are sadly few in number when one considers the magnitude of the task confronting them.

26. Human nature being what it is, one finds that voluntary action, if it can be induced in the subject, is considerably more effective in the overall pattern of accident prevention than the official enforcement of the law, however sympathetically the latter may be applied. Hence the need for a concern such as the National Occupational Safety Association.

This is a body formed to combat industrial accidents, which are estimated to cost the country R55,000,000 annually, quite apart from the loss of human life and limb. The Association is financed with funds provided by the Workmen's Compensation Commissioner, and can supply a wealth of useful services, such as safety posters, safe-

ty surveys and so on, to all employers who pay dues in terms of the Workmen's Compensation Act. Many of those present today will have made good use of these services, and many others could profitably do so.

An expert staff is available to advise and assist with safety surveys, safety training courses and the implementation of safety programmes. I am indebted to this organisation for much of the information contained in this address, which I have gleaned during some years of pleasant association with it.

27. In the final analysis, of course, the results achieved depend on ourselves. If we want the optimum safe condition, thereby leaving as little as possible to the human element, it is up to us who know HOW to bring about this safe condition, which is increasingly being accepted throughout the world as a product of sound management.

It is a fact that this task is difficult because we do not deal only with our own undertakings, but virtually control the conditions in establishments managed by others.

If we consider, however, the value of the property and the number of lives which depend on the safe distribution of electricity, we must accept this responsibility.

There is not a single accident - apart from acts of God - that could not have been prevented by some action from some person.

28. What of the future?

Many of those present here this morning will have listened to or read with great interest, the thought-provoking Presidential Address delivered to the Institution of Certificated Mechanical and Electrical Engineers, South Africa, by Mr. J.C. MacFarlane in February of this year. Part of this address dealt with engineering progress and the almost frightening rate of development in the design and production of machines for both peaceful and warlike purposes.

28 - 1. It may be thought that the municipal electrical engineer will have only a remote connection with these, but who can say that such devices as the laser, the fuel cell and the magnetoplasmadynamic generator, to mention only three, will not one day come into the field of some of the younger members of this audience?

28 - 2. The laser is an invention which produces light amplification by stimulated emission of radiation. It enables a narrow beam of light to be intensified and transmitted over vast distances with almost no spread and very low attenuation.

Its efficiency at present is very low, about one per cent, but even so, it can send a ray of light to the moon's surface, and its beam can pierce a hole in a diamond. Is it not feasible that at some time in the future, perhaps sooner than we realise, a development of this device will transmit large amounts of power from point to point on the earth's surface without the use of intervening wires? The power lines on their pylons, which are such a feature of the country-side today, may disappear for ever.

28 - 3. The fuel cell produces electricity directly from the free energy of combustion of fuels such as hydrogen, by a process which, to put it very simply, is a reversal of the process of electrolysis. Research on various types of fuel cell has been going on for many years and one at least is functioning with an efficiency of 75%. The overall efficiency of a modern thermal power station is of the order of 30%.

The biggest drawback to the use of fuel cells is their very high cost. When this is overcome they will undoubtedly become of fundamental importance for numerous applications. It is a sobering thought that if applied to industrial, commercial and domestic use in the form of a packaged unit for each consumer, they may eliminate municipal generation, transmission and distribution systems entirely.

28 - 4. Magnetoplasmadynamic generation is the extraction of D.C. power from a high velocity flow of gas plasma at high temperature. By applying magnetic fields transversely to the flow, electricity is generated in the same way as in the ordinary rotating machine, but with no moving parts other than the gas itself.

Dr. H.M. Finniston in an article published in a recent issue of the "Electrical Review" has described the exciting possibilities of this machine if combined with a nuclear reactor as the heat source, and super-conducting magnets to provide the magnetic field.

As its name implies, the latter device would have a winding of superconducting material, which at temperatures of the order of that of liquid helium, lose their resistance to the flow of electricity. These materials can carry current densities greater than one million amperes per square centimeter. It has been calculated that while a conventional water-cooled copper solenoid producing a magnetic field of 40 kilowatts, a super-conducting magnet could produce the same field with the supply from a two-volt battery.

I have no doubt that Escom and some of our larger municipal undertakings will one day take a more than academic interest in such a machine.

28 - 5. The foregoing, which forms only a fraction of the vast amount of research and development which is taking place today, is given to illustrate the point that undoubtedly the electrical industry is undergoing a technical revolution.

28 - 6. Hand in hand with these developments will go the need for more and more attention to the safety of person and plant. The highly specialised accident precautions necessary in the case of nuclear power stations illustrates this point.

29. Ladies and gentlemen, it has been said that a Presidential Address inevitably falls into one of two categories. Either it is a pompous presentation of platitudes, or it serves to foist the pet subject of the author off on to a more or less captive audience. I make no apology for having foisted off on you today these few thoughts on safety

- a subject which I consider of prime importance in a world becoming more dangerous as the days pass.

30. It is perhaps topical to conclude with a word from the works of William Shakespeare, who in his uncanny way had an appropriate comment on every subject and every situation under the sun:

"Out of this nettle 'danger', we pluck this flower 'safety'."

(Applause).

THE CHAIRMAN: Ladies and gentlemen, I shall now call upon Mr. Rossler to propose a vote of thanks to the President.

Mr. W. ROSSLER (Kroonstad): Thank you very much for calling upon me.

Mr. Chairman, ladies and gentlemen: My close association with our new President over a long period of years, makes the honour to propose this vote of thanks to him a real pleasure, particularly because I was privileged as a neighbour to observe how, in the comparatively short space of time of seventeen years, the bare veld of the Free State was transformed into the very prosperous town of Welkom.

We have gazed with awe at how this amazing town of which our worthy President is, as you have heard, the electrical and mechanical engineer, has with its rapid progress surpassed Kroonstad, and has, in size, relegated us from the second to the third place in the Province.

The President has certainly made a very appropriate choice in the subject of his address. The time of presentation, too, could not have been more opportune. If we scan around, we find that increased use is being made of scientific discoveries and engineering inventions.

Unfortunately, however, in the measure that we advance in that degree, do the number of accidents and fatalities increase. To make my point, may I transgress slightly just for a moment, and refer to the accidents on our roads.

In 1962 the number of deaths as a result of road accidents was 289. In 1963 the number rose to 458. We may, indeed, call this national suicide. Although the loss of life in the municipal sector is not quite so alarming, it is, nevertheless, as the President rightly points out, formidable. Losses sustained in man hours are appreciable; the grief occasioned cannot be assessed with a pecuniary yardstick.

When we think of the future we become quite frightened and intimidated, for the reason that it appears well nigh impossible to keep abreast of the terrific pace of development and we are lost in the maze.

The President has referred briefly to such devices as the laser, the fuel cell and the magnetoplasmadynamic generator. Truly the field of application appears absolutely without end. In this connection, I would like to quote from one of the latest issues of Scientific South Africa. "Already medicine has a new tool, for it has been shown that a beam of light from a laser can be so finely focussed it is sharper than the edge of a surgeon's scalpel. At the Presbyterian Hospital in New York, and at other centres it is being used to make incisions and cornea welds during delicate eye operations. The laser beam may one day replace the surgeon's knife completely, for it possesses a degree of accuracy not attainable with any other means, guiding the beam by microscope, it is already possible to focus it on a single cell".

That also reminds me of the development I read of in the Continental Press called "Stormarner Tagblatt".

Two men were brought into the Asylum. They protested - they claimed that they were not mentally deranged. The doctors again examined them. Everything appeared in order, except something apparently quite insignificant. But just this was of paramount importance.

The two patients heard voices. Somebody spoke to them and gave them instructions. The voices again became inaudible, only to be heard again later; repeatedly the two unfortunates averred that they were not insane but quite normal, but this is something that all people in this condition maintain.

The tragedy was solved by scientific and medical research. Both patients had been treated by the same dentist. They had received tooth fillings which had minute traces of silica carbide. The fillings did not only fill the holes in the teeth, but simultaneously acted as transistor receivers!

Indeed, the forerunner of a television set that may be accommodated in the ordinary wrist watch.

Meneer die Voorsitter, ons het nou ons gedagtes vir 'n oomblik laat dwaal in die toekoms. Die kern van die saak was, en bly nog altyd, die menslike faktor wat steeds onvoorspelbaar bly. Om hierdie rede voel ek dat ons die dienste van die nywerheidssielkundige tenvolle moet benut. Om 'n voorbeeld te noem wat my argument baie goed sal staaf. Een dag moes 'n haal van ons vragmotor by die werkswinkel afgelaai word. Een naturel het probeer om 'n paal alleen af te laai. Hy het nagelaat om op hulp te wag. Hy het instruksies vir onagsaam en alleen 'n poging aangewend. In hierdie proses is hy sodanig beseer dat hy hospitaal toe moes gaan. In hierdie opsig word baie waardevolle werk verrig deur die verteenwoordigers van die Nasionale Beroepsveiligheids Vereniging gedurende hulle inspeksies kom hulle in aanraking met probleme wat andersins selde of ooit teegekom sal word.

Ek is seker dat die lede wat teenwoordig is die sake wat die President aangeroer het goed sal oordink en probeer toepas waar moontlik.

Mr. Chairman, ladies and gentlemen, it affords me great pleasure to propose a hearty vote of thanks to my old friend and our present President, for his well-timed address which must surely provoke a good deal of thought and action in both councillor and engineer members.

Thank you Mr. President. (Applause).

THE CHAIRMAN: Thank you Mr. Rossler. I will now invite Mr. Theron to second the vote of thanks to the President for his address.

Mnr. G.C. THERON (Vanderbijlpark): Mr. Chairman, ladies and gentlemen: First of all I would like to congratulate you Mr. President, and wish you a very happy and successful year of office.

Soos die President in sy rede gesê het, is dit 'n baie groot eer vir 'n persoon om geroep te word om die Presidentsrede van hierdie vereniging te lewer, maar dit is ook net so 'n groot eer om gevra te word om die bedanking te sekondeer, vernaamlik as die onderwerp van die toespraak so na aan die spreker se hart lê en hy so 'n deskundige op die gebied is, soos ons President.

Dit is voorwaar 'n moeilike taak wat my opgedra is want die President is nie alleen voorsitter van die veiligheids-organisasie van die Vrystaat nie maar ook brandweer-hoof van Welkom.

Ons ken die President as 'n nederige persoon, anders sou hy seker veel meer oor hierdie vertakking van veiligheid uitgewei het, maar ek is seker die ontstaan van min brande word in Welkom toegeskrywe aan „elektriese kortsluitings" omrede 'n ander oorsaak nie voor-dit-handliggend is nie.

In die verspreiding van elektrisiteit is daar twee punte wat ek graag aanvullend wil beklemtoon.

Die een is die ontwerp van die toerusting waarmee ons moet werk en die tweede is standardisasie.

In die tye waarin ons leef word spoed byna as 'n eerste vereiste geplaas. Omrede die motors vinniger jaag word veiligheidgordele aangebring en onder die wanindruk dat die gordel ons sal red, ry ons sneller totdat die gordel ook nie meer veilig is nie.

Is ons seker dat die toerusting en apparaat waarmee ons en ons vakmanne moet werk en wat weens ekonomiese druk so vinnig as moontlik op die mark gestoot moet word, behoorlik ontwerp en getoets is?

Te veel toerusting word vandag gelewer met kleinere en grotere defekte wat eers by die verbruiker reggestel word, om 'n mens algehele gemoedsrus in die verband te gee met die versekering dat daar 'n ervare ONTWERPER in die ware sin van die woord, iewers in die produksie lyn was.

Afgesien van die ekonomiese voordele van standardisasie is daar ook die veiligheidsaspek wat nie altyd genoegsame oorweging geniet nie.

Wat is meer verwarrend en gevaarlik vir elektrisiëns en operateurs as die gebruik van 'n ander soort skakelbord in elke substasie? Wanneer kragonderbrekings plaasvind en die ligte uit is, word die dienspersoneel maar altyd aangejaag om die toevoer so spoedig moontlik te herstel. Maar het die here wat oor die aankoop van die toerusting besluit al ooit gedink aan die probleme en gevare wat geskep word as die skakelaars in die een substasie horisontaal uittrek, in die volgende vertikaal ontkoppel moet word en moontlik in 'n derde substasie glad nie kan beweeg nie en elk nog weer sy eie patroon van vergrendeling het! Die veiligheid van personeel en toerusting is meer as die laagste tender.

Daar word gesê dat ons in die tyd van oppervlakkigheid, haas en maagswere lewe maar 'n mens wonder tog hoeveel van ons industriële ongelukke aan die voete van die afgod „Haas en Spoed" gelê moet word. Sal ons nie met 'n bietjie minder haas 'n veiliger en gelukkiger werkkring skep en beter daaraan toe wees nie?

Meneer die Voorsitter, die President het in sy rede vir ons pitkos vir padkos gegee wat ons tot groot voordeel van die verbruikers, die werknemers en die gemeenskap as geheel gerus kan gaan herkou.

Dit is vir my 'n groot genoeë en eer om die bedanking wat op so 'n bekwame wyse deur die vorige spreker gelewer is, te sekondeer.

THE CHAIRMAN: Thank you, Mr. Theron.

I would now ask the President if he would like to thank his Proposer and Seconder.

THE PRESIDENT: Thank you, Mr. Nobbs.

Well, you have listened to me for a long time this morning, and I see we are already past lunch time. So I will content myself with thanking Mr. Rossler and Mr. Theron for their very thoughtful contributions to this important subject of Safety.

Thank you very much. (Applause).

THE CHAIRMAN: Ladies and gentlemen, you have had the pleasure of listening to our Presidential Address, so ably proposed by Mr. Rossler and seconded by Mr. Theron, and I would like you all to show your appreciation in the usual way. (Applause).

I will now ask our President to resume control of the meeting.

THE PRESIDENT: Thank you for taking over, Mr. Nobbs.

(CONVENTION ANNOUNCEMENTS FOLLOWED)

CONVENTION ADJOURNED FOR LUNCH.

On resuming at 2.30 p.m.

THE PRESIDENT: Good afternoon, ladies and gentlemen. I think we will get on with the afternoon's programme.

We are very privileged to have with us today, Dr. Vlok from the University of South Africa, and he has come all the way from Pretoria to deliver his paper, Psychological Aspects of Productivity.

I now have very much pleasure in asking Dr. Vlok to take the stage. (Applause).

(See Agenda Section, Page 6.)

THE PRESIDENT: Baie dankie, Dr. Vlok.

Ladies and gentlemen, I now have very much pleasure in calling upon Mr. L.J. van der Walt to propose a vote of thanks to Dr. Vlok's paper. As many of you know, Mr. van der Walt is not only an honorary member of our Association, he is a past president. Unfortunately he is also a Town Clerk I believe!

At any rate, Mr. van der Walt you are very welcome now to propose the vote of thanks.

Mr. L.J. VAN DER WALT (Springs): Thank you, Mr. President, for allowing a Town Clerk to speak. I always thought it was a special achievement for an engineer to become a Town Clerk, but since arriving in Windhoek, I have found out that Windhoek has even beaten the Transvaal there. I believe the old Town Engineer of Windhoek was also a Town Clerk. As a matter of fact he beat the lot of us - he had the dual position of being Town Clerk and Town Engineer from 1920 to 1948. I am now referring to Mr. Kirby, who died, I believe, about two years ago. Dit is net terloops menere.

Mnr. die President, Mev. Raadslid Davis en here, ons het vandag weer 'n referaat ontvang wat hoog op ons lys van nodige literatuur vir bestuurders geplaas moet word. Dit is weer iets anders, en behoort baie daartoe by te dra as 'n teenvoeter vir daardie vingerwysers wat altyd sê dat ons bied selde of ooit iets vir raadslede en ingenierus aan.

Raadslede kan gerus hierdie stukkie werk diep en ernstig te bestudeer. Daar is geweldig baie pit in. Dit behoort ook baie daartoe by te dra om ingenieurs bo die algemene naam van tegniese barbare te verhef.

Daar is dikwels gesê dat om 'n bekwame bestuurder te wees moet jy tagtig persent mensekennis hê, en slegs twintig persent kennis van die saak. Ek dink sy edele die Administrateur het die vanoggend baie duidelik uitgebring met sy konferensies in verband met atoom energie.

Of ons nou saamstem of nie, die sosio-sielkundige aspek van enige sakeonderneming speel vandag 'n geweldige rol. Dr. Vlok het ons op 'n paar hiervan gewys. Dr. Vlok wys daarop dat nywerheidssielkunde vier verhoudings behels. Die verhouding van die persoon tot persoon; persoon tot groep; persoon tot masjien; en die probleme van die innerlike mens self.

As ons aan nywerheidssielkunde dink, dink ons onwillekeurig aan F.W. Taylor, wat so 'n groot rol in nywerheidssielkunde en bestuurswese gespeel het. Hy het deur 'n absolute studie van die doeltreffendheid van werksmense en masjienerie gemaak, en was moontlik onbewus van die rol van hierdie vier verhoudinge was afgespeel word.

Hy het wel daarin geslaag om die aantal werkers by die Bethlehem Steel Works van 600 na 150 te verminder, maar hy het later self erken, toe hy ryper en meer ervare was, dat as hy terug dink aan daardie dae, dan sidder hy, want in sy geestesoog sien hy nog net die haat op al die gesigte wat na hom gestaar het.

Taylor het self ook later besef dat die doel van elke werkgewer moet wees om die geskikste persoon in elke pos aan te stel, want 'n misgeplaaste persoon is ongelukkig, voel gefrustreerd, is kriewelrig en is ondoeltreffend in sy werk. Dit is nou juis oor die plasing van persone wat ek so 'n bietjie wil uitwei.

I repeat that a misplaced person is unhappy in his work, he is frustrated, irritable and inefficient, and we should endeavour to place the right person in every post.

Candidates for vacancies are always interviewed to enable the employer to make the best choice. Now, industrial psychology places great importance on this aspect of the interview. Some say only experienced psychologists should handle interviews, because the interview is an inventory of the personality of the individual, and in the hands of the inexperienced it can be dangerous - it can be as dangerous as the American Senator who went to a psychologist looking for a secretary.

He said, "Now Mr. Psychologist, I want a secretary." He said, "Yes, Mr. Whosit, I think I can offer you a candidate. I have three possible candidates here."

First of all he called on Miss Jones to come in.

"Now, Miss Jones, what is two and two?" She said "Well, that's four." He said, "Thank you, Miss Jones, you may go." Second one to come in was Miss Brown, and he said, "Now, Miss Brown, what is two and two?" She said "That's easy, it is twenty two." He said, "Thank you Miss Brown, you may go."

The last one to come in was Miss Smith. "Now, Miss Smith, what is two and two?" She said, "Well, it could be four, and it could be twenty two." "Thank you, Miss Smith. Will you just wait outside."

Then he said, "Now, Mr. Whosit, it is quite clear who your candidate is for your secretary." He said, "Wal, I don't know so much, but I like the one in the tight sweater." (Laughter).

The interview, as I said, is a complete inventory of the personality, in other words the physique (on which the senator placed very great importance), general intelligence, special aptitudes, the motivation of pattern, his interests, social and non-social interests, his practical, constructive interests, his physical interests, his intellectual interests, his characteristic interests.

Thus, before we interview a candidate, we should also make a complete study of the job he has applied for.

Text books teach us that this interview should be carefully conducted. It should be on a confidential basis, ample time should be allowed, and the candidate should be made to feel at ease. No information should be withheld from the candidate.

The interviewer must gain his confidence and respect. The applicant should be made to talk freely. From both sides, honesty is essential. In spite of all this, it is still absolutely impossible to make a hundred percent reliable prediction, because we have to deal with a human being and a personality.

Let us ask ourselves, "How do interviews in municipal organisations compare with this laid down procedure and recommendation?"

I regret to say that I think it clashes very badly.

There is no atmosphere of privacy or anything to instil confidence. Instead of one interviewer to attempt to create a fatherly atmosphere, there are usually twelve or more stern faces glaring at you, doing their utmost to trip you, trying in no uncertain manner to expose your weaknesses. Sometimes, rushing you because there are half a dozen others waiting outside, and the hour is late. The candidate is very seldom given an opportunity to state his

case, his likes or his dislikes. If he dares to suggest that he should start on a notch higher than the lowest notch, he is out!

But how can we change all this? I have often given this very serious consideration, but I have found no solution. It is a democratic right of the elected to have a very big say in the appointment of officials, who can affect the every-day lives of their electorate so much. You may say that appointments should be left to the senior officials, who know what they want, but can we really do that? Is nepotism not just as rife among officials? Can officials adopt this 'holier than thou' attitude? I do not think so. I have personally seen just as bad, if not worse, nepotism where officials have made the appointments.

This happens all over the world - it is not only in South Africa. I do not suggest that we should wring our hands in horror, and let be what will be. If we adopt the golden rule that the man to be appointed must be the right man, he must be qualified, experienced, know his job, must have a sound character, be honest, just, and above all, loyal.

Then, lady and gentlemen, I don't care a darn, how closely he is related to any of the councillors!

Nadat 'n persoon aangestel is behoort hy ook opgelei te word, intensiewe opleiding is nodig. Om behoorlik te kan oplei is dit ook nodig om die werk te beplan. Die werker moet weet waar hy in die hierargiese patroon staan; hy moet geleer word om saam met 'n span te werk, want die hierargiese struktuur bestaan uit mense met hulle eie persoonlikhede; daarom is spanwerk so absoluut nodig.

Ek het gesê die werk moet beplan word. Die regte toerusting is nodig. 'n Persoon het een keer teruggekeer na sy ou geboortedorp nadat hy jare afwesig was en hy het toe by Oom Giepie gekom wat besig was om hout te saag, nog soos Oom Giepie dit dertig jaar gelede gedoen het.

Hy sê, „My wêreld, Oom Giep, Middag. Saag Oom Giep nog hout op die ou manier? Weet Oom Giep, as jy nou 'n elektriese saag gebruik, kan jy tweemaal soveel hout saag as wat jy vandag saag?"

Oom Giepie het so 'n rukkie nagedink toe sê hy: „Ja, neefie, maar as ek nou daaroor dink, ek het nie tweemaal soveel nodig nie! " (Lag)

Ons moet dus versigtig wees met die toerusting; dat ons slegs die toerusting koop wat nodig is en nie onnodig is nie.

Hoeveel plaaslike bestuurders doen al hierdie dinge? Ek glo, bitter min. En dit is tog so jammer. Plaaslike besture moet nou besef dat arbeid seker die grootste belegging in enige sake onderneming is, en ek beskou plaaslike bestuur as een van die grootste en belangrikste sake ondernemings in enige gemeenskap, (want dit behels die volgende grootste sake onderneming).

Moet u dan nie ook die meeste aandag aan hierdie belegging van u bestuur gee nie? Ontwikkel u die esprit de corps gees, of word u werknemers gesê dat daar genoeg ontspannings-klubs in die dorp is, waarby hulle kan aansluit, en dus ontneem u hulle miskien die reg om mekaar beter te leer ken nie? om daardie persoonlikhede uit te bring nie en sodoende beter te kan saamwerk?

Het u al ooit bereken wat dit kos om 'n jong man onder op die leer in diens te neem, hom te lei tot 'n senior betrekking? Dit is tog immers die moeite werd om so 'n persoon te behou maar ons moet die toestande skep wat hom daar sal hou.

Ek glo dat plaaslike besture by vêrre die minste van alle werkgewers vir sy werkers doen; personeel bestuur in plaaslike besture is nog iets heel onbekend. Dit is my persoonlike ondervinding.

Mr. President, I am convinced that incentives are not the answer to greater efficiency. I would place selection, training and motivating first of all, the industrial psychological aspects to greater efficiency. In the atmosphere we live in today, where materialism excels, it is not a problem of organising humanity, but it is a problem of humanising the organisation.

It now gives me great pleasure in proposing a hearty vote of thanks to Dr. Vlok for his very human paper, which he has presented. I am sure every one of us has enjoyed it, and has benefitted from his psychological approach.

Thank you Mr. President. (Applause).

THE PRESIDENT: Thank you Mr. van der Walt for that most interesting discourse. I hope you will forgive me if I have gained the impression that, when I next go for a municipal job, I will take my sweater with me!

CONVENTION ADJOURNED FOR TEA.

On resuming after tea.

THE PRESIDENT: Before I ask Councillor Warman to second the vote of thanks to Dr. Vlok, there are a few announcements.

First of all, regarding the voting this morning, unfortunately there was an irregularity and your office bearers have decided that the election is null and void. It will be held again tomorrow morning, first thing, with the same nominees. It is merely a question of taking the vote again.

That means that there will be no Executive Meeting this afternoon, and that will be postponed until tomorrow afternoon at 5.30 p.m.

Mr. E.E. DE VILLIERS (Carletonville): Mr. President, I feel that we should know what the irregularities were in connection with the decision you have just given us about the election of office bearers please.

THE PRESIDENT: Certainly, Mr. de Villiers. The trouble arose because one of our members put in two voting papers under the mistaken impression that he had two votes. In fact, he had only one vote. Does that satisfy you, or would you like more details.

Mnr. E. de C. PRETORIUS (Potchefstroom): Mnr. die President, sou daardie onwettighede die uitslag soveel beinvloed het?

DIE PRESIDENT: Dit maak nie saak nie, meneer. Die feit is dat daar is net een stem, en daar was twee briefies ingesit.

Mnr. E. de C. PRETORIUS (Potchefstroom): Mnr. die President, ek wil nou nie teen u beslissing gaan nie, maar ek dink die stemming môre is soveel te meer onreëlmatig aangesien die stemming adverteer is op ons Agenda om vandag plaas te vind. U weet daar is baie van ons afgevaardigdes en raadslede wat nie môre hier mag wees nie.

Raadslid Dr. M.A. HEYNS (Potchefstroom): Mnr. die President, mag ek 'n voorstel indien dat u hierdie saak oopstel vir bespreking alvorens u besluit dat die stemming môreoggend sal wees, indien die ope vergadering besluit dat ons die stemming aanvaar soos dit is, of dadelik oorstem. Maar ek dink dit gaan onaangenaamhede inbring as ons stem.

Ek stel dus weer voor dat die ope raad nou moet besluit wat ons moet doen. Dankie.

Councillor H.J. LUCKHOFF (Orkney): Mr. President, surely the man who voted twice, or put in two papers, his vote only is disqualified. I am not disputing your ruling, but I think that that person's vote is just disqualified, and it could have no effect at all.

THE PRESIDENT: The point is this, gentlemen: the voting was so close, we had three people with identical tallies. And one or two others were very close, above or below, so even one voting paper can have a significant effect on the result. That is why the office bearers decided it should be invalid.

I may add that the person concerned, the man who put in the two ballot papers, has no objection at all to the office bearers' decision in this matter.

Mr. G.J. MULLER (Bloemfontein): Mr. President, in view of what has been said, from the hall, I wonder if it would be better if, provided the member concerned is willing, to confidentially tell the President, who he voted for. In other words, we have no identification of our votes, and that is the difficulty. But if he should confidentially tell you, you can correct the voting, also in confidence.

THE PRESIDENT: I think myself, that sounds reasonable if the meeting is agreeable to that.

Mr. T.C. STOFFBERG (Pretoria): Mr. Chairman, only a Town Clerk could be so stupid... ! (Laughter).

THE PRESIDENT: Yes, Mr. de Villiers?

Mr. E.E. de VILLIERS (Carletonville): Mr. President, I think I would just like to say that I think Mr. Muller's suggestion is very sound, and apparently from the acclamation we have heard, the hall supports the idea, and that will give us much less work and save our time at this Convention.

THE PRESIDENT: You have all heard the suggestion - are you all in agreement?

(No member opposed this suggestion).

THE SECRETARY: It depends, of course, on the individual concerned.

THE PRESIDENT: I take it the gentleman concerned will co-operate? Thank you gentlemen, for helping us out of an awkward situation.

THE SECRETARY: At this stage, Mr. President, I think the Executive Meeting will still have to take place tomorrow.

THE PRESIDENT: The Secretary informs me that the room at the hotel which had been reserved for the Executive Meeting has been cancelled, and for administrative reasons it would be better to hold the meeting tomorrow afternoon. That is, if there is no objection?

(There were no objections to this suggestion).

We will announce the result of the elections as soon as we can have a chat with the man concerned. Are you all agreed? (Agreed).

(OTHER CONVENTION ANNOUNCEMENTS WERE MADE).

THE PRESIDENT: I now have much pleasure in calling on Councillor Warman to second the vote of thanks to Dr. Vlok.

Councillor T. WARMAN (Durban): Mr. President, I don't know what has hurt me more - speaking after a town clerk or having had all my thunder stolen by him - but none the less, I shall carry on and I would like to first of all give an example of what Dr. Vlok was talking about in the selection of candidates.

I recall a personnel officer who was one of those very dangerous amateur psychologists that Mr. van der Walt referred to, having a great deal of trouble with the gentlemen employed by the firm who was a renowned thief.

The personnel officer thought that he would try a bit of industrial psychology on him, pulled him into his office and said, "Can you see this?" and he drew a line two inches long, just a straight line. And he said to this fellow, "What does this remind you of?"

The chap said, "Well, in that line I can see myself creeping up into one of the lockers and stealing a R5 note from the foreman."

This really shook the personnel officer, so he drew another line about one inch longer, and said, "Now, what does this remind you of?"

He said, "Well, looking at that, I can see myself creeping into the manager's office and stealing R20. from him."

The personnel manager was very upset by this, and in a disgusted manner threw down his pencil and said, "Man, but you're nothing but a thief."

The man was horrified and said, "How can I be a thief? You are drawing all the pictures! " (Laughter).

Another point that interested me a great deal in Dr. Vlok's paper was the selection of personnel, and he remarked in his paper that the selection of a person, which must be most suited to the task, and I couldn't help thinking with so many heads of departments present here, how they wished that ratepayers paid more attention to the principle when they were returning councillors to office!

Further points which came to mind, Mr. President, were the bases of incentive bonuses. Now Dr. Vlok did apologise in the beginning of his paper for not having sufficient time to cover the full field, but I do hope, if he has time during question time, to differentiate between the difference of paying an incentive bonus, insofar as the comparison is concerned between local authorities and private enterprise, because Mr. van der Walt, as you know also drew attention to the fact that in dealing with personnel selection there were great difficulties insofar as municipalities and local authorities were concerned, also applies.

Mr. President, the import of Dr. Vlok's paper was so great that it is extremely difficult to deal with all the points he has made in such a short time, but I believe I would not be doing my duty if I did not ask particularly all those councillors who were present here, and who have listened, and who have read the paper, to take back to their individual local authorities the very important points that he has made, to digest them and to see to the best of their ability, that their service commissions, or staff committees, and persons of that sort, can try and implement the very worthwhile principles which he has enunciated.

Ten slotte, Mnr. die President, doen dit my 'n groot genoeë om hierdie mosie van dank te sekondeer. Ek moet verder sê, van ons almal teenwoordig, aan Dr. Vlok, dat ons sy referaat baie interessant en leersaam gevind het. Baie dankie, Mnr. die President.

THE PRESIDENT: The paper is now open for discussion, gentlemen.

Mnr. J.D.N. van WYK (Pretoria): Mnr. die President, Ek wil u bestuur komplimenteer met die gedagte om 'n referaat van hierdie aard in die program in te sluit. Ons as ingenieurs weet glad te min van bedryfssielkunde, en alhoewel ons in die harde skool van praktyk met tyd 'n bietjie ervaring opdoen, kan ons baie foute vermy indien ons meer van professionele kennis op die gebied gebruik maak.

Ek wil dan ook Dr. Vlok gelukwens met die keuse van sy materiaal; dit moes voorwaar 'n moeilike taak gewees het om oor te besluit.

Mr. President, I have a few queries that I would like to raise. The first concerns the example quoted by Dr. Vlok about Taylor's work in increasing industrial efficiency at the Bethlehem Steel Works, which according to his example resulted in a significant reduction of labour force, and led to savings in the company, in spite of upgrading of the wages.

Now we know that the Bethlehem Steel Works is one of the most automated of its kind in the U.S.A. For example, during reduction processes, steel samples are taken from the furnaces, transmitted pneumatically to a laboratory, where they are spectro-chemically analysed, the results computed on a computer, and the final information displayed in front of the operator at the furnace.

My query is this, are the figures which Dr. Vlok quoted only concerned with efficiency increases in the personnel or does it include some of these new techniques that I have mentioned? If it does not include these techniques, has he any figures on the further improvement due to the introduction of automation?

The second point in Dr. Vlok's paper on which I would like a little more elaboration is his statement viz. that there is a general feeling that man is losing his zest for work.

Now this worries me greatly, because if one looks around at all the hustle and bustle going on around one, this seems to contradict his statement. I can then only conclude that this means that we have become so inefficient that all we achieve is just contracting more and more ulcers!

In a more serious vein, has he got any statistical, factual evidence for this, or is it, as he has put it, just "a feeling"?

The third and last point which I would like to raise concerns a brief remark in Dr. Vlok's paper, which to my mind is of paramount importance, and that is the fact that we still know so very little about, the work motivation and social perception of the Bantu worker in this country.

We know, for example, that some of the usual incentive schemes used for European labour may have exactly the opposite effect if employed for the Bantu labour. Much research should thus be done in this particular field.

Coupled to this, somebody made a very interesting remark to me the other day, viz. that with the correct application of automation, we should be able to use better and more fully our unskilled Bantu labour. This remark at first appears to be contradictory to the usual accepted statement about the effect of automation, viz. the displacement of the unskilled labourer.

When one examines the remark more closely, however, I think that it has a lot of merit, in particular if one realises that automation does not only concern itself with replacing muscular power, but also some of the thought processes that can be mechanised. If, in addition, we remember that in automation there are certain handling processes, which cannot really be automated, or mechanised if you wish, then I think one can see this particular statement in its true perspective.

I think that this is the field where the automation research engineer and the industrial psychologists in this country should collaborate, and do a lot of intensive

research. This could mean a lot to us in this country with its shortage of skilled labour, and in particular for the Border Industries.

Thank you Mr. President.

Mr. G.J. MULLER (Bloemfontein): Mnr. die Voorsitter, ek wil eers Dr. Vlok besonder bedank vir sy bydrae. Ek het self jare al uitgesien na iets van die aard, dit is die eerste keer dat ons daarin kon slaag om soiets voor ons vergadering te kry.

Op die merite van die referaat wil ek nou nie besonder ingaan nie, op hierdie stadium voel ek dat ek nie daarvoor kwalifiseer nie - ek moet hom nog 'n paar keer lees, alhoewel die eerste twee keer wat ek dit deurgelees het het dit my veel beindruk - ek het toevallig twee eksemplare van die Agenda gekry, dat ek een eksemplaar by my personeel gelaat met die opdrag dat hulle moet dit lees voor ek terugkom, nie dat ek 'n eksamen daaroor wil hou nie.

Mnr. die Voorsitter, ek het werklik waar die referaat geniet - die belangrikste aspek van arbeid soos Dr. Vlok dit behandel het, beskou ek van meer belang as die tegniese sy waaraan ons gewoond is. 'n Mens is nie 'n masjien. Ek sê altyd in my werk, dat ek weet hoe die masjien reageer en daarom weet ek wat om te doen. Die menslike sy, soos my personeel en die raad, is meer gekompliseerd, en dit was nog altyd vir my 'n raaisel gewees. Stellinge wat Dr. Vlok gemaak het kristaliseer nou gedagtes wat ek altyd gehad het, deur die jare, maar dit was vaag.

Iemand het die opmerking gemaak dat daar nie tot 'n konklusie in hierdie referaat gekom is nie. Maar in hierdie soort referaat is dit nie nodig nie. Dit is nie 'n resepte boek vir verskillende situasies nie, dit gee 'n kans aan mense wat wil dink en die vermoê het om te dink. Dit gee rigtings van denke om selfs gedagtes te ontwikkel. In daardie opsig beskou ek die referaat van groot waarde en ek hoop om in die toekoms meer daarvan te sien.

Baie dankie Mnr. die Voorsitter.

DR. R.L. STRASZACKER (Escom, Johannesburg): Mr. President, first of all let me start by congratulating Dr. Vlok for a most interesting and thought provoking lecture. I think the mere fact that this subject was dealt with in this gathering proves how important it has become for the engineer. Engineers have just realised that they must know more about human relations.

I think another encouraging point is that we do have more engineers taking part on councils. May I suggest that this is perhaps the reason why there was this irregularity in the voting - that somebody must have thought himself as voting as an engineer, and all of a sudden he thought, "No" he was a councillor and he took another vote.

That just really proves that this question of human relations is something that the engineer can't side-step. I can't profess at all to be able to cope with the subject matter of the address given to us, but I would like to ask Dr. Vlok how he sees the whole question of dealing with human relations by the engineers from the point of view of what sort of training they should have in order to be able to deal with this aspect?

You know that a lot of attention is being given to the question of training of engineers, and it is really a question of what to leave out of a curriculum and what to put in. And what I would be particularly interested in is whether Dr. Vlok considers it at all feasible to include in the formal training of an engineer something in the line of industrial psychology, or whether, as we all in this hall today, probably have gained our experience in this field, just in practice, by making faults and then gradually realising that there could be a different approach. Is it feasible to have tuition in this direction in a formal course undergraduate, post graduate, or only in the practical years after graduation?

Thank you Mr. President.

THE PRESIDENT: Thank you. I meant to remark on your shot in the dark, in connection with the voting, because it wasn't a shot in the dark really - it was a shot in the light. It was very nearly right.

Dr. Straszacker, I think at this stage I would like to bid you welcome to our proceedings; it is very nice to know that you can spare the time from your very onerous duties to be with us.

Mr. J.A. MATHEWS (Kimberley): Mr. President, there is nothing new in this lesson in psychology and all the theories advanced have been formulated before. The writer, however, had condensed his thoughts, and his remarks are well worthy of study.

His theme is that although there is a natural tendency to cry out for material benefits in the shape of more money, there are in many cases other things which create dissatisfaction amongst workers, such as privileges which could well be granted by way of improved working conditions, and what today we term "fringe benefits".

On only one issue (and I am inclined to cross swords with Dr. Vlok) and that is where he suggests that "most employees naturally belong to the broad normal group and desire responsibility".

My own experience over the years is that the converse possibly applies, and no more so than today, where there is a marked tendency to evade responsibility and look upon work of any kind as an economic necessity.

While we talk glibly about the rate for the job, the job is only secondary to the rate, and this is not only true of the conditions in the Republic but in many other countries.

There is little pressure from below to get to the top, but the pressure has come from top management, or the senior executive if you like, in an endeavour to inculcate a desire to become more proficient through study. This, in the face of inducements which would have been welcomed with open arms a generation or more ago, is a sad reflection on our times that our young people can so readily and unconditionally be absorbed into industry and commerce at high rates of remuneration, this in turn depletes the reservoir from which the local government

would normally derive its supplies.

Mind you, this comes to my main point: and that is that the disadvantage under which we labour in the urban administrative field, in that we seem unable for one reason or another to attract a more desirable type of recruit.

If this assumption is correct, then the psychologist who has produced the paper under review, has done a public service by reducing to writing, not only his own thoughts, but also by offering solutions which might represent the answer to some of our labour problems.

The subject chosen is one on which one could dilate at length, and its mildly provocative nature will no doubt lead to some lively discussion.

THE PRESIDENT: Thank you Mr. Mathews.

Councillor R. BROWN (Livingstone): Mr. President, could Dr. Vlok tell me his opinion on the moral effect job evaluation might have on two categories of worker? The position would be that the one man originally being valued in the job, would be paid say £80 a month. The job is then re-valued, and we get away from the rates for the job, and with the implementation of job evaluation we find that the second person is being paid, say, half the amount.

What would be the moral effect on B working for £40 a month doing the same job, and A being paid £80 a month knowing that the job he is doing is actually valued at £40.

Mr. K. ADAMS (Johannesburg): Many of the difficulties which encourage the growth of studies such as industrial psychology arise from the chaos created from compressing too great a number of persons within a confined income range.

If this range were expanded, this chaos would largely disappear, and organisations could be run quite satisfactorily on the simple minds of the heads of departments.

Very largely this income compression has led to the death of man - as it has been described by Erich Fromm - in the twentieth century. The adverse effects being attributed to automation are at least partly consequent upon income compression.

Mnr. J.L. VAN DER WALT (Ere-lid Ingenieur, Springs):

Daar het so baie onreelmatighede in hierdie konferensie plaasgevind, met stemmery en so voorts, dat ek geneig is om saam met Mnr. Stoffberg te stem - soos ek gesê het - is dit die ingenieur wat nou praat.

Mr. Chairman I have an interesting extract here, "Model Office Rules" framed in Australia in 1853. These model regulations or rules were circulated in Australia.

"1. Godliness, cleanliness and punctuality are necessities in a good business.

2. On the recommendation of the Governor of the Colony this firm has reduced the hours of work and the clerical staff will now have to be present between the hours of 7 a.m. to 6 p.m. on weekdays. Sabbath is for worship, but should any man-of-war or other vessel require victualling the clerical staff will work on the Sabbath.

3. Daily prayers will be held each morning in the main office and the clerical staff will be present.

4. Clothing must be of a sober nature. The clerical staff will not disport themselves in raiments of bright colours, nor will they wear hose unless in good repair.

5. Overshoes and top coats may not be worn in the office, but neck scarves and head wear may be worn in inclement weather.

6. A stove is provided for the benefit of the clerical staff. Coal and wood must be kept in the locker. It is recommended that each member of the clerical staff bring 4 lbs of coal each day during cold weather.

7. No member of the clerical staff may leave the room without permission from Mr. Ryder; the calls of nature permitted.

8. The clerical staff may use the garden below the second gate. The area must be kept in good order.

9. No talking is allowed during business hours. The craving for tobacco, wines, and spirits is a human weakness, and as such is forbidden to all members of the clerical staff.

10. Now that the hours of business have been drastically reduced ..." (I repeat 'drastically' Mr. Chairman) "... the taking of food is allowed between 11.30 a.m. and noon, but work will not on any account cease.

11. Members of the clerical staff will provide their own pens; a new sharpener is available on application to Mr. Ryder.

12. Mr. Ryder will nominate a senior clerk to be responsible for the cleanliness of the main office and the private office and all boys and juniors will report to him 40 minutes before prayers and will remain after closing hours for similar work; brushes, brooms, scrubs, and soap are provided by the owners.

13. The new increased weekly wages are hereunder detailed:-

Junior Boys, 11 years	1/4d per week.
Boys to 14 years	2/1d per week.
Juniors	4/8d per week.
Junior Clerks	8/7d per week.
Clerks	10/9d per week.
Senior Clerks (after 15 years with the Company)	21/- per week."

Mr. Chairman, note the last sentence:

"The owners hereby recognise the generosity of the new labour laws, but will expect a great raise in output of work to compensate for the near Utopian conditions". (Laughter).

Mr. Chairman, it appears that psychologically we have advanced considerably!

THE PRESIDENT: Thankyou Mr. van der Walt. Obviously the clerical staff needed to pray! I sincerely hope the councillors present didn't listen too attentively!

Are there any further speakers?

Mnr. G.B. HEUNIS (Standerton): Mnr. die President, in die referaat is telkemale verwys na die probleem van die keuse van personeel, en dit is in hierdie aspek wat my interesseer op die oomblik. So dikwels moet aanstellings gemaak word wanneer vakatures ontstaan en dan word 'n aanstelling inderdaad gemaak.

Die vraag ontstaan by my; is dit dan nodig om 'n aanstelling te maak as jy 'n beste applikant uit 'n aantal applikante kan vind maar wanneer die beste applikant nie noodwendig 'n geskikte applikant is nie.

Ek wil nie aan die hand doen dat daar nooit meer aanstellings gemaak moet word nie. Wat ek graag van Dr. Vlok wil verneem of daar enige minimum standaarde gestel kan word wanneer besluit word, of 'n persoon wel geskik is vir 'n vakature of nie.

Vyf-en-twintig jaar gelede was die gebruik op die platteland dat 'n persoon bekwaam moet wees in meer as een rigting, veral in die tegniese werkkring, omdat 'n klein munisipaliteit nie 'n kabellasser en 'n metertoetser en 'n lynwerker en 'n draadwerker en 'n paalplanter en so aan, kan emplojeer nie, omdat daar gewoonlik nie genoeg werk is vir sulke persone nie.

Een man moet meer dan een werk kan verrig.

Dit is ook my mening, dat 'n groot aantal mense geskik is vir meer dan een rigting, en ek wil graag aan Dr. Vlok die vraag vra of hy miskien by wyse van 'n frekwensie-verdeling aan ons die groothede persentasie van manlike bevolking kan stel teenoor die aantal rigtings waarin die aanleg voldoende of bevredigend is.

THE PRESIDENT: Gentlemen, it is a quarter to five. According to the Agenda we should finish now. I take it you would like to continue this discussion on another occasion, or do you feel like a little extra work?

(The Convention decided to continue for ten minutes).

Mr. L. LEWIS (Windhoek): I should like to ask a few questions which have been troubling me a bit.

Would Dr. Vlok say that an adequate interview, decision, and choice of individual for the job necessarily means that the individual concerned would retain the psychological and other qualities sought after throughout his working life, or would it alter in essential properties of personality as time goes by?

If so, has the age of an individual anything to do with such a change? In which case, very little corrective action may be possible to correct the position if it had gone, say, in the direction detrimental to his work; or would Dr. Vlok say that corrective action is possible at all in cases such as those?

I gain the impression that various individuals, perhaps due to frustrations, real or imaginary, mostly individuals in the lower positions perhaps, and with long years of service, feel quite secure in their jobs, and yet seem to lose interest in making any improvements, or suggesting improvements, or even exerting themselves more than is absolutely necessary.

This is sometimes a very difficult position, particularly when men have many years of service. Would Dr. Vlok consider that there is a painless cure in such cases? Thank you.

Mr. C. LOMBARD (Germiston): Mr. President, lady and gentlemen: The Minister called on one of the members of his flock, Mrs. Jones. "By the way," he remarked after a while, "I was sorry to see that your husband left the church last Sunday during the sermon. Is there anything wrong?" "Oh, no, sir", replied Mrs. Jones, "it is nothing serious, but you see the poor man does have a terrible habit of walking in his sleep."

I have not noticed any sleep walkers here this afternoon, and I think that, in itself, is a tribute to Dr. Vlok for his very excellent paper and the manner in which he has presented it.

The author has given us a glimpse of the tremendous field covered by industrial psychology, but as is understandable, the author could not deal very exhaustively with many of the aspects mentioned in his paper.

I, for one, was particularly pleased to note that he did devote some time to the question of the relations between employers and employees, and between employees and employees.

Ek dink in die normale werksaamhede van die ingenieur is die verhouding tussen die ingenieur en die werknemers een van die aspekte van die grootste belang. Dit het ek onlangs weer ondervind toe een van my baie goeie en baie ervare ambagsmanne bedank het. In hierdie geval het ons soveel vertroue in hom gehad dat ons hom vir weke aan een op afgeleë plekke laat werk het, en toe hy uit die diens bedank roep ek hom in en vra hom wat sy redes was. Ek moes toe van hom hoor dat hy ander werk aanvaar het maar dat hy nie beter af sou wees nie, en die eintlike rede vir sy bedanking was die feit dat niemand die moeite gedoen het om so nou en dan te kyk hoe hy vorder nie, en vir hom te sê dat hulle met sy werk tevrede is nie.

Dit, Mnr. die President, het my weereens laat besef hoe belangrik dit is dat ons kontak met ons werknemers behou.

Daar is 'n paar vrae wat ek baie graag aan Dr. Vlok sal stel. Die eerste een is: "Do instincts play a significant rôle, or for that matter any rôle at all, in the conduct, attitude, and behaviour of the worker in the work environment?"

In other words, are his attitudes at all influenced by his instinctive make-up?

There is a second question I would like to ask. We are from time to time faced with demands for shorter working hours. Originally we had a working week of 48, then 44, now we have a 40 hour working week. Eventually there will be demands for a 36 hour week, and then a 30 hour week.

I think that we realise that the shorter the number of hours worked during the day, or week, the higher would be the output per hour, but what would the effect be on the overall output, in the first place, with a shorter working week, and secondly would it be advisable to reduce the working hours - that is the working day, or working week - from a psychological point of view? In other words, would it not lead to other psychological problems, such as boredom and so on?

The third question I would like to ask the author is if there is not a tendency these days to get away from the division of labour which is such a feature of the industrial age? We find that in some factories where mass production methods have been adopted, i.e. where the worker probably does one operation, or only a few operations, at a time.

Isn't there a tendency now to more or less get away from that and to let the worker complete - or a group of workers complete the whole process so that he or they can complete their own stamp or hallmark on the product, and that in practice this has been proved to lead to increased production?

The last question I would like to be answered is whether industrial psychologists have made any studies in regard to the most suitable type of dial or instrument layouts for control panels - containing instruments, alarm indicators and so on. Have any studies been made to obtain information as to the most suitable layout from the point of view of the worker?

THE PRESIDENT: Thank you Mr. Lombard.

Gentlemen, I think, with great regret, I must bring this discussion to an end now. We will resume it at some convenient time during the Convention, and we will look forward very much to Dr. Vlok's replies to these questions, and I hope he has time to cook them all up before Friday.

Before we break I will announce the results of the election. I will just read out the surnames to you:

Leishman
Theron
Turner
Waddy
de Villiers
Von Ahlften

I would like to congratulate these gentlemen most heartily on their election and I would remind them that they start work tomorrow afternoon, together with their councillors, please.

We will resume our Convention tomorrow morning at 9.30 a.m.

(CONVENTION ANNOUNCEMENTS WERE MADE)

CONVENTION ADJOURNED AT 5.00 p.m.

SECOND DAY

THE PRESIDENT: Good morning gentlemen. I trust you all had a good night. Before we proceed we have a few announcement.

The first item is in connection with the ballot yesterday. We have had a complaint that the ballot is invalid for the reason that it is intended to be a secret ballot and subsequently certain votes were withdrawn - in other words, it was no longer a secret ballot. I have ascertained that that is a valid legal point, and therefore I don't intend to allow any debate on the question. The ballot is null and void and there will be a fresh one after the tea break this morning.

Ladies and gentlemen, we were going to have Mr. Hobb's paper first thing, but Dr. Vlok, unfortunately, has to leave at the tea break, so I propose to continue with the discussion on his paper, and the replies to the discussion.

Are there any further contributions to the discussion on Dr. Vlok's paper? If not, I will ask Dr. Vlok to reply to the discussion which took place yesterday.

DR. A. VLOK: Mr. President, in the limited time at my disposal I shall try to answer SOME of the questions raised yesterday afternoon. These are the ones I remember, perhaps because to me they seemed the most meaningful psychologically, and relevant to the topic. Perhaps I should add that a psychologist is not necessarily also an expert in business economics.

It is said that in every issue there are at least three opinions: my opinion, your opinion, and thirdly the correct opinion. Since our aims, perceptions, and time perspectives differ, it is not surprising that we sometimes arrive at different conclusions. Human beings, unlike machines, are characterised by differences, rather than similarities. Add to these individual differences the influences of socio-economic background, training, culture, etc. and you will realise that simple answers in the form of exact formulas cannot be given as a solution to managerial problems, or other problems of human relations. To the psychologist each individual and each situation is unique and is regarded as more than the sum total of its constituent parts.

(Ek het eenkeer vir 'n student gevra: „As u nou aan u dame se hand vat, vat u aan haar HAND, of vat u aan HAAR?" Daar is 'n verskil!)

Furthermore, the psychologist is dealing with delicate material, and from his experience has very good reason for not publishing prescriptions.

Dit, Mnr. die President, behoort my benadering tot hierdie referaat en sommige van die vrae wat daaruit ontstaan het, enigsins op te klaar.

Ek sou u ook kon toespreek oor ander aspekte van die industriële sielkunde wat minder subjektief van aard is en waaroor meer feitelike inligting beskikbaar is. Daar was bv. enkele vrae oor keuring. Die uitgangspunt hier is dat mense en ook verskillende werksoorte, verskil t.o.v. sielkundige toerusting, aan die een kant, en werksvereistes aan die ander kant. Heelwat vordering is gemaak met die identifisering van individuele verskille in algemene en besondere verstandelike aanleg, temperament, en ander aspekte van persoonlikheid. Persoonlikheid is gedurig in wording, maar word meer statiel met toename in ouderdom, veral vanaf die latere adolossensiejare. By die keuring van senior personeel is persoonlikheidseienskappe veral van belang, en aangesien dit gewoonlik persone van volwasse leeftyd is, is persoonlikheidsveranderinge nie 'n kritiese faktor in die keuringsproses nie.

Basiese verstandelike vermoëns en temperament berus weer op 'n aangebore basis, is daarom betreklik stabiel en word nie soseer deur ryping beinvloed nie. Psigometriese en statistiese tegnieke word gebruik om die geldigheid van enige keuringstegniek (onderhoude, toets, ens.) empiries te bepaal, en om snypunte van te stel vir die praktiese implimentering daarvan.

Daar is verwys na die mens-masjien-sisteem. Hierin is menslike waarneming, denke en reaksieprosesse belangrike voorwerpe van studie. Bv. in die ontwerp van wyserpanele, moet die meter rond of reghoekig wees? vertikaal of horisontaal? Wat is die optimum hoeveelheid

inligting wat daarop moet verskyn? ens. Ek het bv. my referaat in kleinletters getik, omdat dit makliker leesbaar is as hoofletters van dieselfde grootte.

Training is of major importance, and some interesting and effective methods of training, based on the psychology of the learning process, have been developed - on the lower level e.g. programmed learning, and in the training of senior personnel various clinical methods are commonly used today. This involves more than training in work skills. Correct attitudes towards one's work and the company should also be taught. Changing of established habits of thought often represent a threat to the emotional security of the adult person, and is difficult to accomplish though there are methods of clinical psychology available for this purpose. Less deep-rooted attitudes, however, could be changed by group methods of training, provided the learner is motivated to learn. I do not think that training in human relations should be commenced before the engineer or any other person actually experiences the need of such training in problems related to his work.

(Probably the biggest re-education, training, and guidance services will be required in order to develop a new concept of work and leisure rather than work alone as being the central determinant of everyday living. This need could increase with advances in the field of automation. It already exists in the case of workers approaching retirement age).

'n Ander vraag geld die invloed van werksure op produktiwiteit. Verskeie studies het hier in omgekeerde verband aangetoon: korter werksure, lei tot groter produksie per tydseenheid. Tot op 'n sekere punt. Hierdie punt van verminderde meeropbrengs (a point of diminishing returns), word egter bereik in enige bepaalde werk en moet empiries bepaal word. Dit terloops, behoort ook te geld vir materiale voordele aan die werk verbonde.

There is a question of workers not being able to assume responsibility. Perhaps we should say that workers seem to find it difficult to identify themselves with their work. There are employees who do not desire advancement or participation and seem to find the greatest source of life's satisfaction in outside activities, and not in the work itself. Participative management can only work effectively where employees are able and willing to accept responsibility. There is unfortunately no absolute and definite answer to this question, but rather a conditional one. To begin with, the type of approach that management may find most effective appears to be closely related to the situation and this may vary from one company to another. Under certain conditions a democratic approach to management may be more effective, while in another situation, an authoritarian approach is preferable.

Quite possibly in a crisis, firm and directive leadership may not only be the most effective type of leadership, but also the style that is most welcome to all concerned.

Another situational factor that must be considered in choosing an approach to management is the particular leadership style preferred by the employees and the pattern to which they have become accustomed. Some employees appear to be quite content in a situation where firm, decisive leadership exists, while other employees are happiest and most effective under democratic leadership. It is known, for example, that emotionally insecure persons feel more comfortable in an environment that is characterised by direct and authoritarian leadership.

In judging responsibility one should distinguish between cause and effect. Is it possible that employees have never been trusted with responsibility, never been taught how to behave in a responsible manner?

I do not think that lack of responsibility is a general human characteristic. Surely it would then also apply to managers.

The answer to this problem appears to be in a compromise solution. It would appear that the task for management is to identify and recognise those employees who seek self-realisation and the fulfillment of their psychological aspirations through expression in their daily work. Proper selection, training and counselling services are important in this regard.

In conclusion, if we go back some 20 years, in the history of science, we find that no-one was impatient (as far as we know) with the scientist for not being able to supply immediately an economic, all-purpose source of atomic energy, even though he knew that theoretically atomic energy could be harnessed.

Die voorbeeld is miskien 'n bietjie vergesog, maar nie te min dit verduidelik die punt wat ek wil maak.

Similarly, the social scientist knows that vast resources of human potential are not being used to full capacity. Exactly how this is to be done is still a matter of debate, though we do have certain pointers as to the direction in which an ultimate solution will be found. Some of these I indicated; there are others. We are in a position as it were to see the forest, even if some of the individual trees may be out of place.

Mr. President - of what use is a child?

Dankie, dames en here.

(Applause).

THE PRESIDENT: Ladies and gentlemen, I think you will agree with me that we have been privileged to listen to a most instructive and stimulating paper from Dr. Vlok. I think the amount of discussion that took place yesterday was a tribute to that.

On behalf of us all I would like to thank him for coming all this way to give us such a wonderful paper; I would also like to thank all the people who took part in the discussion, and also the proposer and seconder to the vote of thanks.

Dr. Vlok has to leave us now, and I would like to wish him, from us all, a safe and pleasant journey home.

(Applause).

The next item is Mr. Hobbs' paper on "Some Aspects of Power Cables in Underground Distribution". Mr. Hobbs, would you come up to the lectern please?

I think Mr. Hobbs is well known to all of you. He is Town Electrical Engineer of Virginia, one of the up-

and-coming towns of Southern Africa, and as it is his birthday today, and on behalf of us all, I'd like to wish him many happy returns of the day! (Applause).

Mr. I.L. HOBBS (Virginia): Ladies and gentlemen, I can assure you I can think of better things to do on my birthday than this!

First of all, I should like to convey my congratulations to you Mr. President, on your election, and wish you a very successful year of office. Your election has certainly brought honour to the Free State Goldfields, and I am very happy, as a 'Vrystater' to be so closely associated with this 38th Convention.

After the Presidential Address yesterday, I am beginning to wonder whether it is really necessary for me to present a paper on such an old-fashioned method of power distribution!

I should very much like to attend the mannequin parade which has been arranged for the ladies. You know you can't beat the girls in Windhoek - it's against the law!

The preparation of a paper for this meeting gave me quite a few headaches - Virginia is a small town and we really have very little to write about. In my position it is not possible to tell you anything about Welkom, so I eventually chose as my subject something common to all the new Free State Goldfields' Towns i.e. complete underground distribution networks.

I have not given any details about the distribution systems, which we have rightly or wrongly buried alive, because it is probably better to discuss subjects such as this before a more specialised forum.

I have, therefore, chosen some aspects of power-cables, because they, and the work associated with them, form a large proportion of the costs of an underground system.

The subject is, I must agree, a vast one, so I have tried to include some of the items not normally found in text books. The mere fact that we, in our town, use an underground network does not mean that I am an authority on this subject - I am not propounding anything new - my main object is to stimulate interest and to bring about further discussions. I believe it is important that we develop our views in argument and by experiment because there is a great deal of room for differences of opinion and a general spread of knowledge about the subject.

Now the paper is rather a long one. I am not going to read it - mainly because of my throat - some of my colleagues have threatened to cut it if I do!

You have all had a copy of the paper and I intend to take in only the most important aspects. Unfortunately a number of printing errors have crept in and I shall therefore make corrections as we proceed.

(See Agenda Section, Page 15.)

CONVENTION ADJOURNED FOR TEA.

On resuming after tea:

THE PRESIDENT: The first item, now, gentlemen, is the question of the ballot. I believe somebody wants to speak on a point of order.

Mnr. J.H. DU PLESSIS (Vanderbijlpark): Mnr. die President, in verband met hierdie aankondiging van u omtrent die stemming - ek is 'n stadsklerk en het in my tyd nog al heelwat te doene gehad met verkiesings ens. Soos ek verstaan is die beswaar dat daar nie geheim was by gister se verkiesing nie.

Nou wil ek graag u aandag vestig op die Konstitusie, paragraaf 12, sub-klosule 3, wat soos volg lees:

> „Behalwe soos bepaal in sub-klosule 5 sal elke besluit van die Konvensie geskied deur middel van meerderheid van stemme van die persone teenwoordig en geregtig om te stem."
>
> Sub-klousule 4: „Stemming sal geskied deur opsteek van hande, behalwe wanneer die Konvensie besluit dat die stemming oor 'n besondere saak met stembriefies, of by geheime stemming met stembriefies sal geskied."

Mnr. die President, tot die beste van my wete, het hierdie Konvensie nooit besluit om per geheime stembriefie te stem in verband met die verkiesing van die uitvoerende komittee nie.

Indien my submissie korrek is, te meer nog, nadat die Konvensie die openbaarmaking van 'n stem of altans 'n bedorwe stembriefie wat uitgooi is, gekondoneer het, dink ek nie u het enigiets te vrees omtrent die goeie reeling wat u gister getref het nie, maar ek dink dat as u voortgaan soos wat u vanoggend aangekondig het, deur die stemming te laat herhaal, kan u baie maklik die gevaar loop om, indien die tweede stemming se uitslag anders sou gaan as die vorige, dit ongeldig verklaar kan word.

Mnr. die President, ek wil verder daarop wys dat die Konstitusie aan u Konvensie 'n baie wye mag gee, tewens die Konstitusie bepaal dat as hierdie Konvensie, soos gister, enige ding gekondoneer het binne redelike perke, dat die Konvensie se optrede dan as finaal en bindend beskou moet word.

Mnr. die President, verder dit: indien u dink dat gister se verkiesing ongeldig sou wees, dink ek dat die uitvoerende komittee en u sal moet beraadslaag wat u beslissing behoort te wees. Ek dink nie dit is billik om te verwag dat u as President, tewens as ek na u Konstitusie kyk dink ek het u nie die locus standi om 'n beslissing te vel, om 'n verkiesing om ver te werp nie.

Mnr. die President, ek doen hierdie mededeling in alle nederigheid omdat ek as 'n buite-staander nie graag wil sien dat u enige probleme het met hierdie aangeleentheid nie.

Baie dankie.

THE PRESIDENT: Dankie Mnr. du Plessis.

I wonder if you would mind translating the main

points of what you said for the sake of several people who cannot understand Afrikaans?

Mr. J.H. DU PLESSIS (Vanderbijlpark): Mr. President, the first point I tried to make is this: That in terms of your Constitution, entitled "Procedure at Conventions", that is sub-clause 4 of the main clause 12, reads as follows:-

> "Voting shall be by show of hands, save when Convention decides that voting on a matter shall be by ballot or by secret ballot".

Now to the best of my knowledge, Mr. President, this Convention never decided that the ballot should be by secret ballot.

Therefore, I maintain that your ruling yesterday in connection with this one vote was more or less in the same nature as a spoilt ballot paper; in any case the Convention's decision to ratify whatever perhaps might have gone wrong in this respect was binding, because in terms of your own Constitution, this Convention's decision is final.

That is briefly all - apart from what I said in connection with the powers and duties of the Executive Council. I think until such time as you have elected a new Executive, the old Council is still in power, and that before (and I submit this in all sincerity), you could rule that yesterday's election was not in order, you should take this matter to your Executive Council, and come to some decision; because I doubt whether, in terms of the wording of the powers of the President, that you can make a ruling to the effect that yesterday's ballot was invalid.

Thank you Mr. President.

THE PRESIDENT: Well, we have heard argument - is there anybody else who would like to speak?

Mr. W.H. MILTON (Johannesburg): Mr. President, I would like to review what happened in connection with ballotting for your Executive. I don't think I have missed more than one of your Association meetings for a very long period of time.

When it came to the electing of executives by show of hands, which was the practice in the early days, with the increasing number of delegates entitled to vote, it became increasingly difficult to make sure that each delegate did not exercise more votes than he was entitled to, and at that stage your Executive decided that future voting for the Executive would be by secret ballot.

That is a rule of procedure if you like, which was adopted for Conventions. It may not have been written in to your Constitution, but having had the right to decide at Conventions whether a matter should be by secret ballot or by show of hands, I think that decision was taken to be effective for future Conventions - unless at some Convention it was decided otherwise.

Just for your guidance in your decision, Mr. President.

Councillor T. WARMAN (Durban): Mr. President, I would like to thank Mr. du Plessis for giving us guidance. and I would like to ask him one further question: If, as he says, under the Constitution this Convention has a right, and its decisions in the matters are binding, would not the action of every member present here casting a vote on a secret ballot, or be it, not having been voted on to be done by secret ballot, in fact be binding on this Convention?

Thereupon it is my submission, I would like Mr. du Plessis' opinion on this: That it was a secret ballot, or be it this Convention didn't vote that it should be one. We did in fact, by our actions, ensure that it was a vote by secret ballot.

Mr. J.L. VAN DER WALT (Springs): Mnr. die President, ek dink die saak is heel eenvoudig. Ek dink wat Mnr. Milton nie in ag neem nie is wat Mnr. du Plessis gesê het; daar is drie maniere van stem, nie twee nie.

Dit is met die wys van hande, stembriefie, en geheime stembriefie. Ons het gestem per stembriefie, nie geheime stembriefie nie.

Mr. President, I will repeat: Mr. du Plessis mentioned three methods of voting - show of hands, ballot paper and secret ballot paper.

We voted by ballot paper, not secret ballot paper.

Mr. R.W. KANE (Johannesburg): I think he has made an excellent case to prove the existing vote, no matter how it was done, was clearly illegal.

"Voting shall be by show of hands, save when the Convention decides that the voting must be by ballot or by secret ballot".

Mr. G.J. MULLER (Bloemfontein): Mr. President, which ever way the meeting decides I feel that it would be correct if you announced this morning that an election will be held tomorrow.

My Chairman, for instance, has made arrangements already with the Town Clerk of Windhoek to see certain things that my councillor is interested in, and I presume several other councillors may have done the same. Some engineers not knowing that an election would be held here, are probably playing golf this morning. Perhaps it serves them right ... however the election was on the Agenda and as such everybody who wanted to vote could be here. Nobody knew that the voting would take place this morning, and therefore I feel the correct procedure would be to announce today that tomorrow voting will take place. The existing Executive remains in power, as has been said, until the new Executive is elected, so there is no difficulty about that.

Mr. J. DOWNEY (Honorary Member): Mr. President, the method of voting, as explained by Mr. Milton, was changed due to the difficulties the scrutineers were finding in compiling the final list. And that has been in vogue for a number of years. So far we have found that this is the best method of handling the voting; as explained by Mr. Milton, a show of hands was completely unsatisfactory.

In that way, we also endeavoured to ensure that only those entitled to vote would vote. Thank you.

Raadslid C.J. KRIEK (Carletonville): Mnr. die President ek voel baie jammer om weer hier 'n paar woorde oor hierdie saak te sê, maar ek voel dit is my plig.

Mnr. die President, dames en here: Ek vermoed dat ons 'n respektabelike liggaam is. Ons het 'n President wat net so 'n respektabele persoon is. Ek wil graag hier die beroep doen dat hierdie vergadering so gou as moontlik tot 'n besluit kom hier; te meer omdat ek gesê het, dis 'n respektabelike liggaam, en ons respekteer die Stoel ten alle tye.

Mnr. die President, u sal onthou dat ek gister voorgestel het dat ons die saak oopstel vir bespreking. U het dit toegelaat en hierdie hele vergadering het hom vereenselwig daarmee, met die gevolg ek glo dat besluite wat gister geneem is heeltemal voldoende vir hierdie liggaam is.

Ek is baie jammer dat ek weer op die saak moes terugkom vanoggend, en ek wil aan die hand doen dat ons by ons vorige besluit bly en dat ons liewers van hierdie punt afstap.

THE PRESIDENT: Mr. Kriek, I wonder if you would translate for the benefit of the English-speaking members?

Mr. E.E. DE VILLIERS (Carletonville): If you don't mind Mr. President, I'll help my Councillor in this.

What he was actually saying is that this meeting here is a respectable gathering of respectable people, and including yourself - eminently - and we respect you in the Chair, as President; and he feels that he had asked you yesterday, in this Convention, that this matter should be placed open for discussion, when it was put forward yesterday, and you allowed that, and the meeting was satisfied with your ruling. Discussions took place, and certain decisions were made, and he feels that the ruling should be that the decision that was taken yesterday should be taken as final, and no further discussions allowed now, and that this matter be dropped.

THE PRESIDENT: Thank you Mr. de Villiers.

I hope you'll all forgive me for thinking that I am now in the electric chair!

Councillor R.W. OLIVER (Vereeniging): Mr. President, I want to support Mr. Kriek's suggestion whole-heartedly.

For quite a number of years I have been attending these conferences, and this is the first one where I think we are going to spend the whole week in electing an Executive Committee. I think we should not leave this sort of thing behind us. I want to support Mr. Kriek fully, to stop this discussion immediately, Mr. Chairman. (Applause).

THE PRESIDENT: Gentlemen, I agree, myself, that we are spending far too much time on procedure. After all, people have come hundreds of miles „om die Konvensie te geniet". They are not doing it this way. But there are two schools of thought in the hall, and we have to comply as far as possible...

Councillor L. LUTTRELL-WEST (Newcastle): I formally propose that your decision yesterday be upheld, Mr. President.

Councillor MRS. P.E. DAVIS (Benoni): Mr. President, why are we having all these arguments? What caused this re-discussion? May we know? If your decision of yesterday should be upheld, why are we having all this discussion? What went wrong yesterday that necessitated the discussion today? I am not going to waste my time sitting voting and voting repeatedly, or not voting, and listening to discussions, which are then supposedly out of order. I do not think they are out of order, but something must have happened yesterday that we should now discuss it.

THE PRESIDENT: As I mentioned first thing this morning, somebody objected to the secret ballot being interfered with by extraction of votes; that is extraction of the illegal ballot paper.

I accepted that as a valid objection, and that is why we are having this discussion.

Councillor T. WARMAN (Durban): Mr. President, I wonder if we could get down to tin-tacks now. You know, it really amazes me. We have Councillor Kriek from Carletonville telling us that we are a respectable body, that we are respectable people. We had Mr. de Villiers explaining to us that, translating what Clr. Kriek had said, we had a very high opinion of you and we wish to respect the Chair.

Now, Mr. President, I want to say that I am particularly digging my heels in on this matter, because precisely what Councillor Kriek said was not shown to you in the election of our Vice President, and you may consider that I am bringing up a contentious matter at this stage, but I am afraid I cannot sit still and not say precisely what I think about the matter. If there is any reason why this matter is brought up, it is because, if there has been any stink, the stink was raised in the election of our Vice President.

No respect was shown to the Chair, no respect was shown to His Honour the Administrator, or His Worship the Mayor in bringing up a contentious subject while they were here, and I apologise for raising this matter, but I can't help but feel that if the contentions that have been raised by all those who appear to be in favour of condoning our action yesterday could not have been shown in the previous morning's proceedings, in connection with the election of our Vice President - and thereby lies the tale, Mr. President, why you have got this divergence of opinion because we don't believe that that was what a respectable body should have done; I don't believe that that is what respectable councillors and engineer members, who have or should have their professional status to consider, should have done, and I can't reconcile the remarks that Councillor Kriek has said with what was done and carried out in the morning's proceedings. (Applause).

Councillor G.E. FERRY (Cape Town): Mr. President, I view the matter from a different angle, entirely. I felt yesterday, as I do now, that the decision which you gave immediately after the ballot had been counted, that it was out of order, was the correct one, and should have stood.

I obviously am not going to challenge your right or the right of the meeting to have changed that afterwards but I am of the firm opinion that once a Chairman or President has given a ruling, he cannot change that.

Nevertheless, Mr. Chairman, on other points I feel that the ballot was unconstitutional. Apart from the issue of tampering with a secret ballot, a point raised by somebody else (which I think was a very worthy one, and cognizance should be taken of that), I feel that it was wrong as far as Rule 14 on Page 9 of the Constitution is concerned. Section 5 of paragraph 1 reads: "Six engineer members, other than those already mentioned, who shall be annually elected by the Convention..." and particularly I want to draw the attention of the meeting to Section 2 of that rule, "The engineer members referred to in paragraph 5 of sub-clause 1, shall be elected to give effect to the following rule, namely: That in respect of each of the territories listed hereunder, there shall serve on the Executive Council at least one councillor representative and one engineer member".

I want to emphasise that: "One councillor representative, and one engineer member, representing a member undertaking situated in such territory".

And the territories are listed as follows:- "Cape Province, the Federation of Rhodesia and Nyasaland, Natal, Orange Free State, and the Transvaal."

Notwithstanding the terms of this rule, Mr. President, the Cape have no direct representative whatsoever, and I understand the Free State have no direct representative either, on the Executive Committee.

THE PRESIDENT: Thank you. That is a new line of thought of course.

Mr. P.J. BOTES (Roodepoort): Mr. Chairman, I don't think it is entirely correct what the councillor for Cape Town has just said, because there is Mr. Giles, and Mr. Murray Nobbs, representing the Cape already on the Executive.

(Discussion amongst the members ensued. This was not recorded).

Mr. P.J. BOTES (continued): Mr. Chairman, Mr. van der Walt told me that prior to the election, he asked the Secretary whether he had two votes, and that the secretary said 'Yes'. Is this correct?

THE SECRETARY: Mr. President, the answer to that question is as follows: I was requested by Mr. van der Walt before the proceedings started yesterday to issue him with a second ballot paper. I assumed it was a matter in jest. During the voting, my secretary asked me whether she could issue a second ballot paper to Mr. van der Walt as he had requested it in his capacity as engineer in charge of the undertaking.

Now, up to that time, I had not been advised of the appointment of any engineer in charge of the Springs Undertaking, and I assumed in good faith that that was the case. I therefore agreed that he should receive a second ballot paper.

The question was raised in doubt when the nomination of the new incumbent in Springs was put before the meeting.

Thank you.

Mr. P.J. BOTES (Roodepoort): Mr. President, to my way of thinking, one vote doesn't make any difference, and I think we should stop this discussion and get on with the Convention.

THE PRESIDENT: Thank you. I would like that to occur as well, but unfortunately we must thrash this matter out, having started on it.

Raadslid F.P. VAN ASWEGAN (De Aar): Ek beskou hierdie bespreking nou as ultra vires. Ons het hier 'n voorstel gehad van Standerton dat ons afstap van die bespreking en ons hou by the beslissing gister, en daar was geen teenstem daarteen nie. Gevolglik beskou ek dat ons is nou heeltemal buite orde, Mnr. die Voorsitter.

Mr. G.J. MULLER (Bloemfontein): Mr. President, I think the discussion is getting somewhat out of hand, and as we are not getting any further, and you are being placed in a more invidious position every minute, I feel that the definite proposal by Councillor West of Newcastle - that the meeting votes on this ...

Perhaps I could just ask Councillor West to repeat his proposal.

THE PRESIDENT: Mr. West's proposal was that we stand by yesterday's decision.

Mr. G.J. MULLER (Bloemfontein): I would like to second that proposal, Mr. President, that the meeting decides now that we abide by yesterday's decision. Otherwise you will never get out of the position that you are in, Mr. President.

THE PRESIDENT: Yes, I feel that we must bring the thing to the vote again, as to whether we accept yesterday's decision, or hold a new election. I think this is the only way out.

Mr. G.J. MULLER (Bloemfontein): I feel that you should put Clr. West's proposal to the meeting, and let us settle that. (Applause).

THE SECRETARY: Mr. President, there was also an amendment to the proposal.

Councillor G.E. FERRY (Cape Town): I would like to move that in view of the disagreement, we decide to ballot for a new Executive.

Mr. A.Q. HARVEY (Warmbaths): I would like to second that we have a re-ballot and finish the discussion.

THE PRESIDENT: I think that is the only fair way, ladies and gentlemen.

Mr. W.H. MILTON (Johannesburg): Mr. President, ladies and gentlemen: I would like to make a point clear, that I evidently did not make clear originally.

The ballot yesterday, to my way of thinking, was by no means a secret ballot. I pointed out that the decision to vote by ballot paper was taken owing to the difficulty of counting hands and ensuring that the voting was regular in that no member should vote for more than the candidates he was entitled to vote for, and secondly to ensure that only authorised persons voted.

So this suggestion of invalidating the ballot, because it was a secret ballot, I think, falls away. There was no attempt to make the ballot a secret ballot.

In other words, it was merely a voting by ballot paper, instead of show of hands, and as an open ballot by ballot paper, which could have been the equivalent to a show of hands, where you could have told someone "You are not entitled to vote; your vote is not counted", what was done yesterday was quite legal.

When a Convention adopts a procedure, that procedure is surely effective for future Conventions in a matter of that description. Where it is a question of interpreting the rules, and deciding that the voting for executives shall be by ballot paper, in view of the difficulty of counting hands, that will then remain an operational procedure for future conventions, unless changed by a vote at a future convention.

I would like to make those points to assist those people in voting on the resolution and the amendment. Thank you.

THE PRESIDENT: Thank you, Mr. Milton. There is another speaker.

Councillor H.J. LUCKHOFF (Orkney): Mr. President, the proceedings here today remind me so much of Parkinson's Law. The story of the woman who wrote a letter; I think it is common knowledge to the gentlemen who are here.

This is an engineers' convention, and they have a Constitution which lays down certain procedures. If your first election was unconstitutional, then you have to have another one. If the second one is also unconstitutional you have to have another one.

By all appearances, and from what I have heard, it would appear that the two elections are completely unconstitutional.

This Convention here, cannot, just by resolution, change that Constitution. At least, I don't think that is the normal procedure, in changing a rule. I would therefore like to support those gentlemen here who have moved that a re-election be taken along the lines laid down by the Constitution.

Then there cannot possibly be any repercussions. If yesterday's second election was irregular, there is no doubt, Mr. President, that today, tomorrow, and a week hence, and probably a year hence, it will still be referred to as an election that was irregular. I would like to support those gentlemen who moved that we should have a re-election.

Mr. H.M.S. MULLER (Upington): Mr. President, ladies and gentlemen: I really don't see the need for all this argument. If there were any irregularity, then it should have been said right at the commencement. What I am most concerned about is all the time it has taken up. Does it all go into the printing? And will it all come out in our proceedings?

It does nothing to enhance the prestige of this meeting that this should be recorded further than for record purposes.

And I for one reckon if there was any irregularity then we should ballot again.

Raadslid J.J. HOFFMAN (Krugersdorp): Mnr. die President, in die eerste plek meen ek dat dit nie regverdig is teenoor die persone wat nie vanmôre hier is nie, en wat wel deel geneem het aan die stemming van gister, om nou met hierdie mosie vorendag te kom.

Ongelukkig was ek gister middag nie teenwoordig terwyl hierdie dispuut ontslaan het nie. Ons het heelwat gehoor in verband met die hele aangeleentheid, en so vêr as wat die saak aanbetref het ons geen geheime stemming gehad nie, en daarom voel ek dat ons volstaan by die stemming wat gister uitgebring was, om die rede soos wat ek net nou alreeds genoem het. Hoeveel van die verteenwoordigers gaan nou die reg ontneem en ontsê word of hulle weer gaan stem, ja, of nee, en voel ek in alle billikheid teenoor die persone wat nie nou hier is nie, en stel ek voor dat ons bly by ons oorspronklike stemming van gister. Dankie.

THE PRESIDENT: Ladies and gentlemen, we have two proposals, and I propose to bring them to the vote, to resolve this thorny question.

The first proposal is that we should hold the election over again. First of all are you all agreed that we should do this by a show of hands? (Agreed). Will those in favour of that resolution that this be done over again kindly signify?

(A count of votes was taken).

Now all those in favour of the first proposal that the election held yesterday stand? (A count of votes was taken).

THE PRESIDENT: The resolution that the old election, yesterday's election, shall stand, now goes through.

(Applause).

Ladies and gentlemen, I think I should say, and you will all agree, that what has happened to me at this Convention so far shouldn't happen to a dog, and I sincerely hope from now on, we shall concentrate full time on what we came here to do.

I now have pleasure in calling Mr. Hobbs up to the platform.

I also have pleasure in calling on Mr. de Villiers to propose a vote of thanks to Mr. Hobbs' paper.

Mr. E.E. de VILLIERS (Carletonville): Ladies and gentlemen: first of all I may say 'congratulations' again to Mr. Hobbs, this time not on his paper, but on his birthday; I

hope he will find better things to do the rest of the day than sitting here!

Mr. President, my association with Mr. Hobbs dates back about 10 years, when I started attending meetings of the then Rand Association of Municipal Electrical Engineers. I have found, during the past 10 years, that he has always made very constructive contributions to our discussions at our meetings, and I was very happy when I was told that he was going to deliver a paper at this meeting. To my surprise, I was asked to propose the vote of thanks, which I am very happy to do.

I may also say that Mr. Hobbs was the very first Chairman of the new High Veld Branch, when we affiliated with the A.M.E.U. during 1962, to serve on the Executive and as such I think the honour conferred upon him to deliver a paper here is very fitting.

Mnr. die President, dit is ook verder vir my baie aangenaam vandag om hierdie mosie van dank voor te stel aan Mnr. Hobbs vir sy referaat veral omdat ons in Carletonville 'n feitlik identiese stelsel het, behalwe dat ons nog nie by 11kV gekom het nie, ons is nog heeltemal gelukkig met 6.6kV. Ek dink ons het egter 'n groot voordeel in die sin dat oor die algemeen daar baie minder moeilikhede verbonde is aan 'n 6.6 kV stelsel as 11 kV.

Ek moet vir u dan ook meld, as u dit my sal vergun Mnr. die President, op hierdie stadium - u weet dat ons vir 'n aantal jare 'n taamlike unieke probleem in Carletonville gehad het. Ek wil dit spesifik stel gehad het, omdat ek glo, volgens wat ons nou bevind het, dat ons probleem feitlik opgelos is, en dit is insinkende grond.

Mr. President, this problem of ground subsidence in Carletonville was snatched up by the press, unfortunately, and publicised and magnified to such an extent, that even at this Convention people have the impression that we have an overhead system underground! I can assure you, though, that our underground system is in an excellent condition.

Mr. President, this subject of underground power cables is very large, and I think that what we have in front of us today in Mr. Hobbs' paper on "Some Aspects of Power Cables" is just the right thing for what I could term "the small town man". In the past, every so often, papers were put to the Conventions that catered for the city man, in that they dealt exclusively with extra high tension systems, so that this paper is in that sense rather unique.

Personally, although I have had quite a number of years' experience on underground systems, up to 21kV but mostly on 6.6, I feel that I have also learnt a lot from this paper. I think we all can, and no doubt we all have benefitted.

I must congratulate Mr. Hobbs on the way he has compiled his paper, and the subjects which he has touched on.

Mr. Hobbs has divided his paper into let us say, four main items. Firstly - historical; then he touched on the economics of installations; then the actual procedure of installation; and finally maintenance, which includes, of course, to a very large extent, cable fault location.

On the historical side, it was very interesting for me to note the portion about Sebastian Ferranti and the design of these copper tube cables that were installed in the late 19th Century, but more so that 7,000 joints were put into that cable, and that the cable was in service until 1932. To my mind the actual marvel about the installation is the 7,000 joints - and it would be interesting (I don't know whether Mr. Hobbs has any such information), to know whether they had any faults in the joints. It would also be interesting to find out how they actually made them, because as you know many people recently have trouble with faults in 11 kV joints, and it would be interesting to note whether, in those early days, they had experienced any trouble with 10 kV joints.

Mr. Hobbs mentions in his paper certain matters that have to be taken into consideration in a decision whether an underground system or an overhead system has to be installed. I feel that he has perhaps left out a very important aspect and that is difficulties that we all have, especially on the Reef, and generally in built-up areas, on crossing of other overhead services, such as Post Office telephone lines, Escom lines, and then also the matter of wayleaves and servitudes, especially in regard to the Railways, the Provincial Administration and National Roads. I feel that these almost "man-made mountains" are much greater obstacles than the physical obstructions mentioned in Mr. Hobbs' paper.

In regard to the economics, the first point I would like to touch on is in regard to the thermal restivity of the soil. I agree with Mr. Hobbs that it is a very difficult problem, and apparently the tests are very difficult to apply and get accurate results. I feel that at the present stage there is still a lot to be done to find some simple method of determining the average thermal restivity over a large area. As things stand now, I feel that investigations, especially if a complete new system has to be designed, to find out exactly what the thermal restivity properties of your soil are, would be so costly that the object of the savings that may result would be refuted.

The short circuit ratings of cables, which Mr. Hobbs has eminently dealt with, is a very important subject, and I have learnt quite a bit from this. These different aspects about the damage of the lead sheath, the damage to joints, and the bursting of sheaths, are very important factors which one doesn't always appreciate. One particular point about the earth fault current that should be divided between the sheath and the armouring, Mr. Hobbs has mentioned that it depends upon the condition of your armouring, and whether it is suitably bonded at the joints.

Now Mr. President, we make it a standard practice to have a very good bond over our joints. I feel that, if you have your armouring at terminations well earthed at your sub-stations, it refutes the object if your joints are not properly bonded.

In regard to the savings that could possibly be effected, so far as the short circuit ratings are concerned, I feel it is quite possible that these figures given here can

be exceeded if the cables could be strengthened mechanically, as well as your joints.

I find that, for example, considering a .1 sq. inch cable and a .15 sq. inch cable the actual cost of the cable is in the ratio of 1. to 1.32. In other words, the cost of .15 sq. inch cable exceeds that of .1 sq. inch cable by 32% . I feel that it is possible that, say with a ten per cent or fifteen per cent increase in the cost of cable, to give your cable that firmer mechanical strength, you can still effect a saving of a matter of 10 or even 15% on the initial cost of the installation. This is a matter, possibly, that our manufacturers can go into.

In regard to screened cables, Mr. Hobbs mentioned that they are invariably used for 33 kV and above, which we know, but in view of the widespread occurrence of a particular type of failure of 11 kV belted cable, it has been suggested that consideration should be given to the preferential use of screened cables on 11 kV systems.

I am a little bit in the dark about the particular type of failure mentioned here, and I would be glad if we could be given details.

On the installation aspect, I feel what seems rather unimportant, that is the covering of high tension cables by some means - Virginia employs concrete slabs - is really extremely important. The fact is that your cable is protected against accidental damage when any excavations are made at a later stage, which we find happens very often in built-up areas, not only by the municipality for its services such as water, sewerage, and storm water drainage, but by our friends the Department of Posts and Telegraphs as well. Apart from protecting the cable itself, it provides protection against accidents, and possible fatalities.

We are in the fortunate position in Carletonville that we have a very large brickworks close to us, in our municipal area, and we purchase 9" x 4" x 2" reject face bricks very cheaply for that purpose.

I have not had any comparative costs between the use of these bricks as against concrete slabs, and I would be interested to know, if Mr. Hobbs could give it to me, what his actual costs are, say per 100 ft. of covering of his cable.

In regard to the use of ducting and/or pipes at road crossings, and the restriction to as short a length as possible as indicated in the paper, and where the design has been made for direct laying in ground, I think it is very important (although it is not often appreciated), that it is far better to spend a bit more on longer cable and follow the splays in the township than to take your cables straight across with consequent longer piping.

In Carletonville it is standard practice, and possibly elsewhere, we never run more than one cable in such a pipe on a crossing. We always have a separate pipe for each cable, and on the initial construction work, allow at least one spare pipe for possible future cables, and sometimes two. We also have a spacing of at least 12" apart for these pipes for the obvious reason that you do not interfere with the actual heat dissipation of your cables.

Another point concerning cables in ducts, Mr. Hobbs points out that conditions in America possibly differ from conditions here, in that in America they extensively use the ducting system, but he says that in this country it would probably be uneconomical in all but special cases. I would like to have a little elucidation on that point - how it is possible that the Americans can do it economically and we can't!

In regard to the actual laying of cables, I have found in the past that the aspect of excessive stresses in your cables when laying is very important. Sometimes native labour alone is employed, and very often only under the supervision of quite an unskilled handyman; people not versed in the precautions necessary and what damage can be done to a cable if subjected to these excessive stresses. I feel that is a very important point which is often overlooked that this work must only be entrusted to a person very well versed in the methods of laying of cables.

So far as the routine testing of cables is concerned, under the heading of Maintenance, I am inclined to agree that up to a point routine testing of cables is very important especially, as I have mentioned just now, where cables traverse built-up areas where you have other services possibly being laid at a later stage, or alterations and improvements made. It often happens (and I think we have all had such experiences) that damage done to the cable only shows up after possibly long periods, and if you do your routine testing on cables in such areas, I think it should pay handsome dividends. I don't think that I would advocate doing routine testing throughout on all cables, especially of course also excluding street lighting cables.

In regard to fault location, Mr. Hobbs has dealt exhaustively with the subject, and I agree with him that it is very important for a supply authority to go to quite a big expense to purchase the necessary equipment to deal with almost any type of fault. Your continuity of supply, apart from being important to your consumer, is very important to the supplier as well, and I think in many instances also the councillors! The records to be kept of fault location or cable faults as such, and also accurate records of your cable routes, joints, etc. is a very important aspect, which I feel in some municipalities is very much neglected. The marking of cable joints is just as important, because you very often find that many faults develop in joints and at times you may spend a lot of time with all your equipment trying to find a cable fault which could have been found very much easier if your joint had been marked.

Mnr. die President, dit was vir my interessant om hier op te let dat Mnr. Hobbs so in die verbygaan gepraat het van verskeie nuwe tipes materiale wat gebruik word vir kabel insolasie, maar hy het nie die woord P.V.C. gebruik nie. Dit het verskeie kere onder my aandag al gekom dat die ontwikkeling op die vasteland van Europa taamlik geweldig is in die gebruik van hierdie insolasiemiddel, selfs al vir hoogspanning. Ek weet nie of my inligting korrek is nie. Hier mag miskien persone in

die vergadering wees wat ons beter daaroor kan inlig. Dit sal moontlik baie interessant kan wees.

Dan is daar 'n ander metode van kabellaswerk wat al vir 'n hele aantal jare in gebruik is in verskeie munisipaliteite, en wat deur verskeie andere glad nie gebruik wil word nie. Ek verstaan egter dat die metode alreeds heelwat verbeter is, en dit is die sogenaamde 'Scotch-cast' metode. Ek self, Mnr. die President, het dit nog nie gebruik nie; ek het al demonstrasies bygewoon hiervan, en het ook toevallig met sekere leweransiers gereël vir demonstrasies van die afmaak van eindkaste binnekort na my tuiskeer van die Konvensie af, maar ek reken dit sou nie onvanpas wees as persone in die vergadering vir ons kan inligting gee omtrent die nuutste verwikkeling in die verband nie.

Tenslotte, Mnr. die President, doen dit my baie genoeë om Mnr. Hobbs van harte te bedank vir hierdie referaat wat hy vir ons gelewer het. Ek glo dit sal heelwat verdere kommentaar uitlok waardeur ons almal oor hierdie belangrike onderwerp van ander persone in die vergadering nog meer kan leer en ek stel dus nou die mosie van dank vir die referaat aan Mnr. Hobbs. Dankie Mnr. die President. (Applous).

THE PRESIDENT: Thank you Mr. de Villiers.

I would like to call on Mr. Vergottini to second the vote of thanks.

Mr. P.L. VERGOTTINI (Brakpan): Mr. President, I share this with the previous speaker, that we also distribute our cable work at 6.6 kV but our underground cable system remains underground - so far.

Mr. President and gentlemen: I am sure that I would be speaking on behalf of all those engineer and councillor members present here today when I congratulate Mr. Hobbs on his excellent paper.

The cyclic rating factors for modifying current ratings of cables serving various loads as published by the Electrical Research Association were noted with interest. I take it that, as Mr. Hobbs stated, these rating factors can be calculated from actual load curves, he would like to make the point that these rating factors should only be applied to cables after installation, and which already serve an established load. They could then be used as a check on the reserve capacity of a loaded cable.

An interesting point worth mentioning about current rating tables as published by the above Electrical Research Association, is that for cables up to 11 kV the current-carrying capacity is greater when laid direct into ground, provided the cross section or area does not exceed about 0.2 per sq. inch. When the cross sectional area exceeds 0.2 per sq. inch, the current rating capacity in still air is greater.

While on the subject of cable current rating, two approaches have been made to the problem of preserving normal full-load ratings, the first is to improve the cable environment by using bedding media either (a) possessing an acceptable value of thermal resistivity, or (b) capable of retaining moisture at temperatures up to the level of the cable outside-surface temperature.

The second approach to the problem is by the application of water cooling by means of plastic or aluminium pipes, which is the only means so far in being of ensuring that the maximum winter load capability of cables (based on a conductor temperature of 85° Centigrade), is maintained throughout the year, irrespective of environment.

The laying of cables in ducts is practised by the large undertakings in their business areas, where the excavation of a trench to replace a faulty cable would cause much inconvenience to traffic and business activities. Here I may mention that the maximum allowable stress in the cable sheath as stated by Mr. Hobbs has a definite bearing on the maximum allowable distance between manholes, as cables have to be drawn in by their ends, and it is impossible to distribute the pull evenly over the complete length. Under these circumstances a single wire armoured and P.V.C. served cable has definite advantages from the installation point of view.

Regarding the routine pressure testing of cables, Mr. President, I would rather not disturb the rest of a sleeping dog!

Mr. Hobbs has covered the field of fault location rather thoroughly and his suggestions in connection with apparatus which should be acquired by large and small undertakings are noted with interest. The only cable fault which is difficult to pinpoint is the high resistance one, and here the pulse echo technique comes to our assistance.

Many papers on electricity distribution have, in the past been dealt with at A.M.E.U. conferences, and although this one is an excellent paper, I can assure you that many papers in the future will become necessary and will be dealt with in order to enable municipal undertakings to cater efficiently with an ever-increasing demand for more and more electric power.

There are, I am sure, other delegates who would like to make some contribution to this paper, so with these few remarks, sir, I now have pleasure in seconding the vote of thanks for the very interesting paper delivered by Mr. Hobbs. (Applause).

THE PRESIDENT: We are rather short of time, gentlemen, so I think we will go right into the discussion. Are there any contributors?

Mnr. E. de C. PRETORIUS (Potchefstroom): Mnr. die Voorsitter, u het geluister na Mnr. de Villiers, een van ons elektrotegniese-ingenieurs van een van ons voorstede - dit was een van die opkomende voorstede maar nou is dit besig om weg te sak.

Mr. President, I sincerely wish to add my quota of praise and thanks to Mr. Hobbs for his excellent paper. I always had, and still have the greatest respect and admiration for colleagues who, in the first instance find the time and secondly have the courage to prepare and read a paper.

If I had to do this type of thing, it would be like the young deacon who had to open the church council meeting

(his first) with a prayer, and all he could say was, "Oh God Amen".

Or it would be like a steer, "a point here, a point there, and a lot of bull in between"

Criticism is much easier, and this again reminds me of the classical anecdote of Professor Gerrit Dekker, (the Chairman of the Publications Board - and for the uninitiated he is of Potchefstroom). He, a couple of years ago, wrote a scathing criticism on a publication of one of the younger authors, and this young lad was very furious. He wrote back to Prof. Dekker saying that a person who could not even write the simplest of poetry should keep his mouth shut. Promptly Prof. Dekker replied, „My jong vriend, ek mag nou wel nie 'n eier kan lê nie, maar ek kan gou - baie gou ruik as hy vrot is!"

Fortunately, Mr. President, my sense of smell is not so good!

I do find it a pity that Mr. Hobbs has confined his paper to paper insulated cables. P.V.C. cables, especially in low voltage distribution, surely have taken an equally important place in this particular sphere.

I can only assume that time, the dear old enemy of our conventions, was the deterrent factor.

At this stage I would suggest that the Executive give thought to a symposium on the technicalities and economics of power cables and underground distribution at the next, or a future convention. This could cover everything up to say, 33 kV.

Mnr. die President, ek vind dit 'n verdere tekortkoming dat Mnr. Hobbs nie verwys het na 'n referaat na my mening die enigste van sy kaliber wat nog ooit in die Suidelike Halfrond oor hierdie onderwerp gelewer is en dat hy skynbaar nie hierdie standaardwerk geraadpleeg het nie, naamlik die referaat van Mnr. A.A. Middlecote, "A Critical Review of Present Trends in Low and Medium Voltage Cables" wat opgeneem is in die April 1958 verrigtinge van die S.A.I.E.E. terloops dit dek ook 11 kV kabels. (Dit is altyd vir my so snaaks, as die erkom mense by ons praat van 11 kV-skakelaars as laagspanning skakelaars).

Mnr. Hobbs kon ook miskien uitgewei het oor die elektrolitiese beskadiging van kabels en die voorkoming daarvan want dit is 'n ernstige probleem in die beskaafde dele van ons land. U weet een-ampere-stroomvloei in 'n anodiese area gedurende een jaar kan soveel as 20 lb yster en 75 lb lood wegvreet. Warmteweerstand van grond.

Die Buro van Standaarde, as een van sy lofwaardige dienste; natuurlik teen 'n prys, kan hierdie toetse met die mees gevorderde apparaat uitvoer. Sodanige toetse is verlede jaar vir ons uitgevoer en die resultate was, om die minste daarvan te sê, skokkend. Metings is gedoen by 10 punte. Die laagste waarde was 50 en, nou luister: Beskrywing van die grond - baie hard, gruisagtig. Die hoogste waarde was 240; beskrywing van grond - los rooi grond met groot klippe. Van die 10 lesings was 4 meer as 120 en 5 minder as 90. Die gemiddelde was 116.

Dit is baie belangrik soos Mnr. Hobbs ook gesê het, of geimpliseer het, dat die „g"-toetse gedurende die droogste tydperk van die jaar gedoen word.

Die teorie en meganisme van vogtigheidsmigrasie rondom kragkabels word skynbaar nog nie goed verstaan nie en heelwat navorsing word in die verband deur die E.R.A. gedoen.

Hantering van kabels: Een aspek van die saak wat Mnr. Hobbs blykbaar vergeet het om te noem, is die berging van papiergeisoleerde kabels. Daar moet getrag word om kabeltolle nie son te laat staan nie. Op 'n warm somersdag kan die kabel 'n temperatuur van so hoog as 140°F bereik. Indien kabels nie onder dak geberg word nie, behoort die oorblywende kabel op 'n tol altyd deeglik met kalk afgewit te word.

Current Rating of Cables: Has the author any information on the recommended cable ratings in the U.S.A. and the Continent? It seems as though the Continent are less conservative in this regard, if one takes the rating of P.V.C. cables as a criterion.

Now coming to the paper, I have the following remarks and questions.

Mr. Hobbs says that "the limit from a voltage regulation standpoint is easy to set, and is determined solely by the variation in voltage in which the consumers' equipment will operate satisfactorily".

Apparently the accepted limits in this country are plus and minus five percent from the declared voltage - (though the E.S.C. has the prerogative of $7\frac{1}{2}\%$!)

This is another point that SHOULD be debated at length at a future convention, say, during the Forum, namely "What is considered a generally tolerable, economical voltage regulation?"

The armouring: Mr. Hobbs apparently is sold on wire armouring. In my opinion tape armouring for municipal purposes is as good and considerably cheaper. There really is no justification for the more expensive type of armouring. This also applies to screened cables. The author says "It is possible to justify the use of screened cables above a certain size on 11 kV system due to the definite price advantage." This only holds good if cable sizes were available in a continuous range.

The author also wants to justify the use of screened cables "in view of the widespread occurrence of particular type of failure of 11 kV belted cables". These faults, Mr. President, in my opinion, are solely the result of shoddy workmanship.

The value of 37 kA mentioned on page 18 (the bursting current), is that the R.M.S. value or the peak value?

Ducts: (Page 20). He says here "... as the carrying capacity of cables in ducts is reduced, due to the unfavourable dissipation of heat, it is advisable to reduce the duct lengths as much as possible..." I want to know if the rating of cables in ducts is dependent on the length of the ducts?

Depth of Laying: In Potchefstroom we adopted a depth of 42 inches for high voltage cables, 30 inches for low voltage cables and 18 inches for service and street

lighting cables. Where private property is crossed, a further 12 inches is added to the depth.

Slabs: There is really very little justification for the use of protective slabs over cables along the whole route. The cost of the slabs may approach that of the cable itself. There must be a point where the installation of slabs is not justified at all.

Has the author any personal experience of the use of pipe pushers?

In connection with level differences, he says, "... consequently it is advisable if standard cables are used to permit of no greater level difference than those given below..." and he suggests some figures. I have this question: Where greater level differences are encountered could this problem be solved by straight through joints?

I was very much interested in Fig. 16, but unfortunately the author has omitted to indicate values of R and C.

The higher thermal limit, 160° Centigrade, for cables, (in connection with cable rating): Have all the leading cable manufacturers accepted this higher level? To my knowledge they have not.

In connection with trenching he says, "Experience has revealed that mechanical excavation is by far the most economical". Surely this depends on the amount of trenching to be done, the nature of the terrain and the nature of the soil.

This pulse echo instrument, by which pulses are reflected back to the generator, reminds me of the classical test for good whiskey. It says: Connect a 20,000 volt D.C. generator across the sample. If the current causes the sample to bubble, not too bad; if it turns turgid, still better; but if the whiskey chases the current back to the generator, then you have the real Mackay!" (Applause).

THE PRESIDENT: Thank you Mr. Pretorius. I must say I envy you the facility to get off four jokes, three of them in the first thirty seconds!

With regard to the symposium which you suggest on Power Cables - I think it is a very good idea, and I am sure the Executive will give very careful consideration to it. I hope that you will put up your question on voltage regulation to the Forum next year.

Are there any further contributions?

Mnr. M. VAN DER SPUY (C.S.I.R. Pretoria): Mnr. die President, Mnr. Hobbs en Here: Die referaat wat u so pas na geluister het gee 'n baie paslike en deeglike oorsig van die probleme verbonde aan hierdie belangrike aspek van kragverspreiding, naamlik ondergrondse kabels.

In this aspect there is some similarity between ourselves and the medical profession. Our difficulty, unfortunately being that we only discover our mistakes after we have buried them!

Gentlemen, to return to a more serious vein: the annual investment throughout the world in power cables, buried directly in the ground, is many millions of rand, and increasing attention is being paid by Supply Authorities to the optimum utilisation of current-carrying capacity in order to make the most effective use of money invested in materials, manufacture, and installations.

The author has made mention of some of the problems associated with thermal resistivity of the ground, and also mentions specifically the lack of knowledge of South African soil conditions.

Since this is a national problem, the Power Electrical Engineering Division of the C.S.I.R. has initiated a programme of research into the thermal resistivity of soil throughout the Republic, especially those aspects concerning the power engineer.

By conducting a survey of thermal resistivity in various soil groups, under varying conditions, coupled with the seasonal variation of moisture content, and its correlation to rainfall records, we aim at providing the power engineer with a guide to the type of conditions prevailing in his area. A large number of these measurements will have to be carried out in situ, and we already have the co-operation of several municipal undertakings in assisting with carrying out this programme.

The importance of the moisture content of the soil as a factor affecting the thermal resistivity is not generally realised. In a chalky type of soil, dry density of 1.33 gram per centimeter cube, the reduction of moisture content from 10% to 5% will alter its "g" from 110° Centigrade Centimeter/Watt to 180° Centigrade Centimeter / Watt. We unfortunately also find that in the summer rainfall areas, the highest loadings are encountered during the period of low moisture content of the soil.

This problem is not so predominant in the Continent of Europe, owing to the generally high moisture contents of their soil.

The following values are published as national values of thermal resistance (Degrees Centigrade Centimeter/Watt):

	France	85
	Germany	70
*	Great Britain	120
**	Italy	80 - 100
	Japan	120
	Sweden	100
***	U.S.A.	120 or 80 - 90

* Although according to a very thorough survey recently conducted by the E.R.A. it was found that in 70% of results the "g" was found to be below 90.

** Depending on the geographical location which affects the moisture distribution.

*** Commonly computed on the basis of experimentally determined duct correction factors.

Although the figure of 120° Centimeter/Watt is at present accepted in the Republic of South Africa as a national figure, large areas have dry soils which have a "g" greater than that. Measured values of up to 270, and greater, have been encountered in normal practice.

The importance of the measurement of this "g" of the soil along a proposed major cable route, along with its moisture content, and correlation with the annual rainfall figures, cannot be too strongly stressed, especially, I repeat, the measurement of the moisture contents and its correlation with annual rainfall figures, to establish the worst condition that can be expected throughout the year.

With the modern trend of greater utilisation of installed cable capacity we run the grave risk of overloading cables in certain areas of our country, and over design and consequent capital waste in others.

Further factors being investigated are:

1. A simplified method of testing, as mentioned by previous speakers as quite an urgent requirement. The transient needle probes developed by the E.R.A. are not wholly suitable for South African soils, especially where shale and stones are encountered. Some progress has already been made and a simple and inexpensive instrument is envisaged which could be used by all municipal undertakings.
2. The effect of different types of back-fill in relation to different types of unexcavated earth. (I might mention that the accepted practice of laying a cable in a bed of pure sand about 6 inches thick introduces the worst possible thermal condition in low moisture content areas.)
3. Soil moisture migration, and drying out due to cable heating under service conditions.

Thank you Mr. President. (Applause).

Mr. F. STEVENS (Ladysmith): I would like to associate myself with the congratulatory remarks of others on Mr. Hobbs' paper. No doubt other engineers find cable jointers, or electricians, do not like paper work, and avoid it if they can. If they have to do it, including keeping records, they don't exercise as much care as they should.

What I, and perhaps other engineers would like to know, is who Mr. Hobbs entrusts with picking up information and filling in the record cards.

Mr. A.C.T. FRANTZ (Cape Town): Just a short question, Mr. President. Mr. Hobbs with all his experience in fault finding: could he perhaps assist us in finding a fault in a cable to the microphone on the other side? (Laughter).

Mr. F.J. PRINS (S.A. Bureau of Standards, Pretoria): I would like to raise two points as a result of Mr. Hobbs' paper - the first, again the soil thermal resistivity.

That has been mentioned quite a few times today. A tremendous amount of research has been done in this direction by a number of people; two of the largest concerns in this respect were the E.R.A. and some Italian authorities.

The London Electricity Board took up from where the E.R.A. left off; (they have a chap there, F.C. Hole, who has done a large amount of work on soil thermal resistivity). Based on information obtained from the London Electricity Board, the S.A. Bureau of Standards has devised probes using the needle method which is generally quite accurate for practical purposes.

As pointed out, one of our problems in this country is certain types of soil. We have found that the worst condition is made-up soil, where they have old building rubble and things like that. Very important of course, is the moisture content, and a fact that should not be forgotten, is that the heat of the cable itself will alter the conditions once it is in use.

Again, you have instances, where you have more than one cable, the spacing of these cables will affect the ultimate results and another point, where you protect these cables by means of these concrete slabs, or other means - remember that will also affect the heat dissipation. You can design a perfect system and then take your cable through some ducts, or some pipes, underneath a road and upset the whole design.

I have seen a case, a mine was involved, where the cables were run at just about their maximum rating - it was in order in the soil, but one of those cables was perfectly cooked in a portion where it went underneath a road in a pipe.

Regarding the costs of tests mentioned by Mr. Pretorius, I would like to mention that those probes are very expensive to make up, and they don't last very long. You can only use them a few times, and then, due mainly to the type of soil we deal with, you have to throw them away.

One other small point I'd like to touch on: coming back to the plastic insulated cables that are coming into force today, mainly the P.V.C. insulated, wire-armoured P.V.C. served types, I am very interested in obtaining some information from municipal engineers who have used these cables where they have to join them - as to what type of joint they use.

A very popular method, I believe, is to make a small joint box, and fill it with bitumen.

The text books tell us that there are a number of things that don't react too well with P.V.C. and one of these is bituminous products.

So I would be very interested in obtaining some information as to what methods are practised and what results have been obtained.

Thank you.

THE PRESIDENT: Gentlemen, I'm afraid we will have to stop there for the time being. We will resume this very interesting discussion as soon as we can find the time.

CONVENTION ADJOURNED AT 12.45 p.m.

MEMBERS FORUM

QUIZMASTER: Mr. P. GILES, EAST LONDON.

THE PRESIDENT: Gentlemen, will you all take your seats please. I must tell you, regretfully, that there cannot be any more smoking in this hall. There has been a fair amount of damage so far, and the owners are not very pleased about it.

With that, I'll leave you to the tender mercies of Percy Giles. Please treat him gently, because we are going to need him again after this.

QUIZMASTER asked if he could direct the attention of the Forum to Question No. 2.

> QUESTION No. 2: Referring to Regulation 606.J of the Standard Regulations for the Wiring of Premises. Does the Forum consider there is any good reason for specifying six feet clearance between socket outlet and water tap?

Mr. R.W. KANE (Johannesburg) said that the quarrel with the six feet; should it be five foot six or six foot or seven foot?

QUIZMASTER: Can we consider any good reason for specifying six foot clearance?

MR. R.W. KANE (Johannesburg) said that we are the only country in the world that has this particular bye-law.

Mr. G.J. MULLER (Bloemfontein) said that the bye-law was antiquated and due for revision.

QUIZMASTER said that it would be interesting to know whether any of our municipal engineers are enforcing this or how strictly they are enforcing it.

Mr.P.L. VERGOTTINI (Brakpan) suggested that we should be guided by the Department of Labour.

Mr. J.J. GROENEWALD (Department of Labour) stated that the bathrooms were not covered by the Factories Act, in any case the answer would have been "an adequate distance".

Mr. K.R. MAUGHAN-BROWN (Cape Town) stated that six foot from the tap is a useless regulation.

Mr. R.W. KANE (Johannesburg) said that the regulation specifically says "between the socket outlet and the water tap" not "water pipe".

Mr. M.W. ODENDAAL (Alberton) stated that in his area dispensation has been given when an earth leakage circuit breaker has been installed.

Mr. G.J. MULLER (Bloemfontein) said that six foot is no protection so that the alternative does not exist. He also stated that we are not enforcing earth leakage circuit breakers, but are encouraging them.

QUIZMASTER stated that the Forum is undecided about the matter.

> QUESTION No. 3: Substantial benefits would flow from the use of protective multiple earthing of the neutral conductor throughout a consumer's installation, such as obviating the need to install and maintain earth leakage circuit breakers.

Mr. G.J. MULLER (Bloemfontein): Earth leakage is safe.

Mr. F.J. PRINS (S.A. Bureau of Standards, Pretoria) pointed out that you may have high soil resistivities and you have to protect for that.

Mr. K. ADAMS (Johannesburg) said that combination of core balance and potential types of relay will not operate where the multiple earth neutral is on the load side of the relay.

Mr. R.W. KANE (Johannesburg) said the wiring regulations do not prohibit earth leakage relays or multiple earthing.

Mr. W. BOZYCZKO (Johannesburg) said that using earth leakage the multiple earth neutral relay will not operate where the multiple earth neutral is on the load side of the relay.

Mr. G.J. MULLER (Bloemfontein) said that the position is actually just the reverse.

Mr. R.W. BARTON (Welkom) stated "When I framed this question I was sure of many things, including the theory behind it, but now I am not sure of anything."

QUIZMASTER said that the Forum does not favour the move to withdraw the provisions of the Wiring Regulations at this stage in regard to earth leakage relays. (Reg. 1302.D.).

> QUESTION No. 5: A well-known firm is offering equipment for the making of pressurised, synthetic-resin insulated splices in underground cables. What is the feeling of the conference about the use of these joints in cables operating at 11,000 volts?

Mr. J.M. GERICKE (Klerksdorp): Mr. Quizmaster, for many years I have been looking forward to what can be termed a mechanical means of jointing cables. This method of forming a joint by means of a filler tape, then sealing by means of P.V.C. Tape and finally pumping up with epoxy resin compounds, was therefore welcomed, and it was decided to give this method a thorough tryout. It was realised that a number of failures would be expected due to the novelty of using this method of jointing on 11,000 volt cables.

The risk was, in my opinion, well worth taking, as there was the possibility of eliminating the cable jointer altogether, and thus not making the continuity of a supply system dependent on the personal skill or the mood of this type of artisan.

This new method was adopted during 1958, and during the years up to 1961 we experienced four blow-outs on about 110 joints.

A thorough investigation was made and certain improvements in technique were adopted, viz. each core was

separately taped with filler tape so that the clearance could be accurately predetermined by means of calipers. Calipers were employed to predetermine exactly what the clearance would be between the cores and earth sock. Care was exercised not to make the joints too big. The bigger the joints the more possibility there was of entraining bubbles of air. Injection was made from the side of the joint instead of the centre, as a further guard against air pockets. Pumping up had to proceed at a regular pace without interruption and a spare gun is essential. Great care had to be exercised in not disturbing the joint after the final pumping up before final settling took place.

Since January 1961 accurate records have been kept and we experienced five failures out of a total of 115 joints.

In every case the cause was traced to the carelessness of the official in not adhering to the rules and instructions as laid down; and I have no hesitation in recommending this technique for jointing cables up to 11,000 volts.

On occasions I have even made use of fifth year apprentices for 11,000 joints, and the technique is so completely mechanical.

Mr. G.C. THERON (Vanderbijlpark) reported that he had had two failures out of three joints.

Mr. P.J. BOTES (Roodepoort) reported that they had had difficulty with the gun used to pump the epoxy resin. 36 joints installed and 34 replaced after six months. One other point which was brought up was - does oil paper prevent the epoxy resin from making a proper seal against the other materials?

QUIZMASTER asked whether epoxy resin matches up with oil paper.

Mr. J.M. GERICKE (Klerksdorp) stated that it sealed very well and that it had no effect on epoxy resin.

QUIZMASTER asked if it were a neutral material.

Mr. J.M. GERICKE (Klerksdorp): Yes.

Mr. F.J. PRINS (S.A. Bureau of Standards) said that a very large authority which has done probably more work in this respect than anybody else in the world, (an overseas authority) said that you have to be very careful due to the heating and cooling action when your cable cycles under changing load conditions as, if you do not make proper provision for the internal movement, in time you will get a capillary path between the lead sheath and the epoxy resin. They have developed a special way to try and overcome that difficulty.

QUIZMASTER asked if it met with the approval of the Forum.

Mr. R.W. BARTON (Welkom) stated that one point which had not been cleared up in connection with epoxy resin is that of ageing. He wanted to know what the life of the material was.

Mr. A.Q. HARVEY (Warmbaths) stated that they had put in 40 to 50 joints and that 2 were still holding but could not recommend the use of these joints in 11 kV cables.

Mr. C. LOMBARD (Germiston) said that he could not enlighten the Forum on the ageing properties of epoxy resin after being mixed with a curing agent and stored but if stored with the curing agent separately it does age. He also stated that another point is that the curing time of epoxy resin depends very much on the ambient temperature. Under low ambient temperature the curing time is increased considerably; it is actually a very steep curve.

Mr. N.A. POTGIETER (Brits) raised the question as to ageing of epoxy resin and stated that the manufacturers would not give any information and could not give a guarantee.

Mr. H.E. SUMMERS (Bulawayo) said "We have six copper sleeves resin filled joints which are purely mechanical in service, made four years ago, and so far we have experienced no failures. We did use epoxy resin joints but found the percentage of contraction was tremendous and circumferential cracks appeared in the resin. The copper sleeve joint comes from a different country and is epoxy resin with filler something like Kaolin clay."

QUIZMASTER stated that it could be generally said that the 11 kV epoxy resin joint is not looked upon with favour by the Forum.

> QUESTION No. 12: Many advertisements are appearing in which the qualification asked for is B.Sc. Eng. or recognised equivalent qualification Could you please advise what the equivalent is, or what it refers to.

QUIZMASTER stated that there are two sides to the question - the technical and financial side.

Mr. K. ADAMS (Johannesburg) said that there was no answer to the question. The advertisements are usually worded thus to attract an applicant who has served an apprenticeship. Mr. Adams asked if he could give the Engineers the scope of a paper which he was delivering to the Institute of Town Clerks on the subject. The paper is as follows:

"The title of the paper is 'Emolumetrics and Municipal Service' and it is a scientific approach to the question of how to distribute incomes, or wages or salaries, most effectively throughout a group of people. It has no emotional basis at all. It is purely £.s.d. all the way through.

"I show that value is related to inequality.

"Then I treat the inequality of incomes, measuring the inequality on a geometric pattern. A single factor termed the 'income gradient' is used to measure the magnitude of this inequality of distribution of incomes in a group.

"Then I derive a large number of conclusions from considerations of the income gradient, e.g. the shortage of personnel and recruits occur in groups with gradients less than .2 but not where gradients exceed .35.

"The status (this is the second point) of occupational groups is proportion to the square of the income gradient, and (3) the ability of a group to extract money for their services improves considerably as their income gradient increases. I think this ability is proportional to the cube of the income gradient.

"I shall recommend to the Town Clerks that their salaries should be increased substantially by a factor of 3 or four in the larger towns. This will give room for increased salaries for top engineers and allow a reasonable gradient to occur amongst their staff.

"There are a number of unexpected consequences of this move. I won't attempt to explain them - they are covered in the paper.

"Some of these are:

1. that rates would fall rather than rise;
2. transport services could be run at a profit; and
3. the cost of living will fall.

"I do hope that the engineer members will support me."

Mr. G.J. MULLER (Bloemfontein) said that in this life most of us know that if you can't get what you want, you'd better be satisfied with what you can get!

Mr. A.Q. HARVEY (Warmbaths) stated that he thought the equivalent to a B.Sc. was at least five years' apprenticeship service - and qualified.

Mr. G.B. HEUNIS (Standerton) quoted the expression: „Daar syn veel meer mense in die land met geleerheid dan verstand".

Mr. E. de C. PRETORIUS (Potchefstroom) said that in his opinion, there is only one equivalent to B.Sc. Engineering, and this is in Afrikaans - B.Sc. Ingenieurswese.

QUIZMASTER said that in the opinion of the Forum there is no satisfactory equivalent.

> QUESTION No. 3: What is considered to be the best method of metering large buildings such as blocks of offices or flats?

QUIZMASTER asked if there was a best method of metering blocks of flats and offices.

Mr. C. LOMBARD (Germiston) suggested that the best method would be to do the metering on the high tension side of the transformer and reduce system loss.

QUIZMASTER asked if you would be able to charge a higher tariff or a lower tariff.

Mr. C. LOMBARD (Germiston) said provision could be made to have a lower tariff on the high tension side. He pointed out that your system efficiency is judged by the ratio or units sold as compared with units purchased or generated.

Mr. E.E. de VILLIERS (Carletonville) said that there were two methods in use. One where the bulk meter is installed in a building and meters all flats and offices; the other method is separate meters which he thinks are better because of the basic charge.

Mr. P.J. BOTES (Roodepoort) said to avoid individual complaints about high tariffs individual meters should be fitted.

Mr. G.C. THERON (Vanderbijlpark) said he thought the best method was to meter individually on the low tension side; it boosted the statistics.

Mr. P.L. VERGOTTINI (Brakpan) stated that he thought the best way of metering for everybody concerned was on the low tension side.

QUIZMASTER said the Forum favours individual metering on the low tension side.

> QUESTION No. 15: In this district there is a large fruit farm which takes a supply of electricity from ESCOM. This farm has a low tension line 380/220 volt which is a 3-phase, 4 wire feeding one of their buildings on the farm, which line is perfectly straight.
>
> ESCOM have a 6.6 kV line running across the same farm, which line is not parallel to the low tension line, but gradually approaches this L.T. line, and when within 15 feet again turns away, thus (if put on a drawing board would form a large letter K, but with a gap of 15 feet).
>
> I am informed that the farmer is experiencing considerable trouble with punctured pin insulators on poles within two or three spans on either side of what might be termed the root of the K. These punctured insulators appear only on the one phase, that is to say, the one nearest ESCOM line.
>
> I have been unable to ascertain whether or not the ESCOM phase and the farm phase nearest to each other are like or opposing phases.
>
> Strange as it may seem, it can only be concluded that the punctured insulators are caused by induced voltage from the ESCOM line, and stranger still is the fact that these insulators are always punctured on a Sunday.
>
> I have suggested to the farmer that he extend the length of the cross-arm on the side nearest the ESCOM line by about 12 inches to carry an earth wire beyond the troublesome area, which wire is to be well earthed at both ends.
>
> It will be interesting to hear the comments of those members taking part in the Forum discussion on their views as to the reason for the punctured insulators and their suggestions to overcome the difficulty.

Mr. F.J. PRINS (S.A. Bureau of Standards, Pretoria) says that in this case it would appear to be over voltage induced from Escom line as it is an accepted practice to carry out maintenance work on a Sunday and it is possible that switching surges may be more frequent on Sundays

than on any other week day. No earth wire will help as he has to protect the insulators against over voltages and the best way would be to put a 250 volt outdoor lightning arrestor across from the line to the pin and earth it well together with the cross arm, if steel.

Mr. W.H. MILTON (Johannesburg) said the faults were not due to switching operations because very high vault currents are involved and asked for data of the lines. An earth wire would provide means of protection.

Mr. H.E. SUMMERS (Bulawayo) said that there were four possible reasons for this occurance - three electrical and one human.

The electrical reasons can only be due to the lack of conductive, inductive, and electrostatic co-ordination. As far as conductive co-ordination is concerned, that could only occur if there was an earth bond between the two power lines, and also it would have to be quite fortuitous that a fault in that vicinity occurred on the power lines, so I think we can forget that.

Taking the next co-ordination problem, that is of electrostatic coupling, an earth wire in close proximity to the 380 volt line would, from experiments undertaken in Bulawayo, give a screening factor of about .25, which would reduce it normally tremendously; and on the other hand if the 380 volt system was multiple earthed, the neutral would automatically be an earth wire. But as far as electrostatic conduction, even without the neutral being earthed (you have only got the earth at one point, and that can be drained back through the 380 neutrals) you have really got an earth wire there.

But there again this postulation is quite fallacious, because the length of exposure that one could possibly get, - and it is not a complete parallelism, the minimum distance, from memory of 15 feet - and cannot be very great, and therefore the mutual reactance must be quite low - that is quite certain, because nobody has ever heard of a 380 volt power line 2 miles long - I hope!

The third factor is due to electro-magnetic coupling with an earth wire earthed at two points, would give a screening factor of .25 to .3 depending on the value of the terminal earth, and there again we cannot postulate because the length of exposure must be too small to cause any damage.

Therefore, in my opinion, there is no electrical reason for this thing occurring.

The thing can quite easily be investigated using Carson's formula if the full parameters are known to us. But as a practical demonstration of the way I am eliminating the possibility of certain electrostatic and electromagnetic co-ordination, is because in Bulawayo where I have done a lot of work on this subject, I have pilot wires on ordinary telephone insulators actually mounted on an 88 kV power line 15 miles long, with designed fault level of 2500 MVA at 88, which is about 16 kiloamps and I have never lost an insulator yet, and they are telephone insulators.

There we have obviously got uniform exposure, throughout the length of 15 miles and the distance is only 8 feet. Well, sir, if I can get away with that, I don't see how you can possibly get any trouble due to induction between the 6.6 kV line and possibly with a fault level of about 8 kV - and with a minimum distance of 15 feet and then going out to infinity.

So my conclusion is that electrically, until such time as we have the correct parameters, there is no electrical reason for this occurring, but I think it is rather significant that it occurs on Sunday, and I can only suggest that it is that certain people are going round with catapults.

Mr. E. de C. PRETORIUS (Potchefstroom) said that the faults can be attributed to fifth harmonics - i.e. that in a lightly loaded transmission line with a number of transformers connected to it the voltage can contain very high values of harmonics, and that is the crux of the problem.

Mr. W.H. MILTON (Johannesburg) said he would like to draw the members' attention to the fact that the occurance is very similar to the conditions which must be avoided in line crossings. Although exposures are brief trouble can arise in that locality.

QUIZMASTER said that if possible a solution must be found and that he thought a wealth of information had come forward and that the question was disposed of.

> QUESTION No. 24: Owing to the difficulty experienced in obtaining satisfactory earths in rocky terrain, we are, by way of an experiment, supplying builders with sufficient scrap copper wire to put under foundations of buildings and some of the results obtained, though not entirely satisfactory are better than expected. For example:
>
> (a) 50 ft. Single 19/16 between concrete and decomposed yellow shale after 2 months dry weather returned 3 Ohms (Three Ohms).
>
> (b) 250 ft. Single 1/8 between concrete and sandy base returned .45 Ohms (Point four five Ohms).
>
> (c) 160 ft. Single 1/8 between concrete and compact river silt very dry returned 1 Ohms (One Ohms).
>
> I would be pleased to learn from delegates attending the Forum whether they have any experience with this form of earthing, and size of earth wire used, nature of ground and Ohmic resistance of the contact between the wire and general mass of earth.

Mr. F. STEVENS (Ladysmith) said that his Department had been conducting such tests with copper wire and to date their records indicate that the foundation earths, varying in length from 50 to 300 feet have average values varying from 1 Ohm to 4 Ohms. The resistance tends to drop from time to time and vary slightly with the season - wet and dry. He also stated that during the last few months they had been subjecting them to phase loop impedance tests for the following two reasons - Firstly 3 meg. earth test

sets (two new) do not record the same. This made us doubtful about the actual value of earths. Secondly, it is realised that under fault conditions, values of earth connections could change, and do.

QUIZMASTER asked if anyone had carried out similar experiments.

Mr. F.J. PRINS (S.A. Bureau of Standards) said that Dr. Boyce of the G.P.O. had done a bit of work in connection with high resistance and in very rocky soil the only solution is to go to a counterpoise.

QUIZMASTER said the question had been disposed of.

> QUESTION No. 7: Concentric cables with aluminium conductors (SOLIDAL) are extensively used in Europe but have received little attention in South Africa in spite of considerable savings on first cost. Is this due to users' conservatism, manufacturing problems or difficulties with raw materials?

Mr. G.C. THERON (Vanderbijlpark) said the question refers to the use, for township reticulation, of underground cables with aluminium conductors, and concentric neutrals generally known as Solidal cable, which has apparently economic advantages. Why is this type of cable not used more generally in South Africa?

We know of only one large undertaking using this type of cable. This problem where we are about to commence on the reticulation of a new township over some 1,200 erven has been troubling us for some time.

The P.M.E. system of bonding all earths metal requiring earthing to the neutral conductor, and earthing the neutral conductor at a number of points, on an overhead line reticulation system in order to save separate earth conductor has been generally accepted and is extensively used.

No new principle is therefore included by adopting a similar system of an underground cable. In all P.M.E. systems, both overhead and underground, the danger of a broken neutral conductor always exists, and this is countered by earthing the neutral at a number of points on the system and providing inter-connections between lines. The same precautions can be taken with cables.

Corrosion of the aluminium conductors in the presence of moisture, which may enter through a damaged p.v.c. sheath is a serious possibility but can hardly be more serious than the breaking of an overhead neutral conductor or poor joint.

It is difficult to see why there should be a general reluctance to use this type of cable provided these possibilities and dangers are recognised and suitable precautions taken to meet them.

The failure of aluminium sheaths on cables of various types and under different installation conditions in South Africa is not unknown, but there are also in other countries numerous installations operating with apparent success. Practically all the p.v.c. used in this country is obtained from one supplier and a 20% import duty is imposed on imported p.v.c. compound. Furthermore, the need in this country for specially formulated p.v.c. compound is relatively small when compared with countries overseas and there are therefore economic grounds for using standard grades of p.v.c. which is not as tough as some of the p.v.c. sheaths from the U.S.A.

Are these perhaps underlying reasons for the great emphasis placed on the corrosion dangers and the reluctance to use this cable in South Africa?

I consider that conservatism generally and the type of p.v.c. normally available in this country, are the main reasons why solidal cable, with its capital savings, is not more generally used and encouraged, and that there are no technical manufacturing problems. The proof of the pudding is in the eating, and we are now testing the market for this type of cable and will decide the issue after considering all the cable manufacturers.

Mr. W.L. RANDELL (Vereeniging) stated that he was not technical to any degree at all and read a note sent to him from the United Kingdom which said:

> "The prime reason for our lack of enthusiasm for concentric neutral in aluminium is its vulnerability to damage by corrosion in the event of damage to the outer sheath. This vulnerability is in no way reduced by the use of chromate tapes, although the damage may be retarded to some extent, and it is the view of engineers in the United Kingdom that this type of cable is not really suitable for use in underground situations, although there may be some economic advantages from its use above ground where there is no corrosion hazard. It is possible that some engineers might find the risk more acceptable in systems using protective multiple earthing, in which case damage to the neutral conductor would result in lower voltages on the user's side of the fault, but in this case, the voltage would also appear on all earth bonded metal work due to the earthing of a neutral at consumer's intake point. We understand that because of this risk certain designs of aluminium sheathed paper cables have been banned for use in Germany when the sheath was being used as the neutral conductor, and therefore were operating under conditions similar to those which would apply where solidal cables are used. With regard to the use of chromate tapes for preventing corrosion we regard this as a palliative and not a cure. At best they only delay the appearance of the fault, as sooner or later, the neutral will be damaged to the point of failure unless the faulty sheath can be detected and repaired. It might also be borne in mind that in the event of sheath damage permitting moisture to enter the cable badly impregnated chromate tape could accelerate the corrosion. Manufacture of solidal cable would not present any difficulty except so far as the use of flat wires for the neutral is concerned. We feel

these flat wires to be unnecessary and prefer to use an appropriate arrangement for round wires. We hope that the above will explain our viewpoint regarding the use of solidal cables, and also our reason for preferring a normal four core cable having a fully insulated neutral core. We would stress that we have no objection whatsoever to the use of shaped solidal aluminium conductors as such in the more conventional constructions".

Mr. E.B. MARTIN (Johannesburg) said that as far as solidal cable is concerned there are five features which are fairly uncommon and the relatively slow progress being made in the use of this cable could be due to any one of these features. Firstly the aluminium cores; secondly the fact that the cores are solid; thirdly the fact that the neutral and armour is being combined; fourthly there is plastic insulation in the cable; and fifthly the use of concentric neutral necessitates the use of multiple earthing.

He said that in his opinion the corrosion bogey is exaggerated and is certainly not as severe as the possibility of danger on a P.M.E. system due to a faulty or dry joint in the neutral.

QUIZMASTER said that the Forum found it difficult to say why the development has not taken place except for users' conservatism.

QUESTION No. 16: When calling for tenders for transformers one is usually faced with the offers of transformers having different losses. Should one always capitalise the transformer losses and to what extent?

Mr. F.J. PRINS (S.A. Bureau of Standards) stated that it would appear that there is not much benefit derived from capitalisation. At present the S.A.B.S. was preparing a specification on mains transformers.

Mr. K.A.H. ADMAS (Johannesburg) stated that there is one point that not many people are aware of, and that is when losses are valued highly (the iron losses and copper losses), the designer tends to reduce his flux density and also reduce the current density in the windings, and it works out that for a little bit of extra money you get quite a lot of increased capacity; and that is valuable. I should imagine people should be able to make use of that value in overload ratings.

Mr. W.H. MILTON (Johannesburg) said that as far as Escom is concerned, we invariably take into account the value of losses. From the point of view that, as Mr. Adams has already stated, we do get a range of prices, and in some cases one tenderer will offer more than one price, his price varying with the losses, in respect of the particular offer.

In fairness to tenderers, however, it is very necessary that the formula to be used in the evaluation of losses when dealing with tenders should be expressly given in the enquiry document.

If that is done, then your tenderer knows whether it is worth his while to put forward an expensive transformer, if the losses are high, or whether it is likely that a cheaper transformer with higher losses is better from the purchaser's point of view.

Granted, we cannot justifiably argue that in capitalisation of losses, if you take it on the basis of present worth that those transformer costs, which you are using in your formula are likely to remain for 25 years is valid, (I think that is a fault; one can't regard them as valid, but nevertheless...) in fairness to the tenderer one must adopt some form of basis for the adjudication of the value of tenders. That is on that basis, quite apart from technical quality - which is another consideration. But it is essential that one should take into account the value of transformer losses when dealing with the assessment of the value of the tenders.

Mr. E. de C. PRETORIUS (Potchefstroom) said, „Ek dink kapitalisering van transformator verliese vir transformators onder 'n duisend kV is heeltemal onrealisties op die gronde wat Mnr. Prins daar genoem het. In Potchefstroom as ons vir tenders vra vir transformators, dan het ons heelparty goeie ontwerpe nagegaan en ons het daaruit geneem die verliese - koper en yster - en as ons nou spesifikasies optrek vir transformators sê ons, 'duisend verliese, tender daarop'."

Mr. L. LEWIS (Windhoek) said that there were many other forms of equipment where losses played an important part and that there is no real reason why a transformer should not be considered.

QUIZMASTER said that he thought it could fairly be said that transformers should be evaluated on a basis of loss calculation.

THE QUIZMASTER: I thank you very much indeed for your attendance, and for the valuable contributions you have made to the discussion.

Mr. A.Q. HARVEY (Warmbaths): I would like to propose a vote of thanks to the Quizmaster for the excellent way he conducted the meeting tonight. (Applause).

THE PRESIDENT: Mr. Quizmaster, I think we have had a really excellent evening, and I would like to say to you, "Thank you very much indeed for the magnificent job which you have done."

THIRD DAY

THE PRESIDENT: Will you take your seats please gentlemen? I wish you all good morning. I hope you all had a pleasant evening after your afternoon yesterday and some of you at least came back from one of the trips suitably refreshed!

(CONVENTION ANNOUNCEMENTS WERE MADE)

THE PRESIDENT: Ladies and gentlemen, the first item on our Agenda is Communications from Council, and under this I would like to deal, very quickly I hope, with Councillor Ferry's problem yesterday on the question of Provincial Representation as far as the Executive is concerned.

I must apologise to Clr. Ferry that it was not dealt with yesterday, but we will do it now. I will just read the portion of the Constitution dealing with this. It is Section 14 of the Executive Council. It says:-

"The following shall be members of the Executive Council of the Association:

1. The President
2. The Vice President
3. The two Past Presidents
4. The Chairman for the time being of the duly constituted regional branches
5. Six Engineer Members, other than those already mentioned, who shall be elected annually by the Convention
6. The ten Councillor Representatives of the Undertakings whose Engineer Members are members of the Executive Council in terms of the foregoing".

And then Sub-article 2.

"The Engineer Members referred to in 5 of subclause 1" (those are the six Engineer Members elected by the Convention) "shall be elected to give effect to the following rule, viz. that in respect of each of the territories listed hereunder, there shall serve on the Executive Council at least one councillor representative and one engineer member representing a member undertaking, or undertakings situated in such territory".

Then they list the various provinces, and so on.

Now, my interpretation of that is that the six members elected are elected to give effect to Provincial representation over the whole Council.

In other words, if the President, for instance, represents the Free State, it is not necessary to elect one of the six additional members to represent the Free State.

That is my interpretation which is quite the opposite of Councillor Ferry's.

If anybody is unhappy about that, your Executive suggests that we should take Counsel's opinion on the matter and circularise the results as soon as we get it.

(The Convention agreed to take Counsel's opinion and to circularise the result).

Now we have another two items from Executive Council. Proposed amendments to the Constitution. I think I will ask Mr. Kane to speak on this.

Mr. R.W. KANE (Johannesburg): Mr. President, and gentlemen: There are three suggested amendments to the Constitution, two of which were formerly the subject of a report last December, and the third one was merely discussed yesterday afternoon. Seeing that we are being very constitutionally correct at this Convention, I will explain what the amendments (in brief) are intended to mean, but I think we have got to get the approval of this Convention to put them on the Agenda, and discuss them.

First of all, some time last year a request was made by an associate member of long standing to be given retired membership. We think he meant by that, after some 36 years' service, he would be permitted to become a member without paying any fees. At present he pays something like R4.20 per annum.

The second thing was a little bit of confusion over an honorary member who also represented a supply undertaking, and he, in turn, because he wanted his supply undertaking to be a member of this Association, sought associate membership in addition to his honorary membership, and we thought that to prevent that sort of thing happening we would make a necessary amendment.

The proposal is, really, for the first two items that we should, first of all in connection with Retired Membership add an additional item: "Where an engineer member or an associate retires on superannuation and is in good standing, and has been a member of this Association for not less than 20 years, he may apply for retired membership".

This really means he continues as a member without paying.

The other item, the question of other undertakings for many years we have had this under the Constitution, that the engineer in charge of another undertaking (not a local authority undertaking) could become a member.

We don't know why, but Escom as such has never become a member, or any other of their undertakings has become a member - that is not the main reason for changing the Constitution, but we want to change the Constitution to permit an associate undertaking to join, and rather than saying "the engineer in charge" merely say "an authorised electricity undertaking shall become an associate member." That associate member, as such, will pay us R21. per annum, nothing else.

The third item arose from the question of office bearers - the security of the future President.

There seemed to be some possibility that we might have a repeat next near of what happened last Tuesday morning as far as the President's chair is concerned, and yesterday in Executive it was agreed that where, throughout the Constitution we refer to "Vice President" we will change that to "President Elect". In other words, once a man has taken the position of Vice President, under the present constitution, he is sure, subject to illness, other misdeeds, and things like that, he will become President the following year.

First of all I would like to seek your approval to put these items on the Agenda. I think I am correct in asking that Mr. President.

(The Convention approved putting these items on the Agenda).

Do you want the Amendments in detail?

(The Amendments were not required in detail by Convention, but were accepted in principle for the three items).

Mr. R.W. KANE (Johannesburg): You accept in principle those three items:

(1) Retired Membership;

(2) Associate Undertakings; and

(3) Changing the existing title of "Vice President" to "President Elect".

(The Convention agreed).

There is just one other point, I think if you will approve that the amendment to the Constitution that refers to Retired Membership - we would appreciate this taking place from the 1st March, 1964.

(This was agreed).

THE PRESIDENT: Thank you Mr. Kane. Is that unanimous gentlemen, that we put this on the Agenda for discussion tomorrow morning?

THE SECRETARY: Mr. President, the meeting has agreed to it, so there is no need to discuss it.

THE PRESIDENT: Have you all agreed to it? (Agreed). That's amazing!

(Alterations to the Constitution will be found on the last page of the Proceedings Section.)

Well, gentlemen, we are making very good progress this morning. I think we had better keep up the good work. The next item is the Annual Report of the Secretaries, and first of all I would like to ask Mr. Ewing whether he has anything to add to the Annual Report.

THE SECRETARY: Mr. President, gentlemen: I would just like to draw your attention to one printer's error (it occurs twice), the year "1965" has crept in instead of "1964" in the Balance Sheet against "Payments in Advance in respect of Convention R221.97". That should be "1964" and not "1965".

On the other side, "Hotel and Air Deposits received in Advance" "1965" should of course read "1964". The amount in question is R7,096.00

THE PRESIDENT: Thank you Mr. Ewing.

I think Mr. Muller of Bloemfontein would like to speak on the Annual Reports.

Mr. G.J. MULLER (Bloemfontein): Mr. President, ladies and gentlemen: I have been asked to propose the adoption of the Annual Report and Accounts, and knowing Mr. Ewing as I do, I would be quite prepared to do so without more ado.

I feel, however, that I owe it to the members and the secretaries, to show that I have tried to read the subject matter intelligently, although I must admit that I understand a heat balance sheet somewhat better than a financial balance sheet.

With this in view, I would like to offer the following comments:-

Mr. President, the Secretary has just corrected something that I had noticed. I thought that it was rather enterprising on the part of members to put down deposits for 1965, but seeing that it has now become 1964, the comments under that heading fall away.

It would also appear that the large balance on the daily banking account would probably be absorbed by now, and therefore my comments under that heading would fall away.

Nevertheless, it would still appear that after the deduction of R7,000 there is still a matter of R1,200 on daily account, which I presume is probably required, although it is rather higher, for the current expenses of this Convention.

Deducting the deposits, our estate is reduced from R9,899 in 1963 to R8,371 in 1964.

On the other hand, available funds, i.e. investments and bank balance have gone up from R7,491 to R8,025. Outstanding debts have been reduced from R2,114 to R30. And the loss of R1,890 on the previous year has been turned into a profit of R41 in 1964.

It is therefore quite clear to me, Mr. President, that our Finance Committee and the Secretaries have put in most useful work on behalf of the Association, for which we, as members, are duly grateful.

Die Sekretarisse Verslag is, soos gewoonlik, redelik kort en saaklik, maar dek nie te min die werk van die jaar ten volle.

In die Verslag noem hy ook pogings om te bespaar op een van die vereniging se grootste indiwiduele onkostes, naamlik ons drukwerk. Met die oog dus op wat reeds oor finansiele aspekte gesê is, en die verwagting van verdere goeie werk, weerspieel in die verslag, gee dit my die vrymoedigheid en 'n besondere genoeë om voor te stel dat die verslag en rekeninge soos ter tafel gelê met waardering aanvaar word.

Dankie Mnr. die President.

DIE PRESIDENT: Baie dankie, Mnr. Muller.

The seconder to the proposal will be Councillor R. Brown.

Councillor R. BROWN (Livingstone): Mnr. die President, dames en here ... I think for the benefit of everyone, including myself, I'll switch back to English!

Mr. President, ladies and gentlemen: I think that perhaps the most important aspect of the financial report is the fact that last year we showed a deficit of R1,890. and this year we have a profit of R40.79. I don't know where Mr. Kane got the 79 cents from, but perhaps it is his contribution to the Association this year!

There isn't anything else to say which the Secretaries haven't covered, and Mr. Muller has covered, but I would like to mention the fact that the convenor of the Finance Committee, Mr. Kane, has now finished his term and will no longer be a convenor as such. He has, for a number of years, I think everybody will accept, put a lot of work into it conscientiously, which has been to the benefit of the Association, and I would like it recorded and the Association's thanks ... (Applause).

Since he tries to claim some affinity, however slight, to the Scottish race, I think I would like to tell a little story before I finish my seconding of the proposal.

An African went into a butcher's shop one day and asked to buy a pound of brains, and the butcher said, "Certainly, what kind of brains would you like? Sheep's brains?" So the African said, "No, I'd like some human brains".

The butcher said, "Well, we could supply that too. What kind of brains would you like? I've got English brains at 1/6d a lb; Irish brains at 5/6d and Welsh brains at 12/6d". So the African, being quite an astute fellow, said "No, I'd like some Scotch brains." The butcher said, "Well, they're very expensive." The African said, "Well, how much are they?" and he replied "£2.10. a lb."

"£2.10. a lb - why is that?" said the African, so the butcher replied, "Well, look how many Scotchmen we have got to shoot to get a pound of brains!" (Laughter).

Mr. President, it gives me great pleasure to second the adoption of the Accounts. Thank you.

THE PRESIDENT: Thank you Clr. Brown - and also for that rank bit of libel!

We will now throw open the Annual Reports for general discussion. Is there anyone who would like to speak on them?

Mr. E. de C. PRETORIUS (Potchefstroom): Mnr. die President: Dit is met huiwering dat ek die volgende saak gaan aanroer want dit gaan oor die die gebruik, of sal ek liewers sê, misbruik van die Afrikaanse taal. Maar ek dink die denke van die meerderheid van die teenwoordig is sodanig volwasse dat ek nie van politiekery verdink sal word nie. Ek verwys na die verslag van die Sekretarisse. Daar is heelwat Afrikaanse taalfoute wat baie steurend is en ek dink dit moet gekorrigeer word voordat die verslag opgeneem word in ons verrigtinge. Ek sal nie almal hier noem nie, maar net die paar ergstes aandui. Hier word gepraat van „lesings" terwyl referate bedoel word.

Bladsy 31.

Mnr. J.P.J. de Jager B.Sc. (Engineering) i.p.v. die korrekte B.Sc. (Ingenieurswese).

Bladsy 34.

„Ledeforum" is een woord.

Bladsy 35:

„Medelede - G.J. Honiball - (dit is iets vreesliks hierdie) - „Dorp Elektriese Ingenieur".

Bladsy 36:

„Halfjaarlikse Uitvoerende Vergadering" - ek het nog nooit van soiets gehoor nie, meneer die President.

En dan wys ek net op een ander fout - dit is heelwaarskynlik net 'n glips hierdie - (want ek voel mnr. die Voorsitter, die verrigtinge moet korrek wees): Dr. R.L. Straszacker, Voorsitter van Elektrisiteitsbeheerraad. Hy is Voorsitter van die Elektrisiteitvoorsieningskommissie.

Dankie, meneer die Voorsitter.

DIE PRESIDENT:: Dankie Mnr. Pretorius. U is heeltemal reg. Ek is baie jammer vir daardie foute.

I take it, gentlemen, that the Annual Report is now accepted, and we will proceed to the next item, which is the appointment of Auditors.

Are you agreeable that our present auditors, Messrs. Savoury, Brink, Creamer and Company be re-appointed?

(This was Agreed).

The next item is the discussion of reports on sub-committees and representatives. These reports have been circulated. Does any convenor of a committee wish to add anything to his report?

If not, I think we will take the reports one at a time, if anybody would like to discuss them. The first report is the Electrical Wiremen's Registration Board. Are there any comments on that?

Mr. P. GILES (East London): Mr. President, I move the adoption of the Electrical Wiremen's Registration Board Annual Report by Mr. Kane, and offer him our congratulations on an excellent report.

Mr. J.J. GROENEWALD (Department of Labour): Mr. President, may I be permitted a few words at this stage?

Mr. Kane, having delivered his final report as your representative on the Wiremen's Board, I feel that I should pay tribute to the very valuable services rendered by Mr. Kane over so long a period, a period during which Mr. Kane not only distinguished himself through his wise and mature approach to the problems that had to be faced, but also in doing justice to the representation of this Association in particular, and to suppliers in general.

Mr. President, it must give Mr. Kane some satisfaction to know that his retirement co-incides with what one might call a "rounding-off" of the Wiremen's Act after some 24 years.

As you all know with the recent amendments and ministerial determination, the compulsory registration of contractors is now an accomplished fact, and by the end of this year Sections 19 and 20 of the Act will apply to the Republic, as a whole.

In achieving this, Mr. Kane played no mean rôle. Mr. President, on behalf of the Wiremen's Board, and the Department of Labour, I wish to thank Mr. Kane for his valuable services, and to wish him happiness in his pending retirement.

Mr. President, I would also like to express the Board's pleasure in having Mr. Chris Lombard as your new representative on the Board, and I hope that his association with the Board will be both fruitful and pleasant. (Applause).

THE PRESIDENT: Thank you Mr. Groenewald; your remarks are very much appreciated.

(THE REPORT WAS ADOPTED).

THE PRESIDENT: The next one is the South African Bureau of Standards.

Councillor G.E. FERRY (Cape Town): On page 39, Mr. President, "Safety Specifications". "... the Draft Notice for Promulgation of the ten safety specifications concerned is now with the Department of Commerce and Industries ... "

What safety specifications are those Mr. Chairman? I feel elucidation should be made.

THE PRESIDENT: Thank you Mr. Ferry.

Would the Convenor like to reply to that?

Mr. C. LOMBARD (Germiston): Mr. President, I am afraid I haven't got the list of specifications with me here, but these safety specifications cover portable appliances, and flexible cords, plugs, and so on. If the delegate would like to have further details, I will be only too pleased to furnish him with these details after the meeting.

Mr. President, just to round off my report, I would like to mention that another committee which is not mentioned here has been constituted, and that is the Committee to draft a Safety Specification for Domestic Refrigerators. Mr. Heunis of Standerton is our representative, and one meeting of this committee has so far been held.

Another announcement that I would like to make, although perhaps most of the members here are already aware of it, is that the Safety Specifications mentioned before have now been promulgated in the Government Gazette of 1st May, 1964, and that this will come into effect within 12 months from the date of promulgation.

I think I should mention here, Mr. President, that Mr. Johan van der Walt, (who is sitting right next to me here) first raised that matter in Bulawayo in 1952, and although it took 12 years before we got thus far, I think it has been worth it. I think at this stage we can also express our thanks to Mr. van der Walt for mooting this idea so many years ago. (Applause).

THE PRESIDENT: Thank you Mr. Lombard. It is very gratifying to know that we do get results, although it does take time.

Mr. F.J. PRINS (S.A. Bureau of Standards): Mr. President, I'm afraid I have to dampen your spirits a bit!

Although the notice appeared in the Gazette on the 1st May, the Government Printer unfortunately slipped up and did not include the actual 12 documents concerned, so that notice apparently is not legal and the whole thing is being withdrawn, and a complete new notice, it is hoped, will be gazetted before the end of this month.

THE PRESIDENT: Thank you Mr. Prins. Of course, things were going too easily!

I would just like to mention for the benefit of the councillors from Durban, that Mr. van der Walt, in 1952, was a Town Electrical Engineer and not a Town Clerk.

Mr. C. LOMBARD (Germiston): I'm sorry I have to get up on my feet again, Mr. President, but there is a correction I have to make. Mr. van der Walt did not moot the promulgation of these safety specifications; he made the proposal at this particular convention I mentioned in Bulawayo in 1952.

I have the list of safety specifications here now. I don't know whether you would like me to read them out to you.

THE PRESIDENT: Mr. Lombard, the members can get the Gazette should they require it.

Mr. C. LOMBARD (Germiston): Yes, I don't want to take up too much of your time, Mr. President.

THE PRESIDENT: Is there anything further on this item?

Mr. J. DOWNEY (Springs): Mr. President, I think we should congratulate and thank Mr. Lombard for his very fine report on the contents of the Bureau of Standards activities.

As you know, I was the A.M.E.U. representative for many years on this particular job, and it occupies quite a lot of time, and he has now produced a complete comprehensive report after many years of work showing who the representatives are for each particular committee and I think we should afford him a hearty vote of thanks for his efforts on our behalf. (Applause).

(THE REPORT WAS ADOPTED).

THE PRESIDENT: Thank you Mr. Downey.

The next committee to be dealt with is the Wiring Regulations Committee. Would the representative like to speak? If not - would somebody else like to do so?

Mr. J. DOWNEY (Springs): As the representative, Mr. President ... Unfortunately I was away when the last meeting took place. I understand one meeting has taken place. Perhaps Mr. Kane can give you some information as to what happened.

Mr. R.W. KANE (Johannesburg): Mr. President, and gentlemen: May I first of all reply in Mr. Brown's form of English?

There was a meeting this year of the Wiring Regulations Committee. The meeting that did take place was purely to discuss estimated loads and one or two little items that were outstanding, and really there is no really important progress of any description to announce.

While I am on my feet, I would like to thank Mr. Brown and Mr. Groenewald for their rather touching remarks. I only want to say that I think I got my reward in the very interesting work which took place throughout the last nine years.

Thank you.

THE PRESIDENT: Thank you Mr. Kane. The report is open for discussion, gentlemen.

Mr. C. LOMBARD (Germiston): Meneer die President, dames en here: Soos u weet is dit natuurlik Mnr. Downey se laaste jaar, die afgelope jaar as verteenwoordiger van hierdie vereniging op die komittee vir Bedradings Regulasies, en ek wil graag van hierdie geleentheid gebruik maak om hom namens die vereeniging baie hartlik te bedank vir die uitstekende werk wat hy gedoen het in die afgelope jare. Dankie.

DIE PRESIDENT: Baie dankie Mnr. Lombard.

Are there any further speakers on this Committee?

(THE REPORT WAS ADOPTED).

THE PRESIDENT: The following Committee is the Recommendations Committee for New Electrical Commodities.

You have seen the report gentlemen. Would anybody like to speak on this?

(THE REPORT WAS ADOPTED).

Thank you Mr. Lombard for the report.

The next one is the Rights of Supply, Industrial Consumers. You will notice that there have been no meetings so presumably Mr. Lombard has nothing to add.

(THE REPORT WAS ADOPTED).

The next one is the S.A. National Committee of International Electro-Technical Commission - Mr. Hugo Pretoria. We have no report on it. Presumably nothing has happened during the year to warrant a report.

The next one is the World Power Conference. Apparently nothing much is happening there either, gentlemen.

That concludes the reports of the Committees. Gentlemen, we have heard from various speakers on the amount of work involved in the majority of these committees, and it is very considerable. Some of them meet more than once a month and our representatives put in a tremendous amount of their own time on them, and at the end of this item I would like you to signify your approval acclamation of all the good work done during the year by those representatives. (Applause).

We have fifteen minutes before tea, and, if you are agreeable, I would like to continue the discussion on Mr. Hobbs' paper.

Mr. Hobbs would you come up to the platform please.

Mr. J.L. INGLIS (Pietersburg): Mr. President, first of all, I would like to add my congratulations to the author on his very excellent contribution to the records of our Association.

I would like to ask: does the author consider that the disturbances and outages due to the natural element on an overhead system of distribution to be greater than that caused by the Town Engineer's Department on underground cable systems? And has he considered the financial implications of these two major causes of disruption to supply?

I have found - and I am sure it is the experience of many other electrical engineers - that the town engineer's department is one of our greatest hazards, and can, in fact, be classed as far as electrical engineers and underground cable systems are concerned, as public enemy number one!

Referring to costs of excavations, I would like to congratulate Virginia on having ground suitable for excavation by mechanical means. We in Pietersburg, however, a town built on very solid foundations, find that the cost of excavations where mechanical breakers and blasting must

be resorted to, is almost prohibitive, and cable systems for economic reasons, can be used only for extra high tension and in the business centre.

THE PRESIDENT: Thank you Mr. Inglis. If Mr. Hobbs answers that, perhaps he can supply some statistics showing the difference, if any, between a town which has a separate town engineer and electrical engineer, and a town and electrical engineer in one person; it might be illuminating.

Mr. G.C. THERON (Vanderbijlpark): Ek wil graag die skrywer bedank vir en gelukwens met 'n baie aktuele en omvattende referaat was op meesterlike wyse saamgevat is. Dit bewys dat die skrywer 'n praktiese persoon is wat sy onderwerp ken.

In die paragraaf Algemene Oorwegings (General Considerations) maak die skrywer die stelling dat „die koste van 'n ondergrondse stelsel gewoonlik duurder is as in die geval van 'n gelykwaardige bogrondse netwerk." Dit is 'n beitjie gewaag om van koste te praat sonder om die term te omskrywe. Koste vir die doel om vergelykings te tref tussen verskillende projekte moet insluit:-

(a) Kapitale uitgawe om die bate daar te stel vir die lewering van die gevraagde diens;
(b) Bedryfsuitgawe om die diens te lewer;
(c) Onderhoudsuitgawe om die bate op standaard te hou;
(d) Hernuwingskostes;

en dan al die ander faktore soos deur die skrywer genoem.

Die ekonomie bly na alles nog die belangrikste aspek vir oorweging maar kan alleenlik deurslaggewend wees indien die prentjie in sy geheel gesien word.

Die lang lewe van kabels (30 tot 40 jaar), die swaarder elektriese belastings wat die moderne verbruikers op die netwerk plaas en die vinnige beplande ontwikkeling in nuwe woonbuurtes is almal faktore wat vandag saamwerk om die skaal stadig maar seker in die guns van ondergrondse benettings te swaai. Die vervanging van honderde gloeilampies en verbruikers-sekerings nadat 'n donderstorm oor 'n middelmatige dorp met bogrondse lyne getrek het, is niks buitengewoons nie maar is iets heeltemal onbekend met 'n ondergrondse sisteem. Die gebruik van moderne grondstowwe soos plastiek en aluminium in die vervaardiging van kabels en die vereenvoudiging van ons benetting-stelsels is almal faktore wat kan help om die kapitaal kostes laag te hou en nog glad nie ten volle ontwikkel is nie.

Ek is dus die mening toegedaan dat indien alle faktore met 'n finansiële strekking in aanmerking geneem word en moderne praktyke toegepas word, die gebruik van ondergrondse kabels vir die voorsiening van elektrisiteit in 'n moderne en ontwikkelende stad heeltemal geregverdig is.

Die skrywer hoef dus nie „konstruksie en onderhoudsuitgawes" met huiwering onder aan sy lys vir motivering te plaas nie, maar kan dit heel hoog opstoot.

Mnr. J.M. GERICKE (Klerksdorp): Mr. President, there is one question I would like to put to Mr. Hobbs - do cables deteriorate due to repeated pressure tests?

As we know, these cables are tested in the factory once and a second time when they are commissioned. It is possible that a section of cable between two sub-stations might be tested a further two or three times after faulting, making a total of five tests over a number of years; will the insulation be affected due to these repeated tests and is it possible that the life of the cable might be shortened thereby?

Mnr. P.J. BOTES (Roodepoort): Mnr. die President, ek wil graag Mnr. Hobbs bedank vir 'n baie interessante referaat wat hy gelewer het; Roodepoort is nie 'n ou dorp, soos wat ons onder in die Kaap kry nie, maar in elektrisiteitsleeftyd gemeet is hy taamlik oud, en ons het baie ou kabels wat daar geinstalleer is.

Dit was vir my interessant om van die tipe van fout-vind apparaat wat hy daar beskryf het te lees. Ek wil net graag hierdie staaltjie vertel naamlik dat toe ek begin het as Assistent op Roodepoort, het ek, toe ons die eerste kabelfout kry, aan die Voorman gevra „En nou, wat se apparaat het ons om die fout op te spoor?" Toe sê hy vir my: "Well, there is only one real good test, and that is the cut-and-test method."

So I asked him "What does that mean?" He explained that you take a length of cable, and find almost the middle point of the length of cable, after excavation, cut it there, clear the ends and test both ways. If the fault is at the other side you repeat the performance again. So I said to him: "Why all this - I mean you must have some testing apparatus?" He said "Yes, we have them, but there is one thing: we haven't got the length of the cable or the route." That sort of thing does happen.

Mnr. die President, ek het toe later aan in die Argiewe daar deurgegaan waar ek so 'n klein boekie gekry van een van die vroe ere Elektrotegniese ingenieurs. Op 'n spesifike kabelroete het hy dit gesê: "Joint. Six feet from Joe's gate."

Mnr. die President, ons het nie geweet wie is „Joe" nie. Ons het probeer uitvind, en ons het omtrent 8 of 9 Joe's in daardie straat gekry. Dit is nie probleme wat ons daar ondervind het. Sedertdien, en ek moet sê as gevolg van hierdie "cut and test" method, het ons doeltreffende rekords daar gestel van die kabels roetes. Daar is ook die probleem, in Roodepoort soos u weet, het ons daardie Randjies aan die noordekant waar nuwe luukse dorpsgebiede uitgelê word. Die strate daar kronkel, en jy kan nie 'n bogrondse lyn daar opreg nie - Kabel - goed 'n mens kan nou wel kabels daar installeer maar dit is taamlike groot standplase en dit is soliede rots, meneer die President, jy moet daar blaas en skiet en soos ek gister gehoor het word die leeftyd van 'n kabel tenminste word die vrag wat 'n kabel kan dra beperk wanneer dit in sand gelê word, ek praat onder korreksie, ek dink dit is soos dit geinterpreteer het. Nou daar is sekere lengtes daar van maklik 50-60 voet wat klein seksie is, wat soliede rots is waar jy natuur-

lik moet sandbeddings gooi en die kabel daarin lê. Ek wil net graag hierdie punt beklemtoon dat dit eintlik onmoontlik is om bogronds daar te stel.

Mnr. Theron het ook gepraat van die lampe wat vervang moet word. Wel, in Roodepoort het ons 'n bogrondse sisteem geplaas en as dit kabel moes gewees het sou dit alleen teen 'n fantastiese koste kan geskiet en omdat ons in een van die kwaaiste weerlig areas is kan ek u verseker dat as daar 'n stormpie afkom, dan is amper die hele Roodepoort donker, en ek beny hierdie nuwe dorpe wat feitlik alles ondergronds het.

Dankie mnr. die Voorsitter.

THE PRESIDENT: Dankie, Mnr. Botes. I think you put up a very good case for an increase in salary!

Councillor G.E. FERRY (Cape Town): Mr. President, I think the question was whether the testing of cables would weaken the cable.

It is about time, if I might say so, that the technical people should know exactly what they want. When a matter of this description is brought up you get various opinions, but you never get any opinion given as to the desirability against the economics of the scheme.

To my way of thinking, as a non-technical man, when you purchase a cable, or any other requirement, whether it is electricity or any other department of a local authority, you buy to specification, and before purchasing the particular article you make yourself aware of the performance test of that particular article, and by your experience, which is only gained over a period of years, (a lesson to the younger members and engineers), there is not everything you can learn at a university, or the technical college - things come by years of experience, and getting the best performance out of a particular article is one of them.

To my way of thinking, what I would do if I had the sole responsibility of a cable, after purchasing to the given specification and been aware of the performance test of that particular article, is to leave things as they are and not to periodically test them, because you usually find in the end that the costs of testing are more than the advantages gained, because after all, it is well known that you test an article today (a motor car, for argument's sake, roadworthy purposes and performance), and tomorrow the traffic department or the local authority, will stop you and you will find that there are one or two things wrong with it, and faults happen overnight.

The question by our young friend over there was whether testing weakens the article. Mr. Chairman, whether it weakens an article or not, my honest advice to young engineers is to buy to a good specification and maintain it to the best of your ability, and trust to luck.

THE PRESIDENT: Thank you very much for that useful advice Mr. Ferry. You have, of course, touched on the real reasons for these meetings, and that is to learn from one another's experience, which we are certainly doing this morning.

CONVENTION ADJOURNED FOR TEA.

On resuming after tea.

THE PRESIDENT: Gentlemen, before we continue with the proceedings, Clr. Ferry would like to make an announcement.

Councillor G.E. FERRY (Cape Town): Gentlemen, I have been asked by several members, and I feel it is quite a good thing, we have enjoyed the refreshments outside during the whole of our Convention and we have ascertained that the refreshments are provided by the ladies - they give their time, sometimes their money, but invariably they collect from friends, and they do get a contribution from our Association - but there are several members who feel they would like to make a personal contribution to their worthy cause.

They are serving in the interests of the Vrouevereeniging, and the Missionary Society of Churches, and other charities. The money which they get is not for themselves. As I have already mentioned, their services are entirely voluntary, and the money goes to various charitable works in the interest of their respective churches, and members have asked (which I prescribe to, and you, too, Mr. Chairman), that we have a 'whip-around' so as we can make a voluntary individual contribution towards their worthy cause.

(This was agreed, and a collection was taken).

THE PRESIDENT: The next item on the Agenda is a paper by Councillor Meyer of Welkom.

We in Welkom are extraordinarily proud of the fact that we have a Councillor who has produced a paper and to the best of our knowledge it is the first time it has happened in the forty-nine years of the Association; we are extremely indebted to Clr. Meyer. He is an extremely busy man, and I know that his paper has taken a great deal of his time. I think without any further ado, I will ask Clr. Meyer to come up and present his paper.

Councillor W.F. MEYER (Welkom): Mr. President gentlemen: I must say at the outset that I consider it to be an honour to address you at this Convention on a subject like this. I have done so with great hesitation because I believe that over the years the Councillor Members have elected to stay in the background. I now venture where angels fear to tread!

In preparing this paper, I borrowed ideas from one or two of my professors whose theories I still believe to be sound, and I am indebted to them, therefore. I do not intend reading the whole paper, but I have done a precis therefrom.

(See Agenda Section, Page 46.)

Councillor W.F. MEYER:

That is all I have to say, gentlemen. If this is what you wanted, I shall be pleased. If it did not come up to your

expectations, then please remember, I am only a councillor! Thank you. (Applause).

THE PRESIDENT: Thank you, Clr. Meyer, for a very instructive and very important paper as far as this Convention is concerned.

I now have much pleasure in calling upon Clr. Deysel to propose the vote of thanks.

Raadslid F. F. DEYSEL (Springs): Geagte Mnr. die President, dames en here:

Dit is my aangename voorreg om my geleerde vriend Raadslid Meyer van Welkom hartlik te bedank vir sy referaat. Daar bestaan geen twyfel dat hy baie tyd aan die opstel van hierdie referaat bestee het nie. Res ipsa loquitur - die saak spreek vir homself, dus is dit nie vir my nodig om my stelling met vers en kapittel te staaf nie.

Ek wil nie onnodig hare kloof nie, maar ek wil tog na 'n paar stellings verwys waarmee ek nie saamstem nie, en wat ek nie so sonder kommentaar durf laat verbygaan nie.

Ek verwys na bladsy 60, die derde par. in die eerste kolom. Ek meen dat ons referant die kluts hier heeltemal kwyt is. 'n Regspersoon is nie iets denkbeeldig nie, maar dis 'n juridiese werklikheid met 'n juridiese wil. 'n Regspersoon kan handel na willekeur, hy kan koop as hy wil, hy kan 'n kontrak sluit as hy wil, en hy kan die juridiese wil openbaar om 'n misdaad te pleeg.

As ons hierdie gesindheid of juridiese wil van 'n regspersoon reg begryp, dan is al die hofuitsprake waarna ons referant verwys, meteens baie duidelik en verstaanbaar en lewer Art. 381 van die Strafproseswet, wet 56 van 1955, waarna in par. 1 van die referaat verwys word, ook geen probleme op nie.

Laat my toe, Mnr. die President, om na nog enkele regsdwalings in my geleerde vriend se referaat te verwys.

In par. 2 Bl. 46 word verwys na raadslede en amptenare van munisipaliteite en in die eerste par. op bladsy 48 vra die referant, „Wat is 'n munisipaliteit in die reg?" En dan antwoord hy daarop, „Dit is 'n regspersoon".

Graag verwys ek Mnr. Meyer na Art. 2 van Ord. 17 van 1939 van Transvaal, waar 'n munisipaliteit omskryf word as 'n gebied, dus 'n stuk grond. 'n Stuk grond kan tog nie 'n regspersoon wees nie.

Op bladsy 47 verwys my geleerde vriend na die verbintenisreg, en gaan dan voort: „Hier vloei verpligtings voort 'ex quasi delicto en ex quasi contractu'."

Hier kan ek glad nie met die referant saamstem nie. Daar is nie meer vandag in die regswetenskap van Suid-Afrika so iets soos 'n quasi delik of 'n quasi kontrak nie. Dis 'n verkeerde en 'n verouderde beskouing. Alles wat quasi genoem word, dui daarop dat dit verkeerd ingesien of gestel word.

Op bladsy 51 in par. (a) word die volgende stelling gemaak: „Ook mag 'n raadslid nie teen sy Munisipaliteit direk of indirek 'n saak voer nie. Al die plaaslike bestuursordonnansies in die verskillende provinsies bevat sodanige bepalings".

Ek weet nou nie of ek in die donker gelees het nie, maar ek wil tog my geleerde vriend uitdaag om die betrokke ordonnansie te kwateer waarkragtens 'n raadslid belet word om die raad waarin hy lid is te dagvaar.

Mnr. die President, nie een van ons wil graag tronk toe gaan nie, en as 'n mens hoor van strafregtelike vervolging van ingenieurs en raadslede vir onregmatige dade wat hulle gepleeg het, dan kry 'n mens onwillekeurig sulke snaakse koue rillings langs jou ruggraat af.

En as 'n mens dan nog verder verneem van absolute aanspreeklikheid vir onregmatige dade gepleeg deur 'n onbekende persoon, dan lyk die hele saak bra duister en kan 'n mens maklik in die versoeking kom om jou posisie as ingenieur of raadslid neer te lê. Ek het altyd gedink elektrisiteit is gevaarlik, maar nou wil dit voorkom asof die wet in 'n poging om die gevaar wat elektrisiteit inhou, te bekamp, 'n baie groter bron van gevaar geskep het, altans vir die ingenieur en ook vir die raadslid! Maar vir diegene wat aandagtig geluister het, wil dit tog voorkom asof daar hier en daar 'n ligstraaltjie in die Egiptiese duisternis te bespeur is.

As ek die referant reg verstaan het, kom die hele saak maar net daarop neer dat elke persoon verantwoordelike is vir sy eie wandade.

Aan elke beroep of professie is sekere risikos verbonde. Dink maar aan die meganikus wat die vliegtuig moet nasien waarmee u en ek moet terug reis huistoe. Moet hy dan nie verantwoordelik gehou word vir sy nalatigheid waardeur hy ons lewe in gevaar stel nie? Wat van die tesourier of kassier wat gelde moet hanteer - is hy nie ook verantwoordelik vir sy nalatigheid nie? Of die soldaat of konstabel wat sy eie lewe in gevaar stel in die uitvoering van sy plig.

Is die risiko van die raadslid en die ingenieur in die uitvoering van hul plig werklik so groot? En word elke persoon nie vergoed in ooreenstemming met die verantwoordelikheid en risiko wat hy moet dra nie?

Vir die regsgeleerde is elektrisiteit 'n onbekende gevaar en vir die elektrotegniese-ingenieur is die wet weer vol slagysters waarin hy enige oomblik kan beland.

Die beste vrywaring is en bly tog maar kennis. As 'n man meester is van sy vak en as hy sy taak konsensieus, en met nougesetheid verrig, hou dit geen gevare in nie, nie vir homself nie, en ook nie vir sy medemens nie. Ek is oortuig daarvan dat ons te lief is om net soos 'n koerantverslaggewer, van 'n molshoop 'n berg te maak. Van geen mens word die onmoontlike verwag nie en daar is veel meer skuldige persone in ons howe vrygespreek as wat onskuldige persone, indien enige, skuldig bevind is.

Ek stem gedeeltelik saam met die referant se uiteensetting in par. 5 op bladsy 46 van sy referaat, oor die wese en funksie van die wet.

Ons hele regstelsel is daarop gemik om ons samelewing as mense op regsgebied te orden en te reguleer, en as 'n raadslid of ingenieur nou bokant die toepassing van die wet sou geplaas word deur die een of ander vorm van spesiale beskerming dan is dit onvermydelik dat die een of ander persoon sy regmatige beskerming van 'n

georderde bestaan moet verloor, en stort ons hele regstelsel in duie.

In compiling this paper my learned friend has certainly not followed the line of least resistance. I do not know whether it is to the point, or even whether it has any bearing on the case at all, but I want to conclude by referring to the well-known classical example quoted by van Zyl in his Treaty on the Notarial Practice of South Africa.

On page 98 where van Zyl deals with the drafting of documents, and where he explains how a document should be drawn up, he goes on to say:

"Fortunately the law does not require such unnecessary verbiage, but if this practice were to be continued, it would gradually be still further elaborated; and if any future court of law were to hold it to be absolutely necessary in order to pass the ownership in a thing, then it follows with equal reason, that if a boy on his way to school wished to buy an orange from a fruiterer, the latter would have to make delivery somewhat in the following manner:

> 'Here, my boy, I hereby sell, give, cede, assign, transfer, and make over unto you, all my right, title, and interest in and to every part or parts of the flesh, the pulp, the seed, the kernel, the pips, the sugary and refreshing juice enclosed within this golden sphere; likewise the bark, the peel, the skin, the husk, the rind which yields fragrant oil, and the aroma pertaining thereto of this globose, glucose, yellow fruit, commonly called an orange; to be accepted, taken, held, used and enjoyed by you, the said boy, for and on your own behalf and benefit, as your own free and unincumbered property without the interference or hindrance of anyone whomsoever; and that forthwith you will be at liberty, without obtaining the consent of anyone and least of all of your parents or guardians, to deal with the said orange in any manner you please, or to devour the same at your leisure with all the internals and externals thereof beforementioned; and to do so at such time or times, place or places, as may seem most convenient and secluded for such purpose. In witness and in consideration whereof I hereby acknowledge to have received from you the sum of one penny well and truly paid to me by you as and for and being the purchase price or the value of the said orange'."

(Laughter).

Mnr. die President, namens al die kongresgangers, nogmaals baie baie dankie aan Rld. Meyer van Welkom vir 'n interessante referaat. Daar is 'n hele paar stellings waarmee ek nie saamstem nie, maar net soos dit die funksie van elektrisiteit is om 'n saak te verlig, net so is dit 'n eienskap van die wet en regsgeleerdes om die helderste saak te verduister - anders sou daar mos nie hofsake wees nie, en waarvan sou ons arme regsgeleerdes dan lewe?

Baie dankie, Mnr. die President. (Applous).

THE PRESIDENT: Baie dankie, Rld. Deysel.

Councillor Marais would you like to second the vote of thanks?

Raadslid D. MARAIS (Johannesburg): Mnr. die President, en here: Dit is vir my besonder aangenaam om die mosie van dank wat so mooi voorgestel is deur Raadslid Deysel te sekondeer.

Wat ons as raadslede betref is hierdie referaat is sou sekerlik van baie groot belang, want ek is seker dat enige raadslid wat hierdie referaat mooi deurgaan en bestudeer 'n baie beter begrip sal hê aan sy verpligtinge teenoor sy raad, sy amptenare, sy belastingbetalers, en natuurlik die wette van ons land.

Mr. President, this particular paper delivered to us by Councillor Meyer from Welkom, covers a very, very wide field indeed, and obviously I have read this paper through the eyes of a councillor, without any particular legal background, and the first thing that impresses one is the fact that there is a great deal of confusion existing today in the different ordinances which councillors have to try to sort out.

I am certain that councillors in the Transvaal, for instance, who serve on management committees have seen from time to time the confusion which exists there. I have, for instance, seen certain times when a councillor has believed that he should recuse himself because he was remotely concerned with some matter before the committee; the town clerk has thought it wasn't necessary, but the councillor has been so terrified of possible consequences that he has still insisted on recusing himself.

This, as you know, can be very, very difficult under a management system. You know these committees are very small ones, no alternates are allowed, and obviously sometimes you barely have a quorum present, and you can imagine the confusion when a matter which is possibly very important and a matter which should go to the council at its next meeting, cannot be handled because you barely have a quorum, one councillor feels that he has to recuse himself, and so this particular matter must stand over.

Under the old system, you know that a mayor could be called in to make up a quorum, but that is not possible any more under the management system. I think what the particular paper brings home to us is the fact that the time has come when most of the laws governing councils, councillors, and officials should be reviewed.

I am only hoping that possibly Councillor Meyer (not necessarily even at a conference like this), will follow up this particular paper by suggesting ways and means of simplifying all these various laws and statutes so that the ordinary councillor who comes along to serve his local authority, his city, will not be so confused in the future.

May I say again to Clr. Meyer that we are all very, very pleased that he has broken the ice, and for the first time delivered a very outstanding paper to this congress,

and I hope it is a lead that many other councillors will follow.

Thank you very much indeed. (Applause).

THE PRESIDENT: Thank you very much Clr. Marais.

Gentlemen, the paper is open for discussion.

Mr. E. de C. PRETORIUS (Potchefstroom): Mnr. die President, ek is alles behalwe 'n regsgeleerde maar ek het die voordeel dat een van ons stadsraadslede 'n professor in die regte is. Ek het hom toe gevra om kommentaar te lewer oor die referaat wat hy dan ook goedgunstiglik gedoen het; maar dit is 'n baie lang geskrewe bydrae en dit is nie my bedoeling om dit te lees nie. Ek mag dit sê: Professor Swanepoel stem op baie punte nie saam met die referant nie.

Die eintlike saak wat ek hier wil aanroer, mnr. die President, - (ek is jammer dat ek dit moet doen, maar ek dink dit is die korrekte plek om dit nou te doen; daarby moet ek sê: ek is baie dankbaar as 'n Afrikaanssprekende lid van die Vereeniging dat ons die eerste keer in die geskiedenis van die Vereniging 'n referaat, of sal ek dit so stel, 'n gepubliseerde referaat, in Afrikaans kry) - is die kwessie van taalgebruik. Hier is werklik 'n legis van steurende taalfoute, punktuasiefoute, spelfoute, noteringsfoute en ek voel dat hierdie foute gekorrigeer behoort te word voordat die referaat in ons verrigtinge opgeneem word. Ek gaan hulle nie nou hier noem nie; ek kan hulle later aan Mnr. Meyer uitwys as ek mag. Dankie mnr. die President.

DIE PRESIDENT: Dankie Mnr. Pretorius.

Are there any further contributions to the discussion?

Mr. L. LEWIS (Windhoek): This is a difficult subject for me, but seeing that there is nobody else to speak in the meantime, I'll have a go at it!

There are occasions when the engineer considers a matter very important, and one which could lead to danger. It has been my experience, not here but elsewhere, where I pointed out the necessity for immediate transport in case of faults developing on lines, and lines falling down. The councillors disagreed with me because for something like 20 or 30 years no serious accident had actually occurred, and refused to make available the necessary transport in order to give the standby man these facilities.

I often wondered then, if something did go wrong, whether I would be responsible, or whether the councillors would be responsible, and what action I should have taken.

I would appreciate hearing the speaker's view on that.

Raadslid M.J. JONKER (Witbank): Mnr. die President, as 'n mede regsman voel ek dat Raadslid Meyer darem 'n bietjie sterk vandag gekritiseer is.

Ek voel dat daar te veel na die referaat gekyk is met die kritiese oog van 'n regsgeleerde. Ek kan maklik, wanneer die referaat deurgegaan word, op sekere stellings kritiek lewer; dit is baie maklik om dit te doen, maar ek dink as 'n mens die doel in aanmerking neem van hierdie referaat, naamlik om in die algemeen 'n vergadering wat bestaan meestal uit ingenieurs in ter lig oor een en ander aspekte van die reg wat hulle raak dan het dit die doel waaroor dit geskryf is absoluut bevredig.

Ek wil baie graag Mnr. Meyer van harte gelukwens met en bedank vir die puik referaat. (Applous).

DIE PRESIDENT: Baie dankie, Raadslid Jonker.

Raadslid T.L. RANDLES (Klerksdorp): Mnr. die President, ek wil net vir Mnr. Meyer baie dankie sê dat hy ook so 'n bietjie kyk na die veiligheid van raadslede asook van die ingenieurs.

Ons het omtrent twee jaar gelede 'n geval gehad waar 'n sekere persoon sy dak geverf het. Hy het aan die omhooglyne geraak, 'n kortsluiting veroorsaak en is dood aan skok.

Ons ingenieur is voor die hof gedagvaar, is skuldig bevind en is beboet. Hierdie omhooglyne is verouderd en moes met kabel vervang word. Ons ingenieur het na ons gekom met 'n rapport dat dit verouderde lyne dadelik vervang moes word. Ons kon nie al hierdie huise se ligte afsit nie want dan was die helfte van die stad in die donker. Die ingenieur is opdrag gegee om die werk met verdrag te doen en na 'n jaar is hierdie verouderde drade met ondergrondse kabels vervang.

Ek is maar 'n leek in elektrisiteit en is 'n raadslid soos Mnr. Meyer en ek sê „Baie dankie."

DIE PRESIDENT: Baie dankie, Mnr. Randles.

Mnr. J.M. GERICKE (Klerksdorp): Mnr. die President, wat my hinder in hierdie referaat is die verskillende Latynse terme wat genoem word. My Latyn is taamlik verouderd en gaan terug na my matriekjare. Volgend op wat Raadslid Randles nou net gesê het, verwys ek na die artikel wat lei:-

„Sub-artikel (5) bepaal dat elke direkteur of amptenaar nog boonop persoonlik aanspreeklik sal wees vir misdade deur die regspersoon gepleeg. Hulle is dan socii crimminis".

Beteken dit nou dat hulle gestempel word as "social criminals" of wat? (Laughter).

DIE PRESIDENT: Mnr. Meyer sal vir u sê Mnr. Gericke.

Anyone else, gentlemen?

If there is no further discussion, we have got this short afternoon ahead of us. I don't know whether you would prefer to close now and return at 2 o'clock - would that suit the meeting?

(This was agreed).

Before you go, I have a note which I would like to read to you: It says "Dear Mr. Ferry, Our very sincere thanks to your Association for the collection which realised R83.40" (Applause) "A letter of appreciation to your society will follow" and it is signed by M.E. Ferreira.

I would like to thank you all gentlemen for that very generous contribution, and I would like to thank Clr. Ferry for initiating it.

(CONVENTION ADJOURNED FOR LUNCH).

On resuming at 2.00 p.m.

THE PRESIDENT: Gentlemen, will you take your seats please? We haven't much time, so I think we will get on with the job.

We are very fortunate to have with us this afternoon Mr. Prins of the Bureau of Standards. I know he doesn't need any introduction to you. We have heard from him several times during the Convention.

I will now call upon him to present his paper, entitled "Low Tensions Distribution Protection".

Mr. F.J. PRINS (S.A. Bureau of Standards): Mnr. die President en here: Ek wil graag eers my dank betuig dat die vereniging my die geleentheid gun om hierdie referaat te lewer, en dan aangesien die taal kwessie 'n hele paar maal geopper was tydens hierdie verrigtinge, wil ek die hoop uitspreek dat die Afrikaans-sprekende afgevaardigdes my dit nie sal verkwalik dat ek die referaat in Engels lewer nie. Ons Afrikaanse tegniese taal is nog baie jonk, en die meeste van ons is baie beter vertroud met die Engelse tegniese terme, en daarby is daar ook heelwat van die afgevaardigdes wat nie Afrikaans magtig is nie.

Mr. President, in tackling this paper, I was rather scared. It is a very wide subject. A lot has been said and written about it. It is to a certain extent contentious. I have tried to keep it short, and mainly highlight the important aspects, but I am afraid in doing so I have been, maybe, a bit too blunt, and there may be certain aspects requiring some enlargement, so as time is short I will not repeat the written part of the paper which you have in front of you. I will rather use the time to expand on a few points that may need clarification.

(See Agenda Section, Page 62.)

Mr. F.J. PRINS (continuing at the end of his paper):

In the introduction I stated that in recent years two trends have competed in South Africa for replacing the semi-enclosed fuse in installations, namely the h.r.c. fuse and the air-break miniature circuit-breaker. I would like to clarify this statement. By 'recent' I did not mean to imply the past year or two, but rather the past one or two decades. Actually MCB's have been assembled in South Africa since approximately 1946 and manufactured since about 1952.

In discussing the requirements of a protective system three features were mentioned, namely:-

1. Short-circuits must be cleared rapidly by protective devices of adequate breaking capacity, and Overloads must be disconnected after a suitable interval of time;
2. When faults occur, interruption of supply should be localized by suitable discrimination, and reinstatement should be rapid and convenient, and
3. The system must be capable of giving consistent protection for the whole of its life in service.

However, there are a number of other requirements equally important but that are so taken for granted that we are apt to forget them. Let me mention a few:-

(a) The system should be accurate. If you are informed that a certain fuse has a fusing factor of 1.60 or that a certain circuit-breaker has a definite time-current characteristic, then they must possess these characteristics within close tolerances, otherwise they will be uncertain links in your chain of protection. The "fusing-factor" can be considered as a parameter giving accuracy.

(b) The system should be tamper-proof. Unfortunately we deal with human beings and this strain of animal can devise the most ingenious methods of flouting devices put there for his protection with the result that the engineer has to try and go one better to protect him against himself. The Americans are very "tamper" conscious. That is why the Edison type plug fuses, used for sub-circuit and equipment protection in the U.S.A., are now recognised only as replacement items in existing installations.

Apart from the fact that this fuse had the same thread for all ratings from 0 to 30 amps and hence invited the replacement of a lower rated fuse by one of larger rating, it could also be replaced by a coin. The fuse devised to overcome these shortcomings is also a plug type but is called the 'S' type and looks very much like the Edison type. It is made in groups of 0-15, 16-20 and 21-30 amps. Each group has a different thread so that fuses of different groups cannot be interchanged.

The plug type fuses are rated up to 30 amp, 125 volt. For higher ratings and voltages "cartridge" fuses are used for sub-circuit and equipment protection. These are grouped into various current ratings in two voltage ranges (250 v and 600 v) and the physical dimensions are such that no two groups are interchangeable.

The miniature circuit-breaker is credited with being the most tamper-proof of all protective devices and as approaching nearest to the ideal "tamper-proof" protection.

The well-known "rewirable fuse" is the least tamper-proof of all protection devices and it is interesting to note that it is not used for sub-circuit and equipment protection in the U.S.A.

(c) The system should be indicative of its condition, i.e. whether "on" or "off". This requirement is self-explanatory. It is not as important as the requirements mentioned earlier, but it has definite advantages.

(d) The system must have low losses. This is also self-evident. Current carrying parts should be adequate, the method of fixing or attachment should ensure a temperature rise within limits and the energy consumed by components should be a minimum.

Regarding the adequacy of breaking capacity, the statement that hazards often occur owing to overloading of wiring systems because the initial wiring did not provide for increases in the use of electricity, also needs clarification. Available fault current or capacity increase only with increase in supply capacity such as for instance the addition of another transformer in parallel with an existing supply transformer. A point that could be overlooked in such a case is to ensure that the breaking capacity of existing over-current protection is sufficient to cope with the increased capacity.

Although fuses, being static devices without moving parts, are not expected by the user to require maintenance conditions of use could lead to trouble, such as for instance contact burnout in switch-fuse units due to too high operating temperatures of fuse-links.

It should be noted that the revised Factories, Machinery and Building Works Act actually allows a choice of four methods for the protection of portable electric hand tools. Only the three with which the Bureau is directly concerned were discussed. But in order to round things off the fourth should also be mentioned.

Clause C.59(i) c states: "It is connected to a source of high frequency electricity supply derived from a generator which is used solely for supplying power to such portable electric hand tools and which arrangement is approved by the Chief Inspector".

Note that when this method is used each installation is judged on its own merits and must be approved by the Chief Inspector of Factories.

The principle of protection involved is the same as that applying to the isolating transformer.

Where an isolating transformer is used, it should be made clear that a separate transformer is necessary for each tool.

The earth leakage relay has given rise to a number of queries. However, there is one point that I would like to clarify and underline heavily; an earth leakage relay or an earth leakage protection unit, which is a unit comprising the sensing relay and the switching mechanism, is not an over-current protective device. It is a unit providing protection against leakage currents as its name implies. It can be combined with an over-current device if so desired, but the two functions should not be confused.

A series of tests have been carried out at the Bureau to check the operation of earth leakage relays coupled to shunt-trip isolators in a circuit with normal overload protection in the form of moulded case circuit-breakers.

In the one test the circuit was adjusted so that an earth fault current equal to five times the rated load current of the shunt-trip isolator was flowing from the outgoing live terminal of the relay to earth, with the neutral floating.

In all cases the shunt-trip isolator tripped positively in approximately 0.02 seconds without the isolator or the relay suffering any ill effects.

In the other test the same basic circuit as for the previous test was used, but it was adjusted to give a prospective fault current to earth of 2500A. In all cases the back-up protection (i.e. the over-current protection), operated. The voltage-drop due to the large fault current resulted in insufficient voltage being available to operate the relay. Again, the relay and isolator suffered no ill effects.

It has come to our notice that quite a demand for portable earth leakage protection units has developed. In this connection two facts should be kept in mind, i.e.

1). The earth leakage unit basically protects its load side and not its incoming side; and
2). An unprotected flexible cord and plug, supplying the unit, is now introduced.

The portable unit, in theory, can therefore not offer the same degree of protection as the fixed unit, i.e. the unit mounted on the sub-distribution or distribution board.

Special care should be taken to ensure that the earth socket of the socket-outlet cannot become alive due to loose connections in the supply plug, or due to damage to the plug or supply cord. The same argument applies to the casing of the unit and it would appear advisable to limit the materials used in its construction to non-conducting, shock-resisting materials.

THE PRESIDENT: Thank you Mr. Prins. I think the addendum to your paper was equally as interesting as the paper itself.

Mr. Frantz will propose the vote of thanks.

Mr. A.C.T. FRANTZ (Cape Town): Mr. President, gentlemen:

The subject of fuses, circuit breakers and leakage currents is one in which we all become interested at some time or other, if not in our official capacity as municipal electrical engineers, then merely as the man around the house who is called upon to replace a blown fuse, and we are thankful to Mr. Prins for giving us a review of the present practice in South Africa.

Normally municipal electrical engineers are not concerned with what happens beyond the electricity meter, provided the electrical installation, when first connected, complies with the relevant regulations.

Unfortunately, however, there are always the abnormal cases, where installations are overloaded and faults develop, and we all know of fuses replaced by hair pins, fencing wire, and anything else that can be found. Discrimination then goes by the board, and back up protection in the shape of the undertaking's fuses or circuit breakers is called upon to operate, that is if the place has

not burnt down in the meantime. Or worse things may happen, such as an electrocution.

Mr. Prins has focussed our attention once again on the various kinds of protection available, and their characteristics. It is unfortunate that the re-wirable semi-enclosed fuse, which can be so horribly abused, is still allowed, but fortunately the tendency is towards the H.R.C. fuse and the miniature circuit breaker, both of which have their special fields of application.

In this connection I remember seeing a very vivid film not so long ago showing the difference between the performance of miniature circuit breakers and H.R.C. fuses, and it is quite astounding how the H.R.C. fuse can protect against a very severe fault whereas the miniature circuit breaker blows up completely, plus the equipment.

I am pleased that Mr. Prins has emphasised also the point that the fuse or circuit breaker, in effect, protects up to the socket outlet only. This is an important point, and I think here there is scope for wider use of fuse plugs.

There must be countless cases of flexible cords themselves acting as fuses, and possibly starting a fire - with or without disastrous results.

Mr. Prins has also dealt exhaustively with the far more difficult problem of protection against earth leakage currents - or rather the effects of such currents - and I am pleased to see that approved specifications are available both for insulating transformers and for doubly insulated tools.

I would, however, have liked to have seen in Mr. Prins' paper, for the sake of completeness, a section dealing with the various systems of earthing because the protective devices described, other than the earth leakage relay, after all will clear earth faults only if the earthing is effective.

Electrical installations are quite safe as long as the impedance of the earth path is below a safe value, but this is exactly where the difficulty arises, when we have unsatisfactory ground conditions or non-metallic water mains.

The P.M.E. system which has been adopted by undertakings to overcome these conditions takes care of most of them, but as Mr. Middlecote pointed out 7 years ago in Margate, there are even cases where this doesn't protect.

The question of earthing was aired in Great Britain about two years ago when a new policy was decided upon, because of the difficulties experienced in providing good earths. There the area boards have agreed to assist the consumers by providing earthing points, connected either to the cable sheaths, or to separate earth conductors or to the neutral, or if they can't do any of these, they recommend the use of earth leakage circuit breakers.

These devices have been available in this country for some time, but I believe they were originally developed for use in mines to limit damage to equipment. They can now be made to operate on very small earth leakage currents, but here again on the P.M.E. system they don't suffice, and by virtue of their great sensitivity they may also in individual cases prove to be a greater nuisance than they are worth - but I agree they certainly have their applications.

In connection with earth leakage circuit breakers and Mr. Prins' reference to regulation C.59 it seems to me that the way the regulation is worded, we are precluded from using portable earth leakage circuit breakers. We have to (as I read it) mount them permanently somewhere on the premises, and I would like Mr. Prins to confirm that this is so, because we in Cape Town have tackled this regulation by providing our fitters working in sub-stations with individual protable earth leakage relays and it seems to me that we have broken the law here!

In conclusion, Mr. President, you will remember, that last year in Margate we had a paper on electrical accidents. We heard all about the many ways in which electricity could kill us. In fact, I was nearly frightened into using gas!

We are therefore very grateful to Mr. Prins for coming to our rescue in such a short period of one year, and showing us how to protect our installations and ourselves, and I have now great pleasure in proposing a vote of thanks to Mr. Prins and would ask you to express your appreciation in the usual way. (Applause).

THE PRESIDENT: Thank you Mr. Frantz.

I now have great pleasure in calling upon Mr. Beesley to second the vote of thanks.

Mr. W. BEESLEY (Livingstone): Mr. President, gentlemen: A paper which starts on the basis of comparisons is always of interest to me particularly, because it gives me an insight as to what goes on in other places, and I am able to assess a country's standing in a particular field.

The field of low voltage protection is a vast one, and I believe the author has done justice to the subject within the compass set for himself.

He started by comparing the existing South African regulations with those of other countries, particularly Britain and the United States of America. The relationship with the British regulations is, of course, a close one, but the South African regulations have, to my mind, the advantage of being backed by the Wiremen's Registration Regulations.

We, in Rhodesia, adopted both the South African Regulations and the British Regulations, and adapted them to the Rhodesian conditions. It was hoped that they would eventually be put on the Statute Book because we had no regulations similar to those of your Wiremen's Registration Board.

Unfortunately the legal pundits could not interpret the technical sense of the wording to be satisfied that the courts would accept them, and they were relegated to the level of the British Regulations.

I was particularly interested in the reference to the development of the miniature circuit breaker in England prior to 1930.

Having had 9 years' experience of their application in Southern Africa, I am at a loss to understand why they never caught on universally in Britain until 30 years have passed by.

On the subject of earth leakage protection, which I believe is the most important aspect of protection on low voltage systems with earth neutrals, I might mention that I have been following recent correspondence in the overseas technical press, where the question of the selection of level of operating sensitivity was under discussion. I was interested to note that responsible engineering bodies are following the path trodden by the South African committee and South African engineers can be justly proud of their achievement in this field as they have contributed in no small measure to the development of leakage protection devices.

The author concluded his paper with an expression of hope that whilst his paper was brief it would serve to stimulate further discussion on this important subject, and even though I appreciate time is short, I trust that the company present will react accordingly.

Mr. President, I take great pleasure in formally seconding the proposal of the vote of thanks. (Applause).

THE PRESIDENT: Thank you Mr. Beesley. I agree with you - the subject should create considerable discussion.

The subject is now open, gentlemen.

Mr. R.M.O. SIMPSON (Durban): I would like to congratulate Mr. Prins on a very useful paper, one that will be of great value to all of us, as this particular stage of the protection of an electrical system is the one closest to the consumer and undoubtedly a most important one.

There is one particular point that I would like to ask him about, and that is grading of the characteristics of fuse and circuit breakers.

In Durban we use miniature circuit breakers on the consumers' premises, and as I don't like miniature circuit breakers outside, we use H.R.C. fuses on the pole. Thus on overhead services into a consumer's premises we have miniature circuit breakers in the house, and H.R.C. fuses on the pole.

One has great difficulty in obtaining proper discrimination between these two, and it would be of very great value if we could get proper grading. We are endeavouring to obtain this by choosing a curve suitably situated between the characteristics of the fuses and circuit breakers offered, but I would like to hear Mr. Prins' views on this particular point, particularly as to whether the Bureau could give some guidance in this matter in S.A.B. Standard Specifications.

Mnr. P.J. BOTES (Roodepoort): Mnr. die President, dit is 'n baie interessante onderwerp; daar is net hier 'n paar punte wat ek graag aan Mnr. Prins wil stel.

Daar is twee vername merke op die mark van hierdie aardrelais. Ek sal graag wil weet of hierdie aardrelais - hoe hulle die toetse deurstaan het in verband met oorspannings as gevolg van weerlig. Ek het heelwat probleme in die verband met seker tipes daarvan.

Dankie, Mnr. die President.

Mr. W. BOZYCZKO (Johannesburg): Mr. President, gentlemen: I would like to associate myself with the compliments already expressed to the author, by previous speakers on his paper. His paper is timely and a valuable contribution to the understanding of problems involved in low voltage protection against various hazards which so often arise.

A protective device should have the following characteristics:

Because of demand it must be economical, not only in itself, but also because of the closeness of protection it can offer, circuit design may be made more economical.

Overload protection should be close to the circuit rating. Circuit breakers used generally today have 125% must trip point; however, better tripping characteristics are available for circuits where this is desirable.

At this stage, I could mention I believe there is a move afoot to increase the must trip point to 135%.

A protective device must retain its characteristics, and this is rather important. It should not cause nuisance operation for whatever reason. It must provide for quick and easy restoration of power. Definite indication as to whether it is on or off is often very desirable. It must have time delay sufficient to cope with short time surges. It must be compatible with current time curve of a particular appliance it is to protect, and still provide close overload protection.

At this point, if I may, I will try to answer Mr. Simpson's question as to how he can solve his problem by using the H.R.C. fuse on the pole and the circuit breaker on the board, and get a satisfactory discrimination.

He mentioned that he is trying to use curves for that purpose. In other words, comparison of H.R.C. curve to that of circuit breaker. I could advise that the use of circuit breakers in both instances would undoubtedly solve his problem. Seeing that he is using H.R.C. fuses the uprating of these will also solve his problem.

Mr. Prins mentioned as an addendum to his paper that the device must be tamper-proof, and it is I think, a most important feature of a low voltage protective device.

The American National Electrical Code of 1962 pays very strong attention to this particular factor.

The previous speaker has mentioned that he had seen films where H.R.C. was compared with that of a miniature circuit breaker. Mr. President, I don't know if it is a fair comparison. We know H.R.C. fuses have extremely good short circuit characteristics, but then one must take into account the circuit breaker is not a fuse. It has various other functions that it has to perform and the comparison as such, I don't think is really fair.

The only protective device that really can be classed as such, apart from the convenience which the author

has mentioned in his paper, is undoubtedly moulded case air circuit breaker.

We have agreed that rupturing capacities of miniature circuit breakers are not in some instances sufficient; however, suitable back up protection usually avoids circuit breakers being blown up as mentioned.

The type of back up protection, Mr. President, will very much depend on circumstances. Does one want to protect individual phases? Or does one want to protect all three phases? In those instances it is very often advisable to seek assistance from an engineer who knows.

The author touched on the portable earth leakage relays. It is true, and it is possibly not realising the problems in the field, that manufacturers had developed a unit which will offer no protection if earth wire becomes alive.

The manufacturers will assist those who have purchased these units to make them completely safe and these units will naturally be approved by the South African Bureau of Standards, and the Chief Inspector of Factories.

I must of course mention at the same time that small additional cost will be involved.

I think that is all I have to say. Thank you very much, Mr. President. (Applause).

Mr. E. de C. PRETORIUS (Potchefstroom): Mr. Prins has given us a paper on a subject which has not always received sufficient consideration, and I wish to extend my personal appreciation towards him for preparing and delivering this paper, and I also wish to congratulate him on the excellent way in which he presented it in a summarised form.

H.R.C. fuses in my opinion, in a domestic installation, could be extremely hazardous. If a fuse blows it invariably is replaced by a piece of copper wire which can be very dangerous.

In connection with portable earth leakage relays, I think Mr. Bozyczko has more or less answered this question, but I would like to put it again: I would like to know whether the two available makes in this country do conform with the requirements of disconnection of alive earth lead on a load side, but this is the question: if not, how come they have been approved by the Department of Labour? Thank you.

THE PRESIDENT: Thank you Mr. Pretorius.

Mr. W. BOZYCZKO (Johannesburg): To answer Mr. Pretorius' question: I don't think we can blame the Inspector of Factories for the portable earth leakage unit. The Inspector of Factories approved the relay and the circuit breaker only, and not the wiring of the portabable unit.

Mr. W.H. MILTON (Johannesburg): Mr. President, in this connection I would like to offer just a few comments.

In the matter of the use of earth leakage relays, I have had personal experience, and so have some of my friends.

In my own particular case it saved the life of my grandson. This is a statement of fact.

In the particular installation, which is divided into two sections - a cottage and a neighbouring house - the earth leakage relay is used to protect both. A main switch controlling the installation in the cottage. There is also a separate main switch for controlling the supply into the main house, and each of those installations can be disconnected independently.

As an illustration of sensitivity, I was doing a job of work (by the way registered wiremen are not necessary in that particular area, because it happens to be outside the Republic!) and I had disconnected the supply to the cottage, and I unwittingly happened to touch the neutral conductor. I was not conscious of any passage of current; there was no feeling other than that of the physical contact, but my daughter rang through to the cottage to say, "Daddy, the supply is off, what have you done?"

In other words, the contact with the neutral in that particular case was sufficient to bring out the earth leakage relay.

On the other occasion, the child happened to come into contact with a live conductor in such a manner that the child could never have let go, but the relay came out, and all that happened was that the child squealed momentarily and then continued to play - in other words, no damage at all was done.

So much for the value of the earth leakage relay. It saved me more than money could buy.

The other point I want to mention is that in my friend's case, he installed an earth leakage relay and found that it was a source of continuous nuisance. The case was rather peculiar, in that the apparatus in the premises could be switched on and used, and it would probably be used for a couple of hours, and then suddenly cut out. A little later it was possible to reclose and it might stay in for five minutes or it might stay in for days.

The source of the trouble was ultimately traced to the stove. And there the conclusion come to was that the type of insulation used in the wiring of stoves and in the manufacturing of elements is such that under certain conditions, an increasing magnitude of earth leakage current may occur with the passage of time.

Rather the converse of what one expects, viz. that damp insulation, where you have got a hydroscopic insulation, you have difficulty in keeping the relay in, but if you are patient enough you can dry it out and then keep it in.

In his particular case the resistance to earth reduced while the elements were in use. Another friend of mine had one of these relays in use, and also attributed his troubles and difficulties to the stove, but in that particular case it was found that the switch that was used was defective in passing from the 'off' to the 'high' position. With any other direction of switching the switch was O.K. but there was a definite momentary contact with earth metal as the tumblers came over. Replacement of the switch removed the difficulty.

There was just one other point that I would like to mention and that is in connection with the discrimination between the main circuit breaker equipment in house

wiring, where you are using your M.C.B's, and the usual pole fuse where you come down from an overhead system, where you are using an exterior type of protection.

The usual practice is to provide protection to the capacity of the connection, i.e. the house service connection at the pole, and the capacity of the house service connection is usually in excess of the protection required for the household installation itself.

In our own particular case we never rate the capacity of the service connection to equate the protection required for the house loading.

With that large difference, a factor of 2, 3, 4, - it is quite possible to use fuses for the protection of the pole and get adequate discrimination against the circuit breaker in the house. If your circuit breaker fails, then of course you have got the back up of the fuse.

Where you have cable connections - especially on the 'tree' system - you do run into some difficulty in maintaining protection.

In one such case we have overcome the trouble by suitably grading the circuit breakers used at the meter box some distance away from the house and at the house installation.

Thank you Mr. President. (Applause).

THE PRESIDENT: Thank you Mr. Milton, for a very interesting contribution and for bringing to light some vital information on the value of earth leakage circuit breakers. I think in return the least we can do is to advise you not to do any work on your installation after the end of the year.

Councillor G.E. FERRY (Cape Town): Mr. President, I think Mr. Milton has made a very valuable contribution to this discussion from a safety point of view.

As far as these earth leakage circuit breakers are concerned, I know that my own firm in Cape Town, when a Factory Inspector came to our place a few months ago, and instructed or advised us to equip our premises, in a sense we resented it; we felt it was just another regulation, and that was that. But after he explained to us the nature of the box itself from a safety point of view we unhesitatingly put in two.

If I remember correctly the instructions were that they had to be fixtures. In any event in my premises they are fixtures.

But if, from a factory point of view, it is considered as a safety measure to cut down the accident rate from an electrical point of view in factories, I think that this Association could make a valuable contribution in cutting down accidents in ordinary John Citizen's house - I don't say by regulation, but by education of a general householder.

I think if the average home owner heard what Mr. Milton told us here this afternoon, he would act. I know that the first thing I am going to do when I get back to Cape Town is to put one in my home, and one in the home of my son, where I have two lovely little grandchildren, and I think that if we could, instead of leaving the sound advice which has been given us here today, through our members who are engineers and who come in daily contact with the public, bring home to them how desirable it is in the interests of safety to equip their homes with this device, I feel we will do a valuable contribution in the interests of safety.

In all probability, they are expensive - if I remember correctly they work out round about R50 each - probably municipalities could assist home owners in particular and owners of property in general in acquiring and fitting these devices in their homes, and on premises through hire purchase system, or through an assisted Wiring Scheme.

THE PRESIDENT: Thank you Mr. Ferry, for your very practical interest in this subject.

We have been considering this question of installation in homes quite a lot lately; your contribution is very valuable.

Mr. A.F. TURNBULL (Vereeniging): May I just ask a question regarding the installation of miniature circuit breakers?

In a large new industry there are quite a number of sub-distribution boards, where miniature circuit breakers have been installed.

To facilitate the wiring, these circuit breakers have all been installed sideways - in other words not in the usual vertical position in which they are tested.

The consulting engineer and the manufacturer of these particular boards, claim that it is quite usual for circuit breakers to be mounted in this fashion, and that virtually it is no concern of the local authority, and I would just like to bring this point to the attention of the meeting and obtain from Mr. Prins an opinion.

THE PRESIDENT: Thank you Mr. Turnbull.

Raadslid L. JAMNECK (Vanderbijlpark): Mnr. die President, op 'n punt van orde wil ek nou graag hier 'n reeling vra. Ek het u sekretaris of dan u adjudant gade gestaan tydens die lewering van die referaat. Ek dink dit is hoog tyd dat ons hierdie bespreking nou verdaag. Ek weet nie uit hoeveel lede bestaan 'n kworum vir hierdie vergadering nie maar die helfte van die lede slaap. Mnr. Koos Gericke snork so, ek kan niks hoor nie. Ek wil nou graag voorstel dat ons môreoggend in plaas van 9.30 v.m., 9.00 v.m. begin en dat ons verdaag op hierdie oomblik. Ek beny u posisie glad nie in hierdie omstandighede nie.

U as president, die sekretaris, die referant en adjunk het die onbenydens waardige taak om almal aan te kyk wat slaap en u mag nie slaap nie. (Lag).

DIE PRESIDENT: Baie dankie Raadslid Jamneck.

Gentlemen, are there sufficient of you still awake to continue the proceedings? Clr. Jamneck, I think you have had a very beneficial effect on the meeting and we should be able to continue for another ten minutes.

Mr. G.B. HEUNIS (Standerton): Mr. President, I have no further contribution to make. I was wondering whether we could ask Mr. Prins, with the approval of Mr. Giles,

whether he would be so kind as to go through the questions in the Members Forum on protection and reply to these in writing after the Conference. I think it would serve a very valuable and double purpose. Thank you very much.

THE PRESIDENT: Thank you Mr. Heunis. I think that is a very good suggestion, if Mr. Prins will fall for it!

Mr. A.Q. HARVEY (Warmbaths): There is just one thing I would like to ask Mr. Prins. As I walked to the door he said, "In the case of portable appliances that each appliance must have its own transformer". Is that correct? If so, I'd like to know why.

Mr. A.C.T. FRANTZ (Cape Town): Mr. President, is it in order now to second the motion by Clr. Jamneck that we adjourn until tomorrow morning at 9 o'clock?

THE PRESIDENT: I have no objection to adjourning, gentlemen, but what I do object to is starting at 9 o'clock tomorrow morning. We don't know what time we will get home tonight - if we get home tonight!

I think the matter has been ventilated fairly extensively now. Tomorrow morning we will have very little time to deal with three papers, so I am very much afraid it will have to be restricted to replies from the authors. I think with that we can finish the day's business.

(CONVENTION ANNOUNCEMENTS WERE MADE)

CONVENTION ADJOURNED.

FOURTH DAY

On resuming at 9.00 a.m.

THE PRESIDENT: Good morning, ladies and gentlemen.

Raadslid Dr. M.A. HEYNS (Potchefstroom): Mnr. die President, en here: Tydens my bywoning van die Konvensie, het ek onder die indruk gekom dat daar 'n aansienlike persentasie lede van die Konvensie is wat nie beide amptelike tale magtig is nie, en derhalwe het ek gevoel dat sodanige lede nie in staat is om werklik voordeel te trek uit referate wat b.v. in Afrikaans gepubliseer is in die Agenda en in Afrikaans gelees word nie.

Laat ek u 'n voorbeeld noem: Die referaat van Rld. Mnr. Meyer is in Afrikaans gepubliseer. Nou kan ek nie eintlik sien hoe kan iemand - sê nou 'n afgevaardigde van Rhodesië, enige voordeel uit daardie referaat trek nie. Hy kan hom nie lees nie, hy kan nie vetstaan wat die man praat nie, en derhalwe is daardie gedeelte van die Konvensie verlore vir hom.

Daarom voel ek, wil ek graag voorstel: Die Konvensie versoek die Uitvoerende Raad om oorweging te skenk aan die moontlikheid om alle rapporte en referate in beide amptelike tale in die Konvensie se Agenda in te sluit. Dit is die Konvensie se oorwoë mening dat sodanige prosedure lede in staat sal stel om stukke beter te bestudeer, te waardeer en te assimileer.

Nou vir diegene wat die Afrikaans nie baie mooi kan volg nie ...

For those of you who could not follow this very well I will endeavour to give it in English.

The Convention requests the Executive Council to consider the possibility of publishing all reports and papers to be read in both official languages. It is the considered opinion of the Convention that such a procedure would stimulate study, appreciation and assimilation of papers by members. (Applause).

THE PRESIDENT: Thank you Dr. Heyns.

I can say this: that the Executive has considered the point, which of course is a very good point, and the only reason why it has not been done in the past is because of the expense. The proceedings form a very costly item of our budget and for that reason we have not put in the translations as well, but obviously the Executive must consider it again, and personally I feel we can go even further, and provide an interpreter at our Conventions to do an on-the-spot interpretation from one language to the other for those members who are unilingual. I believe it has been done with great success at a recent conference in Durban - the Town Engineers' - and you may leave it to the Executive to consider both these possibilities.

Our Secretary has just reminded me that this is a formal proposal, so it must be put to the meeting correctly. Is there a seconder that the Executive should consider whether the papers should be reproduced in both official languages in the Agenda?

Mr. P. GILES (East London): I have great pleasure in seconding the proposal from Potchefstroom.

THE PRESIDENT: Thank you Mr. Giles. The motion is carried, gentlemen? (Agreed).

Ladies and gentlemen, we have very little time left, and we have the replies to the discussions on three papers to get through, so I would like to ask the three authors concerned not to spend more than ten or fifteen minutes on their replies please.

The first is Mr. Hobbs - will you come up to the rostrum please?

Mr. I.L. HOBBS (Virginia): Mr. President, ladies and gentlemen: I am sure to forget at the end, so let me first of all thank Mr. de Villiers, and Mr. Vergottini for proposing and seconding the vote of thanks for my paper.

I have known them both for many years, and appreciate their comments and kind words.

I should also like to thank the other contributors for their valuable comments and in particular Mr. van der Spuy of the C.S.I.R. for his valuable and constructive contribution on soil resistivities.

Many of the questions raised during discussions were on points which were omitted from this paper. It was of course imperative in order to deal with so vast a subject, within a reasonable compass, to exclude much that might have been of service. It is obviously not possible in the limited time available to reply to each individual contributor so I intend merely to run through some of the more important questions.

First of all the awful word "criticism" seems to have crept into the proceedings. I tend to regard criticism as something like castor oil - it is easy to give but not so easy to take!

The history of cables is very interesting indeed. Unfortunately, I have no details of the joints used by Ferranti. I believe they were, like his cables, specially made for the job; they were sleeved - I think actually copper sleeved - but I am not quite sure of this.

Now the periodic pressure testing of cables - this was raised by a number of contributors including one councillor - is of course very contentious, and that is really why I included it in my paper, to try and get some idea of whether it is actually done or not.

There are, as I have pointed out, many advantages to be gained from routine testing, but I think generally, in this country, it is not done.

I doubt whether anyone would use A.C. for pressure testing cables out in the field. It is just not practical - for reasons which I won't go into now - and there are risks of injury to cables if A.C. testing pressures are applied for too long a time or repeated frequently.

On the other hand, there is, to my knowledge, no evidence in existence that D.C. testing pressures, within the limits of accepted practice produce any undesirable effects.

P.V.C. Cables - this was left out for the simple reason that I did not want to stick my neck out!

The development of plastic insulated cables has reached a very high standard, but I am afraid the technique of utilisation has not achieved the same high standard.

This was ably dealt with by Mr. Prins in his contribution.

In Fig. 1 - bursting current - (I think it was Mr. Pretorius who asked for this information) - is the R.M.S. current.

I have the values for the components in Fig. 16 - they are not actually shown there - and I will give them to Mr. Pretorius during the tea break. This figure was purely a diagrammatic figure, just to show how complicated things can get and more details of this method may be found in the well known text book on A.C. bridge methods.

Somebody asked about pipe pushers. I did include a picture of a pipe pusher. It is not the whole machine. We have used one for many years but it is not economical to use really. We only use it when they don't want us to dig up roads. It is much cheaper to dig up the road and re-instate it if they will allow you to do it. We have had a lot of success with this machine but also a few failures. I can remember once going into a 600 pair telephone cable, with pretty disastrous results! Generally you have more success with it than failures, and it does a good job.

The level differences that I mentioned in my paper - I think if you go to any greater level differences, you will probably have to use a drained cable. You will get migration of the oil. Or else use barriers in the joints.

Of course, with an underground system it is very important to keep proper records. We have realised this, and we actually have a technician who does all this work for us. He goes out and checks everything and brings the information back to the office where it is all recorded. It is quite easy for us then to pick up any cable lengths, or distances. We have a standard distance from stand boundaries, which is maintained under all circumstances. Your records are very important in an underground system.

Mr. Inglis - Town Engineers? It is quite difficult to educate these fellows I must agree, but I think we have achieved it in Virginia, and the co-operation is very good. I think it is the co-operation that you need, and once you get it and work together, you have very little trouble. You do occasionally get an odd pick mark in a cable. I think it is something we have to accept with an underground system.

The reasons I gave for an underground system are not actually in order of merit, or importance; they were merely included to show some of the reasons for an underground system.

I think time is marching on, so I will conclude by saying that I think the idea of a symposium on Power Cables, raised by Mr. Pretorius, is an excellent one, and I hope some day the Association will give it some thought. It can only be of benefit to us all.

Thank you Mr. President.

THE PRESIDENT: Thank you Mr. Hobbs. I think you will all agree that we have listened to a most interesting and useful piece of work in Mr. Hobbs' paper, and I would like, on behalf of you all, to thank him for all the trouble he has taken over it; and also to thank the proposer and seconder, and all those who took part in the discussion, and I would like you to signify your appreciation in the usual way to all the gentlemen concerned. (Applause).

We will proceed now with Clr. Meyer's reply.

Raadslid W. F. MEYER (Welkom): Mnr. die President dames en here: Ek wil graag aan die voorsteller en sekondant van die mosie van dank, naamlik Rld. Deysel en Rld. Marais respektiewelik ‚baie dankie' sê vir die gedagtes wat hulle geopper het.

Waar Rld. Deysel meer kritiek teenoor my stellings gestaan het, neem ek hom nie in die minste kwalik nie. Dit gebeur baie keer in die hof dat twee prokureurs mekaar se stellinge hand en tand beveg, maar dit gebeur selde dat hulle in mekaar se aansien daal.

Dit sou verkeerd wees van my om hettig te re-ageer op sy kritiek. Ek verwelkom enige kritiek want ek en u leer daardeur, en dit is die doel van hierdie kongres, naamlik om van mekaar se gedagtes te leer.

Terselfdertyd wil ek baie dankie sê vir Rld. Jonker wat my te hulp gekom het toe dit woulyk of ek 'n goeie afranseling ontvang.

Wat betref die drie of vier stellings waarin Rld. Deysel van my verskil, wil ek kortliks antwoord dat ek goed daaroor nagedink het, en nog nie kan toegee dat hy korrek is nie.

The first question posed by me was, "What is a municipality in law?" I did not ask the question, "What is a municipality in terms of a certain local Government Ordinance?"

In the example quoted by Clr. Deysel, a municipality is an area of land. For the purpose of administering the local government ordinance of the Transvaal, that definition may be in order, but then the same ordinance goes on to define also the town council and the ratepayers and the registered owner, as well as their functions and their rights. Should you turn up the Deeds Registration Act you will find a different definition of the term "registered owner" because this has been defined only for the purpose of that particular act.

In order to show you that there is a flaw in Clr. Deysel's argument, I will put to you this question: "Who is levying the rates in the municipality? Is it a piece of land, or is it the ratepayers?" Surely it is the ratepayers, acting through its executive, the Council. A municipality must therefore be a body of ratepayers which have received that status by Government sanction. That is, in my opinion, the body corporate. The area of land as stated by Clr. Deysel cannot have corporate personality.

The distinction drawn between the various conceptions is perhaps a little subtle, but I think that my definition is still intact.

Tweedens, het ek verwys na verpligtinge wat kan voortfloei uit verskillende bronne, naamlik kontrakte onregmatige dade en quasi-kontrakte en quasi-delikte. Hy sê my indeling van die verbintenisreg is verouderd en hy vind fout met my indeling van sekere verbintenisse onder die hoof van „quasi-kontrakte" en „quasi-delikte". Ek kan nie verbintenisse wat nie kontrakte is nie, en ook nie onregmatige dade is nie, by daardie twee groepe gaan indeel nie. Ek moet hulle onderskei. Ongelukkig is ek in hierdie besondere geval 'n ou hond wat u nie so maklik nuwe toertjies kan aanleer nie.

Derdens kritiseer Rld. Deysel my stelling dat 'n raadslid nie teen sy munisipaliteit direk of indirek 'n saak mag voer nie. Dis duidelik dat my stelling uit sy verband geneem is.

Ek het in die paragraaf gepraat van ‚professionele verteenwoordiging'. Persoonlik mag 'n raadslid sy raad dagvaar, d.w.s. as dit gaan oor 'n kontrak of te veel belastings wat gevorder is, ens. maar hy mag as prokureur nie 'n saak vir 'n klient teen sy raad verdedig nie. Dit was die stelling.

Dit laat my dink aan die geval van ... 'n storietjie wat ek gehoor het van 'n oubaas wat uit die Bybel een aand sit en lees het, en ongelukkig na 'n partytjie soos gister aand - toe lees hy op die eerste bladsy „En Moses..." en hy blaai om, en hy sê „vloeg weg". En hy sien, maar dit is onmoontlik, en hy blaai weer om, en hy lees weer, „En Moses vloeg wragtig weg..."

Dit was duidelik dat hy twee bladsye omgedraai het. En die ander geval, waar daar staan, „Kain slaan vir Abel dood" en verder staan, „Gaan en doen desgelyks".

Ek wil net sê hy het dus my stellings blykbaar uit verband geneem.

Vierdens sê hy my stelling is verkeerd, as ek sê 'n regspersoon is iets denkbeeldig. Hy sê, dis iets juridies, met 'n juridiese wil. Sy laasgenoemde stelling is korrek, maar sy eersgenoemde stelling is verkeerd.

'n Regspersoon is nie iets konkreet nie, maar dis iets denkbeeldig, want dit het nie 'n lewe nie, dit kan nie alleen handel nie, en het geen gesindheid nie. Dit kan slegs handel deur middel van mense, en daardie mag om te handel is 'n regsmag; 'n regsmag aan hom toegeken. Daarom is hy korrek as hy sê dit is iets juridies, maar dit is nog iets denkbeeldig.

Nou wat dit betref dink ek het elkafdoende geantwoord, op die kritiese gedagtes van Rld. Deysel.

Mr. Lewis asked me whether a council or an engineer might be held liable for negligence in a case where standby vehicles in its electricity department had been withdrawn by the municipality for reasons unknown to him, and then an accident occurred subsequently to withdrawal of vehicles.

My answer in this case is in the affirmative. A council and engineer may both be liable in certain cases for negligence. The test is what would a reasonable man have done in the circumstances?

Everything depends on the circumstances of the case. A reasonable man would probably foresee that a standby vehicle is necessary in a case of emergency, and a fatal accident may occur should the

engineer be dependent on another department for his urgent transport.

He should report to the council the potential danger, and if the council would then still fail to remedy the position then the engineer would be absolved and the council would then bear the brunt.

Mnr. die President, dames en here: Dit wil voorkom of ek nou al die vrae wat in my gestel was beantwoord het, volgens die beste van my vermoeë, en ek wil ten slotte alle sprekers bedank vir hulle bydraes.

Baie dankie. (Applous).

THE PRESIDENT: Baie dankie, Raadslid Meyer.

I think from that very instructive paper, ladies and gentlemen, about all we can gather really is that the intricacies of the law are not for simple mortals like the rest of us; the most that we can hope for is that we don't come into too close a personal contact with it!

At this stage, I would like to thank, on your behalf, Clr. Meyer for the tremendous amount of work that he has put into the paper. I have been in fairly close contact with him for the past year, and I know when he wasn't working or sleeping, he was busy on his paper. I don't know when he ate!

Also I would like to thank, on your behalf, the proposer and seconder, and also the people who took part in the discussion; if you would signify your appreciation in the usual way please. (Applause).

We come now to the last of the papers on our Agenda, that of Mr. Prins. Perhaps Mr. Prins would come up to the rostrum.

Mr. F.J. PRINS (S.A. Bureau of Standards): Mr. Chairman, ladies and gentlemen: First I would like to thank the proposer and the seconder to my paper, Mr. Frantz and Mr. Beesley, and also all those who participated in the discussion afterwards.

Coming to the questions: there is first of all the one by Mr. Frantz concerning earthing. We know that in South Africa we have rather bad earthing conditions; we have generally high soil resistivities, and in this respect, probably my best reply would be to refer to the work done by a post office engineer, Mr. Boyce - (actually I think he is now Dr. Boyce).

The only experience we have had in this direction on the Bureau's side is in connection with providing protection against lightning. It would appear that in our country the best way to provide an earthing is not by means of earth rods but trenches. Which means that rather than driving down earth rods into the soil, you bury a conductor in a trench, approximately 2'6" to 3' deep, and in lightning protection we quite often resort to the 'ring earth' where you circle the building to be protected with this conductor.

You can also if the conditions, the terrain, and the area available permit it, take radial feeders away. Quite often we take it from two diagonally opposite corners of a building, and you could also combine the two.

You have to put in quite a bit of copper of course - it is usually the equivalent of about a 19/.083 conductor.

Then Mr. Simpson: Regarding the discrimination between H.R.C. fuses and circuit breakers; there I think the best reply is to refer to the work done by Dr. Einhorn of Cape Town University, published in the proceedings of the I.E.E., October 1959. He also found that apparently the manufacturers of the circuit breakers and the H.R.C. fuses are not in step. It is difficult to combine the two and get proper discrimination. Whether that is done intentionally by the fuse manufacturers so that you would only use fuses, or the circuit-breaker manufacturers so you would use only circuit-breakers, I think we will have to ask the manufacturers!

Mr. Botes raised the question about protection against lightning where you install earth leakage relays. Now, it is well known that the bulk of lightning arrestors on your distribution boards in the country is useless. None of them will really stop a real lightning surge - or for that matter any other surge - the only lightning arrestors that fulfill that function are those that comply with the relevant S.A.B.S. specification.

There are a few makes available; we have three mark holders in the Republic. You can also buy certain imported lightning arrestors that will meet those requirements. Only if you use those arrestors will you be protected. Generally, I think that if you have a proper lightning arrestor, on the board, then you should not have any trouble from lightning or other surges as regards your earth leakage relay.

Mr. Milton mentioned the question about stoves. There two popular types of elements are used; the older one and one that is still used quite often, is one where you have a solid plate and you use a ceramic clay as insulant, and that clay has a negative coefficient of resistance with temperature, with the result that, as the plate becomes hotter, the leakage current will increase.

If you use the tubular type, where they normally use magnesium oxide as insulant, it is the other way round, and as the plate gets hotter, it will bake out and will dry out and improve the leakage current.

This brings me to a question that has been raised in connection with earth leakage relays being a nuisance, that is where people go away on holiday for a couple of weeks, or a month, and they come back and they switch on and the relay comes out.

The trouble is most probably due to the stove in that case, and in all probability due to moisture that has been drawn into the insulation of the cooking plates during the period that they have been away. The

best approach would be to gradually bake out the stove again, not switch on everything at once, but the plates one by one at a low or medium heat, and make sure that they are dry.

Mr. Turnbull raised the question about M.C.B's being mounted sideways. This is apparently a new idea that has come across from America, where to suit their system of wiring with rising mains it is advantageous to mount these circuit breakers horizontally.

When we prepared the specification, and defined the test methods to check compliance with the requirements, I don't think anybody on that committee had ever visualised the circuit breaker being mounted horizontally, and all our testing is carried out with the circuit breakers mounted vertically.

I would therefore not like to express an opinion about horizontal mounting until we have had a chance to check the circuit breakers mounted in that position.

Mr. Heunis mentioned the possibility of replies to the questions dealing with safety raised in the Forum. It is a bit of a tall order. I don't know whether we can help. We can try, but I wouldn't like to promise anything.

Mr. Harvey also raised the question again about isolating transformers. There I would like to make it quite clear that if you use an isolating transformer for the protection of hand tools, you must have one isolating transformer per hand tool to be protected. You cannot run more than one hand tool off one transformer.

We also come back to what I think is a rather important question, raised by Mr. Frantz, concerning portable earth leakage protection units. We are now extending the scope of the specification to cover these units, and we are introducing certain tests to try and make them as safe as possible, the most important of which is the intentional shorting out of the phase and earth conductors on the incoming side. The unit must fail to safety.

As regards the units in use by certain members I would like to point out that initially the Chief Inspector did not approve the portable unit as such, only the relay and breaker, and people who have these portable units, should ensure that the units which they have have been approved as portable units by the Chief Inspector.

We have recently, in the light of the proposed tests and requirements to cover these units, tested some of these units, and the Chief Inspector has approved one or two of them on the strength of these provisional test reports. For guidance I may mention that these will only be effective as from about the second week of May, so any units that were bought before May need checking.

I think that answers the query raised by Mr. Frantz, and with that I would like to say to all the people who participated, and the contributors, "Thank you".

THE PRESIDENT: Thank you Mr. Prins. A great deal of discussion was stimulated by Mr. Prins' paper, and that certainly proved its value, and once again on behalf of the Convention I would like to thank you, Mr. Prins, for the great deal of effort you have put into the paper, and also to the proposer and seconder, and all those who took part in the discussion, and once again will you signify in the usual way please? (Applause).

I am afraid the three authors rather let me down. I thought they would keep us going until half past ten. It is now a quarter past ten. I doubt whether there is any more to discuss until the closing session at 11 a.m. when the ladies will be joining us, and also the Mayor and Mayoress at 10.30 for tea, so I propose to adjourn now, ladies and gentlemen.

CONVENTION ADJOURNED FOR TEA.

CLOSING SESSION.

On resuming at 11.00 a.m.

THE PRESIDENT: Your Worship, Councillor Meyer, Councillor Glenday, ladies and gentlemen:

Unfortunately (or fortunately perhaps) Convention business is still pursuing us - I have a little matter still to deal with before we proceed to the formal closing.

We have a letter which says, "On behalf of all the women's associations who served tea at your Convention, I would like to express our very grateful and sincere thanks for the generous donation of R90." (Yesterday it was R83.40 - it has grown in the meantime). "It was indeed a surprise, but a very welcome one, and I can assure you that the wonderful gesture on your part is greatly appreciated. We trust that you have all enjoyed your stay and that you will leave here with pleasant memories of Windhoek". I understand Clr. Ferry is not satisfied with what he has done so far, and is determined to get this R90. up to R100. and he says if there are any further contributions, he will be pleased to receive them. (Applause).

Now before we proceed with the formal business, I want to apologise on behalf of our Vice President, Mr. Murray Nobbs. He had to leave early this morning to get back to some pressing business in Port Elizabeth so he is not with us.

One other item I would like to mention at this stage, as many of you know, the SANCCI Convention will be held next year in Port Elizabeth, the week before the A.M.E.U. Convention and the President, Mr. Jack Downey, has extended a very cordial welcome to any members of the A.M.E.U. to attend that convention if they happen to be in Port Elizabeth.

Our next item is to ask Clr. Meyer, of Welkom, to thank the Mayor and Council of Windhoek for the hospitality extended to us.

Councillor W.F. MEYER (Welkom): Mr. President, Mr. Mayor, ladies and gentlemen; My function to thank His Worship the Mayor of Windhoek and the city for their hospitality is a very pleasant one. I will start off by mentioning the welcome at the Zoo Park the other night. I think I must congratulate them on the beautiful setting there, the pleasant music, and refreshments served, and especially the curry and rice which came at an opportune moment. We thoroughly enjoyed it.

Verder is daar die besoeke aan verskillende plekke, die fabrieke en die installasies en ander besinswaardighede wat deur ons baie waardeer is. Ons het dit geniet, ons het die besoeke baie vrugbaar gevind, leersaam en nuttig. Ons wil ook vir Raadslid Davis baie dankie sê vir sy baie interessante praatjie oor Suidwes-Afrika die ander aand, en die film vertoning wat daar plaasgevind het.

It was immensely enjoyed by everyone present. Furthermore on behalf of the Convention, I would like to thank His Worship the Mayor, the Mayoress, councillors and officials of this municipality for all your hospitality, your very efficient organisation of the arrangements of this Convention. I must congratulate your Town Clerk and his crew for what they have done to make our stay a pleasant and a memorable one.

Wat die uitstappie van gisteraand betref wil ek die Stadsraad van Windhoek en Okahandja bedank, en geluk wens met die groot sukses wat dit was. Almal van ons het dit besonderlik geniet en ontslae geraak van menige inhibisies. Ons het al die 'Sinkenhegers' en kleine-kleines daartoe bygedra om 'n aangename en heerlike atmosfeer te skep. Hulle het heerlik gelag en heerlik geëet, en dit het onse gevoelens baie goed gedoen.

Ek dink ons moet aan Windhoek en sy mense 'n hartelike applous gee vir die wonderlike tyd wat ons hier gehad het.

Namens my stadsraad baie dankie vir die aangename samewerking met Windhoek in hierdie Kongres. En baie hartlike applous vir al die liefde en vriendelikheid en gemoedelikheid wat ons hier gevind het. Baie dankie. (Applous).

THE PRESIDENT: Baie dankie, Raadslid Meyer.

We come now to a vote of thanks to the Town Council of Welkom, and Councillor Glenday of Windhoek is going to propose it.

Councillor R.P. GLENDAY (Windhoek):

Mr. President, Mr. Mayor, ladies and gentlemen: No-one will deny that this Convention has been a memorable one. On the business side our joint hosts, the Town Council of Welkom, have done an admirable job of organisation. Our President has been an example of quiet efficiency throughout the proceedings. If at times his Chair of office became slightly electrified, he took the shocks, but never allowed the Convention as a whole to become shocking.

One of the constitutional changes arising out of this Convention, namely the election of President-Elect in the future, is, to my mind, a worthwhile improvement, and that will be more fully realised in years to come.

Another very worthwhile thing which appears to be happening (it is not yet finalised, but it certainly has been proposed, and looks as if it will come), and that is the question of the proceedings being printed in both languages. I think that is a step in the right direction, and I am quite sure this Convention will be memorable from that point of view.

There have been many nice things said about Windhoek during the past few days, and we appreciated all these kind remarks, but I would like to say something about Welkom. Welkom is probably unique in its record of town planned growth, and I think it could safely be said that Welkom is the leader in South Africa and certainly the leader in the field of new towns which have been properly planned from their inception. Welkom became a local authority only eleven short years ago, in 1953, and I think it shows fantastic growth; they today have a population of 35,000 whites, and I understand a total population of 80,000 non-whites, and in eleven years that is fantastic growth by any standards.

In addition they are financially in a very, very sound position, in fact the only reason why this convention could not have been held in Welkom is, I understand, the present lack of sufficient hotel accommodation. I don't think it is going to take Welkom very long to overcome that hurdle, and we will look forward to a convention in Welkom soon.

I was rather pleased to hear that Clr. Meyer, the Deputy Mayor of Welkom, (we have all heard that he was born in Karibib and is an old South-Wester), but I was very pleased to hear that he spent 18 days prior to this convention travelling around South West Africa, and he determined that he was going to look up every one of his old friends, and rather remarkably he tells me he actually made contact with every one of them. In doing so he travelled 3,500 miles. That, to my mind, Clr. Meyer, is indeed a fine ambassador for us to have to send back to Welkom in the Republic.

Dames en here, dit is my voorreg om namens die Windhoek Stadsraad, en die mense van Windhoek, die Stadsraad van Welkom baie hartlik te bedank vir hierdie aangename Konvensie. Dankie. (Applous).

THE PRESIDENT: Thank you, Councillor Glenday.

At this stage we have a very pleasant change in the routine, the charming Mayoress of Windhoek is

going to address us. (Applause).

Mrs. O. LEVINSON (Mayoress of Windhoek):

Mr. President, Mr. Mayor, ladies and gentlemen: This has come as a complete surprise to me, and when Mr. Ewing spoke to me with a conspiratorial air outside, I was under the impression that you were going to make a very kind donation to me to give to my favourite charity, and I said that I would be only too happy to accept it and to then say a few words to you, but it was never my intention to address you! But now that I am here, I think no lady can forego the opportunity of talking, and so I shall talk!

I must say that your ladies have given me this charming gift towards my favourite charity, and I need not tell you what that favourite charity is - the Arts Association of Windhoek, and I feel that like the famous French archaeologist, who said about archaeology, "Archaeology is a beautiful girl, but she has no dowry". So too with the arts - she is a beautiful girl - but no dowry!

So you will realise how very much I appreciate the kindness of the ladies in giving this gift to me, and I have told them I will have a little plaque put on whatever it is (I don't know what it is yet), but whatever I am able to buy I will have the plaque put on, and I am most grateful.

I can only tell you it was a wonderful experience meeting you all here. I think the gentlemen are charming the ladies are delightful and I feel that we have really made some good friends. It is only sad to think that we shall part, but I am optimistic enough to believe that we shall see some of you here again. I truly hope that this will be the case. As a matter of fact, Mr. Milton touched me deeply this morning, when he said to me that in all his 40 years of attending conventions, he had never received such hospitality as he has received in Windhoek. (Applause).

This really touched me deeply, and I can assure you that we appreciate your warm response most sincerely. I had the great pleasure of trying to do something to entertain the ladies, and we organised the mannequin parade. (I was hoping some of the gentlemen would play 'hookey' as was suggested, but you didn't do so). And afterwards I took some of the ladies to a furrier. I myself always go into the furrier optimistically, and come out misty optically!

I did suggest to the ladies a certain plan for obtaining money on credit from their husbands in order to buy some of these wonderful furs and jewels. I told them the story of the lady who said to her husband, "Will you lend me R20 but only give me R10 of it, and then I will owe you R10 and you will owe me R10, and so we'll be quits!"

I don't know if any of the ladies have tried this out, but I am sure their husbands would be most impressed by their business acumen.

In any case I should like to say that on our part, the part of my husband, the Mayor, and the council and the municipality of Windhoek, we have so enjoyed having you here, and we quite envy Port Elizabeth the opportunity of having you there next year. You may have observed how we arranged the weather to be especially lovely to please you and not cause you any inconvenience; and I might mention to you that having this power to divert the rains and cause the sun to shine and the wind not to blow, we have also arranged that when your flights take off the wind will blow, and you will not be able to take off, because we should like to keep you here with us much, much longer.

In the meanwhile we would just like to say to you, "We hope this is not goodbye; though we say 'goodbye', 'totsiens' and 'auf weidersein' but we truly hope that we shall see you all again."

Thank you. (Applause).

THE PRESIDENT: Thank you, Madame Mayoress. Last night at Okahandja, I said (so I'm told!) that some day in some way we would all find our way back to Windhoek. After listening to you I can only say that we will do that very much more quickly than we first thought!

Next we have Councillor Mrs. Davis to express appreciation on behalf of the ladies. (Applause).

Councillor MRS. P.E. DAVIS (Benoni): Mr. President, and Mrs. Barton, His Worship the Mayor and Mayoress, ladies and gentlemen: I am sure that you will all agree that I have the most pleasant duty, and I know that there will not be one note of discord, when I express, on behalf of all the women a very sincere thank you to our host and hostess, His Worship the Mayor, Councillor Levinson, and his very charming and most attractive wife, and very capable as you heard just now. For an impromptu speech, Madame Mayoress, I think it was excellent!

I would like to express our thanks to the Mayor, and to the councillors and officials and people of Windhoek for the wonderful week of hospitality we have all enjoyed in this most historical and interesting town.

I am amazed, however, at the extent to which the administration builds in this town. Why, even your Old People's Home ... I am worn off to the knees crawling around Benoni looking for money to build our Old People's Home and here you get the administration to build it. The Transvaal will be in for a lot of trouble when I get back - and I advise the other provinces to do the same.

This invitation to Windhoek was made possible by the very kind invitation extended to the A.M.E.U. by Councillor Davis of Windhoek (such a common name - 'Davis' - I got a nice call yesterday which was meant for him.) at the Margate Conference. Clr. Davis and his good lady have also gone out of their way to help make this visit to Windhoek a memorable one. They even acted as unpaid guides on the bus tour yesterday. Thank you, Mr. Mayor, and your wife, for the delightful civic cocktail party in such a beautiful setting. Thank you, Madame Mayoress, for the exciting mannequin parade. I hope some husbands' pockets are going to be very much lighter. The furs were too beautiful ...

The film show was most interesting, revealing and thought-provoking. How little most of us really know about our neighbours. Clr. Sam Davis made it doubly interesting through his knowledgeable commentary. The tours

around your amazing town with its mixtures of historical and modern architecture were delightful. The highlight, of course, for the women, was the visit to your home and castle, Mr. Mayor. Here your charming wife gave us a delicious tea and told us the romantic history of the castle, described all the beautiful paintings and furniture - we were green with envy. It really was most interesting.

There was one flaw, however. I found - there I stood in this glorious and romantic castle, with a lot of women around me. It was such a shame. Even at my age I could still feel romantic.

The grand finale last night, the braaivleis, was out of this world, and obviously enjoyed to the last sosatie and kleine-kleine - that is if you have the nerve to try the kleine-kleine!

We would also like to express to the secretary, Mr. Ewing, our thanks for all the hard work he did to ensure trouble- and worry-free travel to Windhoek, and our accommodation, and to Mrs. Ewing for the pleasant and happy knack of also smoothing out our little problems - if there were any. And many thanks to Miss Brewin for her assistance at all times.

The teas - well I had lost 4 lbs. before I came here and I was trying to make it up again, but I think I have gained double. We say a very big 'thank you' to those wonderful hard-working women who supplied the delectable teas and cakes; their contribution was really outstanding. And here, Mr. Mayor, you also fell down on your job. You said you were modest, but you had the biggest this in Windhoek, and the biggest that in Windhoek, but you didn't tell us that you had the most wonderful women. Of course, that is just like a man, isn't it ladies?

The women can always rise to the occasion. I personally found the conference most interesting, and stimulating in every way.

In conclusion, Mr. President, may I personally extend my thanks and appreciation for all the hard work put into the smooth running of the A.M.E.U. by the Past President, Mr. Downey and his Executive, and all the members. One swallow doesn't make a summer, and you all have to pull together otherwise you just don't have a happy conference, or a good year of work.

I wish, to you, sir, Mr. Barton, and the newly elected Executive, and all the members, a happy and successful year.

Namens die Afrikaanse dames wat hier is, Mnr. die Burgemeester en u gade, en die Raadslede en publiek van Windhoek, kan ek u verseker dat al die dames hier het elke ding wat ons gesien het dit hoogste op prys gestel. Ons het alles so geniet, en dit was rerig wonderlik.

Baie dankie, Mnr. Burgemeester, en u gade weer; dankie Mnr. die President; en al u lede van die V.M.E.O. en al die publiek van Windhoek. Dit was 'n wonderlike week - 'n week wat ons nooit sal vergeet nie. Baie dankie. (Applause).

THE PRESIDENT: Thank you Clr. Mrs. Davis, for that very charming and humourous address.

We come now to Mr. Stanley, who is going to speak on behalf of the affiliates.

Mr. D.W. STANLEY (Johannesburg):

Mr. President, Your Worship, Clr. Meyer, ladies and gentlemen: You who were at the Convention last year and heard John Morrison's tour de force will understand with what diffidence I agreed to the suggestion that I should accept this task.

However, that does not lessen my pleasure, nor my sincerity in offering thanks from the Affiliates to all who have made this, your 38th Convention, such a very pleasurable one for us.

They were having a Bird Show and there was a big parrot section, and they decided to offer a prize for the parrot who, when its cover was removed, would make the best saying. The prize was won by a parrot towards the end of the line; when they took the cover off its cage it took a look around and said, 'What a damn'd lot of parrots!"

I tell that rather silly story to give me the chance to say that we have had no parrot talk this week. Far from it, the lively and at times contentious discussions, show that your Association is still very much a live one.

Our thanks to you and your members for inviting us to attend this Convention. Our gratitude to the municipalities of Windhoek and Welkom for the unbounded hospitality we have received. We have been made most comfortable and entertained right royally!

I would like to express special thanks to Mr. Ewing and Miss Brewin and their staff who have ensured that everything went smoothly for us, and that we were in the right place at the right time.

Also I must support Mrs. Davis' thanks to those kind ladies who so promptly and plentifully plied us with tea and good things to eat during our intervals for refreshment.

Windhoek, Welkom, and A.M.E.U.,
We've had a delightful time - thanks to you.
We have listened intently to erudite papers
And watched your delegates cutting their capers.
A mayoral reception with music and food
Liquid refreshment by fires fed with wood;
A power station, engine sheds, beer, milk and meat
There was nothing to stop us except our poor feet.
A Zoo and a Braaivleis in country Herero
And sunshine enough to require a sombrero;
As I'm not Peggy Mitchell I've run out of rhymes,
So I'll just say again, "Thanks - a thousand times".

Mr. President, may I wish you and your Council a very successful year of office. (Applause).

THE PRESIDENT: Thank you very much indeed, Mr. Stanley. I am sure you will all agree with me that Mr. Stanley is a very worthy successor to John Morrison.

Councillor N.P. RADEMEYER (Port Elizabeth):

Mr. President, Mr. Mayor, ladies and gentlemen: On behalf of my Council I want to thank you for accepting our invitation to come to Port Elizabeth next year.

I can assure you, Mr. President, that we will make every endeavour to make it a happy stay. After talking to the representative of Uitenhage, which is our neighbouring town, and a very fast-growing one, I think they are going to join in and try to make a happy stay for you. We are very delighted that you have accepted it.

Mr. President, apart from Conventions, should anybody ever want to go for a nice holiday ... (laughter) ... I can assure you that Port Elizabeth is the nicest place in the Southern Hemisphere whether it is for holiday or for business. (Applause).

THE PRESIDENT: Thank you, Clr. Rademeyer. I was in some doubt as to whether to allow that little bit of advertising... but I know from personal experience that every word that you said was perfectly true.

Are there any further members who would like to speak at this stage?

Mr. G.C. MOLYNEUX (Rhodesian Railways): Mr. President, Mr. Mayor, ladies and gentlemen: I would like to thank you, Mr. President, for the many kind invitations I have had to these Conventions. I am retiring in October this year, and I would like to take the opportunity, sir, of thanking you for the hospitality and the courtesy I have always received at these Conventions. I will always look back with a great deal of pleasure on the very many occasions I have been with you, and I take the opportunity, sir, of wishing you and the Association well in the years to come. (Applause).

THE PRESIDENT: Thank you, Mr. Molyneux. May I wish you, on behalf of us all, a very happy retirement, and I sincerely hope that this is not the last Convention that you will attend. (Applause).

Is there anyone else at this stage? If not, we come now to a bitter-sweet duty. It is very pleasant in one way because we are going to honour two of our very old members, and on the other hand we are going to say 'goodbye' to them.

I refer, of course, to Mr. Muller of Bloemfontein and Mr. Kane of Johannesburg.

There is no need to elaborate. I am sure you all know both of these gentlemen and their careers. They have been with us for so long that we have become used to them. In fact, one can't think how we will ever do without them, and certainly their wisdom, and their humour, we will miss at Executive Meetings. I sincerely hope that we will have the benefit of their wisdom and humour at our Conventions.

First of all their is a formality. The Executive has decided to honour these gentlemen for their very long and excellent service to this Association by making them Honorary Members. I must ask the Convention to approve that, if they will do so please. (Applause).

Before I ask them to come up and receive their certificates and medals, we did the same for Jack Downey another old stalwart, on the opening day, and unfortunately I omitted to get the Convention's approval for this Honorary Membership. I hope you will do that now, please. (Applause).

It is a sad blow to the Association to lose the services of three such stalwarts. I think for many years they were the backbone of this organisation. They have laid a wonderful foundation, and I hope that the rest of us will be able to live up to the very great tradition which they have established.

One could go on in this vein for an hour, but I think it will all boil down to a few words, and those are, "Well done, gentlemen - and thank you." (Applause).

I will now ask Mr. Muller to come up for his certificate and medal please.

(Mr. G.J. MULLER accepted his certificate and medal). (Applause).

Mr. G.J. MULLER (Bloemfontein): Mnr. die Voorsitter, 'n mens voel so 'n bietjie oorweldig as soiets jou oorkom. Ek sou miskien heelwat meer kan sê - but perhaps I should point out that I visited the Game Reserve just before coming down, and there I noticed something which I would like to use as a comparison.

The lion feast. There were two types of animals on the periphery. The jackals and the old lion. Up till now I felt myself in the position of a jackal. Mr. President, with the help of the Convention, you have now elevated me to the status of the old lion. Unfortunately they have gone and shot him ... (Applause and laughter).

THE PRESIDENT: Thank you Mr. Muller.

Now would Mr. Kane come up please.

(Mr. R.W. KANE accepted his certificate and medal). (Applause).

Mr. R.W. KANE (Johannesburg): Mr. President, Mr. Mayor and Madame Mayoress, ladies and gentlemen: I notice that both Bob Barton and Mr. Muller made use of the word "old". Bob referred to "old member" and I take some exception to that. I think if he said "A member of long standing" it would have sounded a lot nicer.

I do want to thank you for the honour which you have done me. I have had a lot of fun and pleasure, and I think, along with a few of the Reef members, we appreciate (and I certainly do appreciate) what goes on in the background in running this Association. With our contact with Dick Ewing and his staff, we really appreciate the hard work, minor irritations, and work that takes place. I do wish you all the very best for the future.

There is just one thing I have to be careful about. I have noticed over the years a man by the name of Milton - he and I have always quarrelled. He found it very difficult to stick to "Milton - Honorary Member". Occasionally he said, "Milton - Escom". He doesn't say which Escom, he just merely says "Escom", and I am looking forward to the time that I will remember to say "Kane - Honorary Member" and not "Johannesburg". I hope I will do better than he has ever done! (Applause).

THE PRESIDENT: Thank you Mr. Kane.

It now remains for me to record my personal thanks. I will do it very quickly, because I know you are anxious to get away, and there is quite a long list.

Yes, Mr. Lombard?

Mr. C. LOMBARD (Germiston): Mr. President, Mr. Mayor, ladies and gentlemen: On behalf of all the delegates I should like to thank you, Mr. President, for the manner in which you have handled and conducted this Convention. (Applause). We realise only too well how much hard work has been done behind the scenes to enable you to fulfill your duties, and although Mr. President, you must have felt at times you were occupying the hot seat at Sing Sing, I am sure that once you reach home, and you think back, you will realise the seat was only comfortably warm!

Mnr. die President, ons besef al te goed dat aan die sy van elke man staan sy vrou, en in u geval weet ons hoe 'n groot bydra Mev. Barton gelewer het om u in staat te stel om die Konvensie so 'n groot sukses te maak.

Ons beste wense vir gesel u en u gade op die terug reis na Welkom. Dankie. (Applous).

THE PRESIDENT: Baie dankie, Mnr. Lombard. My vrou en ek waardeer u woorde baie.

First of all I would like to extend my personal thanks to the Mayor of Windhoek, and his charming lady for all they have done for us and all the hospitality.

I would like to thank the authors of the papers, the proposers, and seconders, and the people who took part in the discussions. I would like to thank the members of the Executive for their support, because this, as has been said, is a team effort. One man couldn't possibly do it alone.

I would like to say a special word of thanks to Mr. Ewing and his staff who were responsible for the business organisation of the conference, and as usual they did a magnificent job of work.

I would like to thank the Town Clerk, Mr. Arnold, the Town Electrical Engineer, Mr. Lewis, and their staffs, for all the very hard work that they have put into making this a very successful and pleasant stay for us. I would like to mention particularly Mr. Human, whom I don't think has slept during the last couple of weeks, and all those behind the scenes who took part.

I would like to thank the Shell Company and their staff, the ladies at the desk outside, for all the arrangements. There is also Mr. Horn, the sound recording equipment expert who has been with us all the time. He must have wondered in just which direction things were coming more than once!

Then, again, the tea ladies for all they did for us.

I think I have included everyone, except last, but certainly not least - my wife, who has been a great comfort to me, as always.

Then I would like to say it has been a great privilege to serve you all as President. I think the standard of the Conference, both the technical side and the social side, has been of a very high order, and I am very pleased indeed that it is finishing on a much happier note than that on which it started.

And finally I would like to say that next year's Conference will be the Association's jubilee year, and Port Elizabeth will also be having a jubilee year, so it should be a very happy occasion indeed, and I know that our President-Elect, Mr. Murray Nobbs, will see to it that it is so.

With that we come to the end of our proceedings. I would like to wish all delegates a very comfortable and safe journey to their homes, and I say, „Totsiens almal, auf weidersein".

This Convention is now closed.

CONVENTION ADJOURNED.

AMENDMENTS TO CONSTITUTION ADOPTED AT THE 38th ANNUAL CONVENTION HELD AT WINDHOEK.

CLAUSE 6. MEMBERS AND AFFILIATES.

Add the following new sub-clause:-

(a) 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 number of representatives as may be fixed by the Executive Council, but such representatives shall not be entitled to vote.

CLAUSE 7. QUALIFICATIONS OF MEMBERS.

Item (2) (iii): Delete the letter (a) and delete sub-clause (b) in its entirety.

Additional Item 7 (2) (v): 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 apply for retired membership.

CLAUSE 9. MEMBERSHIP CONTRIBUTIONS.

Item (4): Include the words "retired Members" in the first line between "associates" and "and".

Item (5): Between "members" and "and" add "associate undertakings".

Item (7): Between "member" and "or" insert the words "associate undertakings".

Item (8): Between "affiliates" and "shall" insert" and associate undertakings".

Where Vice-President is referred to substitute "President Elect" in:
CLAUSE 12,
CLAUSE 13,
CLAUSE 14 (ii),
CLAUSE 15 (1) and
CLAUSE 17 (3).

WYSIGINGS AAN GRONDWET AANGENEEM TYDENS 38ste JAARLIKSE KONVENSIE GEHOU TE WINDHOEK.

ARTIKEL 6. LEDE EN GEAFFILIEERDES.

Voeg in die volgende nuwe sub-artikel:-

(a) 'n Gemagtigde elektrisiteitsonderneming, ander as 'n onderneming soos omskrywe in Klousule 1, besig met die verskaffing van elektrisiteit in die gebied van 'n plaaslike bestuur, mag toegelaat word tot die status van geassosieerde onderneming. Sodanige geassosieerde ondernemings sal geregtig wees om by die Konvensie verteenwoordig te wees deur 'n sodanige getal verteenwoordigers as die Uitvoerende Raad mag wasstel, maar sodanige verteenwoordigers sal nie geregtig wees om te stem nie.

ARTIKEL 7. KWALIFIKASIES VAN LEDE.

Artikel (2) (iii): Skrap die letter (a) en skrap sub-artikel (b) in sy geheel.

Addisionele Item 7 (2) (v): Afgetrede Lede.

Ingeval 'n ingenieur lid of 'n geassosieerdelid aftree by bereiking van die ouderdomsgrens en nie in diskrediet is nie, en 'n lid was van die Vereniging vir 'n periode van nir minder as 20 jaar nie, mag hy aansoek doen om as afgetredelid aan te bly.

ARTIKEL 9. LIDMAATSKAP-BYDRAES.

Artikel (4): Voeg in die woorde "afgetredelede" in die eerste lyn tussen die woord "geassosieerdes" en "en".

Artikel (5): Tussen "lede" en "en" voeg in "geassosieerde ondernemings".

Artikel (7): Tussen "lid" en "of" voeg in "geassosieerde ondernemings".

Artikel (8): Tussen "geaffilieerdes" en "moet" voeg in "en geassosieerde indernemings".

Waar na "Vise-President" verwys word vervang met "Aanstaande President" in:
ARTIKEL 12,
ARTIKEL 13,
ARTIKEL 14 (ii),
ARTIKEL 15 (1) en
ARTIKEL 17 (3).

NOTICE OF 38TH ANNUAL CONVENTION.

Notice is hereby given that the 38th Annual Convention of the Association will be held in the Arts Theatre, Leutwein Street, Windhoek from the 19th MAY, to the 22nd MAY, 1964, both days inclusive.

DAVIDSON & EWING (PTY) LTD.

per: R. G. EWING.

Secretaries.

AGENDA AND PROGRAMME.

MONDAY, 18TH MAY, 1964.

9.30 a.m. - 4.30 p.m.	Meeting of Executive Council (Grant Hotel).
7.30 p.m.	Civic Reception at Zoo Gardens, Kaiser Street.

TUESDAY, 19TH MAY, 1964.

9.00 a.m.	Registration.
9.30 a.m.	Welcome to Windhoek by His Worship the Mayor of Windhoek.
	Welcome to the Convention by His Worship the Mayor of Welkom.
	Official opening of the Convention by the Administrator of South West Africa, His Honour, Mr. W.C. du Plessis.
	Election of President.
	Venue of next Convention.
	Election of Vice-President.
10.45 a.m.	Refreshment Interval.
11.15 a.m.	Apologies and Greetings.
11.30 a.m.	Presentation of Past President's and Honorary members' medals and certificates.
11.40 a.m.	Election of Executive Council.
11.50 a.m.	Presidential Address.

KENNISGEWING VAN DIE 38STE JAARLIKSE KONVENSIE

Hiermee word kennis gegee dat die 38ste Jaarlikse Konvensie van die Vereniging van 19 tot 22 Mei, 1964, in die Kunsteater, Leutweinstraat, Windhoek, gehou sal word.

DAVIDSON & EWING (EDMS.) BPK.

per: R. G. EWING.

Sekretarisse.

MAANDAG, 18 MEI, 1964.

9.30 v.m. - 4.30 n.m.	Vergadering van Uitvoerende Raad. (Grand Hotel).
7.30 n.m.	Burgelike Onthaal, Dieretuin, Kaiserstraat.

DINSDAG, 19 MEI, 1964.

9.00 v.m.	Registrasie.
9.30 v.m.	Verwelkoming in Windhoek deur Sy Edelagbare die Burgemeester van Windhoek.
	Verwelkoming op Konvensie deur Sy Edelagbare die Burgemeester van Welkom.
	Amptelike Opening van Konvensie deur die Administrateur van Suid-wes Afrika, Sy Edelagbare Mnr. W. C. du Plessis.
	Verkiesing van President.
	Vergaderplek van volgende Konvensie.
	Verkiesing van Vise-President.
10.45 v.m.	Verversings.
11.15 v.m.	Verskonings en Groete.
11.30 v.m.	Presentasies van Oud-President en Erelede se Medaljes en Sertifikate.
11.40 v.m.	Verkiesing van Uitvoerende Raad.
11.50 v.m.	President se Rede.

12.45 p.m.	Luncheon Adjournment.	12.45 n.m.	Verdaging vir Middagete.
2.30 p.m.	Paper: "PSYCHOLOGICAL ASPECTS OF PRODUCTIVITY" by Dr. A. Vlok, D. Phil. University of South Africa.	2.30 n.m.	Referaat: „SIELKUNDIGE ASPEKTE VAN PRODUKTIWITEIT" deur Dr. A. Vlok, D. Phil. Universiteit van Suid Afrika.
3.30 p.m.	Refreshments.	3.30 n.m.	Verversings.
4.00 p.m.	Discussion on paper.	4.00 n.m.	Bespreking van Referaat.
4.45 p.m.	Adjournment.	4.45 n.m.	Verdaging.
5.00 p.m.	Meeting of Executive Council (Grant Hotel).	5.00 n.m.	Vergadering van Uitvoerende Raad (Grand Hotel).
8.15 p.m.	Film and Slide Show of South West Africa. (Arts Theatre).	8.15 n.m.	Film en Kleurskyfie Vertoning van Suidwes Afrika. (Kunsteater).

WEDNESDAY, 20TH MAY, 1964.

WOENSDAG, 20 MEI, 1964.

9.30 a.m.	Convention resumes. Communications from Council. Paper: "SOME ASPECTS OF POWER CABLES IN UNDERGROUND DISTRIBUTION" by I. L. Hobbs - Town Electrical Engineer - Virginia.	9.30 v.m.	Konvensie word hervat. Mededelings van Raad. Referaat: „ENIGE ASPEKTE VAN KRAGKABELS IN ONDERGRONDSE VERSPREIDING" deur I. L. Hobbs - Stads Elektriese Ingenieur, Virginia.
10.30 a.m.	Refreshment Interval.	10.30 v.m.	Verversings.
11.00 a.m.	Discussion on papers.	11.00 v.m.	Bespreking van Referate.
12.45 p.m.	Luncheon Adjournment.	12.45 n.m.	Verdaging vir Middagete.
2.30 p.m.	Alternative visists to Municipal Power Station; Damara Meat Packers; Windhoek Brewery; Municipal Milk Pasteurisation Plant; Municipal Sewage Purification Plant.	2.30 n.m.	Alternatief besoeke aan Munisipale Kragsentrale; Damara Vleispakkers; Windhoek Brouery; Munisipale Melk Pasteuriseerinligting; Munisipale Rioolvuilwerke.
8.15 p.m.	Members' Forum.	8.15 n.m.	Lede-forum.
10.15 p.m.	Refreshments.	10.15 n.m.	Verversings.

THURSDAY, 21ST MAY, 1964.

DONDERDAG, 21 MEI, 1964.

9.30 a.m.	Convention resumes. Communications from Council. Annual Report of Secretaries. Appointment of Auditors.	9.30 v.m.	Konvensie word hervat. Mededelings van Raad. Jaarlikse verslag van Sekretarisse. Aanstelling van Ouditeure.

	Discussion on Reports of Sub-Committees and Representatives.		Bespreking van Verslae van Onderkomitees en Verteenwoordigers.
10.30 a.m.	Refreshment Interval.	10.30 v.m.	Verversings.
11.00 a.m.	Paper: "RESPONSIBILITY OF COUNCILLORS AND ENGINEERS UNDER THE GENERAL LAWS AND CERTAIN STATUTES" by Dr. W.F. Meyer B.A., L.L.B.	11.00 v.m.	Referaat: „AANSPREEKLIKHEID VAN RAADSLEDE EN INGENIEURS ONDER DIE GEMENEREG EN SEKERE STATUTE", deur Raadslid W.F. Meyer, B.A., L.L.B.
	Discussion on Paper.		Bespreking van Referaat.
12.45 p.m.	Luncheon Adjournment.		Bespreking van Referaat.
		12.45 n.m.	Verdaging vir Middagete.
2.30 p.m.	Paper: "LOW TENSION DISTRIBUTION PROTECTION" - Mr. F.J. Prins B.Sc. (Eng.) - South African Bureau of Standards.	2.30 n.m.	Referaat: „BESKERMING IN LAE SPANNING VERSPREIDING" deur F.J. Prins B.Sc. (Eng.) S.A. Buro van Standaarde.
	Discussion on Paper.		Bespreking van Referaat.
3.45 p.m.	Adjournment.	3.45 n.m.	Verdaging.
4.30 p.m.	Departure for Okahandja (Visit to Game Park followed by informal Braaivleis).	4.30 n.m.	Vertrek na Okahandja (Besoek aan Wildtuin gevolg deur informele Braaivleis).

FRIDAY, 22ND MAY, 1964.

VRYDAG, 22 MEI, 1964.

9.30 a.m.	Convention resumes.	9.30 v.m.	Konvensie word hervat.
	Discussion on papers, reports, etc.		Bespreking van Referate, Verslae, e.d.m.
10.30 a.m.	Refreshments.	10.30 v.m.	Verversings.
11.00 a.m.	Closing Session.	11.00 v.m.	Afsluiting.
12.15 p.m.	Meeting of Executive Council (Grand Hotel).	12.15 n.m.	Vergadering van Uitvoerende Raad (Grand Hotel).
2.30 p.m.	Alternative visits as per Wednesday afternoon.	2.30 n.m.	Alternatief Besoeke soos Woensdag namiddag.

FRIDAY EVENING.

Light entertainment and farewell to delegates.

Delegates who have a particular interest in Semi-Precious stones, and would like to take the opportunity when in Windhoek of seeing certain private collections, are advised to communicate directly with Mr. B.M. Kemmey, P.O. Box 2150, Windhoek, prior to the Convention in this connection.

VRYDAGAAND.

Ligte vermaaklikheid en afskeid van afgevaardigdes.

Afgevaardigdes wat besonder belang stel in half-edelstene, en miskien van die geleentheid gebruik wil maak, om terwyl in Windhoek, sekere privaat versamelings te sien, moet asseblief voor die Konvensie in hierdie verband met Mnr. B.M. Kemmey van Posbus 2150, Windhoek, in verbinding tree.

LADIES' PROGRAMME.

MONDAY, 18TH MAY, 1964.

7.30 p.m.	Civic Reception at Zoo Gardens, Kaiser Street.

TUESDAY, 19TH MAY, 1964.

9.00 a.m.	Registration.
9.30 a.m.	Welcome to Windhoek by His Worship the Mayor of Windhoek.
	Welcome to the Convention by His Worship the Mayor of Welkom.
	Official Opening of the Convention by His Honour the Administrator of South West Africa - Mr. W.D. du Plessis.
	Election of President.
	Venue of next Convention.
	Election of Vice-President.
10.45 a.m.	Refreshment Interval.
11.15 a.m.	Apologies and Greetings.
11.30 a.m.	Presentation of past Presidents' and Honorary Members' medals and certificates.
11.40 a.m.	Election of Executive Council.
11.50 a.m.	Presidential Address.
12.45 p.m.	Luncheon Adjournment.
8.15 p.m.	Film and Slide Show of South West Africa. (Arts Theatre).

PROGRAM VIR DAMES.

MAANDAG, 18 MEI, 1964.

7.30 n.m.	Burgelike Onthaal, Dieretuin, Kaiserstraat.

DINSDAG, 19 MEI, 1964.

9.00 v.m.	Registrasie.
9.30 v.m.	Verwelkoming in Windhoek deur Sy Edelagbare die Burgemeester van Welkom.
	Verwelkoming op Konvensie deur Sy Edelagbare die Burgemeester van Welkom.
	Amptelike Opening van Konvensie deur die Administrateur van Suid-Wes Afrika, Sy Edelagbare Mnr. W.C. du Plessis.
	Verkiesing van President.
	Vergaderplek van volgende Konvensie.
	Verkiesing van Vise-President.
10.45 v.m.	Verversings.
11.15 v.m.	Verskonings en Groete.
11.30 v.m.	Presentasies van Oud-President en Erelede se Medaljes en Sertifikate.
11.40 v.m.	Verkiesing van Uitvoerende Raad.
11.50 v.m.	President se Rede.
12.45 n.m.	Verdaging vir Middagete.
8.15 n.m.	Film en Kleurskyfie Vertoning van Suidwes Afrika. (Kunsteater).

WEDNESDAY, 20TH MAY, 1964.

10.00 a.m.	Mannequin Parade by courtesy of the S.W.A. Karakul Board. (Continental Hotel).
2.30 p.m.	Alternative visists to Windhoek Power Station; Damara Meat Packers; Windhoek Brewery; Municipal Milk Pasteurisation Plant; Municipal Sewage Purification Plant.
8.15 p.m.	Members' Forum.

THURSDAY, 21ST MAY, 1964.

10.00 a.m.	Drive around town. Morning tea at South West Africa House - official residence of the Administrator of South West Africa.
4.30 p.m.	Departure for Okahandja (Visit to Game Park followed by informal braaivleis).

FRIDAY, 22ND MAY, 1964.

10.30 a.m.	Assemble for tea and closing session.
2.30 p.m.	Alternative visits as per Wednesday afternoon.

EVENING.

Light entertainment and farewell to delegates.

WOENSDAG, 20 MEI, 1964.

10.00 v.m.	Mannekyn Parade aangebied deur die S.W.A. Karakul Raad (Continental Hotel).
2.30 n.m.	Alternatief besoeke aan Munisipale Kragsentrale; Damara Vleispakkers; Windhoek Brouery; Munisipale Melk Pasteuriseerinligting; Munisipale Rioolvuilwerke.
8.15 n.m.	Lede-forum.
10.15 n.m.	Verversings.

DONDERDAG, 21 MEI, 1964.

10.00 v.m.	Plesierrit deur die stad. Oggendtee by Suidwes Afrika Huis, offisiële woning van die Administrateur van Suidwes Afrika.
4.30 n.m.	Vertrek na Okahandja (Besoek aan Wildtuin gevolg deur informele Braaivleis).

VRYDAG, 22 MEI, 1964.

10.30 v.m.	Vergader vir tee en Afsluite.
2.30 n.m.	Alternatief besoeke soos Woensdag namiddag.

VRYDAGAAND.

Ligte vermaaklikheid en afskeid van afgevaardigdes.

PSYCHOLOGICAL ASPECTS OF PRODUCTIVITY

Dr. A. Vlok, D. Phil., University of South Africa.

INTRODUCTION.

Industrial Psychology is concerned with human behaviour in the work situation. Today, some sixty years since the beginning of scientific Industrial Psychology, we find the psychologist in a varied role. We find him participating in the planning of systems and making decisions on a high level. His knowledge of the human part of a system comprised of machines, processes and human beings with their abilities and limitations in perception, thought and reaction has become serviceable. Problems of fatigue, boredom and occupational safety are within his field of interest. The personnel department employs his knowledge of man and his behaviour in the selection, placement, training and evaluation of workers. Problems of occupational adjustment and maladjustment, harmonious labour relations and industrial conflict have become his concern. And in another field his energies are directed towards the development of techniques for studying public opinion, consumer behaviour and ways in which it may be influenced.

The limited scope of this discussion does not permit consideration of this broad field of study. It will be our purpose to consider only some problems related to those socio-psychological relationships generally called human relations. It should be stated that satisfactory answers have not been found to all the problems in this field. Our present understanding of human relations and individual adjustment is inadequate and as yet not fully systematised. Yet, from a scientific point of view, we have succeeded in formulating some fundamental problems, and certain advances towards solving them have been made. These will be outlined in the course of this discussion.

THE HUMAN FACTOR IN INDUSTRY: DEVELOPMENT OF THE PROBLEM.

Broadly defined, Industrial Psychology is concerned with four relationships of man as he functions in industry. These are relationships between person and person, between person and group, between man and machine, and finally problems of the inner man himself. Let us briefly consider some of these relationship problems in their historical perspective and their effect on industrial efficiency.

The efficiency of an industrial unit may be said to depend upon the ingenuity in the design of machinery, the proper organisation of operations, and the productivity of the labour force. Productivity, in turn, is to a large extent a function of a complex interplay of psychological, social, physiological and physical aspects of man and his industrial environment.

During the Industrial Revolution and for many decades afterwards it was believed that increased production at lower cost could be achieved merely by making more extensive use of machinery. Since the latter half of the 19th century, and especially since the First World War, increasing numbers of people have become convinced that the perfection of machinery alone is insufficient, that it must be supplemented by a more complete utilization of human resources. Machines can be used to advantage only by properly selected and adequately trained men. The first man to give this problem the same careful attention and earnest thought as had been given to the perfection of the machine was an American engineer, Frederic Taylor.

The major contribution Taylor was able to make to industrial efficiency resulted from the application of the following fundamental principles:

(a) Scientific analysis of each element of a man's work to make it possible for the most efficient method of work to be determined.

(b) The selection of the best worker for each particular task and the provision of training in the most efficient work methods instead of the old system of self-choice of work and casual, incidental training.

(c) The establishment of a spirit of wholehearted co-operation between management and workers to enable them to function to the best of their ability.

Taylor claimed that the application of these principles would result in improved industrial efficiency, and considered that increased efficiency should be rewarded by higher wages which would be an incentive to workers to co-operate. The results of Taylor's work at the Bethlehem Steel Plant are reflected in the following figures: the average number of yard labourers was reduced from 500 to 140, wages of those retained went up by 60 per cent, the company saved 75000 dollars per year, and was firmly convinced of the usefulness of "scientific management". In spite of remarkable successes of Taylor and his followers, this approach has been attacked on several grounds. From a psychological point of view it seems that these pioneers in "human engineering" regarded man in his work as just another piece of engineering equipment. The initial view of human motivation proved to be inadequate and one-sided. Man does not expect only economic gain from his work, but also satisfaction of psychological needs. Little wonder that methods of "scientific management" has met with resentment from workers and their representatives. Taylor, who stood by with his stop-watch, directing every movement and changing the traditional way

of doing things, became quite unpopular with the workers. Years later he wrote of this period of his life: 'I was a young man in years but I give you my word I was a great deal older than I am now, what with the worry, meanness, and contemptibleness of the whole damn thing. It's a horrid life for any man to live not being able to look any workman in the face without seeing hostility there, and a feeling that every man around you is your virtual enemy.' (Brown, 1958).

Present-day Industrial Psychology has added to the traditional aim of improved industrial efficiency the aim of better adjustment of men in industry. Maximum efficiency and optimum adjustment are regarded as complementary facets of a single objective. Adjustment is achieved not only by improved methods of selection and placement, or by improved equipment and working conditions, but also by the recognition of the importance of the social environment and the emotional characteristics of workers.

This point of view gained in importance when in 1927 the classical experiments of Mayo and others proved in a spectacular manner the overruling importance of work attitudes. The study conducted at the Hawthorne Plant of the Western Electric Company in the U. S. A. was originally designed to yield information on optimum physical conditions of work (temperature, humidity, lighting, rest pauses, etc.). Although the provision of optimum conditions in the experimental room resulted in improved production, analysis of the results revealed that the variation of the physical factors alone could not explain the improvement. A general upward trend in production rate, quite apart from the variation of the physical environment, became apparent. This was proved conclusively when it was found that the removal of the favourable conditions did not result in a lowered production. It was found that the social relations between the members of the experimental group had improved as a result of the experiment, and that the free communication between the observer and the workers in the experimental group developed confidence in and loyalty to the company. The improved work attitude was apparent not only from the increased production, but also from a redueed absence rate.

These results gave rise to a revision of the fundamental problems of Industrial Psychology. New fields of investigation such as leadership, supervision, interpersonal and group relations opened out. The growing body of knowledge concerning human behaviour in industry was supplemented by significant advances in other fields of Psychology and related disciplines. These demonstrations convinced academic psychologists that industry offered a proper setting for the study of human behaviour, and induced industrialists to allow psychologists into their factories. And Industrial Psychology, by shouldering the obligation of scientific management, has in turn made a considerable contribution to the development of our industrial civilization.

CHANGING SOCIO-PSYCHOLOGICAL CONDITIONS IN INDUSTRIAL SOCIETY.

In the 20th century and especially since the Second World War industrial civilization has developed certain symptoms of illness which may be attributed to emotional causes, and which vary in incidence with the extent to which basic socio-psychological needs are satisfied or not. There is a general feeling today that man is losing his zest for work and that he and his work have become distant and alienated. In studying and overcoming the problem industry would benefit through increased productivity, decreased turnover and absenteeism, and better working relations. The community would benefit by a decreased bill for psychological casualties, better supply of economic needs and more efficient use of manpower. The individual would benefit by increased morale, greater happiness and self-realisation. But first, man, struggling to adjust and find himself in modern industrial society with its confusing complexity of choices and standards of behaviour, must be rediscovered. Personal and social ill-health is partly personal, partly communal and partly occupational in origin. Industrial Psychology is particularly concerned with the latter sources of disharmony, but in order to see these factors in their proper perspective, we must endeavour to understand the total situation.

A brief analysis of the social and labour situation in the period before the Industrial Revolution indicate that each individual had his permanent place in an ordered and clearly defined system. In this less complicated but more integrated and stable community there were fixed and undisputed social norms. Each individual understood and participated in a particular manner in the pattern of community life, linking the various economic and social activities of the community together into an intimate whole. The individual could not conceive of change as visualised by modern Western man, yet from a psychological point of view, he found emotional security in his sense of belonging, his social bondage.

Since the Industrial Revolution this situation has generally changed. Progress in technological fields raised the standard of living of the masses. Greater personal freedom accompanied this development and made it possible for people to move up the social ladder, irrespective of birth status. One of the greatest achievements of the age of industrialization may be found in the psychological field. The basic personality structure of the Western European gradually began to change and a strong individualism arose. If the deficiencies of the period before industrialization are to be found in its lack of pliability and the spirit of individual enterpirse, then the deficiencies of the later period must be sought in the greater loneliness and social isolation into which man was plunged. The corner stones binding a man to society have been replaced by freedom of choice at the expense of social order. This very freedom is for many a burden too heavy to bear. The social significance of work is lost to them. They are re-

placeable production units and have come to regard work as an unpleasant necessity. Anxiety and a feeling of emotional insecurity have become characteristic of our competitive society with its mobility of status and fragmentation of everyday life between work, home and recreation.

However, industrialisation has come to stay, and it would be unrealistic to hope for a solution of psychological problems arising from it by returning to a social and industrial system of the past. We shall have to find means of adapting the technological organisation to basic human needs.

Social-psychological forces are at work in this direction. Thus the development of primary or informal groups among workers has become a factor which management should recognize. The individual derives his emotional security and standards of behaviour to a considerable degree from the informal group to which he belongs, and this group may become a constructive or destructive force depending on whether its aims coincide or are at conflict with that of the larger organization. And in a wider context participation in the activities of organised labour offers the opportunity to improve the status and broaden the role of a group of people arrayed in one social class by circumstances. Although the individual has become replaceable the group has become indispensable. The worker has found new security in his group.

GROUP FORCES.

The dynamics of group relations have recently been the subject of much study. Informal organizations or small primary groups tend to develop within any social organization where people are able to communicate with each other. The size of the groups is determined by the possibility or otherwise of communication. As soon as the group becomes so big that face-to-face communication is no longer possible the group disintegrates. Such groups may result from friendships, nearness of workplace, common interests, etc. The way in which these groups interact determines to a large extent the morale of the organization and may become a major element in productivity. Some studies have shown a high degree of labour turnover and low job satisfaction among workers where social contact was lacking due to the impersonal pressure of the assembly line. The primary group may be considered the instrument of society through which in large measure the individual acquires his attitudes and goals. It also serves as a fundamental source of social control. Any attempt to change behaviour in the work situation should take into consideration the norms of the group rather than that of the individual.

The following study on restriction of output illustrate the importance of group forces. The group consisted of fourteen men who assembled telephone equipment. Output among fully efficient wiremen tended to be about 6, 600 terminals wired, while in the firm's view this figure could reasonably be expected to reach 7, 300 by hard and steady work through the day. Each man's pay depended on his average hourly rate, and also on the average output of the group. Thus an increase in output would also increase the earnings of the group as a whole. Yet output remained suspiciously steady and below a reasonable maximum. This was achieved by workers reporting less than they had actually turned out on one day, or more than they turned out the next, or by claiming more or less time allowed for delays. Why?.

These men constituted a small group of their own and established a social system in which members were assigned social roles and achieved status. Thus wiremen had higher status than soldermen, and though jobs were often exchanged, a solderman was not expected to initiate such a change. Part of the solderman's role might be to fetch lunches for the group. An inspector was expected to wear a cost, waistcoat and tie as a mark of his status but had no jurisdiction to open a window. The group chief was expected to observe the norms of the group in executing orders. Such norms were built into all roles. For example, if you turn out too much work you are a rate-buster; if you turn out too little work you are a chiseler; if you tell the supervisor anything to the disadvantage of an associate you are a squealer; if you are an inspector, don't act like one by trying to maintain social distance. Selector wiremen had relatively low status, and since experience and efficiency were one factor in status, they were expected to have a low output.

The particular level of output was not considered as important as the obligation of all members to abide by the group standard of what was considered a "fair day's work". The investigators ascribed this rigidity to a clash between management's frame of reference and the particular "culture" of the work group. In their attempt to increase output engineers would transfer men to other departments, mix up cliques, introduce new processes or room arrangements, etc. Such changes could not affect workers' economic security, but could be a serious threat to the established social order, standards of status, roles, etc. To prevent its disintegration the group reacted by insisting on the maintenance of its own culture as far as it possibly could by bringing sanctions to bear on any deviate behaviour. Thus its culture prescribed differences in output between low and high status workers, and saw to it that these differences were observed by members. These sanctions could be economic. For example, the prospects of an unpopular inspector might be endangered by claiming excessive time allowances due to inspection. Social sanctions arose out of the customs of the group itself. Those whose behaviour conformed to the group's ideas of roles and status, or group culture, were admitted to the appropriate clique; those who did not conform were excluded and ridiculed.

Morale may be defined as group cohesiveness and adherence to mutual goals. If the goals of work groups are

in line with that of the company, management has a powerful psychological factor in productivity on its side.

FUNDAMENTAL EMOTIONAL NEEDS IN WORK.

What are the psychological needs which man strives to satisfy in his work? Of importance in the understanding of motivation is the concept of prepotency. Human needs may be visualised as ordered on a scale with the primary needs at the basis and secondary needs at the top. Motives higher up the hierarchy tend to gain in importance as those immediately below are satisfied. The primary biological drives are relatively simple to meet but the secondary social and psychological needs become more vague and complicated the higher we go. Industrial society in the Western world has reached the stage where workers are greatly concerned with the highest self-realisation.

However, the individual should not be looked at as a static entity, but rather as a dynamic being whose characteristics and behaviour change under varying circumstances depending on influences of the social field of force of other persons and events constituting the total situation. One of the most difficult aspects of understanding motives is perception and how it differs among individuals and groups. These differences arise from particular experiences, expectations, attitudes and other psychological factors, and are brought about by magnifying certain cues, ignoring and twisting others in accordance with the individual personality or group standards. Thus in sophisticated communities such as in Europe and North America research findings indicate that ego motives are perceived by workers as of great importance. Several surveys have shown the priority of motives such as opportunities for advancement and steady work, while good pay comes only about fifth. However, factors such as age, occupational level, etc. complicate any attempt to classify work incentives in order of importance as perceived by workers. And in less sophisticated societies like those of the Bantu, the situation may be different. Very little is known about the basic motivation of the Bantu and the effect of urbanization on his social perception. Rural and urban Bantu are said to have different perceptions of basic and incentive payments. More research work is needed to make such knowledge available to the industrialist in a systematic and useable form.

Workers are dependent on the attitudes and actions of their superiors for the satisfaction of many of their psychological needs. The subordinate should be aided to identify himself with the organization by providing security as long as he behaves in accordance with certain norms. If security is provided and accepted, the subordinate should then have the opportunity for self-realisation and development.

The worker's quest for security.

The employee's sense of security naturally depends upon more than one factor. It has been found that the behaviour of his seniors and the powers exercised by them may be seen by the employee as a threat to his security. Employers have recognised this need for security and have attempted to make provision for it by means of permanent employment, pensions, etc. On the other hand trade unions try to protect the worker to some extent against "arbitrary" resolutions of management, i.e. resolutions which to the worker seem arbitrary and a threat to his security. These attempts, however, do not get at the root of the problem: the personal emotional dependence of the employee. The relation of the superior to the subordinate leaves ample scope for subjective views and feelings. Not only the facts which determine the superior's actions and resolutions are important but also, and more particularly, the way in which he acts. The following conditions may be regarded as pre-requisites to a sense of security on the part of the employee.

(a) An atmosphere of approval.

The employee must feel that he has the genuine approval of his supervisor. He must feel that he is being accepted in the first place as a human being and that the atmosphere pervading his work is one of approval and goodwill. It is not so much the rules imposed by the supervisor which cause employees to become rebellious, but rather the way in which rules are enforced. If the employees feel that the supervisor disapproves of them or that the atmosphere in general is "strained", they also feel insecure. In such an atmosphere it is difficult to maintain discipline or to obtain the whole-hearted co-operation of subordinates.

(b) Knowledge.

The employee must know what is expected of him. Certain types of organizations and certain kinds of work impose special requirements. In most enterprises the main emphasis falls on productivity, in others, again, a high value may be attached to loyalty or to adherence to rules. The worker requires knowledge of the following:

(i) The firms general policy and management philosophy.

(ii) Procedures, rules and regulations. It comes as a shock to the employee to discover that he has unwittingly broken a rule and to suspect that there may be other rules, written or unwritten, which may endanger his position..

(iii) The requirements of his own work, such as the decisions within his competence, his responsibilities, etc. In the absence of this knowledge, he is never sure when to make a decision or when to refer the matter to someone else.

(iv) His immediate supervisor. It is essential for him to know where he stands with his immediate head, i.e. what the latter thinks of him. It is also important that he should be acquainted with the likes and the dislikes of his immediate supervisors.

(v) The employee should have advance knowledge of changes in the employer's policy and organization that may affect him. Employees often resist changes because of the effect of change upon security.

(c) Consistent discipline as a condition of security.

The employee should be confident that as long as his actions are "right" (i.e. in accordance with the firm's policy and with what is expected of him in his work) he will have the support of his supervisors. He should also realise that he will have to face criticism and punishment for "wrong" actions. Supervisors, however, do not always act in a way which will give employees a sense of security with regard to their actions. There is the type of supervisor who is inconsistent, who will at one moment approve and subsequently disapprove of identical actions. There is another type who in order to protect himself is not prepared to support his employees even though their actions may have been "right".

Often supervisors are too strict and raise a rumpus over a trifling misdemeanor. Discipline can, however, also be too lax. The supervisor may possibly try too much of a "good fellow" in the eyes of his subordinates and fail to maintain discipline. The subordinates take advantage of the situation, and when the supervisor realises that it is time for action and enforces discipline, feelings of guilt, insecurity and rebelliousness are aroused in the employees.

Supervision is a relative process. To be effective and to communicate as intended, a leader must adapt his behaviour according to the expectations, values and interpersonal skills of those with whom he is interacting.

The employee's struggle for independence.

It is obvious that security is not the only objective which the employee strives to attain. He wants to feel that his work is important, that his efforts count, that he occupies a key position, etc. He has the normal urge for self-assertion. Perhaps the most valued goal is man's own ego status, the percept of the self in relation to the environment as perceived. Where society stresses achievement, prestige and power, great potency is added to ego motives. If he has already achieved a reasonable degree of security in his work, the employee will begin to seek constructive ways of participating more actively and independently in the activities of the employer. If he lacks security, however, a reactive struggle for freedom will take place and his aim will be to free himself as much as possible from the restrictions imposed by the requirements of the work and the demands of his employer. The following are conditions of active, constructive independence:

(a) Participation.

The management of any organization is inclined to consult senior staff members and experts in connection with policy, new projects, etc. They rarely do so, however, with junior staff members or production employees. Managers are inclined to think that consultations with ordinary employees are of no practical value. Nevertheless, wide use is already being made of suggestion systems. There are also in existence successful instances of "consultative supervision". Employees and/or their representatives are consulted as far as possible in connection with personnel policy and technical matters.

There is a tendency, both within and without industry, for people to resist change, even though the change may be in the best interest of those affected, because of the threat it subjectively presents to the security of the people concerned. Thus the introduction of new methods of work, or safety devices on machines may cause resentment where such changes or devices necessitate changes in established habits. There are numerous illustrations of how participation on the part of employees can facilitate their adjustment to changing conditions. People tend to support what they help to create. A typical example is the following:

In a certain company, workers were forced to transfer from one job task to another because of changing market conditions. This resulted in severe turnover problems. Psychologists working on the problem set up a controlled experiment. Work groups were established and the difficulty of adapting to shifts in the market and technology were put to them as a problem. By group discussion the workers decided that their own retraining was necessary, and they launched into it. Turnover and training time decreased sharply, and the change was made more smoothly. A different situation prevailed in the control group. These workers were merely told that they would have to be retrained for new jobs. Resistance developed almost immediately after the change occurred, and was evident in expressions of aggression against management, conflict with the methods engineer, deliberate restriction of production and lack of co-operation with the supervisor. A high turnover and a longer, more costly period of training resulted. Subsequently

this control group was subjected to the decision-making process, and again excellent results were obtained.

These experiments again confirm the power of group forces and the way in which it may affect productivity. It should be pointed out, though, that employee participation cannot be created artificially, and will not work when treated as a device to get somebody else to do what you want him to do. Participation is based on respect and is acquired when management realises that it needs the contributions of the operating people.

(b) Responsiblity.

The dissatisfied worker who seeks independence in the reactive sense does not seek more responsibility but less. A desire for more responsibility is a manifestation of a constructive sense of independence and often, too, a sign of inner maturity. Individuals differ in their ability to tolerate responsibility. There is the example of the schizoid personality who does work below his intellectual level and breaks down when promoted to more responsible work. This is an extreme case. The anxious person, again, can cope with responsibility but is usually a weak leader. Most employees naturally belong to the broad, normal group and desire responsibility.

(c) The right of appeal.

There will be instances when supervisors and subordinates differ on important issues and when collaboration will fail to resolve the disagreement. A policy of appeasement on the part of the supervisor will in the long run cause the subordinate to lose respect for him. On the other hand, total disregard for the subordinate's views will develop feelings of dependence in the latter, and will undermine the gains obtained through participation and deligation of responsibility. Adequate machinery should be provided by means of which problems of this kind are put for resolution to another individual on a higher level of authority or to another group such as a grievance committee. However, if a feeling of security and independence in matters that are important to him has already developed into sufficient personal dignity and understanding, the subordinate will seldom have cause to resort to the right of appeal.

Under the conditions outlined above, the positive forces in interpersonal and group relations may be employed, not only for the purpose of increased productivity, but also to make work more than an economic necessity.

It should again be emphasised that many shifts in the importance of motives and needs may occur within this broad framework. Apart from socio-economic differences, many other factors may contribute to the strength of motives at given times and in given situations. There are, for example, indications that attitudes (from which motives can be deduced) may shift within relatively short periods. It is also possible that periodic variations in the tone of feeling may temporarily influence the importance of motives for the individual. Other factors such as family background, circumstances and relationships also influence attitudes and the worker's judgement concerning the needs he desires to satisfy through his work. Furthermore, small changes in work conditions may have an unexpectedly large effect on the importance attached to specific motives. In one factory, for example, the installation of blue-green illumination brought about an increase in production and a decrease in complaints among male workers. The opposite result was obtained with female employees. The difference was attributed to a complaint by the women that the lighting had a disagreeable effect on their appearance. A change in work supervision may similarly lead to dissatisfaction that may find expression in grievances about wages or other aspects of work.

While we have considered only some of the psychological needs of workers the value of financial drives should not be underestimated. Monetary incentive systems may indeed be very effective in raising production. The point is that management can in the long run never satisfy its employees by providing only for the satisfaction of their material needs. The pleasure experienced by the worker when he receives a raise or a bonus does not continue with undiminished intensity. Similarly, although a group of workers will enjoy being transferred to a new and modern workshop that meets all physical requirements, these conditions will soon come to be accepted as normal or "natural". This "law of diminishing returns" applies to all material incentives. The satisfaction of material needs and the denial of psychological needs leads in the long run to trouble for the worker as well as the employer. As wages increase above the bread line and living standards improve, other needs replace material needs as the dominating motivating force.

These remarks are not in conflict with the fact that so many strikes and labour disputes concern wages. There is an increasing realization that demands for higher wages are often merely symptomatic of the desire to satisfy more profound ego needs. We know that in our Western civilization motives tend to be translated into terms of money. As one author puts it, people have been taught that money is the key to satisfaction, so when they feel that something is wrong with their lives they naturally ask for more money. In industrial concerns where morale is low the workers often demand higher and higher wages, even though they may be receiving relatively high pay. Vague and often unconscious needs can hardly be explained to management. Money and other material advantages also have a symbolic value, such as status, and cannot be evaluated in terms of their "real" value only.

JOB SATISFACTION AND PRODUCTIVITY.

Some arguments and experimental evidence supporting a contention that the satisfaction of psychological needs and productivity are positively related have been presented. Before examining this question further, it should be noted that job satisfaction or dissatisfaction is the result of various attitudes a person may hold towards aspects of his job, towards circumstances surrounding the job, and towards life in general. For example, there is evidence that dissatisfaction with one's work is often symptomatic of generalised maladjustment of some kind, and also that employee satisfaction is a function not only of need satisfaction but also of where a person stands with respect to his level of aspiration. When the environment provides little possibility for the satisfaction of psychological needs, workers with the highest aspirations will be the least happy. Furthermore, high productivity is related to high morale only when the attitudes of the work group favour maximum output.

Again the variability of the human factor complicates any attempt to describe in a concise and accurate manner the effect of job satisfaction on production. However, research findings over the last number of years enable us to come to some broad generalizations, even if there are specific exceptions.

One basic consideration is that the inadequacy of measurements used in many companies leaves large gaps in the amount and kind of information available to management. Such information usually deals with end results such as production, sales, profits, etc. obtained over relatively short periods of time and on the basis of these facts manegerial policies and procedures are evaluated. Much less attention is given to intervening variables which in the long run may have a significant influence on the end results. These variables reflect the current psychological state of the organization and include loyalty, motivations, capacity for effective communication and interaction, etc.

There is ample evidence that over short periods close supervision which increases the direct pressure for productivity can achieve significant increases in production even if relatively unfavourable attitudes exist. This increase is obtained, however, at a cost to the human assets of the organization. The production unit as a functioning social system devoted to achieving the objectives of the total organization tend to disintegrate. Eventually increased hostilities, the decline of loyalty and the motivation to produce, labour turnover, etc. gain enough momentum to produce serious problems. On the other hand, building favourable attitudes, interpersonal and group skills and skills and high performance goals is difficult and time consuming, even though it results in a healthy social organization that achieves and maintains impressive performance. Ironically, managers who choose to produce short term results irrespective of the long term damage to the organization, often achieve a reputation of being able managers and are transferred to higher positions before they are adversely affected by any of the resentments, hostilities and turnover created by pressure tactics.

Looking further at the relationship between the productivity of workers and their attitudes towards supervision and other aspects of their jobs, it seems that these relationships vary with the kind of work performed. The relationship is relatively small in the case of machine-paced work or work in which standard operating procedures have been established. With work which cannot be highly standardised and for which time standards cannot be set, there is a strong tendency for favourable attitudes to be associated with high productivity. Low producing managers in charge of units doing varied work seem to be less sensitive to workers' attitudes than high-producing managers. Since they are not guided by both the attitudes and production of their men, they introduce practices which adversely affect attitudes. Subsequently productivity is also adversely affected. A high level of performance in this kind of work tends to be achieved more from enthusiasm and a high level of motivation than from better organization of the work. With repetitive work there is less range of variability with regard to both performance and managerial practices, and the restricted range correspondingly limits the size of the observed correlations. Until the intervening variables such as attitudes and motivations are regularly measured and analysed managers will have little evidence to cause them to question and modify principles and practices in any fundamental way.

For the reasons which we have considered, two systems of management differing in emphasis have developed in business and industry. The first of these relies primarily on work study methods, is clearly defined and well established as the way to manage an enterprise. It is based on the economic motives of buying a man's time and telling him precisely how to do his job and at what level of production. The second system is relatively new and has not yet been stated formally as a theory of management. Managers who are using it are rarely fully aware of all its dimensions. This system is based not only on the economic motive but also on the ego and group motives to which reference was made earlier.

These two systems, which may be termed the job-organization system and the co-operative-motivation system have both proved their value to management. The question arises whether a combination of these two systems could lead to a further improvement of results. There are, unfortunately, fundamental differences in the assumptions concerning human behaviour, underlying these two approaches. However, integration of these systems has actually occurred in some managerial processes. Thus Allan Morgensen changed motion study and related industrial engineering procedures into what has been called "work simplification". This essentially implies that supervisors and workers should be trained to participate in the actual application of improved methods on a co-operative

basis, thus sharing some of the responsibility. And on a higher level, the principle of participation has spread to other procedures generally in the form of "consultative" management.

SOME PSYCHOLOGICAL PROBLEMS RESULTING FROM AUTOMATION.

Automation may be described as the substitution of machine control and regulatory decision-making functions for human effort and thought. It is mechanisation carried further. Manual skill is no longer emphasised, but conceptual skill tends to take its place. The worker is no longer employed with individual cut and fit operations, but with an operation as a whole. Some claim that more intellectual skills are involved. This would certainly seem to be the case with data processing machines which produce information rather than goods, and which require high-level staff to programme them and maintain them. In other cases where individual machining processes are integrated and controlled from start to finish by the machine, only a few operators may be required to read and interpret dials. These operators, however, are like supervisors rather than workmen. In an automated power station described by Mann and Hoffman, the personnel requirements were probably less than half that of a conventional plant of equivalent output. An important result of the emphasis on maintenance was reflected in the new grouping of traditional jobs. Thus there was no longer clear separation between electrical and steam workers, but a new category was created: a power plant maintenance team.

In view of the short history of automation, it is not surprising to find different opinions with regard to the effect of this technological development on the labour force. Few systematic studies of this nature have so far been reported. Thus it has been claimed that automation is the greatest upgrading of the labour force yet. The job is improved, made more conceptual. An opposite view holds that the introduction of automation has simplified jobs to such an extent that all that is required is the pushing of a button. Some industries and businesses which have introduced automation have claimed that their greatest mistake was in over-estimating the skills required. However, if the requirement in the end is only to push the correct button, automation introduces a situation where pushing the wrong button may have serious and very costly consequences. Management may find itself paying for the ability to put up with long periods of alert inactivity. Some have suggested that two levels of staff are required: one to do the tedious watching, and one to be called on when intelligent and quick action is called for.

This could be a solution to the problem of boredom which is present in automated industries, if it could be arranged. Boredom is a subjective feeling which results when future events are monotonously certain and when little activity is needed. Studies on the effect of speed of work on the operator indicate that a very fast job introduces a mental load and leads to fatigue, a slightly slower one allows the worker sufficient time to recover from periods of intense activity and yet does not leave him too long without anything to do. He works well. A still slower rate requires surface attention. He must remain alert and yet inactive for long periods. Consequently he makes mistakes and becomes bored. An even slower rate demands little from him and he has sufficient time to occupy himself in some other way than at his main task. Here he also works well. Therefore the problem of automation is to arrange operations in such a way that the operator is neither overworked where nervous strain and extreme fatigue result, nor in the situation where he becomes bored from inactivity, yet attention is consistently required of him. The problem then is to eliminate mental load as opposed to physical load in mechanisation. The job may be fitted into a more complex environment to make it more complicated, interesting and meaningful. Or it may be made such that the operator is free to engage in other tasks for the majority of the time.

Resistance to automation is frequently experienced. Supervisors particularly have been found to resent it. It has been postulated that resentment and resistance is based on the fact that the existing pattern of human relations will be broken up, rather than because of actual changes in the work content. The operator in an automated factory is not a member of a closeknit work group in the same way as before. Spatial separation as well as increase in shift work because of the increased cost of idle time on the machine, break up primary work groups. The factory must now be perceived as an integrated whole and identification with the total organization is more likely. Physical isolation of the operator appears to be a problem. However, in some cases automation leaves the worker free to move round more. He is required to have a considerable amount of social skill since efficient working depends on the integration of operator's contributions and the close teamwork of the factory as a whole.

The status of the operator is something which determines work satisfaction and yet is something which at the present moment is unsure in automated factories. Status appears to come no longer from individual contributions to a disconnected process, but from the organization. The degree of control a man has over his job is often considered of prime importance in worker satisfaction. Operators in automated factories have little individual control of their jobs, yet control in the sense of having an overview of the whole process and contributing to this process as a whole, could conceivably exist. In fact there is little turnover in automated factories - partly because of high salary.

One of the greatest problems in automation is that of redundancy. Yet some psychologists point out that automation is an evolutionary process rather than a revolutionary one. So far, the problem has not been great for several reasons. Often automation has come just in time

to solve labour shortages, and has taken place in expanding industries. However, it may present a serious threat to the security of the individual worker. No real solution has been found, except that this tremendously costly innovation is unlikely to be so rapid as to bring about a major economic upheaval.

The tendency to date has been to be preoccupied with the technical aspects of change, and to fail to recognise the balance between technical and social systems. The interrelatedness of the social system should not be overlooked, since changes in one part of an organization may have consequences in another. In planning for automation the psychological state of the factory before changeover should be considered. Thus the past history of employee relations would matter, and a supportive atmosphere with a sympathetic management would be a suitable receptive ground for a change. Under these circumstances it would appear that automation can contribute to the ultimate good of the community, even though in the process it may effect changes in the habits of that community. Possibly it may well operate to remove some of the less attractive aspects of our present highly fragmented approach to labour in a manually controlled mass-production industrial environment.

CONCLUSION.

Serious interest in the human factor in industry is a comparatively recent development. Although it can hardly be claimed that the worker was regarded as a mere machine in the past, it is true that the determinants of human behaviour were thought of in extremely simple mechanistic terms. There is an increasing recognition today that the motivation of behaviour is a complex problem, that the worker in the factory cannot be regarded in isolation from the worker at home - that he reacts as a total personality to his physical and social environment.

By adjusting work to man, and the man to his work, and by training senior personnel in handling human relations, Industrial Psychology can contribute towards a healthy industrial community. Experience is teaching us in an unambiguous manner that this investment in the labour force in the long run shows considerable and lasting profits.

SOME ASPECTS OF POWER CABLES IN UNDERGROUND DISTRIBUTION

by I. L. HOBBS.

INTRODUCTION.

The power-distribution-function basically includes all of the facilities and services associated with the delivery, to consumers, of power made available at some central generating or receiving point.

For convenience it has been customary to refer to various components of the distribution system as transmission, sub-transmission, primary distribution and secondary distribution, although each contributes its part to the overall distribution function.

Overhead lines are widely used for the transmission of power, but the rapid industrial and building development in South Africa during the post war years has resulted in the underground system being employed, to an increasing extent, for primary and secondary distribution. With each passing year, therefore, distribution authorities, having little previous experience with underground construction, are finding themselves confronted with the inescapable necessity of entering into this particular field.

The object of this paper is to provide some basic aspects of the power-cable-component of the underground distribution system. The historical development of cables has been included, although only briefly, in order to put the subject matter into its proper perspective. Factors associated with economics, installation, maintenance and cable fault location are reviewed.

It has been imperative, in order to deal with so vast a subject within a reasonable compass, to exclude much that might have been of service. The paper, therefore, is confined to primary and secondary distribution at voltages up to 11 kV.

HISTORICAL DEVELOPMENT.

Distribution of electricity by underground systems was started by the early telegraphers and their experimental work undoubtedly laid the foundation for the development of the power cable as we know it today.

The demand for power cable first arose about 1870, with the advent of the incandescent lamp. However, it was soon realised that the gutta-percha insulant, firmly established in the telegraph cable, was of little value in the power cable as the material softened at too low a temperature. Experiments were then made with vulcanised rubber which proved highly successful as in the initial stages of development it was only natural that the supply of electricity should be carried out by direct current at low voltage, of the order of 100 volts. To the early pioneers, limitation to this "safe" voltage was so obvious as to admit of no argument.

Substantial progress was also being made in transformer design and in 1885 the stage had been set for the next great advance in the distribution of power. A new generation was growing up with ideas that were, to the old pioneers, revolutionary, dangerous and detestable. The history of the period 1885 - 1890 is, in fact, a record of bitter struggle and argument between the protagonists of Low Voltage Direct Current on the one hand and High Voltage Alternating Current on the other.

The distribution of power by direct current had many limitations, and in those days, it was only possible to distribute within a circle of maximum radius of $\frac{3}{4}$ mile from any one generating station. The champions of alternating current however, were quick to claim, with justification, that their method overcame this difficulty.

A young engineer, whose name was to become one of the most famous in all cable history - Sebastian Ferranti - held the view that the generation of electrical energy in the overcrowded heart of London was fundamentally unsound and he suggested a large power station well outside London from which single phase alternating current could be transmitted to the centre city at the then unheard-of voltage of 10 kV.

At that time, vulcanised rubber-insulated cables were still in use and the limit of distribution voltage was about 3000 volts. Ferranti could find no cable suitable for his proposed high voltage and therefore decided to make his own. For his new cable he chose, as his dielectric, brown paper soaked in wax - a startling innovation - but nevertheless a decision of historical importance. The cable was of the concentric type, drawn into a length of iron pipe for protection. Copper tubes were used for conductors and the wax impregnated paper was rolled on radially over the tubes in sheets 20 feet in length. This solid type of construction imposed a limit on the unit lengths in which this new "cable" could be manufactured and transported and twenty feet was chosen as the most economic and convenient unit.

These twenty-feet lengths were successfully laid in 1889, comprising four separate feeders from Deptford to Bond Street, a total of about 27 miles of cable, necessita-

ting some 7000 cable joints; certainly a tribute to Ferranti's genius and determination. Some of this cable was in service until 1932, and parts of it - excavated about ten years ago - were in perfect conditon.

Development has continued steadily in all branches of paper-insulated-cable design and manufacture. The introduction of the screened cable was perhaps the most important single contribution to the cable making art during the first twenty-five years of this century. In about 1927, the practice of prespiralled conductors became general and in 1936, the first South African produced insulated cable was manufactured.

The two South African specifications for paper insulated cables (SABS 97 and SABS 98) were first published in 1950. Amendments were published in July 1951, in the form of emergency standards to provide for relaxation in regard to the requirements for the galvanising and dimensions of the steel armouring wire due to the short supply of both steel wire and zinc at that time.

Because the mining industry, in this country, insisted on working to BS 760:1938, the original S.A.B.S. 98 was revised in 1954 to bring it into line with their requirements.

S.A.B.S. 97 was revised in 1959 and S.A.B.S. 98 was once more revised in 1961. The text of both specifications was improved editorially and some of the tests (e.g. insulation resistance and electrostatic capacity) were deleted and ionization test of radial field cables was introduced. The constructional requirements were considerably extended and the "belling" test on lead sheathing introduced.

GENERAL CONSIDERATIONS.

The cost of an underground system is usually greater than that of an equivalent overhead system and for this reason it has been customary to restrict the installation of underground systems, almost entirely, to localities where considerations other than lowest cost are of primary importance. The use of an underground system will depend upon one or more of the following general considerations:-

(a) The load density in the area to be served.

(b) The importance of the line and the necessity of providing extraordinary precautions to insure it against mechanical damage.

(c) Physical obstructions which are impractical to bypass with overhead lines.

(d) The general appearance of streets.

(e) Considerations of safety, particularly in the case of high tension

(f) Construction and maintenance costs.

The circumstances surrounding any particular problem will dictate which of the above considerations will influence the decision to use underground construction. A substantial proportion of the total cost of electrical energy delivered to the consumer is incurred in its transmission and distribution, consequently decisions by a supply authority to use an underground system where an overhead system would have been practical and economical, must demonstrate inherent sufficient advantage to justify its increased cost.

From a reliability point of view, the relative immunity of underground systems to many of the hazards which are the most frequent causes of discontinuity of supply on overhead systems, is a most important consideration in favour of underground construction. In those installations where the highest practicable degree of service reliability is required, an underground system will offer protection from interruptions caused by storms, traffic accidents, fires and vandalism. Armoured cable properly installed and operated, can be expected to perform satisfactorily for 30 to 40 years and is generally susceptible to only two major external hazards i.e. mechanical damage and corrosion. Only the highest grade of overhead construction compares favourably in service reliability with that of a well designed underground cable system. However, cable systems are usually subject to interruptions of much longer duration for repair and maintenance, and provisions must be made in the system design for this requirement.

From the safety aspect in built up areas, it is generally considered advisable to provide an underground system for distribution or subtransmission when higher voltages are involved. Moreover, modern town planning with its innumerable curves, crescents and circular drives may even preclude the use of low voltage overhead systems in the domestic or other low demand areas.

SOME ECONOMIC FACTORS IN THE USE OF CABLES.

In an underground network, power cables represent the largest single item of expenditure and it is necessary, therefore, to ensure that they are utilised to best advantage.

Cable Loading.

The fundamental problem of cable loading is based on over-all economies which usually means establishing load capabilities as high as feasible. The current carrying capacity of cables is generally limited by maximum allowable temperatures, but voltage-regulation acts as a limit in some cases.

The limit from a voltage-regulation standpoint is easy to set, and is determined solely by the variation in voltage within which the consumers' equipment will operate satisfactorily. On the other hand, it is difficult to establish suitable values for temperature limits, but standards have

been envolved from information on laboratory data and operating experiences. The Electrical Research Association, in reference F/T 183, have published their recommendations for the safe current-carrying capacities of cables and this information may be safely applied to cables manufactured in this country. These figures are based on maximum conductor temperature when the cables are continuously loaded.

In a distribution network, it is necessary to consider the worst condition - that is, the peak load on any particular cable. However, peak loads are not continuous loads and the ultimate temperature rise which a cable system attains depends upon the shape of the load curve and the thermal characteristics of the heat path. Generally, the load varies over a 24 hour period and the temperature rise will be less than in the case of a continuously loaded cable. If this cyclic loading is taken into account it may be possible to use smaller cables and thus effect a reduction in the cost of distribution. A relatively simple method of calculating cycle rating factors for cables laid direct in the ground and in ducts is published in E.R.A., reference F/T 186.

Each distribution system has its own particular characteristics but broadly the cyclic rating factors may be classified as follows:-

(i)	Domestic areas	- 1.21 to 1.8
(ii)	Industrial areas	- 1.07 to 1.10
(iii)	Commercial areas	- 1.12 to 1.15
(iv)	Mixed (i), (ii) and (iii)	- 1.12 to 1.17

The figures are based on the normal type of load curve expected from the abovementioned areas. In order to estimate the safe full load of any particular cable and to use its capabilities to the fullest extent it is necessary to calculate the cyclic loading factor more accurately from an actual load curve.

The thermal resistance of the heat path is an extremely important factor in assessing the load capabilities of underground cables, and unfortunately, is a factor about which we know very little in this country.

The thermal resistivity of soil is a property which involves a number of factors but depends essentially on the type of soil (its texture), the structural arrangement of the soil grains and moisture content. The measurement of soil resistivity is not easy and requires expensive equipment. It is also difficult to obtain with any degree of accuracy unless tests are made, in effect, on each section of the cable route under consideration. Further complications arise because once the cable has been commissioned, the heat dissipated by the cable may alter the resistance of the heat path due to the drying effect on the soil. Consequently, in practice the figure of 120°C. cm/W (this is frequently referred to as 120 thermal ohm-cm, or g = 120) is generally used for all conditions except perhaps in the case of well drained, sandy or rocky soils.

As there are wide variations in the thermal properties of soil over the whole country, and these also vary between summer and winter, very accurate determination is obviously not possible. Tests are being conducted overseas on a simplified system of soil classification whereby the thermal resistivity may be assessed, within fairly restricted ranges, by the nature and feel of the soil. This system appears to have many practical advantages, particularly for the cable engineer in the field, as it would then be an easy matter to fix the maximum current capacity of an underground cable in any type of soil. The foregoing remarks have perhaps over-simplified a rather more complex problem and this factor will probably always provide difficulties due to many imponderables. (Even soil mechanics today present enormous difficulties and this Engineering Science is still largely empirical). If, however, the tests prove effective, it would appear that we should make an effort to explore the possibilities of such a system in this country, as our present lack of knowledge of the thermal characteristics of the soil does not lead to the maximum economic use of valuable capital assets.

Short-Circuit Ratings of Cables.

Until recently the safe short-circuit ratings of underground cables have been based on the limitation of conductor temperature to 120°C when passing fault currents. Recent development work by Gosland and Parr has provided new recommendations which are rather more detailed but which give a better understanding of what happens under short circuit conditions.

They show that paper insulated cables, laid and jointed underground, can fail from three possible causes when subjected to fault conditons, viz:

(1) Damage to the Lead Sheath.

If the lead sheath temperature rises above 250°C, due to the passage of heavy earth fault currents, damage is likely to occur in the form of longitudinal or circumferential cracking of the lead sheath. Some relief may be expected from steel wire armouring because of the division of fault current between the armouring and sheath, but this requires the armouring to be in good condition and suitably bonded at the joint positions.

(2) Damage to Joints.

If the conductor temperature rises above 160°C, the sudden longitudinal expansion of the conductor is likely to cause buckling of the conductors in joints. Due to their mechanical construction, low tension joints are most likely to be affected.

(3) Bursting of Sheath.

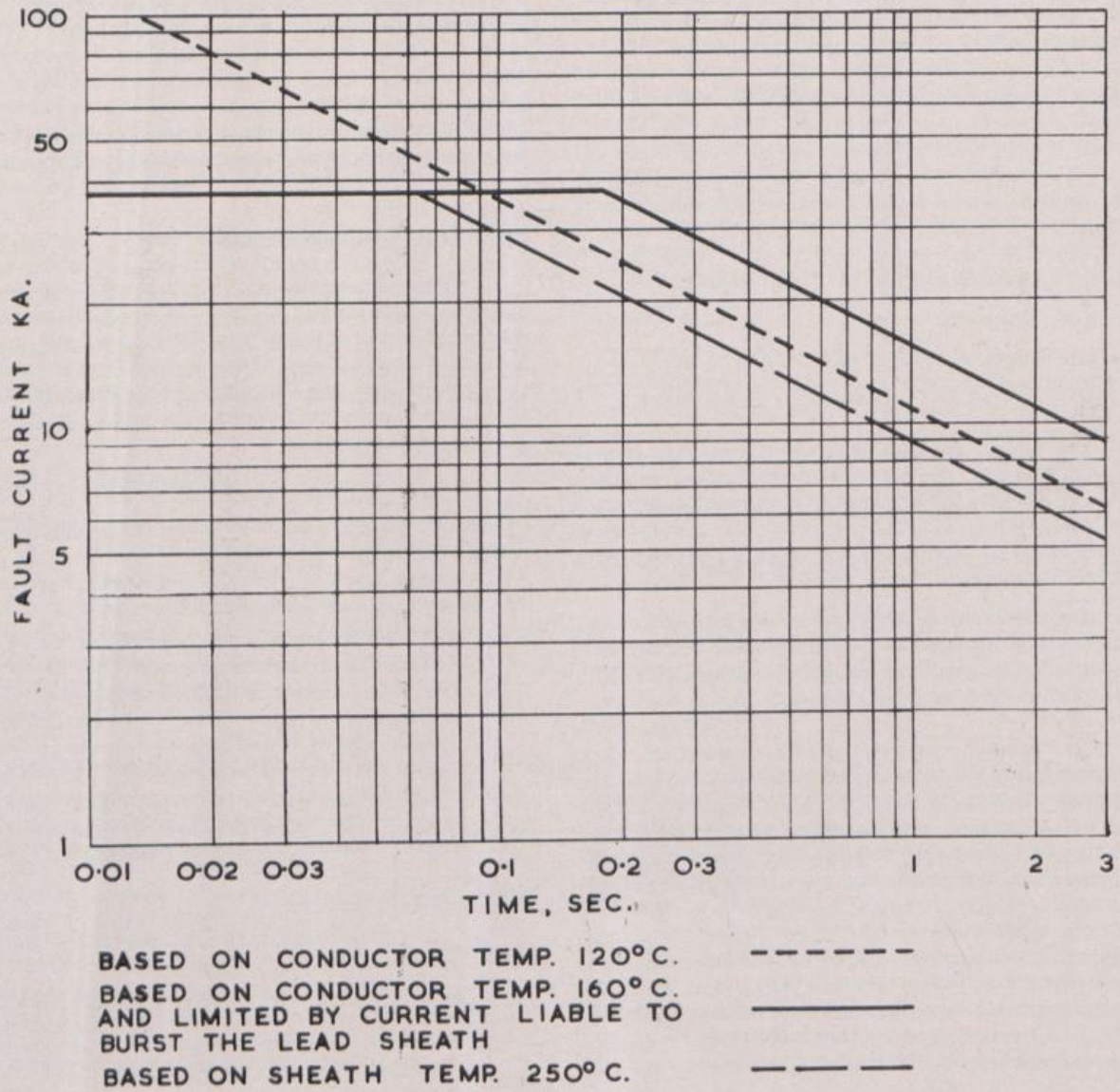
Bursting of the sheath may take place as a result of electro-magnetic forces due to fault currents above a certain limit.

Gosland and Parr give formulae for calculating the above limits and these involve thickness and tensile properties of the belt papers and sheath. These formulae have been verified experimentally, and calculated values based on them have been presented by Buckingham in the form of graphs showing the various current limits. The limits are shown in two parts - a horizontal line representing the "bursting current" and sloping lines representing the "buckling current" (i.e. maximum conductor temperature of 160°C), or the safe conductor current based on a maximum lead sheath temperature of 250°C.

Figure 1 is based on Buckingham's paper and shows the limitations due to short-circuit currents on an 11,000 Volt, 0.2 sq. ins., 3 core (belted) cable.

The old limit (120°C) has been included and it will be seen that the new recommendations impose more severe limitations due to bursting if the fault current exceeds about 37 kA. If the cable is unarmoured or is steel tape armoured the sheath temperature under fault conditions is the limiting factor for faults of relatively long duration and where the short circuit energy level is high, single wire armoured cables should preferably be used.

FIG. 1.



In order to minimise the destructive effect of short circuits to earth on an 11 kV system, a neutral earthing compensator is generally used to limit the earth fault current to a safe level. However, this does not eliminate the possibility of phase-to-phase faults and it may be necessary to consider the use of screened cables which will effectively ensure that all cables will break down to earth first. This type of fault usually causes the least damage and is easier to locate. In this way the engineer will have contributed to security of supply and reduced costs.

The new recommendations provide a valuable contribution in these days of ever increasing load demands and a study of the original work will help the distribution engineer to approach with more confidence the calculation of short circuit ratings and he may, as a result, be able to make better use of valuable materials.

Screened Cables.

Screened cables are invariably used for 33 kV and above, but in view of the widespread occurrence of a particular type of failure of 11 kV belted cables, it has been suggested that consideration should be given to the preferential use of screened cables on 11 kV systems. This type of construction has technical advantages over the traditional belted construction but has not been favoured by distribution engineers because of its higher cost.

While the belted cable is often perfectly satisfactory in many applications, its marginal design may, when subjected to onerous service, lead to unsatisfactory performance. Although the belted cable is slightly cheaper than the screened type, size for size, account should also be taken of the increased carrying capacity of screened cable which arises mainly from the higher permissible operating temperature: 70°C against 65°C.

Figure 2 shows the ratings for typical cable sizes and the approximate percentage difference in present day prices for each size.

From this table, it may be seen that, from about 0.15 sq. ins., more current carrying capacity is obtained for a given sum of money if screened cables are used and, as the breakdown strength of the cable is considerably enhanced, it is possible to justify the use of screened cables, above a certain size, on 11 kV systems due to the definite price advantage.

INSTALLATION.

The manner in which underground cable is installed greatly influences not only the initial cost of an installation but also the operational reliability and service continuity of the system. In the factory, great care is taken during manufacture to ensure that the final product conforms with quality standards issued by the South African Bureau of Standards and accordingly, close attention to the problems involved in installation will prove rewarding.

The method of installation which is adopted for an underground system is mainly governed by local conditions and experience. The life of a power cable is normally assumed to be 25-30 years, possibly because it is the usual repayment period of the associated loan. However, there appears to be no collated evidence to show that any type of power cable, if soundly manufactured and installed, can be assigned any definite life. It is important, in view of the high capital cost of power cables, not to place too much emphasis on reducing to a minimum the initial capital cost of installation at the expense of subsequent higher maintenance costs at some later date.

The general methods of installing cables in this country are:-

(a) Direct laying.

(b) Draw-in (or Duct) system.

Direct Laying.

This method is undoubtedly the simplest and most economical and involves the excavation, direct in the ground, of a trench, the width of which should be as narrow as possible consistent with good workmanship. The cable is laid on a bedding of soft or riddled soil at the bottom of the trench. It is usual to provide ducts under the roadways where the cable crosses under tarred road surfaces and it

CURRENT CARRYING CAPACITY AGAINST COSTS OF 11 kV SCREENED AND BELTED CABLES (LAID DIRECT IN GROUND g = 120).

Normal area of Conductor sq. ins.	Current Rating		% Increase in rating using screened cables	Approx. % increase in price using screened cables
	Belted Type Amp	Screened Type Amp		
0.04	120	130	8.4	10.0
0.1	205	215	4.9	6.5
0.15	250	265	6.0	5.8
0.20	290	315	8.6	5.1
0.25	335	355	6.0	4.5
0.30	370	395	6.8	4.0

FIGURE 2.

may be necessary, where stands have large splayed corners, to follow the splay with the cable trench in order to reduce the length of ducting under the roadway. At first sight, this may appear uneconomical, but, as the current carrying capacity of cables in ducts is reduced, due to the unfavourable dissipation of heat, it is advisable to reduce the duct lengths as much as possible in order to avoid the necessity of reducing the rating of the whole circuit to the current rating permitted for the duct section.

In this country, cables are usually buried in the ground at the following depths:-

Up to 1.1 kV working pressure - 24 inches

1.1 kV to 11 kV working pressure - 36 inches

There is no scientific basis for these varying depths of laying, although the greater the depth of laying, the greater the possibility of freedom from external damage after installation. The cost of excavation is not an important factor in the overall cost of an underground system, but the depths of laying stated above represent a compromise between engineering and economic factors.

Although power cables used for the underground cable system are usually of the steel wire or steel tape armoured type, it is usual, particularly on the high tension system, to install additional protection to provide a warning to future excavators of the presence of cables. This protection consists of a continuous layer of concrete slabs laid about three inches above the top surface of the cable.

FIGURE 3.

In some installations, treated wooden planks have been used but they appear to deteriorate badly in about ten years due to damp-rot and termite attacks. For this reason concrete tiles or slabs are preferable. Figure 3 shows a particular method used for the manufacture of concrete slabs for cable protection.

It will be seen that the slabs are not of the interlocking type, or reinforced in any way but, despite these apparent shortcomings, they have proved most satisfactory and economical in practice.

Draw-in System.

In densely populated areas, such as business areas, where the excavation of a trench is both expensive and inconvenient, the draw-in system is used, since this system allows for the installation of new cables with the minimum labour and inconvenience to the public. Ducts or pipes are buried direct in the ground with manholes at convenient positions from which cables are drawn in and subsequently jointed. The important advantage of this system is that once a group or cluster of ducts has been installed, repairs, additions or alterations may be made without re-opening the ground. On the other hand, however, this system has two major disadvantages; the initial cost is very much higher than the direct laying method and the current carrying capacity of the cables is reduced due to

1.1 kV PAPER INSULATED THREE-, FOUR-, AND FIVE-CORE LEAD SHEATHED, ARMOURED AND SERVED CABLES (MAXIMUM CONDUCTOR TEMPERATURE 80°C)

Nominal Area of Conductor sq. ins.	Laid direct in ground		In single way ducts	
	Thermal resistivity of soil (g) in °C CM/W			
	90	120	90	120
0.0225	105	100	86	83
0.04	150	140	120	115
0.06	190	175	150	140
0.1	260	240	205	195
0.15	320	290	255	240
0.2	385	345	305	285
0.25	440	395	345	325
0.3	495	445	385	365

FIGURE 4.

the close proximity of the cables in the ducts and the higher thermal resistance of the heat flow path.

Figure 4 gives a comparison between some of the more popular sizes of low tension cables laid direct in the ground and pulled into a single way duct.

This comparison shows that the current carrying rating for a single duct system is about 20% less than for the direct laying method. A further derating is necessary if a cluster of ducts is installed and Figure 5 shows the rating for cables in multiway ducts.

The above tables are based on glazed earthenware ducts but apply with sufficient practical accuracy to steel, cast iron and concrete or asbestos cement pipes which also make good cable ducts. Internal duct diameters are usually not less than four inches, but, it may be necessary to provide larger ducts for cables having an external diameter of more than $2\frac{1}{2}$ inches.

Cables intended for drawing into ducts are generally plan lead sheathed as the compounded serving increases installation problems. The subsequent removal, if necessary, of the cable is usually the biggest problem. Some covering over the lead is preferable, however, to protect the soft sheath from mechanical damage, or in some cases as a protection against chemical corrosion. Synthetic plastic materials are admirably suited to this purpose.

It is interesting to note that in America, very few power cables are buried direct in the ground, the draw-in system being used almost exclusively. In this country the duct system would probably be most uneconomical in all but special cases, and the direct-laying method is therefore preferred.

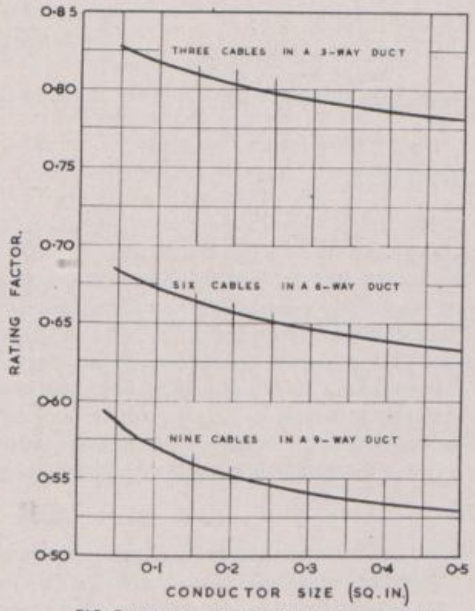


FIG. 5 RATING FACTORS FOR MULTI-CORE S.W.A. CABLES IN MULTI-WAY DUCTS.
APPLY TO RATING OF CORRESPONDING CABLE IN SINGLE WAY DUCT FIG. 4

Trenching.

Since most of the work on a new underground system is completed before streets are paved, practically all excavation work may be accomplished by an excavating machine. Experience has revealed that mechanical excavation is by far the most economical. (It is reasonable, with one machine, to expect to average approximately 2,000 feet deep trench per day in soft soil without obstructions). Small undertakings may not be in a position to afford a suitable machine and under these circumstances it will be more profitable to let this work out to a reputable contractor whenever possible. There are a number of small petrol-engine-driven trenchers and tractor driven back-hoes available today. Their application is somewhat limited, but as long as the distribution engineer recognises this fact, they are capable of quite good service. In practice, however, it is not always easy to assess the nature of the soil being excavated and, more often than not, these small machines are used in soils which are beyond their capabilities. The old adage "Don't ask a boy to do a man's job" is most fitting. Figure 6 shows a typical trenching machine.

During the installation of cables, a crosswalk, driveway or street is often encountered in which the paving or surface must not be disturbed. To comply with such requirements usually entails considerable costs, but if it is necessary, substantial savings, both in cost and time, may be effected by using some type of hydraulic pipe pusher. Under favourable conditions, over 60 feet of piping may be installed with fairly accurate direction. However, where rocks of boulders are present, the pipe may easily be deflected out of line. Figure 7 shows a typical hydraulic pipe pusher.

Mechanical Stresses.

Probably the most important factor in cable laying operations is the avoidance of excessive stresses in the cable.

FIGURE 6.

The specifications laid down by the South African Bureau of Standards for the manufacture of power cables allows sufficient margin in the stresses to which the cables may be subjected, not only during service, but also during transport and laying. However, it is particularly important to consider a few points which, in many cases, can considerably lengthen the life of a cable installation.

Drums of cable must always be rolled in the direction shown by the arrow painted on the flanges, otherwise stresses may arise in the cable due to displacement of the coils. Drums must never be dropped as the shock may cause serious damage to the inner layers of cable. When lifting drums by means of a rope sling it is advisable for the lagging to be left in place to prevent the collapse of the flange and subsequent crushing of the cable.

The insulation in solid type cables stiffens at low temperatures (about 32°F or below) owing to the viscous impregnant and, as the layers outside the lead sheath are impregnated with a bituminous compound and become brittle under the same conditions, cable will not as a rule withstand bending at such temperatures. Consequently, the installation of cable should not be carried out at lower temperatures than about 40°F. If, for any reason, the cable must be subjected to bending at a lower ambient temperature than 40°F, it will be necessary to heat the cable during the bending process. Fortunately, in this country, these conditions are only experienced occasionally during the winter.

Paper cables should always be bent (or straightened) slowly; they must not be subject to sudden or sharp bends, which may damage the insulation and other parts of the cable. In general, a cable may be bent with a radius equal to 12 to 15 times the external diameter of the cable. Individual cores, in a multicore cable may, however, be bent to a smaller radius than the cable itself.

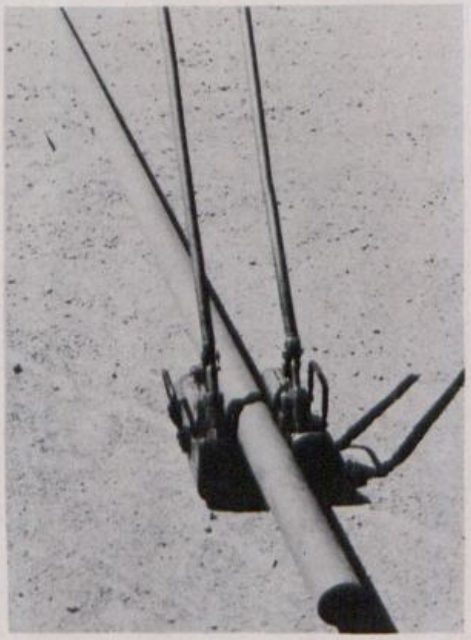


FIGURE 7.

On account of the low mechanical strength of lead, cables are as a rule armoured in some way or another for protecting the sheath. The most common armouring - tape armouring - gives little protection, however, against tensile stresses. It is advisable to allow no higher continuous tensile stress in the lead sheath than 200 - 350 lbs per square inch over long periods. Stresses of 700 - 1000 lbs per square inch, depending on the composition of the sheath material, may be allowed temporarily, for example during the laying of the cable. For this reason, unarmoured and tape armoured cables should not be subjected to considerable tensile stresses. Such stresses may arise when pulling out the cable by winching or by applying the pull at the end of the cable instead of distributing it along its whole length. Cables which are subjected to considerable tensile stresses during laying, or in use, should preferably be wire armoured.

The lead sheath is liable to be subjected to considerable internal pressure when the cable is heated, due to the expansion of the empregnant. This pressure may be particularly high during sudden increases in load. In cable installations with great differences of level, the static pressure is added to the pressure caused by the expansion of the impregnant, and bursting of the sheath may occur. Consequently it is advisable, to provide special sheathing or, if standard cables are used, to permit of no greater level differences than those given below.

Unarmoured cables	-	about 35 feet
Wire armoured cables	-	about 55 feet
Tape armoured cables	-	about 75 feet

MAINTENANCE.

In addition to the numerous external causes of cable failure, deterioration of the insulation occasionally results in failures due to internal causes. There are a number of conditions which take place within a cable leading to subsequent failure of the cable insulation. High potential stresses at weak points in the insulation progressively reduce the insulation level until ultimately breakdown occurs. This process may be very slow and any efforts to reduce failures during service by periodically testing cables to detect insulation deterioration would seem desirable.

When periodic testing is conducted, an appreciable portion of the total internal cable faults can be developed under test conditions with a corresponding reduction in service failures and a number of operating advantages are

produced. Continuity of service is improved by elimination of failures while the cable is in service. High voltage surges on the system, which in some instances occur under fault conditions, are reduced. Repairs can be made more conveniently and economically if service failure is avoided. Cable failures developed by testing equipment are not as likely to cause as much damage as service failures, and consequently, a better study may be made of the cause of failure.

Pressure testing of power cables in the factory is carried out by means of an alternating current supply in accordance with test voltages laid down by standard specifications. Our present S.A.B.S. 97 does not provide for pressure testing after the cable has left the factory. However, this information has been included in S.A.B.S. 98 or the B.S.S. Specifications. These Specifications provide for tests with either alternating current or direct current, but as tests after installation are normally, and more conveniently, carried out by direct current, figure 8 has been reproduced without the alternating current values. The only stipulation is that the test voltage shall be maintained continuously for 15 minutes between conductors and between each conductor and sheath.

Pressure tests on switchgear are usually maintained for only one minute and where it is not possible to disconnect the cable from the switchgear for test purposes, it is advisable to obtain the authority from the switchgear manufacturer for the longer tests. Reputable switchgear manufacturers seldom have any objections to the longer tests with direct current.

TEST VOLTAGE AFTER INSTALLATION.

Voltage Designation	Test Voltage.		
	Belted Cables		Screened Cables
	Between Conductors	Between any Conductor and Sheath	Between any Conductor and Sheath
Cables for earthed systems			
	D.C.	D.C.	D.C.
1 100	3 000	3 000	3 000
3 300	9 000	5 000	5 000
6 600	18 000	10 500	10 500
11 000	30 000	17 500	18 000
Cables for unearthed systems			
3 300	9 000	9 000	9 000
6 600	18 000	18 000	18 000
11 000	30 000	30 000	30 000

FIGURE 8.

Although periodic pressure testing of cables would seem desirable, directly opposite views are found in some electricity undertakings today concerning preventive maintenance testing of cables. Some undertakings, particularly overseas, test cables on a routine basis and show improved service reliability, while others, and probably the greater majority, believe that such tests are not only uneconomical, but also cause service failures that would otherwise not have occurred. The facts probably lie somewhere between these extremes. These views may eventually change because the use of the pulse echo technique is relatively simple to apply to routine testing. It is not as time consuming as the high pressure direct current test method and no damage can be caused to the cable. Changes in the characteristic impedance of any particular cable may be detected if previous test records are available and the incipient fault may then be broken down in the usual way by means of the high voltage test set.

The economic aspects of routine testing of cables in the various voltage classes is difficult to assess and at this stage it seems reasonable to assume that testing should be confined to cables in the transmission or sub-transmission class only.

Generally, apart from the above considerations, there is very little maintenance necessary on underground cables. Oil and gas filled cables need additional care but they are beyond the scope of this paper. A little extra care during the installation of cables, will, therefore, pay handsome dividends in later years.

CABLE FAULT LOCATION.

While outages on an underground system are relatively infrequent, the time involved in locating and repairing cable faults is long in comparison to that usually associated with overhead systems. This element of long outage time is, unfortunately, an inherent disadvantage in all underground systems and since continuity of supply is important to both the consumer and the supply authority, it is essential to locate faults as speedily as possible in order to effect repairs and recommission this service in the minimum amount of time. Even where an alternative supply has been provided it is advisable to repair the faulty cable as soon as possible, because one may be unfortunate enough to lose the alternative supply as well.

The time involved in the location of cable faults varies widely with the voltage rating of the cable and the type of fault. While the effects of a fault in low tension cables usually leave unmistakable evidence of their presence, or at any rate a very low resistance fault condition, those occurring at higher voltages can be more troublesome. Frequently, the only evidence of their

existence is the tripping of a circuit breaker accompanied by the operation of a protective relay.

Networks are continually being reinforced to meet the growing demands for electricity and underground cables are consequently being subjected to greater fault currents. Where these occur, numerous cases have been found where any incipient carbonisation of the paper insulation has been eliminated by the explosive power of the arc at the instant of failure thereby resulting in a fault of very high resistance. The presence of moisture at the fault may lower the resistance of the fault path, but more often than not, it may not only permit surprisingly high resistance, but also very unstable conditions.

Fundamentally, there are only two electrical faults which can occur in a cable; parallel faults, involving a breakdown of the insulation, and series faults, involving open circuited conductors. In practice, however, there are so many variations of these, it is probably safe to say, that seldom are two faults alike. The mains department of any supply authority, operating an underground network, should therefore, have accurate, reliable and up to date instruments, capable of dealing with any emergency which might interfere with the continuity of supply to its consumers.

Fault locating methods in use today may be separated into two major classifications - terminal measurements and tracer methods, which may be summarised as follows:-

Terminal measurement methods are those which involve measuring some electrical characteristic of the faulty conductor from one of the cable terminations and comparing it with unfaulted conditions in terms of distance to the fault.

Tracer methods are those which involve the placing of an electrical signal on the faulty conductor, from one of the cable terminations, which can be traced along the cable length and detected at the fault by a change in signal characteristics.

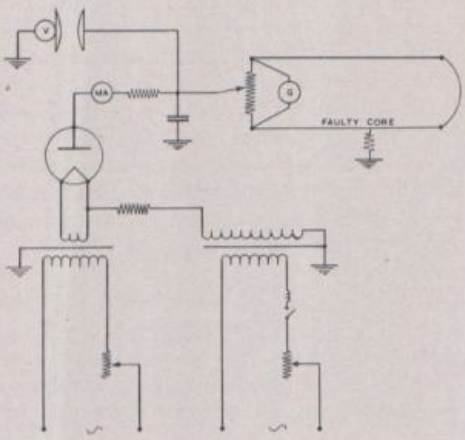


FIG. 9

Terminal Methods.

Murray Loop Bridge.

This method is probably one of the oldest methods in use today. It was originated in 1858 by John Murray, a telegraph electrician, long before power cables were used. However, it has proved to be one of the best methods of locating the majority of cable faults and its greatest merit is its simplicity. Furthermore, the fault resistance and slide wire contact resistance, being in the power supply circuit have no influence on the accuracy of measurement providing the power supply is adequate to make full use of the available galvanometer sensitivity. Figure 9 shows the circuit for an H.T. loop test with rectifying valve.

Figure 10 shows a portable power supply unit, employing rectifier values, which is capable of pressures up to 80 kV. The polarity of the testing pressure is easily selected, and since the effect of a negative charge is to concentrate moisture at a point, it is customary to connect the anode of one of the valves to the faulty core so that moisture, if present, is drawn towards the fault, thereby assisting in the breakdown of the fault.

While it is possible to make up a slide wire and to obtain fairly accurate results, the use of a carefully constructed and properly designed instrument is always best

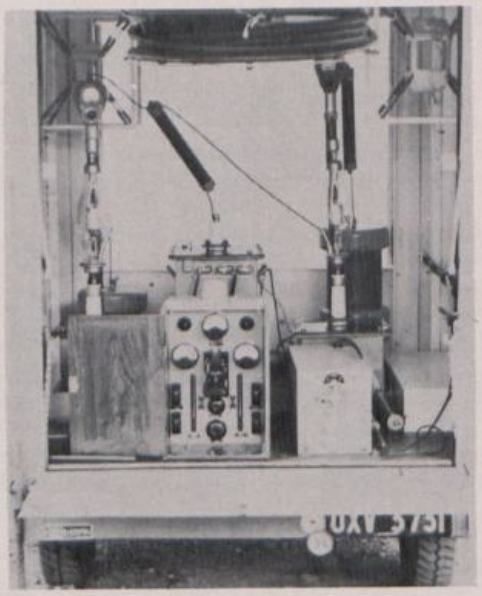


FIGURE 10.

in the long run. Figure 11 illustrates a slide wire specially constructed and insulated for use at high voltage.

The instrument is placed on a stand insulated for any pressure that is likely to be imposed upon it. The slide wire scale is divided into 1000 divisions and by estimating the half divisions it is possible to obtain an accuracy of $\frac{L}{2000}$ where L is the length of the complete cable loop. The loop length of a one mile cable being approximately 10, 000 feet, a fault may be located somewhere within 5 feet with the slide wire instruments mentioned above.

It is seldom possible in practice to connect the slide wire directly to the cable under test and fairly long connecting leads may be required, particularly when the cable terminates at a pole box some 20 ft. or 30 ft. above the ground. In order to eliminate possible errors the galvanometer should be connected across the actual cable termination by means of separate leads. The leads from the slide wire to the cable termination may then be considered as portions of the slide wire. When balance has been obtained the slide wire subdivisions may be checked by means of an accurate resistance bridge. This connection eliminates the necessity of calculating the equivalent length of the connecting leads. The minimum test current necessary to give reliable operation of the bridge is considered to be about 20 mA. A sound core is also necessary but good results may be expected where the ratio of the insulation resistance of the sound core to the faulty core is of the order of 10:1.

Pulse-Echo Method.

The pulse-echo technique imposes a very short d-c pulse from a generator onto the faulted cable and measures time required for the pulse to reach the fault and reflect back to the source, thereby indicating on an oscilloscope the distance to the fault. An illustration of a typical pulse-echo set is shown in Figure 12.

A cable, when pulsed, exhibits entirely different characteristics from those shown when it is connected to normal supply frequencies. If a short d-c pulse is introduced by means of a generator to one end of an infinitely long transmission line, the power supplied to the line will travel along it towards the remote end and will gradually be dissipated in the line. There will be no power travelling in the opposite direction. If the line is now cut, a certain load can be connected to the cut end which will simulate the missing portion of the line by absorbing all the power reaching it; the impedance of this load is the characteristic impedance of the line (Zo). This is for all practical purposes equal to a pure resistance of value $\sqrt{L/C}$, where L is the inductance and C the capacitance of equal lengths of line.

Any load other than the characteristic impedance will not absorb all the power travelling from the generator. The power which is not absorbed by the load is reflected by it and travels back along the line towards the generator. Consequently, if the circuit terminates in a short circuit - zero impedance - no power is absorbed and the wave voltage (E_i) is equal to the reflected wave voltage (E_r), but as no voltage can exist across a short circuit, E_i and E_r must be exactly out of phase. The pulse therefore folds back upon itself with reverse polarity and is reflected back to the generator. If, on the other hand, the terminates in a discontinuity - very high impedance - no power is absorbed. Since no current can flow across an circuit terminates in a discontinuity - very high impedance - no power is absorbed. Since no current can flow across an open circuit, the current due to E_i must be exactly out of phase with that due to E_r, that is, $I_i = -I_r$. As $(\frac{E_i}{I_i}) = Zo$ $-(\frac{E_r}{I_r})$, $E_i = E_r$, that is, they are in phase. The pulse therefore folds back upon itself with the same polarity and is reflected back to the generator. The above two conditions are shown in Figure 13.

A matching circuit is provided at the generator to absorb the reflected wave, otherwise multiple reflections

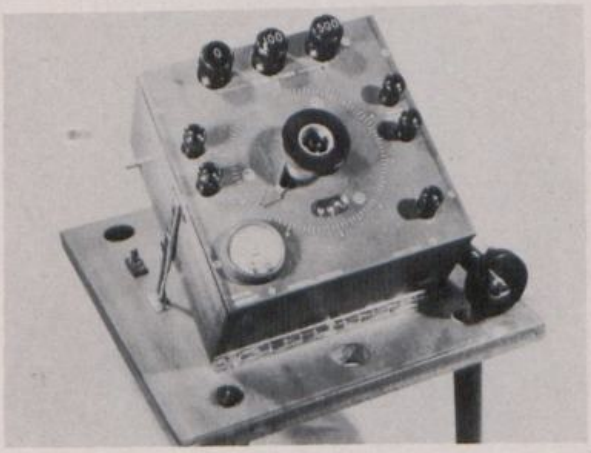


FIGURE 11.

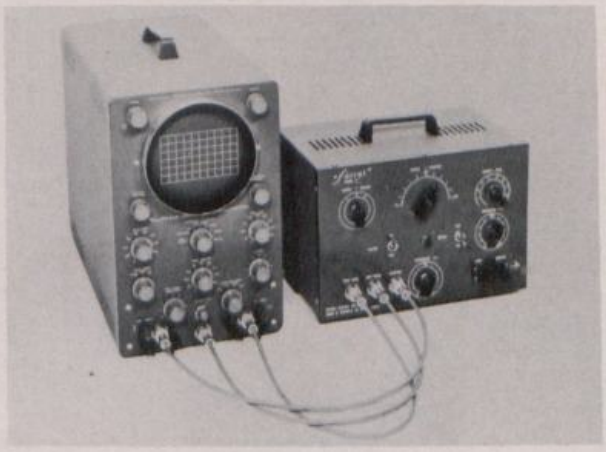


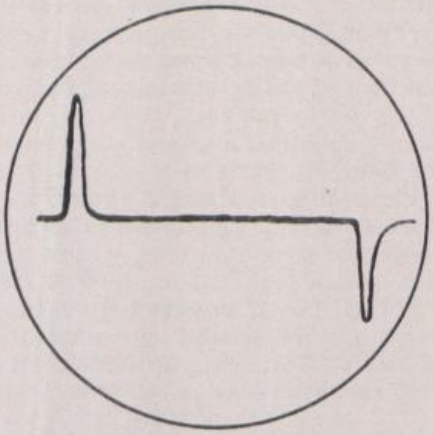
FIGURE 12.

take place as the wave continues to travel back and forth along the circuit, making it difficult to interpret the trace on the oscilloscope.

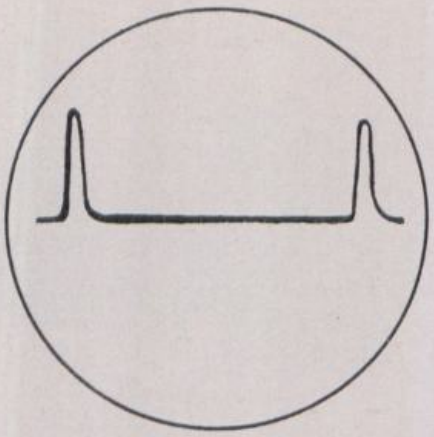
Any change in the characteristic impedance, (L/C ratio) along the length of a circuit will show the trace and this method may therefore be considered as an impedance-change indicating device. The distance between the incident and reflected waves (on the oscilloscope trace) may be controlled by a proper selection of the oscilloscope time base and, by the use of a propogation constant for the type of cable involved, it is possible to calculate the total length of cable under test, or the position of the fault. On the other hand, if a linear trace is derived and a physical distance along the cable route is known in respect of any one reflection, then the position of any other cause of reflection may be obtained from the trace by simple pro-rata measurement. Figure 14 shows diagrammatically, a trace on a healthy cable with typical reflections from cable joints.

This technique of locating faults appears to be very effective because it provides information about the condition of a cable which cannot be obtained by any other means. The visual picture on the oscilloscope display screen allows the mains engineer to "look" at the condition of the cables in his network.

In its present stage of development it appears to be limited to cables where there are no branches or tee-joints. Accuracy may fall off for cable lengths greater than 12 miles because distortion reduces the sharpness of the leading edge of the incident pulse, thereby reducing the sharpness of reflected signals. Accuracy may also fall off for short cable lengths due to the time resolution of the measuring equipment.

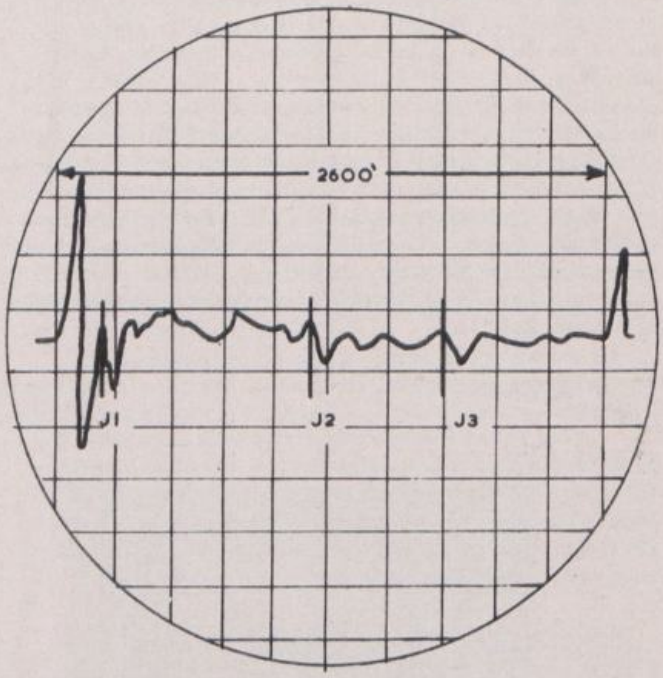


SHORT-CIRCUIT



OPEN-CIRCUIT

FIG. 13



DATA

3X0·6 SQ INS 11 KV CABLE
ROUTE LENGTH 2600 FT.
JOINT "J1" BETWEEN TWO CABLES OF DIFFERENT SPECIFICATION.
SOME VARIATIONS IN TRACE BETWEEN JOINTS DUE TO MECHANICAL DISTORTION OF CABLE AROUND SPLAYS AND CORNERS ESPECIALLY BETWEEN JOINTS 1 & 2.
BETWEEN JOINT 2 AND THE END OF THE CABLE THE ROUTE IS ALMOST STRAIGHT

FIG. 14.

Capacitance Tests for Open Circuits.

The capacitance measuring method is simply the measurement of capacitance from one end of the faulted cable to ground, and comparing it in terms of distance, with the capacitance of an unfaulted conductor in the same cable.

When the break is clean, reliable results may be obtained by very simple apparatus consisting of a non-inductive slide wire, a pair of fairly high resistance earphones and a battery operated buzzer. This equipment is illustrated in Figure 15.

When the fault is complicated by the presence of low insulation, a more elaborate AC bridge must be used, and a typical method of test is shown diagrammatically in Figure 16. Care should be taken to earth all cores not under test in order to avoid errors due to undesirable coupling through the fault resistance to the core under test.

Due to complex conditions which may exist at an open circuit fault, capacitive testing methods may not be very effective and more definite results may frequently be obtained by using tracer methods.

Tracer Methods.

Audio-Frequency.

There are a number of low voltage audio-frequency or tone tracing devices available for locating faults in cables. They may vary in detail, but basically they consist of audio-frequency or tone generators and detectors which are capable of detecting changes in signal level at the fault.

The signal generators are usually electronic oscillators or vibrator-actuated networks. The detectors consist of a search coil incorporating a highly permeable ferrite core which gives a very pronounced directional effect and an audio-amplifier with either output meters or headsets.

The signal which is injected into the cable by the generator produces an electromagnetic field around the cable which is explored by the search coil. Depending on the position of the coil relative to the cable, different voltages are induced in the search coil. These are amplified and can be heard in the headset or read off on the meter.

The greatest accuracy is achieved by using the minimum method as it is then possible to detect very small differences in field strength. This method is indicated diagrammatically in Figure 17, and is generally used to determine the exact location and depth of the cable in the ground. Cables through which current is flowing may be located without the use of the signal generator.

In the case of multi-core cables, the lay of the cores may be utilised for fault location. If a tone generator is connected across two cores which are short-circuited

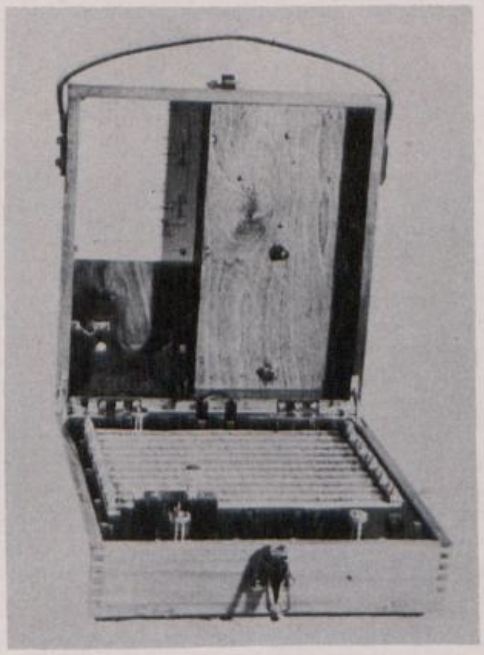


FIGURE 15.

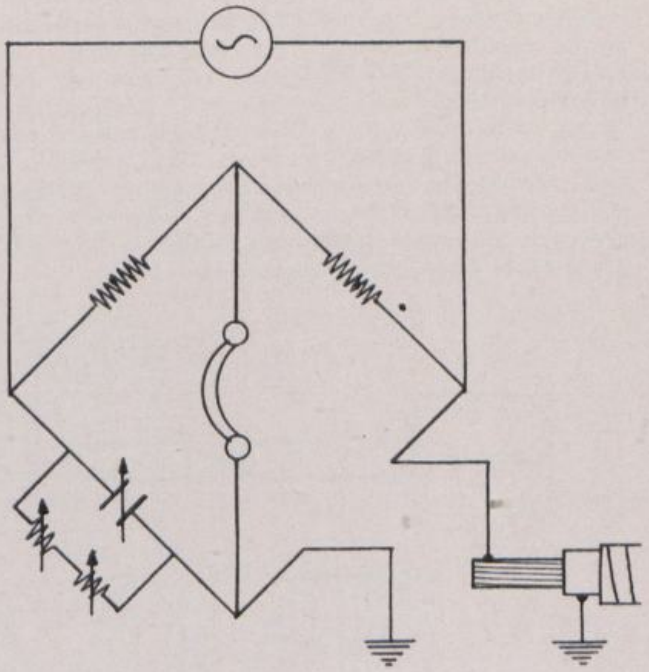


FIG. 16.

at the end of the cable, or by a fault, the magnetic field follows the lay of the cores and produces periodic changes in intensity as the detector is passed along the cable length. This effect falls away beyond the short circuit thus indicating the presence of the fault. This method is illustrated diagrammatically in Figure 18.

The audio-frequency method of fault location has proved effective on faults of near zero resistance but above a few ohms, signal "carry over" beyond the fault and signals on branches ahead of the fault often result in unreliable indications.

Impulse.

The impulse method of cable fault location has as its primary objective, the transmission of a surge of electrical energy along the cable of sufficient voltage to arc over a high resistance fault. The mode of operation is based on charging a capacitor by means of a high voltage d-c generator until there is a flash over on a spark gap which produces, for a short period, the full voltage of the capacitor across the cable. The periodic charge and discharge of the capacitor causes a flashover at the fault at each discharge of the capacitor which can be detected by means of a microphone and amplifier. However, in many cases the thud caused by the flash over can be detected without the use of amplifying equipment and an ordinary medical stethoscope can be used with surprisingly effective results.

The location of the flash over noise is not always easy because some arcing faults may not produce sufficient noise to be useful in all cases. If the fault maintains a low resistance, then, of course, there will be no noise and detection by this means is impossible. Furthermore, arcing faults submerged in water or surrounded by soft mud are extremely difficult to detect. This technique may, therefore, be considered as a supplement to the normal methods of fault location and may be used with confidence to "pin-point" the fault after its approximate location has been determined by other means.

Where equipment, designed for the specific purpose of locating faults by this method, is not available, an equivalent may be devised by using a high pressure d-c power supply, such as is shown in Figure 10, to charge a bank of condensers or another available cable and discharging this stored energy through a spark gap. The spark gap may be set by trial and error to flash over at a suitable voltage limited only by the working voltages of the capacitors and cable under test. This method is shown diagrammatically in Figure 19.

Cable Records.

The importance of accurate cable records and a permanent means of indicating the cable route and cable joints cannot be overemphasised. Everything possible must be done to assist rapid fault location and cable records have a considerable bearing on this. They should provide circuit routes, depth, size of cable, joint positions, details of joints and distances between joints and terminations. Figure 20 shows a detail record of an 11 kV cable. The position of joints from stand boundaries and the actual route are indicated on a separate sheet, not shown here.

Figure 21 shows a typical route and cable joint marker which has proved most successful in practice; it consists of a lightly reinforced concrete slab with a flat

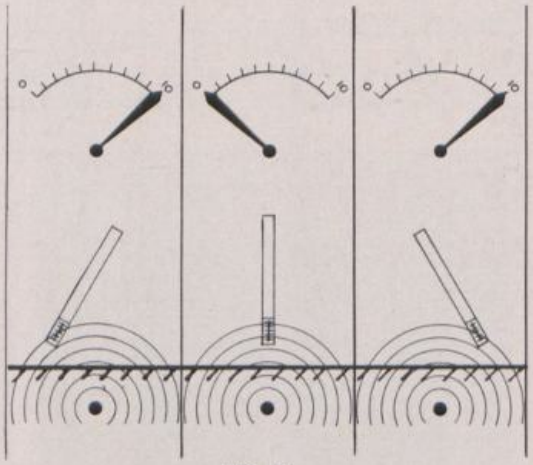


FIG. 17.

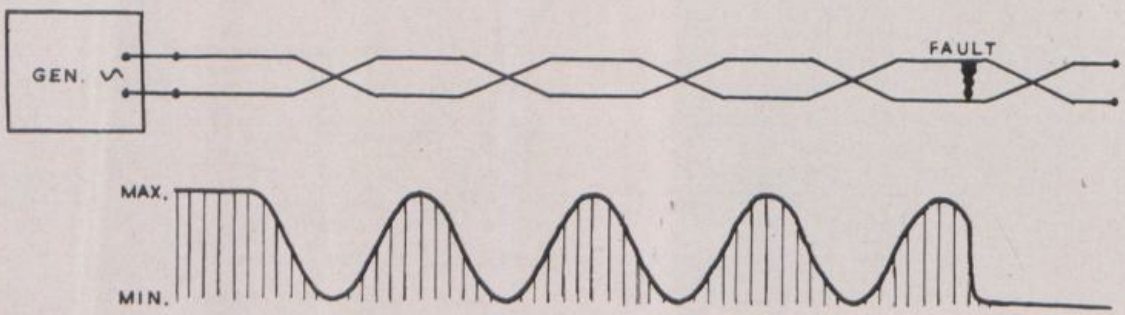


FIG. 18.

copper strip let into the face on which details of the route or cable joint are recorded by means of letter or number punches.

Test Equipment.

From the foregoing remarks and limitations of the various cable fault locating methods, it is evident that there is no one method which can be completely relied upon to localise all types of faults in all kinds of installations. The choice of equipment for any particular system is therefore largely determined by economics. Equipment which can be justified economically on a system having many miles of underground cables may be far too expensive for a system having only a small amount of underground cables.

On a large underground network it is normal practice to pressure test all underground cables before commissioning and a high voltage d.c. power supply is usually provided for this purpose. Test Equipment is, therefore, built up around this test set and basically the following additional equipment would be sufficient to cope with most faults likely to be encountered on systems up to 11 kV.

(i) 2500 Volt Insulation Tester.

(ii) Slide wire bridge and galvanometer insulated for high pressure.

(iii) Capacitor bridge.

(iv) Tone oscillator and detector.

A small undertaking may, on the other hand, be suitably equipped with the following:-

(i) 2500 Volt Insulation Tester.

(ii) Pulse-echo set.

THE FUTURE.

The fact that paper has been used for the insulation of cable from the earliest stages of their development until the present day, is a tribute not only to the material but also to the pioneer cable makers. The status of paper as an insulant does not appear to have been threatened, at any rate, in the higher-voltage power cables, but several new types of synthetics have recently appeared and it is reasonably certain that the use of plastics-insulated cables of one type or another will extend, as will the range of voltage and temperature at which they can be used.

Cable manufacturers, in the face of strong competition, are constantly searching for savings in the use of materials, and, although our competition is not great, we should, in the interests of national economy, realise the importance of reducing costs on our part. Standardization has led to many economic benefits, but if effective progress is to be maintained, two further steps would appear to be necessary. Firstly, investigations should be carried out

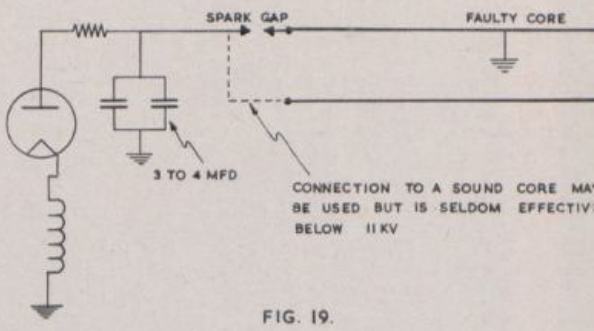
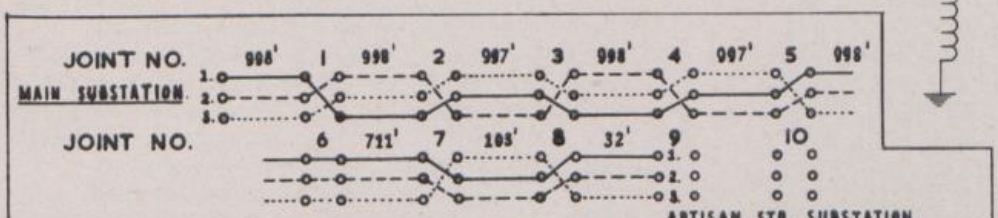


FIG. 19.



CABLE ROUTE		CORE NO.		
FROM	TO	R	Y	B
MAIN SUBST.	JOINT NO. 1	1	3	2
JOINT NO. 1	" NO. 2	3	2	1
" NO. 2	" NO. 3	2	1	3
" NO. 3	" NO. 4	3	2	1
" NO. 4	" NO. 5	2	1	3
" NO. 5	" NO. 6	1	3	2
" NO. 6	" NO. 7	1	3	2
" NO. 7	" NO. 8	2	1	3

CABLE ROUTE		CORE NO.		
FROM	TO	R	Y	B
JOINT NO. 8	ARTISAN ST. SUB.	1	3	2

MAIN SUBSTATION TO ARTISAN STR. SUBSTATION.

TOTAL LENGTH — 6832 FT.

FIG. 20.

in connection with the utilization of cables on similar lines to those carried out overseas by the Electrical Research Association mentioned earlier in the paper. Secondly, as we are probably the largest users of power cables in the country today, municipalities must be prepared to face up to the consequences of rationalisation of production. One of the biggest bugbears in cable production today is variety and alternatives, and unless we are prepared to accept some measure of restriction of choice, we can expect little improvement in our constant struggle against rising costs.

ACKNOWLEDGEMENTS.

The author wishes to thank the Village Board of Management, Virginia, for affording him the opportunity of presenting this paper to the Association and gratefully acknowledges the help which he has received from numerous discussions with friends and colleagues, and also from many books and technical articles, a number of which are quoted in the references.

FIGURE 21.

REFERENCES.

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P. V. Hunter and J. Temple Hazell.
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South African Institute of Electrical Engineers.
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JAARVERSLAG VAN DIE SEKRETARISSE.

Aan die Voorsitter en Lede van die Vereniging.

Mnr. die Voorsitter en Here,

Dis met genoeë dat ek die Jaarverslag van u Vereniging tesame met die Inkomste en Uitgawerekening en Balansstaat vir die boekjaar geëindig 29 Februarie 1964 aan u voorlê.

SEWE-EN-DERTIGSTE KONVENSIE:

Die sewe-en-dertigste Konvensie is gehou in Margate vanaf Dinsdag 7 Mei tot Vrydag 10 Mei 1963. Afgevaardigdes is in Margate verwelkom deur Sy Edele die Burgemeester, Raadslid R. L. Baker, en die verwelkoming tot die Konvensie is waargeneem deur Sy Edele die Burgemeester van Springs, Raadslid F. F. Deysel. Die verrigtings van die Konvensie is amptelik geopen deur Dr. R. L. Straszacker, Voorsitter van die Elektrisiteitsbeheerraad, Republiek van Suid-Afrika. Die Konvensie is bygewoon deur 476 lede, afgevaardigdes, verteenwoordigers, amptenare, besoekers en dames.

Namens die Voorsitter, lede van die Vereniging en al diégene wie die Konvensie bygewoon het wens ek met genoeë ons waardering uit te spreek teenoor Sy Edele die Burgemeester en Dorpsraadslede van Margate vir die gasvryheid aan ons betoon, asook aan Sy Edele die Burgemeester en Dorpsraadslede van Springs vir hulle hulp met die Konvensie. Ook wil ek innige dank betuig teenoor die bewoners en amptenare van Margate wat bygedra het, deur hulle gewaardeerde hulp, tot die organisasie van die Konvensie. Ek wil teenoor die Voorsitter namens almal teenwoordig waardering uitspreek vir die doeltreffende wyse waarop hy hom van sy taak gekwyt het. Ons hartelike dank gaan ook aan Mev. Downey vir haar hulp en bystand.

Die eerste lesing by die Konvensie aangebied was "Electrical Accidents" deur Mnr. R.R. Gilmour, A.M.I.E.E., M.(S.A.)I.E.E., Sen. M.I.R.E., Elektrisiteitsafdeling, Kaapstad, en het 'n belangwekkende bespreking voortgebring.

Die lesing deur Mnr. J.P.J. de Jager, B.Sc. (Eng.) "Economics of Distribution Planning", het, omdat dit gehandel het oor 'n onderwerp van belang in alle ondernemings, heelwat bespreking uitgelok.

Die derde lesing "Some Practical Aspects of 11kV Overhead Reticulation" deur Mnr. A.P. van Schalkwyk, Elektrisiteitsafdeling, Bloemfontein, het ook met 'n onderwerp van ruime toepassing gehandel en was prakties baie belangwekkend.

Die lesing "Meter reading methods in Salisbury" deur Mnr. L.J.J. Hutton van die Stadstesouriersafdeling Salisbury, het voorsien vir inligting omtrent die metodes vir hierdie roetine-daad in Salisbury, wat baie ongewone kenmerke insluit. Die voortspruitende bespreking was aansienlik.

Die laaste lesing "Some Aspects of the Statutes relating to Electricity Supply" deur Mnr. A.P. Burger, LL.D. F.I.T.C., het aansienlik bygedra tot die navorsings van tyd tot tyd onderneem namens die Vereniging in ver-

ANNUAL REPORT OF THE SECRETARIES.

To the President and Members of the Association.

Mr. President, Gentlemen,

It gives me great pleasure to submit to you the Annual Report of your Association together with the Revenue and Expenditure Account and Balance Sheet for the financial year ended 29th February, 1964.

THIRTY-SEVENTH CONVENTION:

The 37th Convention of the Association was held in Margate from Tuesday, 7th May to Friday, 10th May, 1963. Delegates were welcomes to Margate by His Worship the Mayor, Councillor R. L. Baker, and the welcome to the Convention was conveyed by His Worship the Mayor of Springs, Councillor F.F. Deysel. The Convention proceedings were officially opened by Dr. R.L. Straszacker Chairman of the Electricity Supply Commission, Republic of South Africa. The total attendance of members, delegates, representatives, officials, visitors and ladies numbered 476.

On behalf of the President, members of the Association and all others who attended the Convention, it gives me great pleasure to record our appreciation to His Worship the Mayor and Town Councillors of Margate for the hospitality extended to them, as also to His Worship the Mayor and Town Councillors of Springs for their assistance towards the Convention. I also wish to extend sincere thanks to the citizens and officials of Margate who contributed, through their valued assistance, to the organisation of the Convention. To the President it gives me great pleasure to place on record the appreciation of all for his efficient discharge of his duties. Grateful thanks are also extended to Mrs. Downey for her support and assistance.

The first paper presented to the Convention was "Electrical Accidents" by Mr. R.R. Gilmour, A.M.I.E.E., M.(S.A.)I.E.E., Sen.M.I.R.E., Electricity Department, Cape Town, which invoked interesting discussion.

The paper by Mr. J.P.J. de Jager B.Sc. (Eng.) "Economics of Distribution Planning", dealing as it did with a subject of interest in all undertakings brought forth considerable discussion.

The third paper "Some Practical Aspects of 11kV Overhead Reticulation" by Mr. A.P. van Schalkwyk, Electricity Department, Bloemfontein, also dealt with a subject having wide application and proved of great practical interest.

The paper "Meter reading methods in Salisbury" by Mr. L.J.J. Hutton of the City Treasurer's Department, Salisbury, provided information on the methods adopted for this routine operation in Salisbury, which have many novel features. There was considerable resultant discussion.

The final paper "Some Aspects of the Statutes relating to Electricity Supply" by Mr. A.P. Burger, LL.M., F.I.T.C., added considerably to the researches under-

ASSOCIATION OF MUNICIPAL ELECTRICITY UNDERTAKINGS OF SOUTHERN AFRICA.

BALANCE SHEET - 29th FEBRUARY, 1964.

1963				1963			
7,487	ACCUMULATED FUNDS		7,527.93	2	PRESIDENTIAL BADGE		
9,377	Balance at 28th February, 1963.	7,487.14			Nominal Value		2.00
(-) 1,890	Plus: Excess of Income over Expenditure for the year	40.79		80	FURNITURE AND FITTINGS At cost less depreciation		72.17
				7,453	INVESTMENTS		6,810.66
1,900	PROVISIONS		633.45	2,000	200 Class "B" Indefinite fully paid Shares of R10. each	2,000.00	
117	Sales Commission	-		4,464	Fixed Deposit	4,702.04	
180	Agents' Commission	78.45		989	Savings Account	108.62	
1,603	Cost of Printing 1962 Proceedings	-		2,114	DEBTORS LESS PROVISION FOR BAD DEBTS.		30.00
-	Provision for Loss on 1963 Proceedings	555.00		192	PAYMENTS IN ADVANCE - 1965 CONVENTION		221.97
-	SUNDRY CREDITORS		113.30	20	DEPOSIT Davidson & Ewing (Pty.) Limited		20.00
12	SUBSCRIPTIONS IN ADVANCE.		96.60	38	CASH AT BANK		8,310.48
-	HOTEL AND AIR DEPOSITS RECEIVED IN ADVANCE - 1965 CONVENTION		7,096.00				
500	GRANT RECEIVED IN ADVANCE		-				
R9,899			R15,467.28	R9,899			R15,467.28

J.C. DOWNEY : President.

DAVIDSON AND EWING (PROPRIETARY) LIMITED :

PER: R.G. EWING Secretaries.

Report of the Auditors to the Members of the Association of Municipal Electricity Undertakings of Southern Africa.

We report that we have examined the books, accounts and vouchers of the Association for the year ended 29th February, 1964; we have satisfied ourselves of the existence of the securities and have received all the information and explanations we required. In our opinion the above Balance Sheet is properly drawn up so as to exhibit a true and fair view of the state of the affairs of the Association as at 29th February, 1964, according to the best of our information and the explanations given to us and as shown by the books of the Association.

Johannesburg, 16th April, 1964.

SAVORY, BRINK, CREMER & CO.
Chartered Accountants (S.A.), Auditors.

ASSOCIATION OF MUNICIPAL ELECTRICITY UNDERTAKINGS OF SOUTHERN AFRICA.

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 29th FEBRUARY, 1964.

1963.				1963.		
70	Audit Fees - 1963		70.00	446	Income from Investments	382.07
34	Bank Charges		31.70	2,421	Subscriptions and Attendance Fees - Affiliates	2,468.00
4,488	Convention Expenses		2,789.02	3,637	Subscriptions - Council and Other	4,463.55
9	Depreciation - Furniture & Fittings		8.02	11	Bad Debts Recovered	1.86
870	Executive Council Expenses		725.50	1,890	Excess of Expenditure over Income transferred to Accumulated Funds	-
20	Insurance		4.45			
82	Legal Fees		-			
317	Loss on Sale of Proceedings	683.62				
-	Bad Debts - Advertising in Proceedings	128.00	811.62			
234	Postages and Telegrams (General)		236.05			
346	Printing and Stationery (General)		498.65			
1,800	Secretarial Fees		1,800.00			
30	Subscriptions Paid		30.00			
15	Sundry Expenses		51.70			
90	Telephone		102.60			
-	Travelling Expenses (General)		115.38			
-	Excess of Income over Expenditure transferred to Accumulated Funds		40.79			
R8,405			R7,315.48	R8,405		R7,315.48

ASSOCIATION OF MUNICIPAL ELECTRICITY UNDERTAKINGS

OF SOUTHERN AFRICA.

SCHEDULES TO ACCOUNTS - 29th FEBRUARY, 1964.

SCHEDULE 1.

PROCEEDINGS.

Advertising (gross estimate)	553.00		
Add: Underprovided - 1962	15.00	568.00	
Sales (estimate)	392.00		
Add: Underprovided - 1962	18.00	410.00	978.00
LESS:			
Provision for Cost of Printing		1,500.00	
Provision for Agents Commission	78.45		
Less: Overprovided - 1962	59.33	19.12	
		1,519.12	
Less: Sales Commission Overprovided - 1962		4.00	1,515.12
NET LOSS ON PROCEEDINGS			537.12
Debtors for Advertising Overprovided at 28th February, 1962			146.50
			R 683.62

NOTE: Sales Commission for 1963 Proceedings has been waived.

SCHEDULE 2.

CONVENTION EXPENSES.

Travelling and Accommodation		1,051.07
570 Copies of Agenda		912.44
Variety Show	400.00	
Less: Proceeds of Show	74.71	325.29
Recording of Congress Proceedings		488.00
Stationery and Printing		147.24
Preliminary Advice		62.92
Postages		55.56
Honoraria		37.00
Photographs		31.20
Entertainment		19.30
Preparing Badges and Folders		5.00
Translation of Annual Report		4.00
Sundries		150.00
		3,289.02
Less: Grant received for 1963 Convention		500.00
		R2,789.02

band met die regsoogpunte van elektrisiteitsvoorsiening, en die bespreking wat daaruit voortgespruit het was baie leersaam.

Die amp by die Lede Forum was weer deur Mnr. R.W. Barton waargeneem en baie praktiese probleme was

taken from time to time on behalf of the Association into the legal aspects of electricity supply, and was followed by very informative discussion.

Mr. R.W. Barton again officiated at the Members Forum and many practical problems were discussed by

deur dié teenwoordig bespreek. Ons betuig ons dank teenoor Mnr. Barton vir sy onderneming in hierdie taak.

Dit was eenparig besluit om die uitnodiging, ontvang van Windhoek om die agt-en-dertigste Konvensie in dié dorp te hou, te aanvaar.

LIDMAATSKAP:

Die volgende nuwe lede is verkies gedurende die jaar geëindig 29 Februarie 1964:

RAADSLEDE:

Munisipaliteit van George
Dorpsraad van Mooi Rivier
Makwassie Gesondheidsraad
Thabazimbi Gesondheidsraad
Munisipaliteit van Gwelo

INGENIEURSLEDE:

D.P. du Plooy (Nelspruit)
H. Edwards (Middelburg)
A.G. Peters (Gwelo)

MEDELEDE:

G.T. Honiball (Voorheen Dorp Elektriese Ingenieur, Windhoek).

GEAFFILIEERDES:

Pratley Manufacturing and Engineering Kie. (Edms.) Bpk.
W.R. Burnett (Edms.) Bpk.
Crawford, Clinkscales, Maughan-Brown en Vennote.
A.E.I. Henley Africa (Edms.) Bpk. (Gevorm deur die samestelling van Henley Simplex (Africa) (Edms.) Bpk. en Siemens Edison Swan (Edms.) Bpk.)

Die volgende bedankings is ontvang:

RAADSLEDE:

Munisipaliteit van Delmas
Munisipaliteit van Butterworth

INGENIEURSLEDE:

H.C. Joslin (Delmas)

GEAFFILIEERDES:

C.A. Parsons & Co. (Rhodesia) (Pvt.) Ltd.
Wright Anderson (S.A.) Bpk.
Caltex (Africa) Bpk.

those present. Our thanks are extended to Mr. Barton for undertaking this task.

It was unanimously agreed to accept the invitation received from Windhoek to hold the 38th Convention in that town.

MEMBERSHIP:

The following new members were elected during the year ended 29th February, 1964:

COUNCILLOR MEMBERS:

Municipality of George
Borough Council of Mooi River
Makwassie Health Committee
Thabazimbi Health Committee
Municipality of Gwelo

ENGINEER MEMBERS:

D.P. du Plooy (Nelspruit)
H. Edwards (Middelburg)
A.G. Peters (Gwelo)

ASSOCIATE MEMBERS:

G.T. Honiball (Formerly Town Electrical Engineer, Windhoek).

AFFILIATES:

Pratley Manufacturing and Engineering Co. (Pty.) Ltd.
W.R. Burnett (Pty.) Ltd.
Crawford, Clinkscales, Maughan-Brown and Partners.
A.E.I. Henley Africa (Pty.) Ltd. (Formed by the merger of Henley Simplex Africa (Pty.) Ltd. and Siemens Edison Swan (Pty.) Ltd.)

The following resignations took place:

COUNCILLOR MEMBERS:

Delmas Municipality
Butterworth Municipality

ENGINEER MEMBERS:

H.C. Joslin (Delmas)

AFFILIATES:

C.A. Parsons & Co. (Rhodesia) (Pvt.) Ltd.
Wright Anderson (S.A.) Ltd.
Caltex (Africa) Ltd.

Die vergelykende ledetalsyfer is as volg:

	1962/63	1963/64
Raadslede	127	130
Ingenieurslede	121	123
Erelede	13	13
Medelede	33	34
Deelgenote	12	14
Geaffilieerdes	87	86

Comparative membership figures are as follows:

	1962/63	1963/64
Councillor Members	127	130
Engineer Members	121	123
Honorary Members	13	13
Associate Members	33	34
Associates	12	14
Affiliates	87	86

FINANSIES:

Die Inkomste en Uitgawerekening vir die jaar in oënskou en die Balansstaat soos op 29 Februarie 1964 wat aan u voorgelê word toon 'n surplus van inkomste oor uitgawes van R41. (£20) vir die jaar. Die opgehoopte fondse van die Vereniging staan nou op R7528. (£3764).

Terwyl dank betuig word teenoor dié firmas wat ons nog ondersteun met advertensies in die Verrigtings, moet ek daarop wys dat hierdie bron van inkomste heelwat verminder het. In 'n poging om die Vereniging se toekomstige begrotings te balanseer, doen ons hierdie jaar 'n proefneming met nuwe drukmetodes wat, ons hoop, die koste van vervaardiging van die Verrigtings sowel as die lesings ens. wat voor die Konvensie uitgereik word, aansienlik sal verminder.

Graag wil ek my innige dank betuig teenoor die Lede van die Finansiekomitee, Mnr. R.W. Kane (Saamroeper) en Mnr. C.G. Lombard, vir hulle hulp gedurende die jaar.

Ten opsigte die naderende aftreding van Mnr. Kane wil ek graag melding maak van sy vrygewige hulp as Saamroeper van die Finansiekomitee oor 'n aantal jare. Ons is hom opreg dankbaar vir die ywerige belangstelling wat hy altyd in hierdie opsig getoon het in verband met die Vereniging se sake, asook sy bereidwilligheid te alle tye om van hulp te wees.

STREEKSTAKKE:

Die Streekstakke in Oos-Kaapland, Natal en die Hoëveld het gedurende die jaar in oënskou aangehou om bevredigend te werk, en ek wil graag van hierdie geleentheid gebruik maak om my dank te betuig teenoor diégene wat die Vereniging gehelp het met die reëling in hierdie opsig van die Vereniging se sake.

HALFJAARLIKSE UITVOERENDE VERGADERING:

Die Halfjaarlikse Uitvoerende Vergadering in 1963 het in Welkom plaasgevind en, namens die Voorsitter van die Uitvoerende Raad, betuig ons dank teenoor Sy Edele die Burgemeester en Raadslede van Welkom vir die gasvryheid bewys aan die Uitvoerende Raad by geleentheid van die Vergadering.

ONDERKOMITEES EN VERTEENWOORDIGERS:

Weereens is dit my voorreg om die waardering van die Vereniging oor te dra aan die lede van die verskeie Tegniese Organisasies, en ons Verteenwoordigers en ander Organisasies vir hulle vrygewige hulp gedurende die jaar. Alhoewel hulle pligte van uiterste belang vir die lede van die Vereniging en die elektrisiteitsbedryf is, het hulle baie min publisiteit ontvang.

Aan u, Mnr. Voorsitter en alle lede van die Uitvoerende Raad, wens ek dank te betuig vir die hulp en hoflikheid gedurende die afgelope jaar.

Aan die Vereniging en al sy Lede word vir 1964/65 die beste toegewens.

R.G. EWING.
namens Davidson & Ewing (Edms.) Bpk.
Sekretarisse.

19 Maart 1964.

FINANCE:

The Income and Expenditure Account for the year under review and the Balance Sheet as at 29th February, 1964, which are submitted to you reflect an excess of income over expenditure for the year of R41. (£20). The Accumulated Funds of the Association now stand at R7528. (£3764).

Whilst expressing thanks to those firms etc. who still support us by advertising in the Proceedings, I have to point out that this source of revenue has now dropped to small proportions. In an endeavour to balance future budgets of the Association we are this year experimenting with new printing methods which we hope will considerably reduce the cost of production of the Proceedings as well as the Papers etc. issued prior to the Convention.

I wish to convey sincere thanks to the Members of the Finance Committee, Mr. R.W. Kane (Convenor) and Mr. C.G. Lombard for their assistance during the year.

In view of Mr. Kane's forthcoming retirement I wish to refer to his unstinted assistance as Convenor of the Finance Committee over a number of years. We are sincerely grateful to him for the keen interest he has always shown in this aspect of the Association's affairs and for his ever willingness to be of assistance.

REGIONAL BRANCHES:

The Regional Branches for the Eastern Cape, Natal and Highveld have continued to operate satisfactorily during the year under review, and I wish to take this opportunity of thanking those who have assisted the Association by organising this aspect of its affairs.

MID-YEAR EXECUTIVE MEETING:

The Mid-Year Executive Meeting held in 1963 took place in Welkom, and, on behalf of the President and Executive Council, sincere thanks are conveyed to his Worship the Mayor and Councillors of Welkom for the hospitality extended to the Executive on the occasion of this meeting.

SUB-COMMITTEES AND REPRESENTATIVES:

Once again I have pleasure in conveying the appreciation of the Association to the members of the various Technical Sub-Committees, and our Representatives on other Organisations for their unstinted assistance during this year. Their many duties receive little publicity, but are of the utmost importance to the membership of the Association and the electricity industry as a whole.

To you, Mr. President and all Members of the Executive Council I express sincere thanks for their assistance and courtesy during the past year.

To the Association and all its Members we extend best wishes for 1964/65.

R.G. EWING.
for Davidson and Ewing (Pty.) Ltd.
Secretaries.

19th March, 1964.

JAARVERSLAG OOR DIE WERKSAAMHEDE VAN DIE ELEKTROTEGNIESE INGENIEURSONDERAFDELING VAN DIE S.A. BURO VIR STANDAARDE.

Dis vir my aangenaam om die verslag oor die werksaamhede van die S.A. Buro vir Standaarde gedurende die afgelope jaar voor te lê:

SABS 156, MINIATUURSTROOMBREKERS.

Die hersiene spesifikasie is op 14 Oktober 1963 deur die Raad van die Suid-Afrikaanse Buro vir Standaarde goedgekeur, en op 1 Januarie 1964 na die drukkers gestuur.

SABS 163, MUUR- EN TOESTELSKAKELAARS.

Die Raad het die hersiene spesifikasie op 19 Augustus 1963 goedgekeur en die eerste proewe is op 27 Januarie 1964 na die drukkers teruggestuur.

SABS 177, ISOLATORE VAN PORSELEIN EN VERSTERKTE GLAS VIR BOGRONDSE KRAGLYNE.

Die Raad van die Buro vir Standaarde het hierdie spesifikasie op 17 Junie 1963 goedgekeur. Dit was nodig om sekere byvoegings aan te bring voor dit na die drukkers gestuur kon word en die gewysigde stukke word nou opgestel vir finale afronding deur die betrokke komitee.

SABS 187, HOOG- EN LAAGSPANNINGSDEURVOERE.

Die finale konsep is op 4 Junie 1963 uitgestuur vir kommentaar. Die kommentaar ontvang is vergelyk en die dokument is nou gereed vir bespreking deur die komitee.

SABS 188, STANDAARD DEURVOERISOLATORE.

Die finale konsep is op 6 Junie 1963 uitgestuur vir kommentaar. Die kommentaar ontvang is vergelyk en die dokument is gereed vir bespreking deur die komitee.

SABS 743, LAAGSPANNINGS-ISOLERINGSTRANSFORMATORS.

Hierdie spesifikasie is op 19 Augustus 1963 deur die Raad van die Suid-Afrikaanse Buro vir Standaarde goedgekeur en in gereedheid gebring vir die drukkers. Inskrywings vir die drukwerk word ingewag.

DISTRIBUSIETRANSFORMATORS.

Die tweede komitee konsep is op 20 Junie 1963 afgestuur en die derde konsep word nou voorberei.

AARDLEKBESKERMINGSEENHEDE.

Die konsep vir kommentaar is op 30 Augustus 1963 uitgestuur en die kommentaar ontvang word nou vergelyk.

ELEKTRIESE VLAMBOOGSWEISTRANSFORMATORS.

Die eerste vergadering van hierdie komitee is op 12 Maart 1963 gehou. Besluite op die vergadering het gelei tot

ANNUAL REPORT ON THE ACTIVITIES OF THE ELECTRICAL ENGINEERING DIVISION OF THE S.A. BUREAU OF STANDARDS.

I have pleasure in presenting the report on the activities of the S.A. Bureau of Standards during the past year:

SABS 156, MOULDED CASE CIRCUIT BREAKERS.

The revised specification was approved by the Council of the South African Bureau of Standards on October 14, 1963 and sent to the printer on January 1, 1964.

SABS 163, WALL AND APPLIANCE SWITCHES.

The revised specification was approved by the Council on August 19, 1963 and the first proofs returned to the printer on January 27, 1964.

SABS 177, PORCELAIN AND TOUGHENED GLASS INSULATORS FOR OVERHEAD POWER LINES.

This specification was approved by the Council of the South African Bureau of Standards on June 17, 1963. Certain additions became necessary before it could be sent to the printers and the amended document is now being prepared for final scrutiny by the relevant committee.

SABS 187, HIGH AND LOW VOLTAGE BUSHINGS.

The final draft was sent out for comment on June 4, 1963. Comments received have been collated and the document is now ready for discussion by the committee.

SABS 188, STANDARD BUSHING INSULATORS.

The final draft was sent out for comment on June 6, 1963. Comments received have been collated and the document is ready for discussion by the committee.

SABS 743, LOW VOLTAGE ISOLATING TRANSFORMERS.

This specification was approved by the Council of the South African Bureau of Standards on August 19, 1963, has been prepared for printing and tenders for printing have now been called for.

DISTRIBUTION TRANSFORMERS.

The second committee draft was despatched on June 20, 1963 and the third draft is now being prepared.

EARTH LEAKAGE PROTECTIVE UNITS.

The draft for comment was despatched on August 30, 1963 and the comments received are now being collated.

ELECTRIC ARC WELDING TRANSFORMERS.

The first meeting of this committee was held on March 12, 1963. As a result of this meeting a preliminary

die opstel van 'n voorlopige dokument wat op 3 Julie 1963 aan lede van die komitee gestuur is. 'n Program van toetse en ondersoek geniet aandag.

FLUORESSEERLAMP SMOORSPOEL.

'n Vergadering is op 21 Februarie 1963 gehou en voort spruitend uit besluite geneem is 'n dokument voorberei en aan lede van die komitee besorg. 'n Werkgroep is sedertdien aangestel en het een vergadering gehou. 'n Tweede vergadering van die werkgroep is belê vir 5 Maart 1964.

GEBRUIKSKODE VIR DIE BELIGTING VAN STRATE EN HOOFWEË:

Na die agste vergadering van die werkgroep op 18 Januarie 1963 was daar nog vier vergaderings en twee verdere vergaderings is belê vir Februarie en Maart 1964. Na verwagting sal die gebruikskode met die Maartvergadering afgehandel word.

SABS 151, VASTE ELEKTRIESE OPGAARWATERVERWARMERS.

'n Vergadering is op 28 Mei 1963 gehou om sekere noodsaaklike wysigings te bespreek. Dit staan hoofsaaklik in verband met die bekamping van ontsinkingsprobleme. 'n Dokument wat die finale wysigings uiteensit, is aan lede van die komitee gestuur vir kommentaar teen 30 November 1963. Die Raad van die Suid-Afrikaanse Buro vir Standaarde het die finale dokument goedgekeur op 17 Februarie 1964.

SABS 153, ELEKTRIESE STOWE EN VERWARMINGSPLATE:

Die Raad van die Suid-Afrikaanse Buro vir Standaarde het toestemming verleen tot die algehele hersiening van hierdie dokument en die eerste vergadering is op 13 Februarie 1964 gehou.

SABS 166, BOGRONDSE HUISAANSLUITING-VERBINDINGSKASTE:

Wysigings is deur verskeie instansies voorgestel as gevolg van ondervinding ingewin met hierdie tipe handelsware. 'n Vergadering is op 25 Junie 1963 gehou om hierdie voorstelle te bespreek. 'n Dokument wat die aanvaarde voorstelle bevat is op 20 Augustus 1963 uitgestuur vir kommentaar. Die wysiging is deur die Raad van die Suid-Afrikaanse Buro vir Standaarde goedgekeur op 17 Februarie 1964.

VERBINDINGSKASTE VIR ELEKTRISITEITSMETERS.

Die eerste vergadering van hierdie komitee is op 4 Februarie 1964 gehou. 'n Dokument wat die besluite vervat sal nou in gereedheid gebring word vir versending aan lede van die Komitee.

document was prepared and despatched to members of the committee on July 3, 1963. A program of tests and investigations is in hand.

FLUORESCENT LAMP BALLAST.

A meeting was held on February 21, 1963 and as a result of decisions taken at this meeting a document was prepared and submitted to the members of the committee. A working group was subsequently appointed and had one meeting. A second meeting for the working group is scheduled for March 5, 1964.

CODE OF PRACTICE FOR THE LIGHTING OF STREETS AND HIGHWAYS.

Four further meetings of the working group were held after the eighth meeting on January 18, 1963 and two further meetings are scheduled for February and March of 1964. It is estimated that the Code will probably be completed at the March meeting.

SABS 151, FIXED ELECTRIC STORAGE WATER HEATERS.

A meeting was held on May 28, 1963 to discuss certain amendments that had become imperative. These dealt mainly with dezincification problems experienced. A document detailing the final amendments agreed upon, was sent to the members of the committee for their comment by November 30, 1963. The final document was approved by the Council of the South African Bureau of Standards on February 17, 1964.

SABS 153, ELECTRIC STOVES AND HOTPLATES.

The Council of the South African Bureau of Standards has agreed to the complete revision of this document and the first meeting was held on February 13, 1964.

SABS 166, OVERHEAD SERVICE LINE CONNECTOR BOXES.

Amendments were proposed by a number of instances as a result of experience gained with this type of commodity. A meeting to discuss these proposals was held on June 25, 1963. A document embodying the proposals accepted was circulated for comment on August 20, 1963. The amendment was approved by the Council of the South African Bureau of Standards on February 17, 1964.

CONNECTION CUPBOARDS FOR ELECTRICITY METERS.

The first meeting of this committee was held on February 4, 1964. A document, embodying the decisions taken, will now be prepared for submission to the members of the committee.

METAALMANTELVERWARMINGSEENHEDE MET MINERAALISOLASIE.

Die eerste vergadering van hierdie komitee is op 12 Februarie 1964 gehou.

HUISHOUDELIKE RADIO-ONTVANGERS VIR DIE ONTVANGS VAN RADIO-UITSENDINGS OP DIE M.F., H.F., EN B.H.F. BANDE.

Sedert die 19de November 1963 is drie vergaderings gehou en 'n vierde is belê vir 18 Februarie 1964.

VEILIGHEIDSPESIFIKASIE.

Die konsepkennisgewing vir afkondiging van die tien veiligheidspesifikasies is by die Departement van Handel en Nywerheid ingedien wat dit weer aan hulle regadviseurs vir noukeurige ondersoek oorhandig het. As die regsadviseurs tevrede is mag daar voortgegaan word met die afkondiging.

AFRIKAANSE ELEKTROTEGNIESE NOMENKLATUURKOMITEE.

Hierdie komitee het gereeld vergader gedurende die afgelope jaar.

Die V.M.E.O. verteenwoordigers wat in die verskillende S.A.B.S. tegniese komitees dien is soos volg:

MINIATUURSTROOMVERBREKERS:

Mnr. E.L. Smith.
Plaasvervanger: Mnr. H.D.O. von Oppel.

KOPERDRAAD EN -STAAF VIR ELEKTRIESE GELEIERS:

Mnr. G.C. Theron.
Plaasvervanger: Mnr. A.F. Turnbull.

TOETS VAN TRANSFORMATORS:

Mnr. W. Barnard.

HOOG- EN LAAGSPANNINGSDEURVOERE:

Mnr. C. Lombard.
Plaasvervanger: Mnr. F.J. Sulter.

RUBBERGEÏSOLEERDE KABELS:

Mnr. G.C. Theron.
Plaasvervanger: Mnr. A.F. Turnbull.

Pvc.-GEÏSOLEERDE KABELS:

Mnr. G.C. Theron,
Plaasvervanger: Mnr. A.F. Turnbull.

ISOLERINGSTRANSFORMATORS:

Mnr. V. Hart.

MINERAL INSULATED METAL SHEATHED HEATING UNITS.

The first meeting of this committee was held on February 12, 1964.

DOMESTIC RADIO RECEIVERS FOR THE RECEPTION OF BROADCAST TRANSMISSIONS IN THE M.F., H.F. AND V.H.F. BANDS.

Three meetings have been held since November 19, 1963 and the fourth meeting is scheduled for February 18, 1964.

SAFETY SPECIFICATIONS.

The Draft Notice for Promulgation of the ten safety specifications concerned is now with the Department of Commerce and Industries who has passed it on to their legal advisers for scrutiny. If the legal advisers are satisfied, promulgation can be proceeded with.

AFRIKAANSE ELEKTROTEGNIESE NOMENKLATUURKOMITEE.

This committee met regularly during the past year.

The A.M.E.U. representatives serving on the various S.A.B.S. technical committees are as follows:

MOULDED CASE CIRCUIT BREAKERS:

Mr. E.L. Smith.
Alternate: Mr. H.D.O. von Oppel.

COPPER WIRE AND BAR FOR ELECTRICAL CONDUCTORS:

Mr. G.C. Theron.
Alternate: Mr. A.F. Turnbull.

TESTING OF TRANSFORMERS:

Mr. W. Barnard.

HIGH AND LOW VOLTAGE BUSHINGS:

Mr. C. Lombard.
Alternate: Mr. F.J. Sulter.

RUBBER INSULATED CABLES:

Mr. G.C. Theron.
Alternate: Mr. A.F. Turnbull.

PVC. INSULATED CABLES:

Mr. G.C. Theron.
Alternate: Mr. A.F. Turnbull.

ISOLATING TRANSFORMERS:

Mr. V. Hart.

SMOORSPOELE VIR ELEKTRIESE GASONTLADINGS-LAMPE:

Mnr. N.P. Adams.
Plaasvervanger: Mnr. J.D. van Niekerk.

HANTERING VAN NARKOSEMIDDELS IN HOSPITALE:

Mnr. J.C. Fraser.

VLAMBOOG SWEISTOERUSTING:

Mnr. J.K. von Ahlfton.

BESKERMING VAN GEBOUE TEEN WEERLIG:

Mnr. D. Lees.
Plaasvervanger: Mnr. R.E.G. Andrews.

ISOLATORE VAN PORSELEIN EN VERSTERKTE GLAS:

Mnr. C. Lombard.
Plaasvervanger: Mnr. F.J. Sulter.

BELIGTING VAN STRATE EN HOOFWEË:

Mnr. G.C. Theron.
Plaasvervanger: Mnr. J.K. von Ahlfton.

INSTALLERING VAN LUGDRAADSTELSELS VIR DIE ONTVANGS VAN KLANKUITSENDINGS:

Mnr. E.L. Smith.
Plaasvervanger: Mnr. H.D.O. von Oppel.

DISTRIBUSIETRANSFORMATORS:

Mnr. F.L. Knobel.
Plaasvervanger: Mnr. F. Regenes.

STAALBUISE EN TOEBEHORE:

Mnr. G.C. Theron.
Plaasvervanger: Mnr. A.F. Turnbull.

MUUR- EN TOESTELSKAKELAARS:

Mnr. D. Lees.
Plaasvervanger: Mnr. G. Stephenson.

HUISHOUDELIKE YSKASTE EN WASMASJIENE:

Mnr. F.J. Sulter.
Plaasvervanger: Mnr. M.N. du Preez.

WOLFRAMGLOEIDRAADLAMP:

Mnr. D. Lees.
Plaasvervanger: Mnr. R.E.G. Andrews.

STANDAARD DEURVOERINGS:

Mnr. C. Lombard.
Plaasvervanger: Mnr. F.J. Sulter.

BALLASTS FOR ELECTRIC DISCHARGE LAMPS:

Mr. N.P. Adams.
Alternate: Mr. J.D. van Niekerk.

HANDLING OF ANAESHETICS IN HOSPITALS:

Mr. J.C. Fraser.

ARC WELDING EQUIPMENT:

Mr. J.K. von Ahlfton.

PROTECTION OF BUILDINGS AGAINST LIGHTNING:

Mr. D. Lees.
Alternate: Mr. R.E.G. Andrews.

PORCELAIN AND TOUGHENED GLASS INSULATORS:

Mr. C. Lombard.
Alternate: Mr. F.J. Sulter.

LIGHTING OF STREETS AND HIGHWAYS:

Mr. G.C. Theron.
Alternate: Mr. J.K. von Ahlfton.

INSTALLATION OF AERIAL SYSTEMS FOR THE RECEPTION OF SOUND BROADCASTING:

Mr. E.L. Smith.
Alternate: Mr. H.D.O. von Oppel.

DISTRIBUTION TRANSFORMERS:

Mr. F.L. Knobel.
Alternate: Mr. F. Regenes.

STEEL CONDUIT AND FITTINGS:

Mr. G.C. Theron.
Alternate: Mr. A.F. Turnbull.

WALL AND APPLIANCE SWITCHES:

Mr. D. Lees.
Alternate: Mr. G. Stephenson.

DOMESTIC REFRIGERATORS AND WASHING MACHINES:

Mr. F.J. Sulter.
Alternate: Mr. M.N. du Preez.

TUNGSTEN FILAMENT LAMPS:

Mr. D. Lees.
Alternate: Mr. R.E.G. Andrews.

STANDARD BUSHINGS:

Mr. C. Lombard.
Alternate: Mr. F.J. Sulter.

KODE VIR DIE HANTERING, BERGING EN INSTALLERING VAN KABELS:

Mnr. E. L. Smith.
Plaasvervanger: Mnr. H. D. O. von Oppel.

PAPIERGEÏSOLEERDE KABELS VIR SWAARDIENS:

Mnr. G. C. Theron.
Plaasvervanger: Mnr. A. F. Turnbull.

ELEKTRIESE TOERUSTING SPESIFIKASIES:

Koördinasiekomitee:
Mnr. C. Lombard.
Plaasvervanger: Mnr. G. C. Theron.

AARDLEK-BEVEILIGINGSAPPARATE:

Mnr. E. L. Smith.
Plaasvervanger: Mnr. H. D. O. von Oppel.

AFRIKAANSE ELEKTROTEGNIESE NOMENKLATUURKOMITEE:

Mnr. J. K. von Ahlfton.

VASTE ELEKTRIESE OPGAARWATERVERWARMERS:

Mnr. J. R. Cherry.

I. E. K. TEGNIESE KOMITEE 37: HERSIENING VAN PUBLIKASIE 99-1: WEERLIGAFLEIERS:

Mnr. E. de C. Pretorius.

HERSIENING VAN SABS 157-1950: ELEKTRIESE BROODBRAAIERS, SABS 158-1950: DRAAGBARE ELEKTRIESE TOESTELLE VIR DIE VERHITTING VAN VLOEISTOWWE, SABS 159-1950: ELEKTRIESE STRYKYSTERS, SABS 160-1950: ELEKTRIESE LUGVERWARMERS EN UITSTRALERS:

Mnr. E. E. de Villiers.
Plaasvervanger: Mnr. L. Dreyer.

HERSIENING VAN SPESIFIKASIE VIR BOGRONDSE HUISAANSLUITING-VERBINDINGSKASTE:

Mnr. E. L. Smith.

HERSIENING VAN SABS 153-1958: ELEKTRIESE STOWE EN VERWARMINGSPLATE:

Mnr. H. R. Durr.
Plaasvervanger: Mnr. L. Futcher.

VERBINDINGSKASTE VIR ELEKTRISITEITSMETERS:

Mnr. P. J. Botes.
Plaasvervanger: Mnr. F. J. v.d. Merwe.

CODE FOR HANDLING, STORAGE AND INSTALLATION OF ELECTRIC CABLES:

Mr. E. L. Smith.
Alternate: Mr. H. D. O. von Oppel.

PAPER INSULATED CABLES FOR HEAVY DUTY:

Mr. G. C. Theron.
Alternate: Mr. A. F. Turnbull.

ELECTRICAL EQUIPMENT SPECIFICATIONS CO-ORDINATING COMMITTEE:

Mr. C. Lombard.
Alternate: Mr. G. C. Theron.

EARTH LEAKAGE PROTECTION DEVICES:

Mr. E. L. Smith.
Alternate: Mr. H. D. O. von Oppel.

AFRIKAANSE ELEKTROTEGNIESE NOMENKLATUURKOMITEE:

Mr. J. K. von Ahlfton.

FIXED ELECTRIC WATER STORAGE HEATERS:

Mr. J. R. Cherry.

I. E. C. TECHNICAL COMMITTEE 37: REVISION OF PUBLICATION 99-1: LIGHTNING ARRESTORS:

Mr. E. de C. Pretorius.

REVISION OF SABS 157-1950: ELECTRIC TOASTERS, SABS 158-1950: PORTABLE ELECTRIC APPLIANCES FOR HEATING OF LIQUIDS, SABS 159-1950: ELECTRIC IRONS, SABS 160-1950: ELECTRIC AIR HEATERS AND RADIATORS:

Mr. E. E. de Villiers,
Alternate: Mr. L. Dreyer.

REVISION OF SPECIFICATION FOR OVERHEAD SERVICE LINE CONNECTOR BOXES:

Mr. E. L. Smith.

REVISION OF SABS 153-1958: ELECTRIC STOVES AND HOTPLATES:

Mr. H. R. Durr.
Alternate: Mr. L. Futcher.

CONNECTION CUPBOARDS FOR ELECTRICITY METERS:

Mr. P. J. Botes.
Alternate: Mr. F. J. van der Merwe.

METAALMANTEL VERWARMINGSEENHEDE MET MINERAALISOLASIE:

Mnr. L. Dreyer.
Plaasvervanger: Mnr. U.B. Gresse.

Dit word steeds meer en meer moeilik om ingenieurs te vind wat gewillig is om die V.M.E.O. op die SABS se tegniese komitees te verteenwoordig. Ingenieurs van die Rand en omgewing is reeds oorlaai met pligte en is dikwels nie in staat om bykomstige verantwoordelikhede op hulle te neem nie. Enige hulp wat ingenieurs van veraf sentrums mag aanbied sal waardeer word. Dit is, om klaarblyklike redes, noodsaaklik dat die V.M.E.O. 'n aktiewe rol moet vul in die opstel van standaard spesifikasies vir elektriese ware.

'n Uitnodiging is gedurende die jaar ontvang van die Voorsitter van die Raad van die S.A. Buro vir Standaarde om 'n V.M.E.O.-lid af te vaardig om die Nasionale Standaarde Konferensie by te woon wat van 23 tot 26 September in Pretoria gehou is, en Mnr. G.C. Theron het toe die Vereniging op die Konferensie verteenwoordig.

'n Informele samespreking is gedurende die jaar gehou met 'n verteenwoordiger van die S.A. Buro vir Standaarde in verband met die implikasies van 'n moontlike oorskekaling van die bestaande mate- en gewigte stelsel na die metrieke stelsel en 'n antwoord wat op 'n vraelys oor hierdie aangeleenthede van die Buro ontvang is, is voorberei en ingedien.

Om mee af te sluit, wil ek graag weer alle amptenare van die S.A. Buro vir Standaarde bedank vir al die vriendelike hulp en samewerking gedurende die jaar asook die ingenieurlede en lede van hulle personeel wat as verteenwoordigers van hierdie Vereniging op die verskeie tegniese subkomitees gedien het.

C. LOMBARD,
V.M.E.O. VERTEENWOORDIGER,
S.A.B.S.-KOMITEES.

MINERAL INSULATED METAL SHEATHED HEATING UNITS:

Mr. L. Dreyer.
Alternate: Mr. U.B. Gresse.

It is becoming increasingly difficult to find engineers who are prepared to represent the A.M.E.U. on S.A.B.S. technical committees. Engineers from the Reef and environments are already carrying a heavy burden and are often unable to take on additional responsibilities. Any assistance that engineers from further afield may offer, will be appreciated. It is, for obvious reasons, essential that the A.M.E.U. should continue to play an active role in the preparation of standard specifications for electrical commodities.

During the year an invitation was received from the Chairman of The Council of the S.A. Bureau of Standards for a representative of the A.M.E.U. to attend the National Standards Conference which was held in Pretoria from September 23 - 26 inclusive and Mr. G.C. Theron represented the Association at this Conference.

An informal discussion was held during the year with a representative of the S.A. Bureau of Standards in connection with the implications involved in a possible change-over from the present system of weights and measures to the metric system and a reply to a questionnaire on this subject received from the Bureau was prepared and submitted.

In conclusion, I would once again like to thank the officials of the S.A. Bureau of Standards for their kind assistance and co-operation during the year, and also the engineer members and members of their staffs who are serving as representatives of this Association on the various technical sub-committees.

C. LOMBARD,
A.M.E.U. REPRESENTATIVE,
S.A.B.S. COMMITTEES.

JAARVERSLAG: „REG VAN VOORSIENING" ONDERKOMITEE.

Hierdie komitee het nie gedurende die afgelope jaar vergader nie maar verskeie vrae in verband met hierdie onderwerp is per korrespondensie behandel.

'n Verteenwoordiger van hierdie Komitee het ook 'n vergadering van die Verenigde Munisipale Bestuur in Pretoria bygewoon waar die onderwerp bespreek is.

C. LOMBARD,
SAAMROEPER.

ANNUAL REPORT: RIGHTS OF SUPPLY SUB-COMMITTEE:

The Committee did not meet during the past year but several queries in connection with this subject were dealt with by correspondence.

A representative of this Committee also attended a meeting of the United Municipal Executive in Pretoria where this subject was discussed.

C. LOMBARD,
CONVENER.

JAARVERSLAG: S.A.I.E.I.-KOMITEE BELAS MET DIE HERSIENING VAN DIE GEBRUIKSKODE VIR BOGRONDSE GELEIDINGS VIR TOESTANDE SOOS IN SUID-AFRIKA AANGETREF.

Die Onderkomitee deur die hoofkomitee aangestel om 'n konsep op te stel het gereeld vergader gedurende die afgelope jaar en ek kan rapporteer dat goeie vordering gemaak is.

Na verwagting sal hierdie onderkomitee sy werksaamhede afhandel en in staat wees om 'n finale konsep van die gewysigde gebruikskode aan die hoofkomitee vir goedkeuring voor te lê gedurende die loop van hierdie jaar.

C. LOMBARD,
VERTEENWOORDIGER.

ANNUAL REPORT: S.A. I.E.E. COMMITTEE TO REVISE THE CODE OF PRACTICE FOR OVERHEAD LINES FOR CONDITIONS PREVAILING IN SOUTH AFRICA.

The Drafting Sub-Committee appointed by the Main Committee met regularly during the past year and I can report that good progress has been made.

It is expected that this Sub-Committee will complete its work and will be in a position to submit a final draft of the revised Code of Practice to the main Committee for approval during the course of this year.

C. LOMBARD.
REPRESENTATIVE.

JAARVERSLAG VAN DIE KOMITEE BELAS MET AANBEVELINGS T.O.V. NUWE ELEKTRIESE HANDELSARTIKELS.

Die samestelling van hierdie Komitee is soos volg:

(1) V.M.E.O.: Mnr. C. Lombard, Mnr. R.W. Bolton.

(2) Mnr. R.W. Kane.

(3) Suid-Afrikaanse Buro vir Standaarde:
Mnr. A.A. Middlecote,
Mnr. D.I. Jones.

(4) S.A.I.E.I. Bedradingsregulasieskomitee:
Mnr. J.C. Fraser,
Mnr. J.T. Williams.

(5) Elektrisiteitsvoorsieningskommissie:
Mnr. J.W. Barnard,
Mnr. W. Steen-Stenerson.

(6) Elektrotegniek en Geallieerde Nywerhede Vereniging:
Mnr. J. Morrison.

(7) Elektrotegniese Aannemersvereniging van Suid-Afrika:
Mnr. F.B. Gibson,
Mnr. J.M. Fraser.

Die Komitee het eenkeer gedurende die jaar vergader en lede is van alle aanbevelings verwittig op die gewone manier deur middel van die nuusbriewe.

In die geval van verskeie navrae van voornemende applikante ontvang is laasgenoemde meegedeel dat die Komitee nie aansoeke oorweeg ten opsigte van ware waarvoor daar reeds 'n standaardspesifikasie bestaan nie.

ANNUAL REPORT OF THE RECOMMENDATIONS COMMITTEE FOR NEW ELECTRICAL COMMODITIES.

This Committee is constituted as follows:

(1) A.M.E.U.: Mr. C. Lombard, Mr. R.W. Bolton.

(2) Mr. R.W. Kane.

(3) South African Bureau of Standards:
Mr. A.A. Middlecote,
Mr. D.I. Jones.

(4) S.A.I.E.E. Wiring Regulations Committee:
Mr. J.C. Fraser,
Mr. J.T. Williams.

(5) Electricity Supply Commission:
Mr. J.W. Barnard,
Mr. W. Steen-Stenerson.

(6) Electrical Engineering and Allied Industries Association:
Mr. J. Morrison.

(7) Electrical Contractors Association of South Africa:
Mr. F.B. Gibson,
Mr. J.M. Fraser.

(8) Secretaries: Messrs. Davidson & Ewing (Pty) Ltd.

The Committee met once during the year and all recommendations were made known to members in the usual way through the medium of the news bulletins.

In the case of several enquiries received from intending applicants, the latter were informed that the Committee does not consider applications in respect of commodities of which a standard specification exists.

Een aansoek word nog oorweeg en sal afgehandel word sodra die applikant reëlings getref het om 'n monster van die betrokke artikel by die S. A. Buro vir Standaarde in te dien en verslae beskikbaar is.

Twee aansoeke is geskrap aangesien hulle, te wyte aan onvoldoende inligting, nie afgehandel kon word nie, en aangesien daar geen verdere korrespondensie in verband daarmee ontvang is nie.

Soos in vorige jare het die S. A. Buro vir Standaarde die Komitee weer bygestaan met die toets van artikels waar nodig en ons wil graag ons dank en waardering aan die Buro te boek stel vir die dienste gedurende die afgelope jaar aan die Komitee gelewer.

Ons is ook dank verskuldig aan die verteenwoordigers van die verskillende liggame en organisasies wat gedurende die afgelope jaar in die Komitee gedien het.

C. LOMBARD,
SAAMROEPER.

Our application is still under consideration and will be finalised as soon as the applicant has made arrangements to submit a sample of the commodity concerned to the S. A. Bureau of Standards and test reports are available.

Two applications were removed from the records as these could not be finalised owing to lack of information and no further correspondence in connection therewith had been received.

As in previous years, the S. A. Bureau of Standards has again assisted the Committee by carrying out tests on commodities where necessary and it is desired to place on record our thanks and appreciation to the Bureau for the services rendered to the Committee during the past year.

Our thanks are also due to the representatives of the various bodies and organisations who served on the Committee during the past year.

C. LOMBARD.
CONVENOR.

ELECTRICAL WIREMEN'S REGISTRATION BOARD.

ANNUAL REPORT 1963.

As in previous years the Board met on eleven occasions during the year but it is rather interesting to note that the number of applications for registration have increased considerably during 1963. The average number of applications for the years 1960/1/2 were 400 per annum, whilst 1963 resulted in 640 applications. Whether this is the result of the Republic wide registration of contractors and the consequential increased interest by supply authorities in the contractors' staff or alternatively added interest in registration resulting from the impending full determination of the Republic or finally an outcome of the compulsory trade test at the end of the penultimate year, I would not like to guess but it certainly is an outstanding increase. Of the 640 applications, 23 were granted exemption, 606 accepted for the examination and 11 refused or deferred.

The usual examinations were held throughout the year, 650 candidates writing the written examination with 272 or 41.8% becoming eligible to take the practical section which is some 4% better than the 1962 result and considerably better than the results of previous years. 342 Candidates presented themselves for the practical section of the examination with 267 or 78.1% passing being nearly a 17% improvement over 1962.

During 1962 the Secretary of the Board was asked to record details of wiremen apprentices taking the compulsory test and the results, since it was felt that these figures would be interesting. The attached table reflects the position. It only refers to wiremen apprentices but the wide spread application of trade tests for the overall electrical trades has resulted in certain successful results being accepted as further part or whole exemptions for the Wiremen's Licence.

Since the inception of registration in 1940, 13,276 applications have been considered, 2,500 exemptions granted, 9,276 were accepted for the examination and 1,500 deferred or refused. The total number of certificates issued is now 8,417.

The Regulations made and published under Section 33 of the Act, as amended from time to time, were consolidated, amended and republished under Government Notice No. R1662 dated the 25 October, 1963.

The Minister has withdrawn all the existing determinations and has determined the whole of the Republic of South Africa as the area in which Sections 19 and 20 of the Act shall apply with effect on the 1st September, 1964 vide Government Notices Nos. R1735 and R1736 dated the 8th November, 1963.

Finally, Mr. President, and gentlemen, this will be my last report to you as your representative on the

Wiremen's Board. I have spent nine interesting and happy years on the Board under three Chairmen and one Acting Chairman. My sincere thanks is due to all members of the Board, the Chairman and finally the Secretary, Mr. Louw, and his staff, for a very pleasant period of office and also my thanks to the Association for affording me the opportunity to serve them on this important Board.

Mr. Chris Lombard now represents you on the Board and I am quite sure that the interests of all will be well looked after and I wish him all success.

R.W. KANE,
(Representative).

TABLE.

Year	Number whose contract periods were reduced between 12 and 6 months.	Number whose contract periods were reduced by less than 6 months.	Number whose contract periods were not reduced, but who qualified for registration on termination of their contracts.
1963	5	4	5
1962	17	2	2
1961	3	-	7
1960	11	4	4
1959	* 14	* 8	9

* These figures are approximate as no detailed records were kept prior to 1960.

DIE AANSPREEKLIKHEID VAN MUNISPALITEITE, RAADSLEDE EN INGENIEURS ONDER DIE GEMENEREG EN SEKERE STATUTE

Deur RAADSLID W.F. MEYER, WELKOM.

1. Hierdie referaat het sy oorsprong gekry met 'n stelling wat gemaak was deur die Stadsklerk van Parow, verlede jaar te Margate, tydens die Elektrisiteitskongres toe hy in 'n referaat kortliks die soeklig laat val het op die aanspreeklikheid van Munisipale Ingenieurs vir onregmatige dade gepleeg in hulle diensbetrekking, en die gevolge wat daaruit voortvloei.

Die bewering was dat kragtens Artikel 381(5) van die Strafproses-Wet Nr. 56/55, die Publieke aanklaer geregtig is, om, wanneer 'n misdaad gepleeg is, waarvoor 'n regspersoon aanspreeklik is, ook die werknemers of direkteure persoonlik aan te kla vir die misdryf.

2. Hierdie stelling is so belangrik vir Raadslede en Amptenare van Munisipaliteite dat ons Instituut dit goedgedink het om 'n verdere bespreking te wy aan die onregverdige bepalings en terselfdertyd dit ook 'n bietjie kritiies te beskou.

3. Die regsaanspreeklikheid van Munisipaliteite, Raadslede en Amptenare kan voortvloei uit verskillende bronne naamlik:-

(A) die gemenereg;
(B) die verbintenisreg;
(C) die strafreg;
(D) sekere statute en deur die strafprosesreg.

4. Omdat ons by hierdie kongres nie almal regsgeleerdes is nie, en ten einde die aanspreeklikheid van Munisipale Rade, raadslede, en hulle amptenare beter te verstaan, wil ek eers kortliks 'n algemene uiteensetting gee van die samestelling van ons reg.

5. Die mens is 'n sosiale wese. Hy leef in samelewing met sy medemens. Hierdie samelewing is slegs bestaanbaar indien dit georden is. Die ordende faktor in die samelewing is die Reg. Die Reg baken die bevoegdhede, regte en verpligtinge, af van die mens in die samelewing, want ordening is slegs moontlik deur afbakening. Die afbakening geskied deur reëls te stel waaraan die mens gebind is in sy handel en wandel. (a)

Reg is dan die geheel van bindende reëls wat menslike samelewing orden. (b)

Die regsreëls wat binne 'n staat geld, vorm een geheel, 'n groot eenheid. Om hierdie reëls beter te kan begryp en verstaan, word regsreëls, geklassifiseer of gegroepeer na gelang van die verhoudings waarop hulle betrekking het. So praat ons van privaatreg en publieke reg, van materiële reg en formele reg, van verbintenisreg en strafreg, ens. Hierdie groepe of klasse stel egter nie presies afgebakende gebiede daar nie, want die grense tussen die verskillende groepe is nie suiwer te trek nie. In sy wese en oorsprong is alle reg privaatreg, want die reg reël verhoudings tussen mens en mens. In regsgeleerde terminologie word vandag egter as privaatreg beskou die deel van die reg wat oorbly na aftrekking van die publieke reg. (c)

Soos reeds gesê, is die grense tussen die verskillende regsgebiede nie met noukeurigheid aan te wys nie. In breë trekke kan mens darem tussen privaatreg en publieke reg onderskei, en wel na gelang van die verhoudings waarop die reëls betrekking het. Publieke reg is daardie deel van die reg wat die verhoudings reël waarin die mens, as ondergeskikte, teenoor die owerheid staan. Die enkeling staan nie altyd as ondergeskikte teenoor die owerheid nie. Die owerheid of staat kan as gelykwaardige in 'n regsverhouding teenoor die enkeling staan. As ek my grond verkoop aan die staat, wat dit koop om 'n nedersetting daarop te stig, of 'n vliegveld daarop aan te lê, staan ek en die staat as gelykwaardige kontrakspartye teenoor mekaar, en is die verhouding 'n privaatregtelike. Publiekregtelik is die verhouding as ek as ondergeskikte teenoor die owerheid te staan kom. So is die staat se bevoegdheid om my grond te onteien, 'n publiekregtelike. Maar, soos reeds gesê, die afbakening is 'n kunsmatige, en verhoudings is denkbaar waarby mens nie presies sal kan sê of hulle publiekregtelik dan wel privaatregtelik is nie. (d) (e)

Tot die publieke reg behoort ook die strafreg. Dit was nie altyd so nie. Alle reg was oorspronklik privaat-

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(a) Strafreg deur J. C. de Wet en H. L. Swanepoel 1949 ed. p. 1.

(b) Strafreg supra p. 1
(c) & (d) Strafreg supra p. 1
(e) Strafreg supra p. 1

reg, want uiteraard kan daar nie publieke reg wees waar daar geen staatsorganisasie is nie. Ook die primitiewe strafreg was privaatreg, want die pleging van onreg is gewreek deur die benadeelde of sy sipgenote, en nie van staatswëë gestraf nie. Die ou strafreg was dus eintlik privaatregtelike wraakreg. Mettertyd, met die ontwikkeling van 'n staatsorganisasie, tree die staat al hoe sterker op die voorgrond as handhawer van die orde, en word die privaatregtelike wraak al hoe meer ingekort totdat die enkeling nie meer die onreg mag wreek nie, maar die staat die onreg straf. Regte van die ontwikkeling van die strafreg tot publieke reg, tref mens vandag nog aan. Tot sekere hoogte het ons nog in die privaatregtelike aksies uit onregmatige daad middels wat nie net gerig is op vergoeding van gelede skade nie, maar 'n element van straf vir gepleegde onreg bly behou. Aan die anderkant sien ons weer in die strafreg, spore van privaatregtelike agtergrond daarin dat die benadeelde 'n strafvervolging kan instel waar die staat weier om te vervolg. (f) (g)

Alhoewel die skeiding tussen privaatreg, en publieke reg nog nie tot in al sy konsekwensies deurgevoer is nie, mag ons darem die stelling maak dat in ons hedendaagse maatskaplike organisasie die strafreg publiekregtelik is, en wel daardie afdeling van die publieke reg wat aanwys welke menslike gedraginge die mens blootstel aan straf, en wat die straf sal wees. Grondbegrippe van die strafreg is die misdaad en die straf. So innig is hierdie twee begrippe met mekaar verbonde, dat die een nie sonder verwysing na die ander omskryf kan word nie. Misdaad is 'n handeling wat op straf verbied is en straf is 'n leed wat die pleger van 'n misdaad van staatswëë toegevoeg word, omdat hy die misdaad gepleeg het. (h)

In die moderne reg is 'n misdaad 'n wederregtelike menslike gedraging, waaraan die dader skuld het, en wat met straf bedreig word. Dit was nie altyd so nie. In primitiewe regstelsels is strawwe ook toegevoeg aan diere, en selfs lewelose voorwerpe, en is menslike daders met straf besoek ook al het hulle nie skuld nie. Met die verfyning van die regsgevoel raak misdade, waarvan skuld nie 'n element is nie, al hoe meer op die agtergrond. Mens voel dit as onbillik aan om die mens te straf as hy geen skuld het nie.

Straf is 'n leed wat die mens van staatswëë toegevoeg word weens sy oortreding. Die enigste voorwaarde vir die straf is die pleging van 'n misdaad deur die persoon aan wie die straf toegevoeg word en hy word gestraf omdat hy oortree het. (i) (j)

Dit is hierdie grondbegrippe, misdaad en straf, en hulle onderlinge verband wat die strafreg van ander regsgebiede onderskei. In die privaatreg sien ons ook dat aan die pleging van onreg nadelige gevolge vir die pleger vasgeknoop word. Iemand ry 'n ander op straat omver en breek sy been. Hierdie gebeure kan die dader strafregtelike en privaatregtelike gevolge op die hals haal. Hy kan vervolg word weens die misdaad wat hy gepleeg het, en gestraf word met boete, en hy kan deur die benadeelde aangespreek word vir vergoeding van skade, en tot die betaling van 'n bedrag veroordeel word. Die verskil tussen die twee bedrywighede sit nie daarin dat in laasgenoemde die benadeelde, en in eersgenoemde die staat, die geding aanhangig maak nie, want, soos ons al gesien het, kan die benadeelde self ook strafregtelik vervolg indien die staat nie vervolg nie. Die verskil sit hierin dat die boete aan die benadeelde opgelê word met die doel om die oortreding van die verbod te wreek, terwyl skadevergoeding toegestaan word met die doel om die nadeel, wat die veronregte gely het, op die stigter van die skade te rus te laat kom. (k)

Die begrippe misdaad en straf onderskei die strafreg ook van ander dele van die publieke reg, en veral van die administratiewe reg. 'n Kranksinnige word gegryp en in 'n gestig gestop. 'n Persoon wat aan aansteeklike siekte ly, word met geweld van sy medemens afgesonder. 'n Lisensiehouer, wat die terme van sy vergunning verbreek, word sy lisensie, wat vir hom miskien duisende rande werd is ontneem. In al hierdie gevalle word die persoon 'n leed van staatswëë toegevoeg, en tog val hierdie dinge nie onder die strafreg nie. Die rede is dat hierdie leed die persoon nie toegevoeg word as vergelding vir die oortreding van 'n verbod nie, maar omdat dit in die belang van die gemeenskap beskou word om gevaarlike kranksinniges of die draers van siektes van die gemeenskap af te sonder, of in die geval van die lisensie, omdat die staat iemand, wat die voorwaardes van sy vergunning nie nakom nie, onwaardig ag om die vergunning te behou. Selfs al sou die verbeuring van die vergunning volg op 'n skuldigbevinding aan 'n misdaad is die verbeurdverklaring van die vergunning nog 'n administratiefregtelike bedrywigheid, en wel omdat die doel daarvan nie straf is nie, maar iets anders. (l)

DIE verbintenisreg is 'n onderafdeling van die vermoënsreg en dien om die vermoëns regtelike posisie tussen persone onderling te bepaal. Hier vloei verpligtings voort ex Contractu & ex Delicto en Ex quasi contractu en ex quasi delicto. Die strafprosesreg is reëls van bewysleer wat bepaal hoe die Staat sy bevoegdhede handhaaf en in die regte afgedwing kan word.

Ek wil dan verder ook nagaan die regsaanspreeklikheid van Rade, Raadslede, en Ingenieurs wat voortvloei uit die Elektrisiteits Wet, Fabrieks Wet, Bedrading van Kontrakteurs Wet, want ons besprekings i.v.m. Elektrisiteitsvoorsiening draai gewoonlik maar net om hierdie Wette.

(g) Art. 11 van Strafproseswet 56/1955
(h) & (i) Strafreg Supra p. 2
(j) Strafreg Supra p. 3
(k) Stratreg Supra p. 3
(l) Strafreg Supra p. 3

Wat is 'n Munisipaliteit, in die Reg? Dit is 'n regspersoon en kan as volg gedefinieer word.

'n Regspersoon of Universitas personarum, is in regte 'n persoon wat onderskeibaar is van sy lede, wat bevoeg is om in sy eie naam te dagvaar of gedagvaar te word. Dit is 'n versameling van indiwidue, wat 'n persoon of entiteit vorm, wat die bevoegdheid besit om regte te verkry en verpligtinge aan te gaan, tot 'n groot mate net soos 'n menslike wese. Sy essensiële kenmerke is dat dit in staat is om eiendom te besit afsonderlik van sy lede, en dat dit voortdurend kan bestaan, met ander woorde dit bestaan voortdurend alhoewel die lede wat dit saamstel voortdurend mag wissel. (m)

Die belangrikste soorte regspersone is publieke liggame soos Munisipale rade, Hawe-rade, Universiteite ens., wat daar gestel word deur spesiale ordonansies of Wette van die Parlement, en maatskappye wat ingelyf is deur die Maatskappye Wet. Tans is staatsgesag nodig om 'n regspersoon daar te stel, maar dit was nie altyd so nie. (Sien Morrison vs Standard Building Society). (n)

A. AANSPREEKLIKHEID VAN DIE REGSPERSOON EX CONTRACTU :

Op hierdie gebied kan 'n regspersoon regte en verpligtinge verkry deur die sluiting van Koop en Verkoop, Huurkontrakte, Heer- en diensbode wette en verder die bepalings van onderstaande Wette:

Nywerheidsversoeningswet	36/1937
Loonwet en Kantore Wet	41/1939
Fabriekswet (soos gewysig)	22/1941
Vakleerlingwet	37/1944

wat spesifieke loonbepalings bevat. Ook die Stadsgebiedewet, bepaal die registrasie van dienskontrakte.

Deur vervoerkontrakte is die regspersoon aanspreeklik vir skade of verlies aan persone en goedere, en verder deur Borgstellings of waarborge, en deur verteenwoordiging as prinsipaal of agent, kan die regspersoon regte en verpligtinge beding.

(Ek gaan niks sê oor die aanspreeklikheid van Raadslede en amptenare ex contractu nie want dit is te algemeen bekend).

B. AANSPREEKLIKHEID VAN DIE REGSPERSOON EX QUASI CONTRACTU :

In sekere gevalle skryf die reg aanspreeklikheid toe op die basis dat geen persoon of regspersoon onregverdiglik verryk sal word ten koste van 'n ander nie en hierdie aanspreeklikheid ontstaan ex quasi contractu. Rade kan gedagvaar word vir restitusie tot die mate waarin hulle onregverdiglik verryk is, of ultra vires gehandel het. (Sien Petersen vs. Green Point Municipality 186 V) 5. S.C. 63). Netso moet 'n regspersoon vergoeding betaal vir werk of dienste of voordele wat dit ontvang het en so ook vir verbeterings waarvan dit die voordeel behaal het. (o)

C. AANSPREEKLIKHEID VAN DIE REGSPERSOON EX DELICTO :

'n Onregmatige daad is 'n verbreking van 'n algemene verpligting daar gestel deur die reg, wat aan die benadeelde persoon 'n reg van aksie gee (Lee & Honore P. 193). (p)

Die aanspreeklikheid vir delikte kan voortvloei uit nalatigheid (culpa) of deur opset (Dolus- "malice").

'n Onregmatige daad kan mens onderskei van ander siviele oortredings, daarin dat die verpligting wat deur die reg van onregmatige dade opgelê word, aan die mensdom in die algemeen verskuldig is, en nie net aan 'n enkele persoon, of groep persone nie: maar dit is 'n verpligting wat deur die reg neergelê word, onafhanklik van die handeling of wil van die partye. (q)

'n Munisipaliteit is aanspreeklik vir die onregmatige dade van sy amptenare gepleeg in die bestek van sy dienstrekking. (r)

1. Wie is die Werkgewer?.

Teneinde deliktuele aanspreeklikheid te bepaal moet bepaal word wie is die werkgewer en dit kan gedoen word deur te bepaal wie die seggenskap of beheer het, oor die wyse of metode waarop 'n taak verrig sal word. Die persoon wat beheer reserveer oor die wyse waarop die werk verrig moet word deur 'n ander, is die werkgewer, en die wat die taak uitvoer is die werknemer. (s)

Ten opsigte van aanspreeklikheid vir sy onregmatige dade, mag 'n persoon in die diens wees van een werkgewer en terselfdertyd 'n dienskneg vir 'n ander werkgewer vir 'n ander besondere doel. In daardie geval is daardie persoon aanspreeklik wat reg tot kontrole gehad het oor

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(m) "Law of Delect". McKerron 4de Ed. P. 140

(n) McKerron p. 141. Morrison vs Standard Building Society. 1932 AD. p. 238

(o) The S.A. Law of Obligations, by R.W. Lee & A.M. Honore 1950 EDN. para. 682

(p) Lee & Honore Supra P. 193

(q) Lee & Honore Supra para. 720

(r) Lee & Honore. p. 201. para. 736. Union Govt. vs Hawkins 1944 AD. 556

(s) Lee & Honore. para. 737 Pretoria Municipality vs Esterhuizen. 1928 TPD. 678

die manier waarop die dienskneg sy werk moes doen tydens die pleeg van die onregmatige daad. (u)

Teneinde vas te stel of die dienskneg 'n daad gepleeg het binne die bestek van sy diensbetrekking, is die volgende reëls van belang:-

(i) As 'n daad wat gepleeg is deur die dienskneg so intiem verbind was met dit waartoe hy 'n opdrag gehad het deur sy werkgewer, sodat dit beskou kan word as 'n metode van uitvoering van daardie daad, dan sal die werkgewer verantwoordelik wees.

(ii) Indien 'n dienskneg afwyk vir sy eie doel van die werkgewer se besigheid, is dit 'n vraag of die graad waarmee hy afgewyk het so groot is in terme van tyd en ruimte, dat dit nie redeliker wyse gehou kan word dat hy nie steeds besig is om die funksies te verrig waartoe hy opdrag gehad het nie.

(iii) Die werkgewer kan nie aanspreeklikheid vryspring slegs deur die feit dat die gedrag van die dienskneg wat die onregmatige daad daar stel deur die werkgewer uitdruklik verbied was, of opsetlik of kwaadwilliglik of strafregtelik was of bestaan het in 'n versuim om die werkgewer se werk te doen nie. (v)

'n Dienskneg het 'n reg van aksie vir onregmatige daad (dade) teen sy werkgewer in verband met skade wat hom berokken is deur die onregmatige daad of 'n ander dienskneg in diens van dieselfde werkgewer, wat gepleeg is in die diens van daardie dienskneg se diensbetrekking. (w)

'n Werkgewer is nie aanspreeklik vir die onregmatige dade van 'n onafhanklike kontrakteur nie. (x)

'n Werkgewer is onder die gemene-reg verplig om redelike maatreëls te tref vir beskerming van sy werknemers in die loop van hulle diensbetrekking. (y)

Afgesien van enige vraag van nalatigheid mag 'n werkgewer verplig wees om sy werknemer skadeloos te stel vir leed wat hom berokken is ten gevolge van 'n ongeluk wat ontstaan het en gebeur in die loop van die dienskneg se diensbetrekking en tot gevolg het, aan hom persoonlike beserings. (aa)

So is 'n regspersoon aanspreeklik soos enige ander werkgewer vir onregmatige dade van sy dienskneg wat gepleeg is in die loop van daardie dienskneg se diensbetrekking, mits 'n besondere daad gedoen was binne die omvang van die regspersoon se regsmag. (ab)

3. Mc. Kerron het die volgende mee te deel aangaande die aanspreeklikheid van die Regspersoon:-

In die Romeinse-reg was 'n universitas nie aanspreeklik vir die onregmatige dade van sy verteenwoordigers nie, in soverre die regspersoon nie daardeur verryk was nie. (ac)

Dit is twyfelagtig of hierdie reël ook deel gevorm het van die Romeinse-Hollandse reg, maar of daardie reël nou al deel was van die Romeinse reg of nie, is dit nou vasgestel bo enige twyfel dat die regspersoon aanspreeklik is vir die onregmatige dade van sy verteenwoordigers of diensknegte op dieselfde manier en tot dieselfde mate as enige ander prinsipaal of werkgewer. Bowenal is daar gesag vir die mening dat, in sekere omstandighede, kan die regspersoon persoonlik aanspreeklik gehou word vir die onregmatige daad gepleeg deur sy verteenwoordiger of dienskneg. Byvoorbeeld, waar 'n gewraakte daad direk gemagtig is deur die Raad van Direkteure, of hoof-uitvoerende liggaam, van die regspersoon, in so 'n geval wil dit skyn asof die daad beskou moet word as 'n uitdruklike daad van die regspersoon self. (ad)

4. 'n Baie moeilike vraag wat nog nie in ons Howe oor beslis is nie, is of 'n regspersoon aanspreeklik gemaak kan word vir 'n onregmatige daad, wat gepleeg is deur een van sy diensknegte in die loop van 'n handeling wat ultra vires die regspersoon is. (ae)

5. Onder die kontraktereg is die reël dat 'n regspersoon nie aanspreeklik kan wees ten opsigte van 'n ultra vires handeling nie. Maar, dit word beweer dat die reël nie van toepassing is op onregmatige dade nie. As die reël toegepas sou moet word in onregmatige dade, dan sal 'n regspersoon nooit gedagvaar kan word vir 'n onregmatige daad nie, aangesien streng gesproke, die onregmatige daad, altyd ultra vires die regspersoon is. Dit word derhalwe beweer, dat in beginsel daar geen regsgrond is om die verskil te maak betreffende aanspreeklikheid uit onregmatige dade, tussen intra vires en ultra vires handelinge. Waar handelinge ultra vires is, moet dit natuurlik duidelik bewys word dat die daad deur die regspersoon gemagtig

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(t) Colonial Mutual Life Ass. Society vs Mc. Donald 1931 AD. 412
(u) Lee & Honore. para. 739 & Kohlberg vs. Uitenhage Municipality 1926 EDL. 90
(v) Lee & Honore p. 202 en Moosa vs Duma & Vereeniging Mun. 1944 TPD. 30
(w) Lee & Honore p. 202
(x) Lee & Honore para. 742
(y) Lee & Honore para. 743 & van Heerden vs SAPPI Ltd. 1946 AD. 382

(aa) Lee & Honore para. 744
(ab) Lee & Honore para. 745
(ac) Mc Kerron Supra p. 141
(ad) Mc Kerron Supra p. 142
(ae) Mc Kerron Supra p. 142

was teneinde die regspersoon aanspreeklik te maak, aangesien die reg nie sal impliseer dat die regspersoon sy diensknegte gemagtig het om die handelinge te verrig wat die regspersoon nie die reg het om self uit te voer nie. (af)

VERSKILLENDE ONREGMATIGE DADE :

I. OORLAS:

'n Persoon veroorsaak 'n oorlas wanneer hy op eiendom wat aan hom behoort of deur hom ge-okkupeer word, 'n toestand laat ontstaan waardeur die eienaar of besitter van ander eiendom onwettiglik benadeel of gehinder word, in sy gebruik en genot van sy eiendom, hetsy dit geskied deur fisiese skade aan die eiendom of deur ander inmenging in sy genot en gebruik van die eiendom, of met sy gebruik van 'n serwituut of 'n ander dergelike reg of met sy gesondheid, gerief en gemak. (ag)(ah)

'n Aksie ten opsigte van oorlas, is gegrond ten opsigte van 'n oorlas wat, uit sy aard, 'n private oorlas is en ten opsigte van die publiek, 'n oorlas is, waar die eiser ten gevolge van so 'n publieke oorlas 'n skade gely het. (aj)

II. INMENGING TEN OPSIGTE VAN HANDEL EN BESIGHEID :

'n Persoon wat opsetlik inmeng met die handel, besigheid, beroep of professie van werk van 'n ander, waardeur die laasgenoemde skade gely het, is aanspreeklik in 'n aksie vir skadevergoeding, en in sekere gevalle kan 'n interdik uitgeneem word deur die benadeelde of die eiser, as daardie inmenging geskied het deur 'n onwettige metode of deur kwaadwilligheid aangevuur was. (ak)

III. LASTER :

'n Persoon wat sonder wettige rede 'n verklaring publiseer aangaande 'n ander lewende persoon, hetsy deur gesproke woorde, of deur geskrif, of drukwerk, prente, „voorstelling effiges", of ander dergelike wyse, en daardeur beoog om daardie persoon se aansien te laat daal in die aansien van ander regdenkende lede van die samelewing, of beoog om hom te benadeel in sy handel, besigheid, professie of amptelike posisie, is (met sekere voorbehoud) aanspreeklik vir skadevergoeding deur die persoon aangaande wie die verklaring gepubliseer is, en indien nodig, mag 'n interdik teen die onregpleër uitgereik word teneinde verdere publikasie te verhoed. (al)

(a) GEKWALIFISEERDE PRIVILEGIE:

As 'n verweerder in 'n aksie vir skadevergoeding bewys dat die gewraakte verklaring gemaak was op 'n beskermde geleentheid soos hierna beskrywe, dan is hy geregtig op vonnis in sy guns b.v.

i. Enige verklaring van/of 'n uittreksel van enige verslag, geskrif, notule stemming of verrigting, gepubliseer deur die Verweerder of sy dienskneg kragtens opdrag of onder 'n Parlementêre gesag of Provinsiale Raad of 'n Komitee daarvan.

ii. Enige verklaring synde 'n direkte en/of korrekte en akkurate verslag van die verrigtinge van Geregshowe of die Parlement of 'n Publieke Statutêre liggaam.

iii. Enige verklaring wat betrekking het op die verrigtinge van 'n ondersoek, mag in die loop van 'n geregtelike of semi-geregtelike proses deur die regterlike amptenaar, party, gedingvoerder, getuie, advokaat of prokureurs gebesig word.

iv. Enige verklaring synde 'n kommunikasie van een persoon wat 'n regmatige belang in die onderwerp het, of kommunikasie wat gemaak is in uitvoering van 'n wetlike of morele plig aan 'n ander persoon wat 'n belang of 'n plig het om die kommunikasie te ontvang, op 'n geleentheid en op 'n manier wat redelik is in die omstandighede, m.a.w. waarmee nie bedoel word om aan 'n eiser meer leed toe te dien dan wat nodig is vir die beskerming van die belang of van die uitvoering van die onderhewige plig nie. (am)

(b) VERBEURING VAN GEKWALIFISEERDE PRIVILEGIE :

'n Gekwalifiseerde privilegie word verbeur as 'n verweerder die gewraakte verklaring met kwaadwillige bedoeling maak, m.a.w. as hy die geleentheid gebruik vir ander doeleindes dan daardie waarvoor 'n privilegie geskep is en as hy daarin aangevuur was deur 'n indirekte of kwaadwillige motief. Kwaadwilligheid kan afgelei word van die onverskilligheid, of die vernynigheid waarmee die woorde gebruik word, of van die omstandighede waaronder dit gepubliseer word. (an)

(af) Mc Kerron Supra p. 142
(ag) Lee & Honore p. 226
(ah) Lee & Honore para. 791 en Bfn. Town Council vs Richter 1938 AD. 195
(aj) Lee & Honore para. 793 en Municipality of Stellenbosch vs Levinsohn 1911 CPD.
(ak) Lee & Honore p. 229
(al) Lee & Honore para. 802
(am) Lee & Honore para. 810
(an) Lee & Honore p. 235

IV. AANSPREEKLIKHEID VIR GEVAARLIKE EIENDOM :

(a) Aanspreeklikheid van die Okkupeerder.

Enige persoon wat grond of geboue wat geokkupeer word deur andere binnetree en daar beseer word of skade ly as gevolg van 'n defek in die perseel of die gevaarlike toestand van die perseel mag skadevergoeding eis ten opsigte van 'n onregmatige daad van die okkupeerder as hy kan bewys dat in die omstandighede die okkupeerder nalatig was en dat sy nalatigheid die skade veroorsaak het. 'n Raad mag natuurlik ook aanspreeklik wees op ander gronde naamlik vir sy eiendom wat gevaarlik mag wees. (ao)

(b) Toetse van Nalatigheid.

'n Okkupeerder van grond of geboue is skuldig aan nalatigheid as:-

i. Hy geweet het van/of redelikerwys behoort te geweet het van die defektiewe of gevaarlike toestand van die perseel en; (ap)

ii. Hy geweet het van/of redelikerwys behoort te geweet het of te voorsien het, die teenwoordigheid van die Eiser op die perseel en;

iii. Hy versuim het om redelike voorsorgmaatreëls te neem vir die veiligheid van die Eiser. (ap)

(c) ENIGE persoon wat 'n voorwerp aanhou of gebruik of 'n werksplek aanhou of handel met 'n voorwerp wat, tensy dit met versigtigheid hanteer word, skade aan andere kan aanrig, is verplig om sodanige voorwerp of werksplek veilig te maak of sodanige stappe te doen as wat redelik noodsaaklik is in die omstandighede om te verhoed dat skade aan andere aangerig word. Hier dink ons aan die toepassing van meganiese werkswinkels en elektriese kragstasies of distribusieplekke. (aq)

AANSPREEKLIKHEID DEUR SEKERE STATUTE EN ORDONANSIES :

Aanspreeklikheid van Raadslede persoonlik:

(a) In enige regsproses waarin 'n Munisipaliteit betrokke is, mag dit verteenwoordig word deur Prokureurs of deur Advokate. Die Raadslid mag ook nie sy Munisipaliteit professioneel verteenwoordig nie, aangesien dit sal neerkom op diskwalifikasie. Ook mag hy nie teen sy Munisipaliteit direk of indirek 'n saak voer nie. Al die Plaaslike Bestuursordonansies in die verskillende Provinsies bevat sodanige bepalings. (ar)

(b) STRAF VIR DEELNAME WANNEER GEDISKWALIFISEERD :

Enige Raadslid wat in sy hoedanigheid as 'n Raadslid 'n vergadering bywoon of deelneem aan, of in 'n bespreking of verrigting van die Raad, of 'n komitee of sub-komitee daarvan;

(i) Deur die bespreking van enige saak waarin hy direk of indirek deur homself of deur sy eggenoot of vennoot of besigheids assosiasie enige geldelike belang het of

(ii) as hy ten tye van sy verkiesing of op 'n latere stadium opgehou het om bevoeg te wees, in terme van die Plaaslike Bestuurs-Ordonansies van die betrokke Provinsies, is skuldig aan 'n oortreding, tensy dit bewys kan word dat hy nie geweet het dat hy sodanige belang het of dat hy onbevoeg was. 'n Raadslid wat geweet het, of redelike gronde gehad het om te weet dat hy sodanige belang het, of dat hy onbevoeg was om deel te neem, sal nie onderhewig wees aan die strafklousules wat voorgeskryf word deur hierdie besondere bepalings as hy sy setel behou het, maar nie deelneem of deelgeneem het of gestem het in die bespreking van die Raad, komitee of subkomitee nie. (as)

Aandag word gevestig op die strenger bewoording van die nuwe Ordonansies. Onder die vorige Ordonansies was die onus op die Staat om beslissend te bewys die element van die Raadslid se kennis. Nou is die onus op die beskuldigde raadslid om te bewys dat hy nie geweet het van sy belang of dat hy gediskwalifiseer was nie. (as)

(c) OPTREDE AS ADVOKAAT ENS. TEEN RAAD :

Hierdie beletsel het betrekking op beide siviele en kriminele prosesse wat ingestel is deur of teen 'n Munisipale Raad. Hierdie artikel is so wyd gestel dat die beletsel ook geld vir 'n Raadslid om op te tree teen sy Raad deur 'n firma waarvan hy 'n lid is. Dit moet duidelik wees dat die aksie teen die

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(ao) Lee & Honore p. 242 para. 821
(ap) Cape Town Municipality vs Paine 1923 AD. 207
(ap) Lee & Honore p. 242
(aq) Lee & Honore p. 224 en
Kift vs Cape Town Munisipaliteit (1900) 17 SC. 465 (elektrisiteit)
Kelly vs Jhb. Munisipaliteit (1906) TH. 245 (Elektrisiteit)
Hauman vs Malmesbury DC. 1916 CPD. 216 (ontploffingstowwe).
Colman vs Dunbar 1933 AD. 141 157

(ar) Dönges & v. Winsen Municipal Law p. 25
(as) Municipal Law - Dönges en van Winsen. 2e Ed. p. 88

Raad is. As 'n Raadslid verksyn voor 'n waardasiehof of 'n appélraad in verband met waardasies, waar die Raad sittende was in 'n judisiële kapasiteit, en appél aangeteken word teen 'n waardasie wat op sekere eiendom geplaas is, het die Hof gehou dat sodanige verrigtinge nie teen die Raad was nie. 'n Persoon wat genomineer is as 'n Raadslid, maar wat nog nie werklik as sulks verkies is nie, val nie binne die voorskrifte van hierdie artikel nie. (at)

(d) KONTRAKTE MET RAADSLEDE EN AMPTENARE:

Amptenare:

In die algemeen gesproke is dit vry vir alle persone om te kontrakteer met die Raad. Die reg van Raadslede en amptenare om met die Raad te kontrakteer is egter besonder beperk. Die geldigheid van die kontrak tussen die Raad en enige van die bogenoemde klasse van persone is in generly opsig geaffekteer deur sodanige beperking nie. Die verbreking van die beperking het alleenlik tot gevolg die persoonlike straf bepaling op die persoon wat skuldig is aan sodanige verbreking. Die regte van beide partye ex-contractu is ongeaffekteer. Hierdie beperking het egter nie betrekking op 'n dienskontrak tussen die werknemer en die Raad nie. Soos enige ander munisipale kontrak, mag hierdie soort ooreenkoms gesluit word formeel of informeel soos die partye mag verkies. 'n Werknemer in diens van 'n Munisipaliteit mag ook sonder enige diskwalifikasie met die Raad kontrakteer om hom 'n jaargeld of 'n gratifikasie te betaal. (au)(av)

'n Raad moet vir tenders vra waar 'n kontrak vir die uitvoering van sekere werk, of vir die lewering van enige goedere 'n bedrag van tussen R400 - R500 betrokke is in die onderskeie provinsies.

In 'n dringende geval mag 'n Raad versuim om tenders te vra, maar die vraag of die aangeleentheid dringend was, al dan nie, mag in die Hof betwis word. Indien 'n Raad versuim om tenders te vra, waar geen dringendheid bestaan nie, is sodanige optrede onwettig en die Raadslede en ander persone aanspreeklik vir sodanige optrede mag deur die Provinsiale Ouditeure aangeslaan word. (aw)

ELEKTRISITEIT :

Die verkoop en distribusie van elektrisiteit binne enige deel van die jurisdiksie gebied van 'n Munisipaliteit is, met sekere uitsonderings, onder die beheer van daardie Munisipaliteit. 'n Munisipaliteit mag self die ontwikkeling en distribusie van elektrisiteit onderneem binne die grense van sy regsgebied in welke geval dit in volle beheer daarvan sal wees. Aan die anderkant mag die ontwikkeling van en distribusie van elektrisiteit binne die jurisdiksiegebied van 'n Munisipaliteit onderneem word deur enige persoon, maatskappy of vereniging van persone, waaronder ingesluit is die Elektrisiteits-voorsieningskommissie, enige Regeringsdepartement, soos die Suid-Afrikaanse Spoorweë en Hawens. In soverre die laasgenoemde liggame onder die definisie „gemagtigde ondernemer" val, soos beskrywe in die Elektrisiteits Wet 40/1958, en hulle wettiglik die reg om elektrisiteit te verskaf binne die jurisdiksiegebied van 'n Munisipaliteit, of in enige gedeelte van daardie gebied bekom het, hetsy kragtens 'n lisensie of toestemming waarvoor voorsiening gemaak is in hoofstuk 2 van die Elektrisiteitswet of deur ooreenkoms met die Munisipaliteit of andersins, is die beheer van die Munisipaliteit protanto uitgesluit. (ax)

Dit is nie nodig om te handel met die metodes waarvolgens 'n persoon of liggaam van persone die reg kan verkry om 'n ondernemer in die besondere gebied van 'n Munisipaliteit te wees, of die regte en verpligtinge wat aangegaan word deur sodanige ondernemer. Dit is slegs nodig om te sê dat hierdie sake ten volle bespreek word in die Elektrisiteitswet en byvoorbeeld in Ordonansie 6 van 1911 (Kaap). 'n Munisipaliteit wat elektrisiteit voorsien is spesifiek uitgesluit van die verpligting om 'n lisensie te bekom of 'n permit te bekom, soos voorsien is in die geval van 'n ondernemer in die Elektrisiteitswet.

Dit moet verder aangestip word dat 'n persoon wat aansoek doen by die Elektrisiteitsbeheerraad vir 'n lisensie om elektrisiteit te voorsien binne die jurisdiksiegebied van 'n Munisipaliteit moet behoorlik skriftelik kennis gee aan die Stadsklerk van sodanige Munisipaliteit van sy aansoek tesame met enige toepaslike inligting. (ay)

'n Munisipaliteit het derhalwe 'n volle geleentheid om sodanige vertoë te rig tot die Elektrisiteitsbeheerraad as wat dit nodig is ten opsigte van weerhouding van die lisensie of die toekenning daarvan op sekere voorwaardes. Bowendien sal geen persoon, maatskappy of vereniging van persone, Regeringsdepartement of administrasie of Elektrisiteitsvoorsieningskommissie, behalwe die Spoorwegadministrasie vir kragdoeleindes die reg verkry, na die aanvang van Wet 40/1958, om elektrisiteit te voorsien aan ander persone, binne die gebied van die Munisipaliteit of om distribusie- of versendingslyne te bou vir sodanige voorsiening daarvan oor enige gedeelte of sodanige gebied, behalwe met die toestemming van die Munisipaliteit, welke toestemming natuurlik nie onredelik weerhou sal word nie. As dit beweer word dat 'n Munisipaliteit sy toestemming onredelik weerhou, sal die Elektrisiteitsbeheerraad 'n publieke verhoor van albei partye gelas waar die kwessie ten volle opgelos sal word. In praktyk egter sal gevind

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(at) Dönges & van Winsen p. 131
(au) Dönges & van Winsen p. 279
(av) Municipal Law Supra p. 279
(aw) Municipal Law Supra p. 279

(ax) Municipal Law p. 407
(ay) Municipal Law p. 408

word, dat, (in die meerderheid van die Kaapse Munisipaliteite) word elektrisiteit opgewerk en gedistribueer in hulle gebied alleen, of in samewerking met die Elektrisiteitsvoorsieningskommissie wat gemagtig is om kontrakte aan te gaan met Munisipaliteite vir die voorsiening van krag. (az)

DIE OPRIGTING VAN 'N ELEKTRIESE ONDERNEMING DEUR 'N MUNISIPALITEIT :

Formaliteite:

Die daarstelling van 'n elektriese onderneming deur 'n Munisipaliteit is gereguleer deur die Ordonansies in die onderskeie Provinsies en deur Wetgewing, die jongste waarvan is: Wet Nr. 40/1958. In soverre as wat hierdie verordeninge nie bots nie, het beide van hulle eweveel regsgeldigheid. In soverre as wat hulle bots, het die Wet voorkeur bo die Ordonansies. In die interprestasie van die twee Wetlike verordeninge moet sodanige vertolking op die voorskrifte daarvan geplaas word, wat sover dit moontlik is, beide stelle verordeninge van krag hou, b.v. Ordonansie 6 van 1911, stel in die vooruitsig dat 'n Munisipaliteit 'n ondernemer mag word wanneer dit elektrisiteit voorsien, gebruik of distribueer vir publieke doeleindes binne die jurisdiksie of gebied van die plaaslike owerheid. 'n Munisipaliteit is derhalwe beperk in die oprigting van sy skema vir die voorsiening van/of gebruik of distribusie van elektrisiteit tot daardie doeleindes gedefinieer deur die Ordonansies as Publieke doeleindes. (ba)

Wet Nr. 40/1958 en so ook die ou Wet (sy voorganger Wet Nr. 42/1922) sluit ook 'n Munisipaliteit in onder sy definisie van 'n gemagtigde ondernemer, maar dit blyk asook die Wet die Munisipaliteit vrystel van sodanige beperkings want nêrens in die Wet is enige beperking geplaas op 'n ondernemer ten opsigte van die doel waarvoor hy elektrisiteit mag voorsien. Enige Munisipaliteit, behalwe die Munisipaliteit van Kaapstad moet, voordat hy enige elektrisiteitsskema vir die voorsiening van Elektrisiteit begin, behoorlik planne en spesifikasies aan die Administrateur voorlê, met betrekking tot die werk, die uitvoering van konstruksie van die be-oogde skema en ook besonderhede van die finansiële aspekte daarvan voorsien en van die administrateur skriftelike aanduiding ontvang van sy toestemming tot die skema, dat dit die geskikste en die mees praktiese is, vir die betrokke Munisipaliteit. (bb)

Die Administrateur mag op ontvangs van 'n skema vir verdere inligting vra, of veranderinge aan die skema voorstel of dit onvoorwaardelik goedkeur of sy toestemming heeltemal weier. (bc)

As 'n Administrateur eens 'n kondisie opgelê het, mag hy dit later weer terugtrek as hy dit goeddink. Indien 'n ondernemer versuim om aan die kondisies wat opgelê is, te voldoen, kan die Administrateur sy toestemming tot die skema weier of terugtrek. (bd)

Ordonansie 6/1911 b.v. word slegs van toepassing op ondernemers wat reeds bestaan het op die datum van sy afkondiging, en 90 skoon dae na sodanige datum. Enige ondernemer wie se onderneming reeds bestaan het op sodanige datum het slegs nodig om te voldoen aan die voorskrifte van Artikel 4(1) van Ordonansie 6 van 1911 met betrekking tot voorlegging van skemas as sodanige ondernemer begeer om die betrokke skema uit te brei, of 'n verandering aan die bestaande onderneming te bring, wanneer die totale koste van sodanige verandering of uitbreiding bereken word om 'n bedrag beraam teen $\frac{1}{2}\%$ van die totale onderneming te oorskry, of wanneer die bedrag minder is as R200.00

Bykomstig tot die bogemelde formaliteite wat neergelê is deur Ordonansie 6/1911 wanneer 'n Munisipaliteit begeer om 'n onderneming daar te stel of om sy bestaande onderneming te vergroot dat dit binne enige periode van 12 maande 10% van die bestaande opweggingskapasiteit oorskry, moet aansoek gedoen word by die Administrateur vir sy toestemming en die aansoek moet vergesel wees van 'n rapport van 'n Raadgewende Ingenieur oor die betrokke voorstelle. Die Administrateur is verplig om van die Elektrisiteitsvoorsieningskommissie 'n rapport oor die voorstelle te vra. Die laasgenoemde liggaam is verplig om die Administrateur van 'n rapport te voorsien waarin hulle adviseer wat die beste metode is vir die Munisipaliteit om die skema ten uitvoer te bring en in die besonder of die Kommissie self so 'n diens kan instel ten voordeel van die belastingsbetalers en die verbruikers. (be)

BEDRADINGSWERKERS ONDER WET NR. 48/1962.

'n Persoon wat verlang om geregistreer te word as 'n elektriese bedradingswerker moet skriftelik aansoek doen by die Elektriese Bedradingswerkers-Registrasie Raad, soos ingestel onder Wet Nr. 48/1962. Hy moet die Raad tevrede stel dat hy in besit is van sekere kwalifikasies soos neergelê deur die Wet. As die Raad tevrede is dat die applikant geregtig is op registrasie, sal die Raad na betaling van die voorgeskrewe fooie, hom registreer en aan hom 'n registrasiesertifikaat uitreik in die voorgeskrewe vorm.

Die Raad mag ook voorlopige registrasiesertifikate uitreik geldig vir 'n periode van nie meer dan ses maande nie.

(az) Municipal Law p. 408
(ba) en (bb) Municipal Law Supra p. 409
(bc) en (bd) Municipal Law p. 409

(bd) Municipal Law p. 409
(be) Municipal Law p. 410

Die Raad het die mag in voorgeskrewe omstandighede om die naam van enige persoon van die register van die Elektrotegniese bedradingswerkers te skraap, of in sekere gevalle enige sertifikaat wat deur sodanige persoon gehou word, op te skort, en in ander gevalle sekere feite teenoor sy naam te endosseer in die register. Die Raad mag ook die opskorting van die sertifikaat kanselleer of die naam op die register herstel.

In 'n gebied bepaal deur die Minister van Arbeid in terme van Artikel 18 van Wet nr. 48 van 1962 mag geen persoon enige bedradingswerk doen of vir sy voordeel of die voordeel van iemand anders, tensy hy 'n houer is van 'n bedradingswerker-sertifikaat of dat hy onder enige van die ander gespesifiseerde klasse van persone val.

Nie alleen moet 'n persoon wat bedradingswerk doen in 'n bepaalde gebied binne die bogemelde klasse val nie, maar niemand in gemelde klasse in sodanige bepaalde gebied mag enige bedradingswerk, toebehore of apparate in verband waarmee bedradingswerk alreeds gedoen was, met 'n bron van krag voorsiening verbind, tensy sodanige draadwerk toebehore of apparate ge-inspekteer was, getoets was en goedgekeur was deur 'n persoon in diens en genomineer vir die doel deur 'n gemagtigde voorsiener en bestemming om sodanige verbinding te maak, gegee was deur sodanige voorsiener. (bf)

As by sodanige inspeksie enige defek of fout in sodanige werk of 'n oortreding van die voorsiener se reglemente gevind word, moet die persoon wat die inspeksie doen, alle besonderhede van die fout, defek of oortreding tesame met die naam van die bedradingswerker verantwoordelik, aan die Munisipaliteit wat krag voorsien, rapporteer. As die Munisipaliteit besluit dat die fout, defek of oortreding regverdig dat die naam van die draadwerker van die register verwyder word, of die opskorting van sy sertifikaat, of 'n endossement teenoor sy naam, moet dit gerapporteer word aan die Bedradingsregistrasieraad en mag die draadwerker verbied word om vir een maand die bedradingswerk te doen, hangende die besluit van die Bedradings Registrasie Raad. Hierdie laasgenoemde mag alleenlik gebruik word as die Munisipaliteit van mening is dat die verwydering of opskorting van die bedradingswerker geregverdig is.

Die Raad oorweeg dan die saak en dit mag óf die verbod teen die bedradingswerker uitgereik, deur die Munisipaliteit opskort, óf kanselleer, of daar mag met die bedradingswerker gehandel word kragtens Artikel 14 van die Wet. As die Raad tot die gevolgtrekking kom dat die uitreiking van die verbod nie geregverdig was nie, moet die Munisipaliteit die bedradingswerker skadevergoeding betaal vir sy verlies van verdienste. (bg)

(bf) Municipal Law Supra p. 417
(bg) Municipal Law Supra p. 419

AANSPREEKLIKHEID VAN DIE MUNISIPALITEIT VIR SKADE DEUR ELEKTRISITEIT:

(i) Onder die Gemenereg.

'n Munisipaliteit wat 'n gemagtigde ondernemer is in terme van die Elektrisiteits Wet nr. 40 van 1958, soos gewysig (of volgens Wet 42 van 1922, soos gewysig) het die statutêre mag om 'n onderneming vir krag-opwekking en distribusie van elektriese energie te onderneem. Wanneer 'n Munisipaliteit wat sy onderneming op sodanige manier beheer soos deur die statuut in vooruitsig gestel en metodes gebruik wat in die ontwikkeling en verbetering en deur ervaring geblyk het om die beste metodes te wees en in geen opsig nalatig is nie, dan kan sodanige Munisipaliteit nie aanspreeklik gehou word vir die besering van enige persoon of beskadiging van enige eiendom as gevolg van die opwekking en distribusie van elektriese energie nie. (bi)

'n Munisipaliteit is in sy hoedanigheid as 'n ondernemer onder die Wet nie 'n versekeraar nie. Daar is geen absolute verantwoordelikheid wat op 'n Munisipaliteit geplaas word vir alle skade wat voortvloei uit die opwekking en distribusie van elektriese energie nie. Die leer van Rylands vs Fletcher word nie in Suid-Afrika toegepas nie. (b2)(bh)

Die toets vir 'n Munisipaliteit in teenstelling daarmee, is die van nalatigheid (culpa) nl. 'n versuim of om sodanige redelike en behoorlike maatreëls te neem as wat nodig is om skade te verhoed aan persone of eiendom. Ten einde te besluit wat nalatigheid is, aan die kant van 'n ondernemer, moet dit in gedagte gehou word dat 'n Munisipaliteit besig is om te handel met 'n hoogsgevaarlike hulpmiddel en die voorsorgmaatreëls wat dit neem moet op sodanige wyse wees, dat dit behoorlik is, ten einde die Publiek teen sodanige hulpmiddel te beskerm. Wat behoorlike voorsorg maatreëls is, sal ook afhang van alle omstandighede van die saak.

In Kift's se saak b.v. was dit gehou dat 'n Munisipaliteit nie behoorlike voorsorgmaatreëls getref het nie, waar 48 uur verloop het tussen die tyd toe 'n elektriese distribusie draad gebreek het en geval het op die grond in 'n dig bewoonde deel van Kaapstad en die tyd toe dit eers aandag ontvang het. (bj)

(bi) Dönges en v. Winsen Supra p. 420 en Eastern & S.A. Telegraph Co. vs Cape Town Tramways Co. 17 S.C. 95
(b2) Botes vs Potchefstroom Municipality and Another 1941 TPD. 149 re p. 154
(bh) Rylands vs Fletcher. (1868) L.R. 3H. L. 330 and Dönges & v. Winsen Supra p. 420 and 421

In dieselfde saak was dit gehou dat waar 'n Munisipaliteit se bogrondse distribusie lyne bo-oor 'n tremlyn loop was dit nalatig vir die Munisipaliteit om nie behoorlike voorsorgmaatreëls te getref het ten einde kontak tussen die twee stelle drade te verhoed nie. Aan die anderkant in Jurgenson se saak waar 'n dooie tak van 'n boom afgebreek het op 'n punt 40 vt bo die grond in 'n posisie van waar dit nie op die gewone wyse bo-op drade sou val nie, en wel op die drade geval het, was dit gehou dat die Munisipaliteit nie nalatig was toe hulle versuim het om die boom te inspekteer nie. Sonder dat die Hof egter beslis het of daar 'n plig op die Munisipaliteit was om die boom te inspekteer, het die Hof gehou dat geen redelike inspeksie die feit aan die lig sou gebring het, dat die tak verrot was en moontlik op die drade sou val, indien dit nie verwyder was nie. Daar is geen twyfel dat een van 'n Munisipaliteit se pligte is om gereeld die verskillende dele van sy onderneming te inspekteer nie en as dit kan bewys word dat skade ontstaan het deur die ontsnapping van elektrisiteit, wat verhoed kon gewees het deur redelike inspeksie, dan sal 'n Munisipaliteit aanspreeklik wees op grond van nalatigheid, tensy daar enige ander wetlike verdediging mag wees. (bk)

In Botes se saak is dit gehou dat as 'n persoon 'n gevaarlike artikel aan 'n ander persoon verskaf, en dit uit eersgenoemde se beheer uitraak en oorgaan in die alleen-beheer van daardie ander persoon en die laasgenoemde daarna dit nalatiglik gebruik op sodanige manier dat die skade berokken aan 'n derde party, sal die verskaffer nie vir skadevergoeding aanspreeklik wees aan so 'n derde persoon nie, tensy sodanige verskaffer 'n gevaarlike artikel in besit geplaas het van 'n persoon wat klaarblyklik ongeskool was, of onbekwaam is om dit te beheer of onwaarskynlik voorsorgmaatreëls sou tref. (bk)

(ii) Onder die Statutêre reg.

Ordinansie 6 van 1911, (Kaap) plaas geen statutêre verpligting op 'n Munisipaliteit, wat 'n ondernemer is om skade te betaal aan enige persoon, wat skade ly as gevolg van 'n Raad se opwekking en distribusie van elektrisiteit. Op 'n dergelike wyse voeg die ou Wet 42 van 1922, soos gewysig, (of die nuwe Wet 42 van 1958) soos gewysig, niks toe of verander dit in geen opsig die gemeenregtelike aanspreeklikheid van 'n ondernemer vir skade gedoen, deur elektrisiteit wat opgewek word of deur hom oorgestuur word nie. Hierdie Wet maak wel verandering in die byvoeglike reg as dit besonders bepaal waar die bewyslas in sekere gevalle sal rus. (bl)

Hiermee handel ek hieronder.

Dit Staats President is egter gemagtig om regulasies te maak vir die beskerming van die Publiek teen skade of beserings voortvloeiende uit die be-oefening van die regte wat toegeken word kragtens die elektrisiteits-Wet en volgens die Wet wat ook insluit die reg wat aan 'n Munisipaliteit toegeken is om sy elektrisiteits onderneming op te rig of uit te brei.

(iii) Bewys van nalatigheid onder die gemene reg moet die Eiser wat sy eis baseer op nalatigheid, die nalatigheid van die Verweerder bewys ten einde te kan slaag in sy aksie. 'n Persoon beseer deur elektrisiteit moet bewys dat sy besering te wyte is aan die nalatigheid van die Munisipaliteit. Dit mag wees soos dit neergelê is deur Hoof-Regter de Villiers in die saak Eastern and S.A. Telegraph Co. saak dat: "The facts of the escape and damage would afford prima facie evidence of negligence". (bm)

Die feit dat 'n elektriese draad gebreek het en op die grond gelê het vir 48 uur voordat die Raad bewus geword het van die feit, was gehou in Kift's se saak as prima facie getuienis van nalatigheid aan die kant van die Raad.

Die leerstuk van „res ipsa loquitur" kan ook aangewend word deur die Eiser ten einde bewyslas af te wend in sommige gevalle.

Omdat dit so uiters moeilik is om in sekere omstandighede nalatigheid aan die kant van 'n Munisipaliteit in sekere sake te bewys het die wetgewer ingetree en bepaal dat in prosesse teen 'n ondernemer wat ontstaan uit skade of beserings veroorsaak is deur induksie of elektroliese of op 'n ander wyse deur middel van elektrisiteit wat ontwikkel is of oorgestuur is deur, of ontsnap het van elektriese toerusting, of masjinerie van enige ondernemer, sal dit nie nodig wees dat 'n eiser moet bewys dat die skade of beserings veroorsaak was deur nalatigheid van die Verweerder en skade vergoeding mag verhaal word, ondanks die afwesigheid van sodanige bewys. (Artikel 50 (i) Wet 40 van 1958).

As ons die uitspraak van Hoof-Regter de Villiers en die Eastern en S.A. Telegraph Co. Saak toepas op hierdie artikel dan is die submissie dat dit betrekking het in sy toepassing op daardie gevalle waar skade of beserings veroorsaak was deur induksie of elektroliese of iets dergeliks in sy werking van die twee genoemde metodes. In daardie besondere saak het die geagte Hoof-Regter opge-

(bj) Kift vs Cape Town Municipality 17 SC. 465
(bk) Dönges & van Winsen p. 421
(bl) Dönges & van Winsen p. 421
(bm) Dönges & van Winsen p. 422

merk: "The Legislature would not have specified electrolysis as one of the forms of damage for which the defendants should be liable if it had intended that the liability should extend to every possible form of damage". (bn)

As die feit in ag geneem word dat dit baie moeilik sal wees om nalatigheid te bewys, in die geval van veroorsaking van skade deur induksie of elektroliese en dat die wetgewer dit derhalwe nodig gevind het om die Eiser by te staan in sodanige sake en verder in agnemende dat waar hierdie artikel die bewyslas verander, en dit 'n afwyking van die gemene-reg is, is die submissie dat dit in 'n baie beperkende sin vertolk moet word. (bo)

Verder moet dit bewys word dat die skade of besering beslis ontstaan het deur induksie of elektroliese of sodanige dergelike metode.

Dit het die Eiser in die onderhawige saak versuim om te doen.

Dit Artikel gaan verder en bepaal dat dit ook 'n verdedigingsgrond sal wees in enige sodanige geding dat die skade of besering te wyte is aan die opsetlike daad of te wyte is aan die nalatigheid van die beseerde persoon of iemand wat nie in diens van die Verweerder is nie, of van een of ander persoon wat met die uitrusting of masjinerie van die Verweerder, sonder sy toestemming gewerk het. (bp)

Toe Regter Malan hierdie artikel vertolk het, het hy in die Botes saak gesê: „Na my mening en ten einde 'n behoorlike vertolking van hierdie artikel te gee, gaan hierdie artikel nie verder dan om die bewyslas onder die gemenereg te verskuif nie. Sodra die feite wat uiteengesit is in Artikel 50 (i) van die Elektrisiteits Wet bewys is, dan word nalatigheid vermoed, maar as 'n mens hierdie artikel vertolk, dan moet dit verder beperk word in die opsig dat die bewyslas, in soverre dit nodig is vir die beslissing of op die ontwikkeling en distribusie, of op die persoon van wie se uitrusting die stroom ontsnap het te plaas, slegs wanneer die besering veroorsaak is in die proses van opwekking of in die proses van oorstuur, of wanneer die ontsnapping van stroom plaasvind van die toestel of die persoon wat in beheer is". (bq)

BESKERMING VAN MUNISIPALE AMPTENARE EN/OF RAADSLEDE IN DIE UITVOERING VAN HUL PLIGTE.

Onder die gemene reg is enige amptenaar van Munisipaliteite, wanneer hy as sulks optree in die uitvoering van sy pligte geregtig om skadeloosstelling te ontvang op dieselfde wyse as enige ander verteenwoordiger. Spesiale statutêre beskerming word ook aan sekere werknemers voorsien.

Geen rapport wat gemaak is, of aksie wat geneem is, of enige daad wat verrig is deur 'n mediese gesondheidsbeampte of enige algemeen of spesiale gemagtigde amptenaar van 'n plaaslike owerheid, in die uitvoering van enige mag wat hom opgelê is, of die uitvoering van enige plig wat hom opgelê is, deur die Wet op Agterbuurtes, stel hom bloot in sy persoonlike hoedanigheid aan enige regsproses hoegenaamd, met dien verstande dat sodanige rapport was of die daad ter goeder troue en sonder nalatigheid gedoen was. Waar 'n amptenaar in uitvoering van sy pligte onder die Publieke gesondheidswet beweer word om 'n persoon enige leed aan te gedoen het, of skade aan enige eiendom verrig het, dat dit 'n verdedigingsgrond in enige regsproses wees, wat gegrond is op sodanige bewering, en gebring is teen sodanige amptenaar, dat die laasgenoemde amptenaar die bes bekende maatreëls getref het of die enigste of die mees praktiese metodes aangewend het in die uitvoering van sy pligte soos vermeld. (br)

KOSTE DE BONIS PROPRIIS.

Die beginsels wat ons Howe sal toepas ten einde te besluit wanneer koste teen 'n amptenaar de bonis propriis toegeken sal word, is dieselfde as die beginsels wat toegepas sal word in 'n geval waar 'n Burgemeester optree in sy amptelike hoedanigheid. In die algemeen gesproke sal die Hof slegs koste teen enige persoon de bonis propriis beveel waar sy bona fides afwesig is, of in 'n geval waar hy heeltemal nalatig of onredelik opgetree het. (bs)

Die amptenaar is soms geplaas in 'n posisie waarin hy 'n judisiële of quasi-regtelike funksie moet verrig. Sou hy 'n verkeerde beslissing gee en sy beslissing op appel geneem word, dan ontstaan die vraag of die suksesvolle appéllant enige koste teen die amptenaar wie se beslissing omver gegooi is, moet kry.

In die saak Pillay vs Humansdorp Munisipaliteit en andere het die Hof gehou dat waar 'n persoon op 'n bona fide manier sy regtelike funksies of quasi-regtelike funksies uitgevoer het in sake wat hy kragtens die reg vereis word om uit te voer, sal die feit dat hy tot die verkeerde beslissing geraak het hom nie aanspreeklik maak vir koste nie.

So ook in die saak van die Hoofpasbeheerbeampte van Johannesburg teen Mashamba het die Hof tot die gevolgtrekking gekom dat waar 'n Publieke amptenaar aan wie toevertrou is judisiële of quasi-regtelike funksies en hy beide sodanige funksies op 'n bona fide manier uitvoer, sal die Hof nie koste teen sodanige amptenaar in 'n geding

(bn) Dönges & van Winsen p. 422
(bo) Dönges & van Winsen p. 422
(bp) Dönges & van Winsen p. 423
(bq) Dönges & van Winsen p. 423

(br) Dönges en v. Winsen p. 334
(bs) Dönges en v. Winsen p. 335

wat voortspruit uit die verkeerde beslissing deur hom gegee, toeken nie.

Die Hof sal slegs weier om 'n bevel vir koste te maak waar 'n amptenaar optree, in die regtelike of quasi-regtelike hoedanigheid en nie in gevalle waar hy nie in 'n administratiewe hoedanigheid optree nie. As hy sou optree in 'n administratiewe hoedanigheid sal koste teen hom gegee word in daardie hoedanigheid of persoonlik de bonis propriis indien sodanige bevel geregverdig is. (bt)

WELKE BESKERMING IS DAAR VIR AMPTENARE EN RAADSLEDE:

Onder die gemene reg is 'n werkgewer verplig om redelike maatreëls te neem vir beskerming van sy werknemers teen skade voortvloeiende uit dade verrig in hulle diensbetrekking. Soos reeds genoem is sekere amptenare deur statute beskerm. (Volgens die Wet op Agterbuurtes en die Publieke Gesondheidswet).

Oor die algemeen is daar vele munisipale amptenare in die onderskeie provinsies byvoorbeeld die Elektriese-ingenieur wat nie beskerm is nie. Die munisipale rade het ook geen magte kragtens ordonansie om sodanige beskerming te verleen nie, behalwe in Natal waar Artikel 79 van Ordonansie 21 van 1942 (Natal) munisipaliteite magtig om regulasies af te kondig waardeur munisipale werknemers gevrywaar kan word teen enige persoonlike hofgedinge, regsaanspreeklikheid, eise of aanskrywings, waaraan hulle blootgestel mag word as gevolg van enige handeling deur hulle in goedertrou gedoen of nagelaat is om te doen, in die uitvoering van hulle pligte.

Die onderhawige regulasies afgekondig onder die Natal Ordonansie lees as volg:-

(a) It is recorded that by section 79 of Ordinance No. 21 of 1942, officers and servants of the Council are indemnified against any personal action, liability, claim or demand in consequence of any matter or thing done by them under the direction of the Council, in good faith, for the purpose of Ordinance No. 21 of 1942, or any by-law in force within the city.

(b) WHENEVER:-

(i) Any law imposes upon any officer or servant of the Council, acting in his official capacity, a statutory duty of a personal nature, in the performance of which he is independent of the control of the Council; and

(ii) such officer or servant becomes involved in legal proceedings whether civil or criminal arising out of any matter or thing done or omitted by him in the performance of such statutory duty; and

(iii) such officer or servant has forthwith reported to the head of his department or, in the case of a head of department, to the Town Clerk, in writing, the fact that such legal proceedings have been commenced against him and has furnished such particulars thereof as have been required; and

(iv) the Council has resolved or, in any case of urgency, the Mayor and Chairman of the Staff committee have agreed in writing, that in its or their opinion the officer or servant concerned acted in good faith and without negligence of foolishness in the performance of the statutory duty in question;

the Council shall be deemed (subject to subsection (c) hereof) to have indemnified the officer or servant concerned against any claim of liability which may devolve upon him as a result of such legal proceedings and shall undertake his defence or pay his legal costs therein.

(c) If any officer or servant, in respect of whom the indemnity provided by sub-section (b) is in operation, fails to obey any lawful direction given to him on behalf of the Council in regard to the legal proceedings in which he is involved, such indemnity shall thereupon cease and determine, and the officer or servant shall on demand, reimburse to the Council the amount of any expenses or other liabilities it may have incurred on his behalf".

Ook onder die Transvaalse Plaaslike Bestuurs Ordonansie Nr. 17 van 1939 (soos gewysig) word in Artikel 47 persoonlike beskerming verleen aan amptenare en raadslede vir hulle onregmatige dade onder die omstandighede gepleeg soos uiteengesit in die Ordonansie.

Die onderhawige artikel lui soos volg:-

"Section 47

No matter or thing done or omitted, and no contract entered into by the Council, and no matter or thing done or omitted by any councillor or officer or servant of the Council shall if the matter or thing were done or omitted or the contract was entered into in good faith for the purposes of this Ordinance or of any by-law or regulation in force in the municipality, subject any such person personally to any action, liability, claim or demand whatsoever, and any expense incurred by the council or any such person as aforesaid shall be paid by the Council out of its revenues; provided that nothing in this section shall exempt any such councillor, officer or servant or other person aforesaid

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(bt) Municipal Law Supra p. 335

from liability to be surcharged with the amount of any payment which may be disallowed by the auditor, appointed by the Administrator under section fifty-nine of this Ordinance in the accounts of the council and which such councillor authorized or joined in authorizing".

Bogemelde artikel verleen geen beskerming teen kriminele stappe nie. Dit is juis die kriminele prosesse wat teen die Ingenieur persoonlik ingestel word onder die Fabriekswet, Elektrisiteitswet en Mines and Works Act wat bekommernis wek.

Dit wil voorkom of verskeie ander amptenare wat pligte het om uit te voer onder ander Wette soos Verkeer en Administrasie van Nie-Blanke sake, nie gedek word nie. (bu)

Laat ons die aanspreeklikheid kortliks behandel:

'n Munisipaliteit kan krimineel vervolg word.

"Strictly this is only where mens rea is not an essential ingzedient of the offence. This is the case where the acts complained of are acts which in the public interest are prohibited under a penalty .....; another class comprehends some, or perhaps all, public nuisances .....; and lastly there may be cases in which, although the proceeding is criminal in form, it is really only a summary mode of enforcing a civil right"

per Wright J. in Sherras vs de Rutzen (1895) QB 918

Nou egter, maak die voorskrifte van Artikel 381 van die Strafproseswet Nr. 56/1955, die publieke aanklaer geregtig om, wanneer 'n misdaad gepleeg is, voortvloeiend uit enige, Wet, Regulasie, of gemene reg, waarvoor 'n regspersoon aanspreeklik is, ook die werknemers of direkteure, burgemeester, Voorsitter, Stadsklerk of ander amptenare persoonlik of in 'n verteenwoordige hoedanigheid aan te kla.

Die volle teks van die betrokke Artikel waarna verwys word, lui as volg:-

Art. 381:

(1) Teneinde 'n regspersoon strafregtelik aanspreeklikheid op te lê weens 'n misdryf, hetsy wetregtelik of gemeenregtelik, word:-

(a) enige daad wat deur of in opdrag of met uitdruklike of stilswyende toestemming van 'n direkteur of dienaar van daardie regspersoon, met of sonder 'n besondere opset, verrig word; en

(b) die versuim, met of sonder 'n besondere opset, om 'n daad te verrig wat verrig moes geword het, maar nie verrig is nie, deur of in opdrag van 'n direkteur of dienaar van daardie regspersoon,

by die uitoefening van sy bevoegdhede of die uitvoering van sy pligte as so 'n direkteur of dienaar, of ter bevordering of gepoogde vordering van die belange van daardie regspersoon geag 'n daad met dieselfde opset, as daar opset by is, deur daardie regspersoon verrig te gewees het of, na gelang van die geval, 'n versuim en met dieselfde opset, as daar opset by is, aan die kant van daardie regspersoon te gewees het. (bv)

(2) By 'n vervolging teen 'n regspersoon, word 'n direkteur of dienaar van daardie regspersoon, in die hoedanigheid van verteenwoordiger van daardie regspersoon, as die oortreder gedaag, en met die aldus gedaagde persoon kan dan, as so 'n verteenwoordiger, gehandel word asof hy die persoon was wat beskuldig word dat hy die betrokke misdryf gepleeg het: Met dien verstande dat:-

(a) indien bedoelde persoon skuldig pleit, die pleit nie geldig is nie tensy die regspersoon hom gemagtig het om skuldig te pleit;

(b) indien bedoelde persoon op enige stadium van die saak ophou om 'n direkteur of dienaar van daardie regspersoon te wees of vlug of nie in staat is om aanwesig te wees nie, die betrokke Hof of Magistraat op versoek van die aanklaer van tyd tot tyd bedoelde persoon kan vervang deur iemand anders wat ten tyde van so 'n plaasvervanging 'n direkteur of dienaar van bedoelde regspersoon is en die verrigtinge dan voortgaan asof geen plaasvervanging geskied het nie;

(c) indien bedoelde persoon, as verteenwoordiger van die regspersoon ter strafsitting verwys word, hy nie na die gevangenis verwys word nie maar op sy eie borgakte vrygelaat word om op verhoor gestel te word;

(d) indien bedoelde persoon, as verteenwoordiger van die regspersoon, skuldig bevind word, die Hof wat hom skuldig bevind, hom in sy verteenwoordigende hoedanigheid geen straf, hetsy regstreeks of as alternatief, behalwe 'n boete, oplê nie, selfs indien die toepaslike wetsbepaling vir die oplegging van 'n boete ten opsigte van die betrokke misdryf geen voorsiening maak nie, en sodanige boete deur die regspersoon, betaalbaar is en deur

(bu) Notas deur Professor J. C. de Wet.

(bv) Notas deur Professor J. C. de Wet.

beslaglegging op en verkoping van enige eiendom van die regspersoon, ingevolge artikel d r i e h o n d e r d sewe-en-dertig verhaal kan word;

(e) (e) die daging van 'n direkteur of dienaar van 'n regspersoon by 'n vervolging wat daarteen ingestel w o r d, te verteenwoordig, daardie direkteur of d i e n a a r nie van 'n vervolging weens daardie misdryf ingevolge sub-artikel (5) vrystel nie.

(3) By 'n strafsaak teen 'n regspersoon, in enige aantekening deur 'n direkteur, dienaar of agent van die regspersoon binne die bestek van sy werksaamhede as sodanige direkteur, dienaar of agent gedoen of gehou, of enige dokument wat te eniger tyd in die bewaring of onder die beheer van so 'n direkteur, d i e n a a r of a g e n t binne die bestek van sy werksaamhede as sodanige direkteur, dienaar of agent was, as getuienis teen die beskuldigde toelaatbaar.

(4) By die toepassing van sub-artikel (3) word e n i g e aantekening deur 'n direkteur, dienaar of agent van 'n regspersoon gedoen of gehou of enige dokument wat te eniger tyd in sy bewaring of onder sy beheer was, v e r m o e d deur hom binne die bestek van sy w e r k s a a m h e d e as so 'n direkteur, dienaar of agent, gedoen of gehou te gewees het of in sy bewaring of onder sy b e h e e r te gewees het tensy die teendeel bewys word.

(5) Wanneer 'n misdryf gepleeg is hetsy deur die verrigting van 'n daad of deur die versuim om 'n daad te verrig, waarvoor 'n regspersoon v e r v o l g kan word of kon g e w o r d het, word enige-iemand wat ten tyde van die pleeg van die misdryf 'n direkteur of dienaar van die regspersoon was, geag aan bedoelde misdryf s k u l d i g te wees, tensy dit bewys word dat hy nie aan die pleeg van die misdryf deelgeneem het en dit nie kon verhoed het nie, en kan hy saam met die regspersoon of afsonderlik weens daardie misdryf a a n g e k l a word, en by skuldigbevinding persoonlik daarvoor gestraf word.

(6) By 'n strafsaak teen 'n direkteur of dienaar van 'n regspersoon weens 'n misdryf:-

(a) is getuienis wat teen daardie regspersoon by 'n vervolging weens daardie misdryf toelaatbaar sou wees of was, t e e n die beskuldigde toelaatbaar;

(b) is 'n dokument, memorandum, boek of aantekening wat in die gewone loop van die besigheid van die regspersoon opgestel, aangeteken of gehou is, of wat te e n i g e r tyd in die bewaring of onder die beheer was van 'n direkteur, dienaar of agent van bedoelde regspersoon, in sy hoedanigheid van direkteur, dienaar of agent, prima facie bewys van die inhoud daarvan en as getuienis t e e n die beskuldigde toelaatbaar, hetsy bedoelde regspersoon weens die misdryf vervolg kan of kon word, al dan nie, tensy en totdat hy in staat is om te bewys dat hy te alle ter s a k e dienende tye geen k e n n i s van bedoelde dokument, memorandum, boek of aantekening gehad het nie vir s o v e r die inhoud daarvan op die ten laste gelegde misdryf betrekking het, en op generlei wyse aan die o p s t e l van bedoelde dokument, memorandum, boek of aantekening gehad het nie vir sover die inhoud daarvan op die ten laste gelegde misdryf betrekking het, en op generlei wyse aan die o p s t e l van bedoelde dokument of memorandum of die aanbring van enige ter sake dienende aantekening in bedoelde boek of die aantekening medepligtig was nie.

(7) Wanneer 'n lid van 'n vereniging van persone wat nie 'n regspersoon is nie, in verband met die behartiging van die b e s i g h e i d of sake van daardie vereniging of in v e r b a n d met die bevordering of gepoogde bevordering van sy belange, 'n misdryf pleeg, hetsy deur 'n daad te verrig of deur te versuim om 'n daad te v e r r i g word enigiemand wat ten tyde van die pleeg van die m i s d r y f 'n lid van daardie vereniging was, geag aan daardie misdryf skuldig te wees, tensy dit b e w y s word dat hy nie aan die pleeg van die misdryf deelgeneem het nie en dat hy dit nie kon verhoed nie: Met dien verstande dat indien die besigheid of sake van die vereniging deur 'n komitee of ander soortgelyke bestuursliggaam b e s t u u r of beheer word, die bepalings van hierdie sub-artikel nie van toepassing is op iemand wat ten tyde van die p l e e g van die misdryf nie 'n lid van daardie komitee of ander liggaam was nie.

(8) By 'n saak teen 'n lid van 'n vereniging van persone weens 'n bepaling in sub-artikel (7) bedoelde misdryf, is enige aantekening wat deur 'n lid of dienaar of agent van die vereniging binne die bestek van sy werksaamhede as sodanige lid, dienaar of agent gedoen of gehou is of enige dokument wat te eniger tyd in die bewaring of onder die beheer van so 'n lid, dienaar of agent binne die bestek van sy werksaamhede as sodanige lid, dienaar of agent was, as getuienis teen die beskuldigde toelaatbaar.

(9) By die toepassing van sub-artikel (8) word e n i g e aantekening deur 'n lid of dienaar wat te eniger tyd in sy bewaring of o n d e r sy beheer was, vermoed deur hom binne die b e s t e k van sy werksaamhede as sodanige lid of dienaar of agent gedoen of gehou te gewees het of in sy b e w a r i n g of onder sy beheer te gewees het, tensy die teendeel bewys word.

(10) In hierdie artikel beteken die woord „direkteur" met betrekking tot 'n regspersoon iemand wat daardie regspersoon beheer of bestuur of wat lid is van 'n liggaam of groep persone wat daardie regspersoon beheer of bestuur of, waar daar nie so 'n liggaam of groep is nie, wat lid is van daardie regspersoon.

(11) Die bepalings van hierdie artikel vul enige ander wetsbepaling aan wat vir 'n vervolging teen regspersone of hul direkteure of dienare of teen verenigings van persone of hul lede voorsiening maak, en vervang dit nie".

Dit was nie altyd so dat die regspersoon aanspreeklik gehou kon word vir sy misdade nie.

Die Romeinse Reg het op die standpunt gestaan dat die regspersoon nie strafregtelik aanspreeklik kan wees nie.

"Societas delinquere non potest" was hulle spreuk.

In die Romeinse Reg is geargumenteer dat so 'n idieële iets soos 'n regspersoon nie die gesindheid wat vir misdade vereis word, aan die dag kan lê nie. In die Middeleeue is onder invloed van die Kanoniste tot die ander uiterste geswaai, dat die Regspersoon handelende deur sy organe, wel deeglik aanspreeklik kan wees.

Bartholus in sy kommentaar op Digesta gee 'n volledige uiteensetting van die strafregtelike aanspreeklikheid van die regspersoon. Hierdie opvatting was die min of meer gangbare tot met die reaksie wat aan die einde van die 18e Eeu intree.

In die jongste tye kry ons weer 'n ommeswaai na die Middeleeuse opvatting. Suiwer teoreties beskou, is die Romeinse reg opvatting die juiste. Die regspersoon is iets denkbeeldig. Dit kan nie alleen handel nie, dit het geen gesindheid nie. Dit kan alleen optree deur middel van mense, en waar hierdie mense in die belang of in diens van die regspersoon misdade pleeg, is hulle self daarvoor verantwoordelik. Korrek of nie, word daar egter vandag geleer dat om redes van doelmatigheid, die regspersoon strafregtelik verantwoordelik gehou kan en moet word.

Hier by ons het die strafregtelike aanspreeklikheid van die regspersoon langsaam gekom. (bw)

In Rex vs Oudtshoorn Municipality (25 SC 257) is 'n munisipaliteit skuldig bevind aan oortreding van 'n wetsartikel wat die afkap van bome onder straf verbied. Die Hof het daar bevind dat 'n regspersoon hom skuldig kan maak aan 'n oortreding van 'n wette regtelike voorskrif maar die vraag ope gelaat of dit ook 'n gemeen regtelike oortreding kan begaan. So het die aanspreeklikheid van die regspersoon al hoe meer in wetteregtelike bepalings ingedring. Sien uitspraak van Regter van Zyl in Rex vs Hewitson & Others. 137 CPD. 5.

Die twispunt in vroeëre sake was meesal van prosesuele aard, nl. hoe die regspersoon voor die hof gedaag sal word. So het die bogenoemde Art. 381 van Wet 56/1955 tot stand gekom.

In hierdie artikel (soos in sy voorganger 384 van Wet 31/1917 en herroep deur Art. 117 van Wet 23/1939) gaan die wetgewer eenvoudig uit van veronderstelling dat die regspersoon misdade kan pleeg en hy skryf nou voor hoe die regspersoon voor die Hof gedaag sal word, en hoe strawwe op hom verhaal sal word. Die artikel bevat ook 'n aantal voorskrifte van suiwer materieel regtelike strekking.

Elke handeling verrig deur 'n direkteur of amptenaar, (so ook raadslede en ingenieurs) van die regspersoon is kragtens hierdie Wet, 'n handeling van hierdie regspersoon, mits die direkteur of amptenaar binne die kring van sy bevoegdhede of pligte gehandel het of deur sy handeling beoog om die belange van die regspersoon te dien.

Nog belangriker is dat elke opset (intent) van 'n direkteur, amptenaar of raadslid ook aan die regspersoon toegeskryf word. Alle teoretiese besware teen aanspreeklikheid van die regspersoon is daarmee uit die weggeruim. Hoe die regspersoon gestraf sal word, word in die artikel bepaal.

Hierdie artikel bevat ook bepalings wat nie op die strafbaarheid van die regspersoon betrekking het nie, maar wel op die strafregtelike aanspreeklikheid van individue. (bx)

Sub-artikel (5) bepaal dat elke direkteur of amptenaar nog boonop persoonlik aanspreeklik sal wees vir misdade deur die regspersoon gepleeg. Hulle is dan SOCii crimminis.

Hierteen bestaan geen beginsel beswaar nie, want mens bly strafregtelik aanspreeklik vir jou dade, selfs al pleeg jy jou misdade met medewerking of deur middel van ander. Normaalweg moet die Staat die saak in sy geheel teen die beskuldigde bewys. Hier ontstaan uit 'n skuldigbevinding van die regspersoon dat elke amptenaar of direkteur ook skuldig is en die las om te bewys dat hy onskuldig is rus op die amptenaar of direkteur.

Die fout wat ons te vind het met hierdie artikel, is dat hiervolgens word 'n mens aanspreeklik gehou vir die gevolge van 'n daad waaraan hy hoegenaamd geen skuld het nie.

'n Misdaad is 'n wederregtelike menslike handeling, waaraan die dader skuld het, met straf as regsgevolg.

(bw) Notas deur Professor J.C. de Wet.

(bx) Notas deur Professor J.C. de Wet.

Hierdie artikel is 'n belangrike geval waar die skuldvereiste in die praktyk veronagsaam word. Die beginsel van vicarious responsibility word derhalwe ook in die Strafreg toegepas.

Dit is bekend dat in die Privaatreg die heer somtyds aanspreeklik gehou word vir die dade van die mense in sy diens maar selfs in die Privaatreg word erken dat mens hier te doen het met aanspreeklikheid sonder skuld. In die Strafreg behoort hierdie leerstuk geen toepassing te vind nie; want die hele grondslag van die Strafreg is dat 'n dader gestraf word weens sy skuld.

Die houding waarteen beswaar gemaak word is die neiging om die heer eenvoudig, soos in die privaatreg aanspreeklik te hou vir misdade gepleeg deur mense in sy diens. In Rex vs Wunderlich 1912 TPD 1118 het die Hof geredeneer dat waar mens met die sgn. „absolute prohibition" te doen het, die heer eenvoudig aanspreeklik gehou kan word, omdat skuld tog geen vereiste by „absolute prohibitions" is nie. (by)

So ook in Rex vs van Schalkwyk 1921 CPD. 79 verklaar Regter Watermeyer „as a general rule a man is not criminally liable for the acts of his servants or agents, but in certain circumstances the master may be held criminally responsible, even where the act is done without his knowledge and without his instructions. The reason why he is not as a rule criminally liable for the acts of his servants, is that he has no mens rea. In many statutory offences, however, mens rea is not required".

Hierdie toepassing van die leer van Vicarious responsibility in die Strafreg is ongesond, want dit is strydig met die beginsels van die Strafreg en daardeur word mens aanspreeklik gehou vir dade waaraan hulle geen skuld het nie.

Hoe dit ook al sy, ons het gesien hoe wyd die bepalings van Artikel 381 van die Strafproseswet slaan en nou is daar die beweging op tou gesit om vir die aangeklaagde amptenaar (ingenieur) beskerming te verkry deur Assuransie, teen aksies wat ontstaan uit verbrekinge van die Elektrisiteitswet, Fabriekswet en Mines & Works Act, en dergelike wette en ordonansies. 'n Begin is gedeeltelik gemaak deur Natal en Transvaal (vir siviele sake) en dit word vertrou dat daardie bepalings ook weerklank sal vind in die ander Provinsies.

In al my naslaanwerk het ek geen bepaling gevind wat daarop gemik is om Raadslede afdoende te beskerm teen die bepalings van Artikel 381 van die Strafproseswet nie. Waar daar pogings is om vir Amptenare in te tree, wonder mens of die Administrateurs in die Provinsies ook aan Raadslede sal dink?. (bz)

(bz) Notas deur Professor J.C. de Wet. (by)

A REVIEW OF LOW VOLTAGE INSTALLATION PROTECTION PRACTICE IN SOUTH AFRICA

by

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1. INTRODUCTION.
2. REQUIREMENTS OF A PROTECTIVE SYSTEM.
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1. INTRODUCTION.

The protection of an electrical installation against excess current and energy and against the persistence of earth-leakage currents liable to cause danger, is of primary interest to every practicing municipal engineer who is entrusted with the safety of the installation under his jurisdiction. Apart from the fact that practices change as new ideas and equipment become available, there is also quite a divergence of opinion as to what system will afford the best protection. It was accordingly decided to present this review of current practices with the object of assisting those concerned.

In Low Voltage Installations the requirement for protection has traditionally been met by the use of semi-enclosed fuses. In recent years two trends have competed in South Africa for replacing the semi-enclosed fuse in installations, namely the h.r.c. fuse and the air-break miniature circuit-breaker.

The Standard Regulations for the Wiring of Premises issued by the South African Institute of Electrical Engineers specifies in Regulation 206:

"Throughout an installation every circuit and sub-circuit shall, except as prohibited under Regulation 208, be protected on each pole by a suitable fuse or circuit-breaker, unless an approved linked circuit-breaker is used with overload protection on each live pole". The prohibition refers to neutral switching, which is not allowed in an earthed system.

Regulation 1302(D) specifies that:

"Automatic earth-leakage protection shall be installed forthwith on an installation upon receipt at any time of written instructions to that effect from the Engineer," and then carries on giving more detail about the apparatus and how it should be used.

It may be of value to compare the equivalent requirements in Great Britain and the U.S.A.

The Regulations for the Electrical Equipment of Buildings issued by the British Institution of Electrical Engineers requires:

a) That no fuse, non-linked switch or non-linked circuit-breaker shall be inserted in a conductor connected with earth; and that all single-pole switches shall be inserted in line conductors only;

b) That every distinct circuit shall be protected against excess current and energy by means of a suitable fuse or automatic circuit-breaker of adequate breaking capacity suitably located and of such construction as to prevent danger from over-heating, arcing or scattering of hot metal when it comes into operation and as to permit the ready renewal of the fusible metal without danger, and

c) That every circuit shall be protected against the persistence of earth-leakage currents liable to cause danger.

The Regulations also mention that: "Where a circuit-breaker of insufficient breaking capacity for short-circuit faults is installed, fuse(s) of adequate breaking capacity may be required.

The requirements of the American National Electrical Code can be condensed to essentials such as those enumerated under a) and b) above. It is interesting to note that plug fuses of the Edison-base type are recognized only as a replacement item in existing installations and that preference is given to cartridge fuses. Another requirement worthy of noting, and one to which we will again refer, states that: "Overcurrent devices shall be located at the

point where the conductor to be protected receives its supply (with certain exceptions)".

It would, therefore, appear that some form of fuse, or circuit-breaker, or a combination of both, is generally accepted as providing adequate protection to a circuit in a low voltage installation.

2. REQUIREMENTS OF A PROTECTIVE SYSTEM.

The primary function of an overcurrent protective device is to guard against over-heating of the circuit conductors and to isolate a circuit fault. A protective system should meet the following requirements:

1. Short-circuits must be cleared rapidly by protective devices of adequate breaking capacity, and overloads must be disconnected after a suitable interval of time.
2. When faults occur, interruption of supply should be localized by suitable discrimination, and reinstatement should be rapid and convenient.
3. The system must be capable of giving consistent protection for the whole of its life in service.

Hazards often occur owing to overloading of wiring systems because the initial wiring did not provide for increases in the use of electricity. In such cases the breaking capacity of the protective devices will in all probability not be adequate.

In coastal areas, where equipment has to function in a saltladen atmosphere, sometimes with a very high relative humidity, special care is needed to ensure satisfactory operation, e.g. special anti-corrision treatment of metal components, judgment in using components made of dissimilar metals, etc. Similarly, dust-laden atmospheres can jeopardise the correct functioning of moving parts such as, for instance, contacts.

To meet the requirements listed under 3) above, protective devices must, therefore, either possess the property of complete non-deterioration or must be retested, maintained and recalibrated at regular intervals throughout their service lives. Normally a fuse, being a static device without moving parts, is not expected by the user to require maintenance and is seldom disturbed over a period of years unless a fault occurs.

Discrimination, mentioned under 2) above, has been defined 1) as the ability of protective devices to interrupt the supply to a faulty circuit without interfering in any way with the source of supply or the remaining healthy circuits fed from it. This necessarily implies co-ordination between two interdependent devices in series. Non-deterioration is one of the essential properties of protective devices on which discrimination depends.

Discrimination can also depend as much upon the design of the system as upon the performance of the protective devices involved, and the best results can be achieved only if the protective devices are co-ordinated with the system as a whole in the first stage of planning.

3. PROTECTIVE DEVICES.

The following fuses and circuit-breakers are available as protective devices on Low Voltage Systems:

a) The semi-enclosed fuse - a rewirable fuse with a breaking capacity below 4 kA,

b) the high rupturing capacity fuse - a cartridge fuse with a breaking capacity of at least 15 kA,

c) the miniature circuit-breaker - a small air circuit-breaker with a breaking capacity not exceeding 9 kA*,

d) the air circuit-breaker with a breaking capacity of at least 10 kA, and

e) the oil circuit-breaker with a breaking capacity of at least 10 kA.

Current-balance and potential-operated earth-leakage relays have been available for a number of years, but current-balance earth leakage relays, operating on very small currents, are a more recent introduction.

All these devices can claim a place in different installations. Except for the earth leakage relays, they can all operate independently. An earth-leakage relay, whether of the voltage-operated type or current balance-operated type, is only a sensing mechanism and must operate in conjunction with e.g., a circuit-breaker or contactor.

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* The name "miniature circuit-breaker" was given to small air-break circuit-breakers developed to replace fuses on distribution boards. Recent trends in the USA and South Africa have been towards much larger units with bigger breaking capacities to which this name no longer strictly applies. These units are now known as moulded case circuit-breakers and in the recently revised South African Specification, SABS 156, the scope was extended to include breaking capacities up to 100 kA. In Britain, where the h.r.c. fuse has found wide application, the tendency has been towards limiting the size and breaking capacity of miniature circuit-breakers and retaining the old name. Draft British Specification for miniature air-break circuit-breakers for A.C. circuits, Document AB(ELE) 1118, 28 April 1961, limits the breaking capacity to 9 kA.

4. CHARACTERISTICS OF PROTECTIVE DEVICES.

4.1 Semi-enclosed fuses are cheap, they discriminate easily in front of m.c.b.'s, but they have a low breaking capacity and are liable to deteriorate (copper is subject to oxidation trouble), which necessitates a fusing factor of 2. They also lend themselves to easy abuse.

4.2 H.R.C. fuses are well known in Europe and have been used for about 32 years in Great Britain. The fuse elements are of silver, generally with inserts of low-melting-point alloys[2], except for very low current ratings. The silver used for the elements does not deteriorate in service. When the temperature of the element reaches the melting point of the alloy, diffusion of the alloy into the silver occurs. The amalgam has a higher resitivity than pure silver and heating is increased. The action continues progressively until fusion occurs. In effect, therefore, the melting point of the silver element is reduced from 960 degrees centigrade to a little more than 200 degrees centigrade. A considerably cooler running fuse is the result. In addition the time-lag on moderate overloads is increased.

H.R.C. fuses have excellent breaking capacities and compare favourably with semi-enclosed fuses as regards precision and fusing factors.

They also provide discriminative protection to a degree of sensitivity which is well within the requirements of normal distribution[1].

H.R.C. fuse-links should be used in the fuse handles and fittings in which they are designed to be used in service. It must be remembered that the link is a thermal device and must export some of the heat generated within itself to the contacts to which it is attached. Fuse fittings are normally designed on this basis, so that the link runs within the temperature limits required to ensure non-deterioration. If fuse-links are applied to equipment other than that for which they were originally designed, it is only to be expected that the running temperatures will be other than normal and discrimination may suffer to some degree. The use of extremely small terminals and undersize cables as well as connections that are badly made, will result in similar trouble and, in the latter case, will be a source of heat which will cumulatively worsen until the point is reached where the fuse may blow prematurely.

4.3 The first air-break miniature circuit-breakers were apparently designed in Germany during the period 1908 - 10[3] and were successfully in use in Britain as long ago as 1925. The design of this circuit-breaker, as we know it today, began almost simultaneously in Britain and in the United States about 1930.

Circuit-breakers are fundamentally more convenient than fuses and allow easy and rapid re-instatement of circuits after a fault has been cleared. They are popular for this reason, particularly in residential and commercial premises. Protection against sustained small overloads by circuit-breakers which open at 1.25 times rated load compares favourably with the fusing factors commonly attainable. The breaking capacities of miniature circuit-breakers, however, are very much lower than those of H.R.C. fuses, and so is the speed of operation.

4.4 Both oil and air circuit-breakers are relatively expensive.

4.5 The operation of a thermal protective device (circuit-breaker or fuse) is affected by the ambient temperature around the device. The National Electrical Manufacturers' Association of America recommends that circuit-breakers be derated 30 per cent when used in distribution boards and 20 per cent when individually enclosed (where no ambient compensation is provided).

5. PROTECTION OF FINAL SUB-CIRCUITS.

Comparing the requirement of the American National Electrical Code, n.l. that overcurrent devices be located at the point where the conductor to be protected receives its supply, with the equivalent requirements of the British and South African Wiring Regulations, we find the following:

A. The British Regulations require all portable appliances to be connected by means of fused plugs rated at 13 amperes in domestic installations and 13 amperes or (in extra-low-voltage circuits) 30 amperes in industrial installations; the plugs and associated socket-outlets to be of a pattern in which non-fused plugs are unobtainable. Fuses of appropriate rating shall be inserted in the plugs. Fixed appliances, each of rating not exceeding 13 amperes, may be connected either by means of fused plugs and socket-outlets or be protected by local fuse(s) or circuit-breaker(s).

B. The South African Regulations have no similar requirements. Regulations 503(F) and 1212(C) only states that where a fuse is fitted in a plug, the current rating of the fuse-element shall not exceed that of the flexible cord connected to the plug.

The South African National Specification for plugs, SABS 164, caters only for plugs with round pins, and the provision of fuses is optional. No fused plug is manufactured locally. The use of fused plugs is therefore the exception and not the rule.

This means that in practice in South Africa, and especially in newer installations, it is possible to have a 30 ampere circuit-breaker, capable of carrying 125 per cent of its rated current for 60 minutes or 200 per cent of

its rated current for 3 minutes, feeding eight or less socket-outlets, or a 30 ampere fuse with a fusing factor of 2, feeding six or less socket-outlets. These socket-outlets in turn will feed some form of appliance or hand tool via a flexible cord and it is safe to assume that in a domestic installation this cord will most probably have either 14/.0076 or 23/.0076 conductors.

The implication of the foregoing is that the fuse or circuit-breaker protecting the sub-circuit will only protect up to the socket-outlet and not necessarily the cord and appliance beyond. There is therefore a very real danger that a fault in the cord (especially two-core cord) could ignite the cord with resultant fire hazard with the protective device failing to come into operation.

6. FUSE VERSUS MINIATURE CIRCUIT-BREAKERS.

As might have been expected there have been many claims and counter claims regarding the superiority of fuses over circuit-breakers and vice versa. Among others Dr. H.D. Einhorn, Senior Lecturer in Electrical Engineering, University of Cape Town, has been carrying out tests for a number of years in connection with the protection of low-voltage installations by means of miniature circuit-breakers and h.r.c. fuses[4] and with regard to the discrimination between h.r.c. fuses and miniature circuit-breakers[5].

As a result of these investigations he, like many others, is convinced that both h.r.c. fuses and m.c.b.'s have their place in low-voltage installations. Miniature circuit-breakers are convenient on sub-distribution boards and capable of clearing most load-end faults; busbar faults usually exceed their breaking capacity in large installations, and h.r.c. fuses or circuit-breakers of relatively high breaking capacity are then required on main distribution boards. Such application, however, requires careful discrimination design, so that the fuse will cope with heavy short-circuits while the m.c.b. will clear overloads or moderate faults and thereby achieve discrimination in most cases.

7. PROTECTION AGAINST LEAKAGE CURRENTS.

7.1 STATUTORY REQUIREMENTS.

It has been mentioned that the South African Wiring Regulations require automatic earth-leakage protection to be installed forthwith on an installation upon receipt at any time of written instructions to that effect from the Engineer.

In the Extraordinary Government Gazette No. 534 of June 28, 1963 promulgating the revised Factories, Machinery and Building Works Act, 1941, the following clause is applicable:

C.59 Portable Electric Hand Tools

(i) No user shall permit the use of and no person shall use a portable electric hand tool unless:-

(a) it is connected to a source of electricity supply incorporating an earth leakage protection device of a type and construction which is approved by the Chief Inspector, or

(b) it is connected to the source of electricity supply through the imposition between each tool and the source of an individual double wound isolating transformer, the secondary winding of which is not earthed at any point and which is constructed in accordance with a code approved by the Chief Inspector; or

(d) it is constructed with double insulation in accordance with a code approved by the Chief Inspector.

A closer look at these requirements may be useful in that it may clarify a number of points.

7.2 THE EARTH LEAKAGE RELAY.

If an overload or short-circuit occurs on a healthy electrical system, the fault can be cleared by one of the devices described under 3(a) to (e). But if the fault involves leakage currents, which are small in comparison with load currents and which are difficult to detect, other methods of protection must be employed.

The majority of systems are earthed at at least one point (usually at the transformer supplying the network) and the leakage currents return through the earth connection. Safety is maintained as long as the earth path is continuous and of relatively low resistance.

Solutions for this problem centred around detecting the presence of earth leakage currents and switching off the supply as soon as any serious leakage occurred. One method, referred to previously as voltage-operated earth-leakage protection, was to detect leakage currents by measuring the voltage developed along some portion of the earth path followed by the leakage currents. The other method, referred to as current-balance-operated earth-leakage protection, detected leakage currents by the vector summation of the currents in the conductors supplying the load or network.

A British Specification[6] for the voltage-operated type of relay has been in existence since 1939. There is also an International Specification[7] for this type of earth-leakage relay.

In South Africa, the stimulus for the development of a satisfactory system of earth-leakage protection arose from the acute problem encountered in mines, where an

extensive 500 volt distribution system underground supplied a very large number of pieces of electrical equipment. The high voltage, the damp conditions and the unfamiliarity of miners with safe practices in regard to the handling of electrical equipment accentuated the very real dangers.

Early workers in the development of a system of earth-leakage protection were Badham[8] and Martin[9]. A committee was also established jointly by the South African Institute of Electrical Engineers and the Chamber of Mines to investigate earth-leakage protection. As a result of the work of this committee a Code of Practice[10] was published in 1953. At that stage the limit of sensitivity of current-balance detection of leakage currents was believed to be 5 amps and that spurious tripping would occur if operation at greater sensitivities was attempted. In 1957 Adams[11] showed that a much improved sensitivity was possible for current-balance earth-leakage protection; units with a 250 milliamp sensitivity were in general use, while more sensitive devices were projected. At the present time, by far the most promising system is the sensitive current balance method of earth leakage protection with units with 5 milliamp sensitivity being available.

A problem regarding the general application and acceptance of current-balance earth-leakage relays presented itself, however. There was no South African Standard Specification for this type of apparatus and no equivalent specification could be traced in other countries. It was imperative that certain parameters, such as maximum safe current through the human body and speed of operation of switching apparatus associated with the relays should be established.

The Council of the South African Bureau of Standards was therefore approached with the request that a suitable specification should be prepared and this project was approved in June 1960.

Fortunately, a number of people and organizations had and were still engaged in the investigation of the phenomena of electric shock and quite a lot of information was available. Amongst these were the results of the work carried out by Professor Charles F. Dalziel of the University of California, USA (numerous publications); Dr. Ferris and his associates who did pioneering work as far back as 1935 at Columbia University, New York; Dr. W.B. Kouwenhoven and his associates of the Johns Hopkins University, Baltimore, and E.R.A. reports No. F.T. 112 and F.T. 146.

The first meeting of the committee was held on March 5, 1963 and the final draft document for comment was despatched on September 30, 1963.

After investigating all the available information, the committee decided to base the requirements for leakage current and tripping times on paragraphs 33 and 36 of the Report of the Meeting of Experts on Electrical Accidents and Related Matters, held under the auspices of the International Labour Organization in Geneva during October, 1961 (Document No. E A R M/1961/D9). These requirements stipulate that the threshold tripping current shall not exceed 25 milliamperes and that the associated circuit-breaker shall trip positively within a maximum period of 0.1 seconds.

In a subsequent paper[12], Professor Dalziel confirmed that although any current above 9 mA constitutes a let-go hazard, there is little if any evidence of serious injury from accidental shock currents less than about 50 mA. This is most probably due to the fact that only a portion of this current will pass through the human body because of inevitable parallel paths. The value of 25 milliamperes, in association with a maximum tripping time of 0.1 seconds, would therefore, appear to be quite adequate for the majority of cases.

It should be remembered that, in theory, a current-balance system of protection will not suffice on Protective Multiple Earthed Neutral Systems[13], should a break in the neutral occur, and should the soil resistivity be high. In such applications it is desirable to use a potential protection system in addition to the current-balance protection.

As mentioned previously, the earth-leakage relay is only a sensing device and, as the protection afforded is dependent upon both sensitivity and speed of operation, the responsible committee preparing the South African Specification decided to consider only an earth-leakage protection unit incorporating both relay and associated circuit-breaker. Also, because the sensitive current balance method is at present the most promising system, the committee decided to limit the scope of the specification to core balance earth-leakage protection units.

7.3 THE ISOLATING TRANSFORMER.

It is known that several conditions must be met simultaneously before death by electrocution will follow. Briefly, the five main conditions are as follows:

a) A fault must occur on the system,

b) the earth connection to the non-current carrying metal parts affected by the fault, or the alternative protection provided, must fail.

c) the metal work concerned must be near a conducting or well-earthed floor, or other return path,

d) the person must actually touch the metal work and complete the circuit, and

e) the physical condition of the person touching the metal work as well as his body resistance as determined by the condition of the epidermis, must be such as to contribute to the possibility of an electric shock being sustained, and, most

important of all, the way of touching must minimize the chances of letting go, e.g. touching with the palm of the hand is far more dangerous than touching with the back of the hand.

Now if some other method could be devised which would necessitate yet a sixth condition needed to cause electrocution, the probability of such electrocution taking place, would be drastically reduced - in the simplest case, assuming that all conditions have an equal chance of occurring, or not occurring, - by 50 per cent.

This, in effect, is what is achieved with the isolating transformer. The appliance or tool is connected to the electric supply via a double wound transformer in which the secondary is floating, i.e. not tied to earth. Only phase and neutral conductors are used, the earth conductor being eliminated. Both phase and neutral must, therefore, of necessity, become defective to complete a fault path and present an electrical hazard.

The South African Bureau of Standards published a Standard Specification for low voltage isolating transformers during 1963 (SABS 743). This specification caters for transformers for use with toys, bells, hand and bench lamps, in addition to those for general domestic and industrial application.

7.4 DOUBLE INSULATION.

The term double insulation applied to electric hand tools or appliances denotes that two sets of insulation are used in the construction of the tools or appliances, viz. the usual functional insulation and protective insulation. Protective insulation is a layer of insulating material covering all exposed non-current carrying metal parts that could become alive, should a fault develop. Where a driving motor is used in the tool or apparatus, the torque is transmitted via an insulating member such as, for instance, gears made of nylon.

The protective principle involved is the same as that applying to isolating transformers, i.e. the creation of a sixth condition to be fulfilled before electrocution can take place. In this case the protective insulation must also become defective. The weakness of this system therefore lies in the possibility of damage to the protective insulation due to a fall or bump. This risk can be greatly reduced by the correct choice of materials (e.g. nylon) and proper design.

There is no South African specification for double insulated hand tools or appliances, but there is an excellent International Specification covering the subject, i.e. C.E.E. Publication 20, May 1960, 'Specification for portable motor operated tools'.

The Chief Inspector of Factories has agreed to accept this specification as the criterion for assessing double insulated hand tools until such time as a South African specification is available.

8. CONCLUSION.

The field of Low Voltage Protection is a wide one and in presenting this summary of current practice and thought it has only been possible to mention briefly some of the most important aspects. It is to be hoped that this survey will serve to stimulate interest and perhaps set afoot further discussion.

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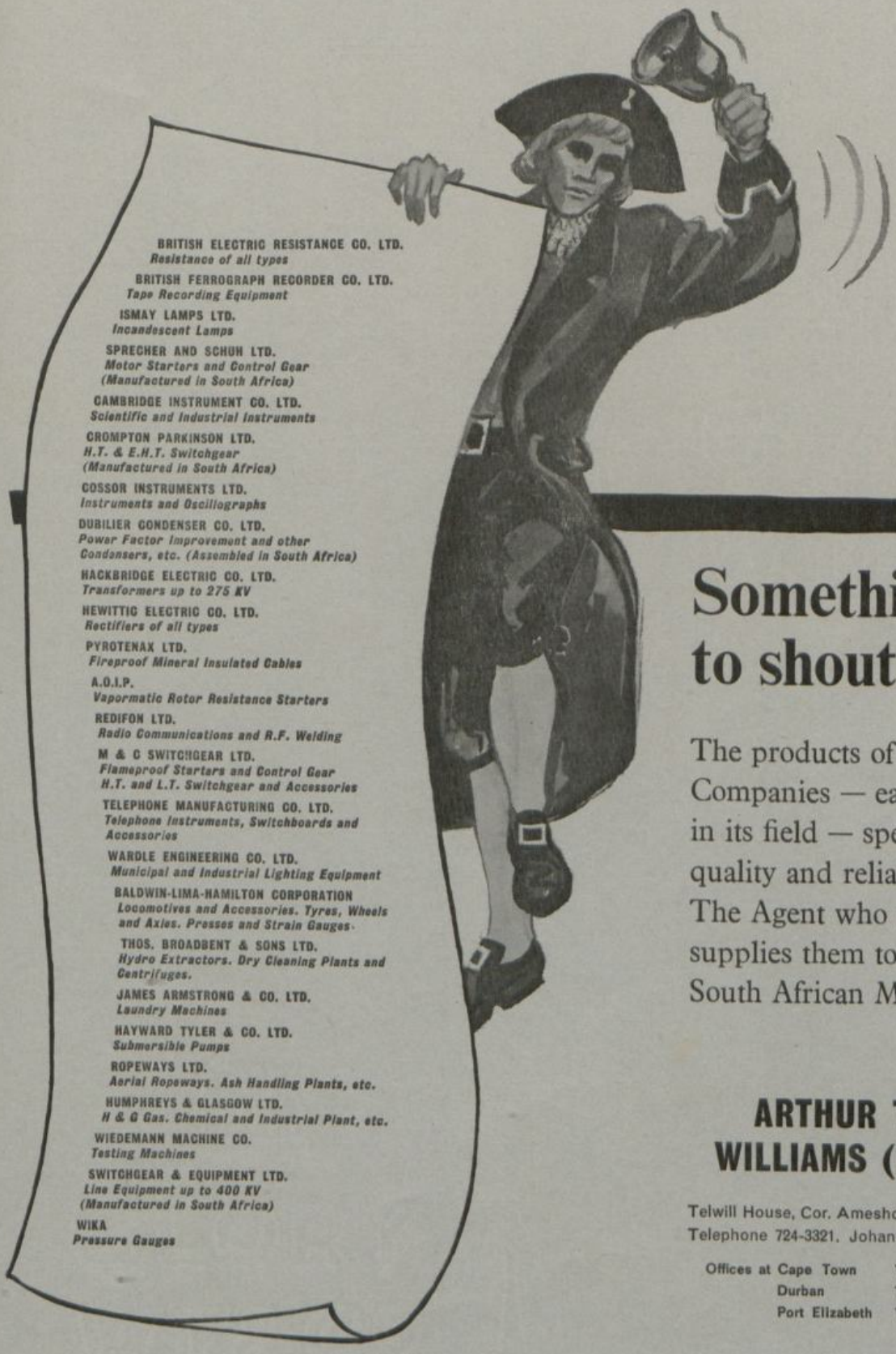

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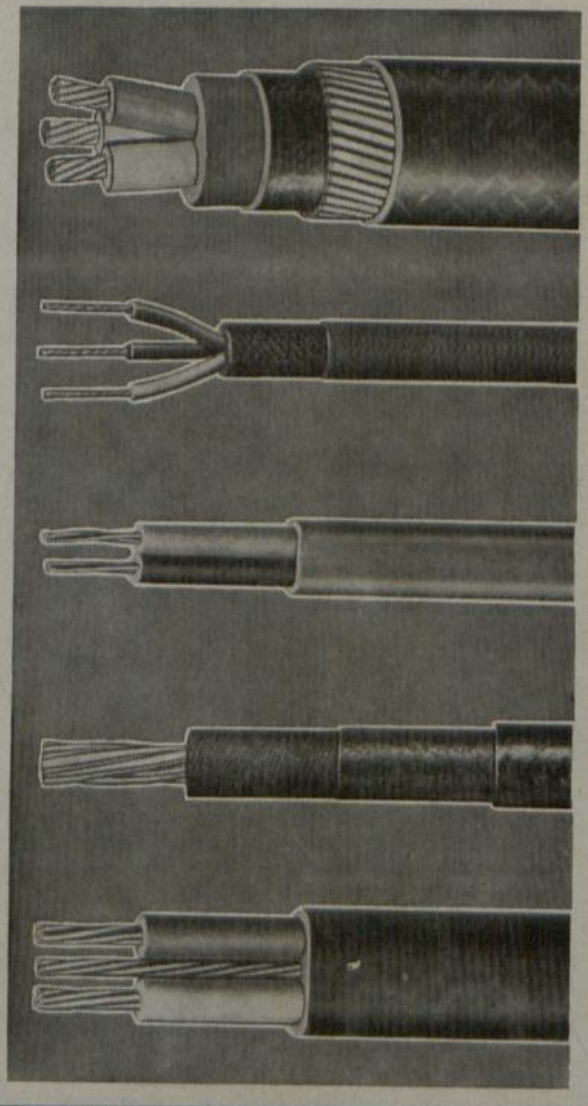

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