
PROCEEDINGS 1968

Volume 2

Technical Meeting

9th to 10th MAY, 1968

Vanderbijlpark

The Association of Municipal Electricity
Undertakings of Southern Africa



VERRIGTINGS 1968

Deel 2

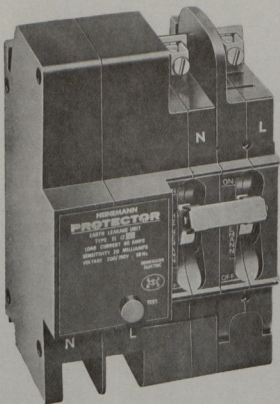
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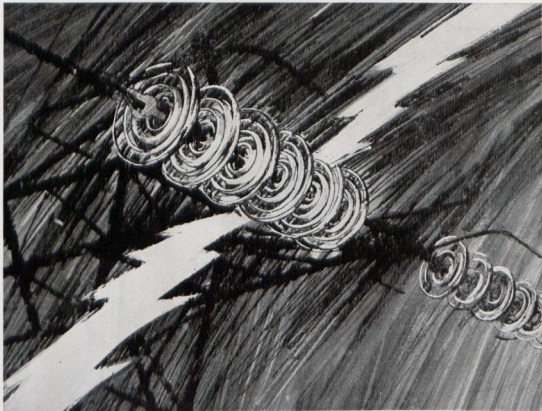
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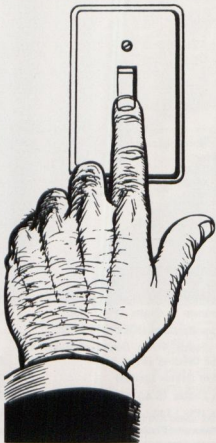
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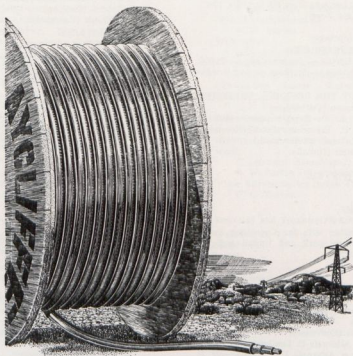


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- 1948 Barton, R. W., Electrical Engineer, Box/Bus 708, Welkom, O.F.S. (Past President).
- 1959 Beard, G. R., Town Electrical Engineer, Box/Bus 176, Grahamstown, C.P.
- 1957 Brooyens, L., Town and Electrical Engineer, Box/Bus 155, Vrede, O.F.S.
- 1960 Boshoff, J. J., Assistant Electrical Engineer, Box/Bus 3, Vanderbijlpark, Tvl.
- 1962 Boshoff, M. H. L., Assistant Electrical Engineer, Box/Bus 45, Uitenhage, C.P.
- 1959 Botes, P. J., Municipal Electrical Engineer, Box/Bus 217, Roodepoort, Tvl.
- 1958 Brown, D. C., Municipal Electrical Engineer, Box/Bus 3, The Strand, C.P.
- 1959 Carpenter, B. F., Town Electrical Engineer, Box/Bus 45, Umtata.
- 1948 Cherry, J. R., Municipal Electrical Engineer, Box/Bus 139, Randfontein, Tvl.
- 1955 Clarke, M. P. P., Municipal Electrical Engineer, Box/Bus 21, Somerset East, C.P.
- 1956 Craig, J. S., Borough Electrical Engineer, Box/Bus 21, Newcastle, Natal.
- 1965 Cronje, W. F., Electrical Engineer, Peri-Urban Areas Health Board, Box/Bus 1341, Pretoria, Tvl.
- 1956 Dawson, J. D., Municipal Electrical Engineer, Box/Bus 45, Uitenhage, C.P.
- 1965 Dernier, W., Electrical Engineer, Box/Bus 46, Aliwal North, C.P.
- 1955 De Villiers, E. E., City Electrical Engineer, Box/Bus 288, Bloemfontein.
- 1964 De Villiers, S. de V., Municipal Electrical Engineer, Box/Bus 44, Ceres, C.P.
- 1957 Dreyer, H. C., Electrical Engineer, Box/Bus 12, Paarl, C.P.
- 1950 Dreyer, L., Municipal Electrical Engineer, Box/Bus 19, Westonaria, Tvl.
- 1957 Dunstan, R. S., City Electrical Engineer, Box/Bus 369, Port Elizabeth.
- 1963 Du Plooy, D. P., Electrical Engineer, Box/Bus 45, Nelspruit, Tvl.
- 1963 du Plessis, G. C., Deputy Town Electrical Engineer, Box/Bus 113, Potchefstroom.
- 1968 du Plessis, C. P., Electrical Engineer, Box/Bus 42, De Aar.
- 1963 Du Toit, A. A., Municipal Electrical Engineer, Box/Bus 19, George, C.P.
- 1950 Erikson, J. G. F., Borough Electrical Engineer, Box/Bus 15, Estcourt, Natal.
- 1944 Fisher, K. M., Municipal Electrical Engineer, Box/Bus 3, Bedfordview, Tvl.
- 1957 Fohren, H., Borough Electrical Engineer, Box/Bus 37, Eshowe, Zululand.
- 1966 Fortman, A. H. L., Deputy Town Electrical Engineer, Box/Bus 215, Boksburg, Tvl.
- 1961 Frantz, A. C. T., City Electrical Engineer, Box/Bus 82, Cape Town, C.P.
- 1952 Futcher, L., Municipal Electrical Engineer, Box/Bus 13, Kempton Park, Tvl.
- 1965 Fraser, D. H., Deputy City Electrical Engineer, Box/Bus 147, Durban, Natal.
- 1968 Foden, H., Deputy City Electrical Engineer, Box/Bus 73, Salisbury.
- 1945 Gericke, J. M., Municipal Electrical Engineer, Box/Bus 99, Klerksdorp, Tvl.
- 1949 Halliday, K. W. J., Municipal Electrical Engineer, Box/Bus 5, Port Shepstone, Natal.
- 1927 Harvey, A. Q., Town Electrical Engineer, Box/Bus 96, Louis Trichardt.
- 1953 Hatwisch, A. H. J., Town and Electrical Engineer, Box/Bus 13, Dewetsdorp, O.F.S.
- 1953 Heunis, G. B., Town and Electrical Engineer, Box/Bus 66, Standerton, Tvl.
- 1965 Heydenrych, J. E., Electrical Engineer, Box/Bus 14, Middelburg, Tvl.
- 1956 Hobbs, I. L., Town Electrical Engineer, Box/Bus 156, Virginia, O.F.S.
- 1965 Hosking, N. G., Deputy General Manager, Electricity Department, Box/Bus 699, Johannesburg.
- 1944 Inglis, J. I., Town Electrical and Water Engineer, Box/Bus 111, Pietersburg, Tvl.
- 1949 Kirberger, M. N., Town Engineer, Box/Bus 3, Bethal, Tvl.
- 1959 Keoslag, H. J., Electrical Engineer, Box/Bus 52, Robertson.
- 1949 Kruger, M. J. C., Municipal Electrical Engineer, Box/Bus 13, Port Alfred, C.P.
- 1931 Lategan, J. F., Town Electrical Engineer, Box/Bus 17, Stellenbosch, C.P.

- 1953 Lees, D., Town Electrical Engineer, Box/Bus 45, Benoni, Tvl.
- 1944 Leishman, R., General Manager, Electricity Department, Box/Bus 699, Johannesburg.
- 1956 Lewis, L., Town Electrical Engineer, Box/Bus 59, Windhoek, S.W.A.
- 1947 Lombard, C., City Electrical Engineer, Box/Bus 145, Germiston, Tvl. (Past President).
- 1944 Lotter, G. A., Town Electrical Engineer, Box/Bus 34, Potgietersrust, Tvl.
- 1966 Louw, H. A. L., Asst. Electrical Engineer, Box/Bus 12, Paarl, C.P.
- 1955 Lynch, E. C., City Electrical Engineer, Box/Bus 73, Salisbury, Rhodesia.
- 1953 Macques, J. A., Municipal Electrical Engineer, Box/Bus 42, De Aar, C.P.
- 1966 MacHutchon, J. F., Asst. Electrical Engineer, Box/Bus 82, Cape Town.
- 1965 McLachlan, A. C., Town Electrical Engineer, Box/Bus 22, Saldanha, C.P.
- 1948 Mathews, J. A., City Electrical Engineer, Box/Bus 194, Kimberley, C.P.
- 1948 McIntyre, H. A., Assistant Town Electrical Engineer, Box/Bus 35, Vereeniging, Tvl.
- 1954 McNeil, J. L., Borough Electrical Engineer, Box/Bus 5, Howick.
- 1968 McWilliam, E. A., City Electrical Engineer, Box/Bus 423, Pretoria.
- 1945 Meintjies, P. A., Municipal Electrical Engineer, Box/Bus 16, Rustenburg, Tvl.
- 1952 Millen, T. J., Town and Electrical Engineer, Box/Bus 24, Tzaneen, Tvl.
- 1929 Mocke, T. M., Town and Electrical Engineer, Box/Bus 23, Piet Retief, Tvl.
- 1968 Murphy, K. J., Municipal Electrical Engineer, Box/Bus 24, Cradock.
- 1964 Odendaal, M. W., Town Electrical Engineer, Box/Bus 4, Alberton, Tvl.
- 1957 Paull, R. A., Borough & Elec. Engineer, Box/Bus 57, Vryheid.
- 1963 Peters, A. G., Town Electrical Engineer, Box/Bus 278, Gwelo, Rhodesia.
- 1966 Pike, E. B., Town and Electrical Engineer, Box/Bus 8, Kokstad.
- 1951 Pretorius, D. R., Town Electrical Engineer, Box/Bus 39, Parys, O.F.S.
- 1952 Pretorius, E. de C., Electrical Engineer, Box/Bus 113, Potchefstroom, Tvl.
- 1960 Pretorius, J. W., Assistant Electrical Engineer, Box/Bus 23, Nigel, Tvl.
- 1968 Psotta, K. U., Elektrotegniese Ingenieur, Bus/Box 25, Kectmanshoop.
- 1957 Rautenbach, G. F., Electrical Engineer, Box/Bus 99, Klerksdorp, Tvl.
- 1948 Reyneke, G. M., Town Electrical Engineer, Box/Bus 26, Winburg, O.F.S.
- 1962 Rishworth, D. L., Town Electrical and Mechanical Engineer, Box/Bus 21, Odendaalsrus, O.F.S.
- 1966 Robertson, F. H., Electrical Engineer, Box/Bus 19, George, C.P.
- 1954 Ross, J. W., Municipal Electrical Engineer, Box/Bus 106, Brits, Tvl.
- 1935 Rossler, W., Town Electrical Engineer, Box/Bus 302, Kroonstad, O.F.S.
- 1968 Robson, K. G., City Electrical Engineer, Box/Bus 529, East London.
- 1968 Robertson, W., Town Electrical Engineer, Box/Bus 20, Hermanus.
- 1944 Rush, W., Town Electrical Engineer, Box/Bus 43, Harrismith, O.F.S.
- 1953 Simpson, R. M. O., City Electrical Engineer, Box/Bus 147, Durban, Natal. (Past President).
- 1962 Stanton, R. J. G., Deputy Town Electrical Engineer, Box/Bus 255, Oudtshoorn, C.P.
- 1934 Stevens, F., Borough Electrical Engineer, Box/Bus 29, Ladysmith, Natal.
- 1965 Strauss, J. C., Town Electrical Engineer, Box/Bus 60, Sasolburg, O.F.S.
- 1956 Sulter, F. J., Assistant Electrical Engineer, Box/Bus 145, Germiston, Tvl.
- 1962 Surtees, E. H., Electrical Engineer, Box/Bus 76, Dundee, Natal.
- 1962 Te Brugge, E. J., Town Electrical Engineer, Box/Bus 42, Mafeking, C.P.
- 1946 Theron, G. C., Town Electrical Engineer, Box/Bus 3, Vanderbijlpark, Tvl.
- 1945 Theron, W. C., Municipal Electrical Engineer, Box/Bus 37, Worcester, C.P.
- 1966 Trautmann, E. P. E. W., Town Electrical Engineer, Box/Bus 61, Lydenburg.
- 1950 Turnbull, A. F., Town and Electrical Engineer, Box/Bus 35, Vereeniging, Tvl.
- 1931 Turner, H. T., Town and Electrical Engineer, Box/Bus 121, Umntali, Rhodesia.
- 1964 Van den Berg, A. J., Town Electrical Engineer, Box/Bus 94, Krugersdorp, Tvl.
- 1964 Van der Merwe, D. S., Electrical Engineer, Box/Bus 3, Witbank.
- 1955 Van der Merwe, F. J., Municipal Electrical Engineer, Box/Bus 20, Stilfontein, Tvl.
- 1957 Van Heerden, W. J., Electrical Engineer, Box/Bus 201, Heidelberg, Tvl.
- 1956 Van Meerdevort, J. K. L. Pompe, Town Electrical Engineer, Box/Bus 33, Barberton, Tvl.
- 1967 Van Schalkwyk, A. P., Deputy City Electrical Engineer, Box/Bus 288, Bloemfontein, O.F.S.
- 1965 Van Wyk, A. A., Town Electrical Engineer, Box/Bus 9, Meyerton, Tvl.
- 1966 Van Wyk, Schoombee, Electrical Engineer, Box/Bus 12, Bothaville.
- 1945 Vergottini, P. L., Town and Electrical Engineer, Box/Bus 48, Warmbaths.
- 1951 Verschoor, D. R., Town and Electrical Engineer, Box/Bus 36, Fort Beaufort, C.P.
- 1957 Von Ahlfen, J. K., Town Electrical Engineer, Box/Bus 45, Springs, Tvl.

- 1955 Vorster, P. J., Municipal Electrical Engineer, Box/Bus 3, Witbank, Tvl.
- 1954 Waddy, J. C., City Electrical Engineer, Box/Bus 399, Pietermaritzburg, Natal.
- 1952 Waldron, F. R., Municipal Electrical Engineer, Box/Bus 86, Walvis Bay, S.W.A.
- 1961 Wiehahn, G. D., Town Engineer, Box/Bus 551, Bethlehem, O.F.S.
- 1952 Williams, A. H., Assistant Electrical Engineer, Box/Bus 45, Springs, Tvl.
- 1956 Yodalaken, J., Municipal Electrical Engineer, Box/Bus 197, Ndola, Zambia.

Technical Associates/Tegniese-Geassioeerders:

- 1965 Barnard, W., Assistant General Manager (Technical Administration) Electricity Department, Box/Bus 699, Johannesburg.
- 1968 Brink, W., Assistant General Manager (Tech. Administration) Electricity Dept., Generation, Box/Bus 699, Johannesburg.
- 1968 Brink, H. J., Section Engineer, Generation, Box/Bus 288, Bloemfontein.
- 1968 Briers, D. B., Planning Engineer, Box/Bus 288, Bloemfontein.
- 1968 de Vries, G. S., Section Engineer, Distribution, Box/Bus 288, Bloemfontein.
- 1968 Reichert, W. J., Assistant Electrical Engineer, Box/Bus 20, Stilfontein.

Associates/Geassioeerders:

- 1965 Clarke, J., Municipal Electrical Engineer, Box/Bus 115, Que Que, Rhodesia.
- 1963 Coetzee, J. C., Town Engineer, Box/Bus 130, Bethlehem, O.F.S.
- 1968 Dauth, W. J., Town Electrical Engineer, Box/Bus 5, Postmasburg.
- 1965 De Bruyn, Town Electrical Engineer, Box/Bus 17, Willowmore, C.P.
- 1965 De Jager, M. J., Electrical Engineer, Box/Bus 37, Viljoenskroon, O.F.S.
- 1962 De Witt, F., Electrical Engineer, Box/Bus 38, Adelaide, C.P.
- 1966 Hugo, J. G., Electrical Engineer, Box/Bus 51, Bredasdorp.
- 1953 Haig-Smith, D., Assistant Municipal Electrical Engineer, Box/Bus 113, Queenstown, C.P. (previously of Cradock).
- 1962 Huysamen, G. A., Electrical Engineer, Box/Bus 5, Postmasburg, C.P.
- 1966 Jooste, P. M., Electrical Engineer, Box/Bus 44, Messina.
- 1959 Laas, C. P., Electrical Engineer, Box/Bus 15, Kenhardt, C.P.
- 1956 McNamara, A. B., Electrical Engineer, Box/Bus 21, Komgha, C.P.
- 1962 Ploos van Amstel, W. F., Electrical Engineer, Box/Bus 14, Koppies, O.F.S.

- 1968 Smith, E. L., 23 Kellan Court, Ross Street, Amanzim-tote.
- 1962 Van der Schyff, G. W., Town Engineer, Box/Bus 24, Carolina, Tvl.
- 1965 Wilson, A. McD., Town Electrical Engineer, Box/Bus 17, Fort Victoria.

Associate Members/Verbonde Lede:

- 1946 Andrew, W. M., 7 Tainton Avenue, Bonnie Doon, East London, C.P.
- 1951 Attridge, W. H., Box/Bus 412, Sasolburg, O.F.S.
- 1944 Burton, C. R., 54 Memorial Road, Kimberley, C.P.
- 1956 Barnard, F. J. W., c/o Electricity Supply Commission, Box/Bus 12, Springs, Tvl.
- 1960 Bozyczko, W. B., 7 fifth Street, Klipfontein.
- 1948 Conradie, D. J. R., Box/Bus 1009, Bloemfontein, O.F.S.
- 1954 Coetzee, F. J., Box/Bus 21, Evaton, Tvl.
- 1934 Dawson, C., Electricity Supply Commission, Box/Bus 2408, Durban, Natal.
- 1965 De Wet, D. P., Box/Bus 19, Groot Brakrivier, C.P.
- 1948 De Wit, T., Box/Bus 44, Brits, Tvl.
- 1960 Ford, W. P., Box/Bus 40, Lusaka, Zambia.
- 1936 Heasman, G. G., Box/Bus 77, Fort Victoria, Rhodesia.
- 1962 Honiball, G. T., 111 Church Street, Kempton Park, Transvaal.
- 1962 Liebenberg, S. J., Electrical and Mechanical Engineer, Department of Bantu Administration and Development, Box/Bus 384, Pretoria, Tvl.
- 1960 McGibbon, J., Box/Bus 92, Carletonville, Tvl.
- 1946 Mole, E. W., Box/Bus 118, Bramley, Johannesburg.
- 1926 Muller, H. M. S., Box/Bus 112, Upington, C.P.
- 1961 Magowan, J. M., Southern Rhodesia Electricity Supply Commission, Box/Bus 377, Salisbury.
- 1968 Murray-Nobbs, D., 4 Ascot Road, Kemsley Park, Port Elizabeth.
- 1934 Rossler, A., 3 Greenwood Road, Pietermaritzburg, Natal.
- 1953 Rothman, J. L., Box/Bus 606, Kimberley, C.P.
- 1966 Thackwray, W. G., Box/Bus 64, Dealesville.
- 1948 Woolridge, W. E. L., Box/Bus 24, Harding, Natal.
- 1947 Williams, J. T., Box/Bus 1617, Pretoria, Tvl.
- 1946 Wylie, R. J. S., c/o E.S.C. Rand Undertaking, Box/Bus 103, Germiston, Tvl.
- 1957 Zeederberg, T. D., Private Bag No. 1, P.O. Pyramid, Northern Transvaal.

Affiliates/Geaffileerders:

- 1959 AEG South Africa (Pty.) Ltd., Box/Bus 10264, Johannesburg, Tvl.
- 1957 Aberdare Cables (Africa) Ltd., Box/Bus 494, Port Elizabeth.
- 1957 Adams, Symes & Partners, Box/Bus 1498, Johannesburg.
- 1957 African Cables Ltd., Box/Bus 9909, Johannesburg.

- 1959 African Explosives & Chemical Industries, Ltd., Box/Bus 1122, Johannesburg.
- 1962 African Wire Ropes, Ltd., Box/Bus 6554, Johannesburg, Tvl.
- 1957 Allenwest S.A. (Pty.) Ltd., Box/Bus 6168, Johannesburg.
- 1957 Alcan Aluminium of S.A. Ltd., Box/Bus 2430, Johannesburg.
- 1957 Arthur Trevor Williams (Pty.) Ltd., Box/Bus 2873, Johannesburg.
- 1959 Asea Electric (Pty.) Ltd., Box/Bus 691, Pretoria.
- 1957 Aycliffe Cables Ltd., Hargreaves Works, Main Road, Eastleigh, Edenvale.
- 1960 African Lamps (Pty.) Ltd., Box/Bus 75, Industria.
- 1960 Associated Electrical Industries (Pty.) Ltd., Box/Bus 7755, Johannesburg.
- 1965 Ballenden & Robb, Box/Bus 4648, Johannesburg.
- 1963 Bell, Harold E., (Pty.) Ltd., Box/Bus 6906, Johannesburg.
- 1967 Bellis & Morcom Southern Africa (Pty.) Ltd., Box/Bus 815, Johannesburg.
- 1957 Babcock & Wilcox of Africa Ltd., Box/Bus 4561, Johannesburg.
- 1957 Brian Colquhoun O'Donnell & Partners (Rhodesia), 10th Floor, Chester House, Speke Ave., Salisbury.
- 1959 British Insulated Callender's Cables S.A. Ltd., Box/Bus 2827, Johannesburg.
- 1936 W. R. Burnett (Pty.) Ltd., Box/Bus 358, Johannesburg.
- 1957 Chloride Electrical Storage Co. S.A. (Pty.) Ltd., Box/Bus 7508, Johannesburg.
- 1957 C.M.B. Engineering Co. (Pty.) Ltd., Box/Bus 55, Denver, Johannesburg.
- 1959 Construction Electric Co. (Pty.) Ltd., Box/Bus 10100, Johannesburg.
- 1963 Copperbelt Power Co. Ltd., Box/Bus 819, Kitwe, Zambia.
- 1964 Crawford Clinksales, Maughan-Brown & Partners, Box/Bus 196, Port Elizabeth.
- 1957 Crompton Parkinson S.A. (Pty.) Ltd., Box/Bus 4236, Johannesburg.
- 1965 Cullinan Refractories Ltd., P.O. Olifantsfontein, Tvl.
- 1957 Davidson & Co (Africa) (Pty.) Ltd., 207 Biccard House, 24 Biccard Street, Braamfontein, Johannesburg.
- 1957 Dowsen & Dobson Ltd., Box/Bus 7764, Johannesburg, Tvl.
- 1959 Ian Drewett, Box/Bus 35, Johannesburg, Tvl.
- 1959 Electrical Contractors Association (South Africa), Box/Bus 5327, Johannesburg.
- 1966 Electrical Protection Co., Box/Bus 570, Benoni.
- 1957 Enfield Cables (S.A.) Ltd., Box/Bus 5289, Johannesburg, Tvl.
- 1959 English Electric Co. (C.A.) (Pvt.) Ltd., Box/Bus 2191, Salisbury, Rhodesia.
- 1957 English Electric Co. S.A. Ltd., Box/Bus 2387, Johannesburg, Tvl.
- 1961 Farad (Pty.) Ltd., Box/Bus 31220, Braamfontein, Transvaal.
- 1957 First Electric Corp. of S.A., Box/Bus 3961, Johannesburg, Tvl.
- 1957 Fuchs Electrical Industries Ltd., Box/Bus 758, Alberton, Transvaal.
- 1968 Fluorescent Lighting Corp. S.A. (Pty.) Ltd., Box/Bus 7148, Johannesburg.
- 1958 G.E.C. — A.E.I. of S.A. (Pty.) Ltd., Box/Bus 2406, Johannesburg, Transvaal.
- 1957 W. T. Glover & Co. Ltd., Box/Bus 1386, Johannesburg, Transvaal.
- 1957 E. Green & Son. S.A. (Pty.) Ltd., 406 Barclays Bank Buildings, Krus Street, Johannesburg.
- 1957 Heinnemann Electric (S.A.) Ltd., Box/Bus 99, Bramley, Tvl.
- 1957 Hopkins S.A. (Pty.) Ltd., Box/Bus 11029, Johannesburg, Tvl.
- 1957 James Howden & Safanco (Africa) (Pty.) Ltd., Box 9501, Johannesburg, Tvl.
- 1957 Hubert Davies & Co. Ltd., Box/Bus 1386, Johannesburg, Tvl.
- 1960 Hawker Siddeley Brush (Southern Africa) Ltd., Box/Bus 67, Germiston.
- 1957 International Combustion Africa Ltd., Box/Bus 5981, Johannesburg, Tvl.
- 1962 A. Jackson, Box/Bus 4814, Cape Town, C.P.
- 1957 John Thompson (S.A.) (Pty.) Ltd., Box/Bus 3570, Johannesburg, Tvl.
- 1957 Johnson & Phillips S.A. (Pty.) Ltd., Box/Bus 552, Germiston, Tvl.
- 1957 R. T. Jones, Esq., 43 The Avenue, Orchards, Johannesburg, Tvl.
- 1967 Keen's Electrical Distributors (Pty.) Ltd., Box/Bus 2656, Johannesburg, Tvl.
- 1961 Lodge-Cottrell (Africa) (Pty.) Ltd., Box/Bus 6070, Johannesburg, Tvl.
- 1968 Loteryman & de Kroon, 47 Colosseum Building, East London, C.P.
- 1957 Harold Martinussen & Co. (Pty.) Ltd., Box/Bus 469, Johannesburg, Tvl.
- 1957 L. H. Martinussen Ltd., Box/Bus 25664, Denver, Tvl.
- 1967 Marthinussen & Coult's (Pty.) Ltd., Box/Bus 469, Johannesburg, Tvl.
- 1957 Merz & McLellan, Box/Bus 11578, Johannesburg.
- 1965 Motorola S.A. (Pty.) Ltd., Box/Bus 118, Bramley, Transvaal.
- 1959 N.V. Nederlandsche Kabelfabrieken Ltd., Box/Bus 3513, Cape Town, C.P.
- 1965 North and Robertson (Pty.) Ltd., Box/Bus 309, East London.
- 1957 Oerlikon S.A. (Pty.) Ltd., Box/Bus 132, Jeppe town, Tvl.
- 1957 C. A. Parsons & Co. (S.A.) (Pty.) Ltd., Box/Bus 3425, Johannesburg, Tvl.
- 1959 Patrick Murray (Pty.) Ltd., Box/Bus 1541, Durban, Natal.
- 1963 Pratlley Manufacturing and Engineering Co. (Pty.) Ltd., Box/Bus 55, Luipaardsvlei, Tvl.
- 1957 Reunert & Lenz Ltd., Box/Bus 92, Johannesburg.

- 1957 A. Reyrolle & Co. Ltd., Box/Bus 9677, Johannesburg, Tvl.
- 1960 A. Reyrolle & Co. (Rhodesia) Ltd., Box 1975, Salisbury, Rhodesia.
- 1957 Rice & Diethelm Ltd., Box/Bus 930, Johannesburg, Tvl.
- 1967 G. S. Rogers (Pty.) Ltd., Box/Bus 3667, Johannesburg.
- 1957 Scottish Cables (S.A.) Ltd., Box/Bus 2882, Johannesburg, Tvl.
- 1960 Siemens S.A. (Pty.) Ltd., Box/Bus 4583, Johannesburg, Tvl.
- 1957 Standard Telephones & Cables Ltd., Box/Bus 286, Boksburg, Tvl.
- 1968 Satchwell Controls (Pty.) Ltd., Zuider Paarl, C.P.
- 1957 Stone-Stamcor (Pty.) Ltd., Box/Bus 31522, Braamfontein, Transvaal.
- 1957 S.A. General Electric Co. Ltd., Box/Bus 1905, Johannesburg, Tvl.
- 1957 Superconcrete Pipes (Pty.) Ltd., Box/Bus 92, Roodepoort, Tvl.
- 1957 Switchcraft (Pty.) Ltd., Box/Bus 6444, Johannesburg, Tvl.
- 1960 South Wales Electric (Pty.) Ltd., Box/Bus 2180, Johannesburg, Tvl.
- 1965 South Wales Electric Rhodesia (Pvt.) Ltd., Box/Bus 343, Salisbury.
- 1957 Southern African Cable Makers' Association, Box/Bus 2258, Johannesburg, Tvl.
- 1967 S.A. National Committee on Illumination, Box/Bus 395, Pretoria, Tvl.
- 1965 G. D. Wiehahn, Box/Bus 664, Bethlehem, O.F.S.
- 1957 Wilson and Herd (Pty.) Ltd., Box/Bus 3093, Johannesburg, Tvl.
- 1957 Yarrow Africa (Pty.) Ltd., Box/Bus 6918, Johannesburg, Tvl.
- 1959 Yorkshire Transformers (S.A.) (Pty.) Ltd., Box/Bus 43, Bedfordview, Tvl.

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A MEMBER OF THE STONE-PLATT GROUP

LIST OF MEMBERS, COUNCIL MEMBERS AND VISITORS ATTENDING THE 1968 TECHNICAL MEETING OF THE ASSOCIATION OF MUNICIPAL ELECTRICITY UNDERTAKINGS AT VANDERBIJLPARK.

COUNCIL AND ENGINEER MEMBERS

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

ALBERTON:
Odendaal, M. W.

BRAKPAN:
Barnard, H.

BETHAL:
Kerkberger, M. N.

BEDFORDVIEW:
Van der Schyff, G. W.

BOTHASVILLE:
Schoombee, G. T. van W.

BLOEMFONTEIN:
Briers, D. B.
De Villiers, E. E.

BOKSBURG:
Swanepoel, J. J.
Fortmann, A. H. L.

CRADOCK:
Murphy, K. J.

CARLTONVILLE:
Loubser, J. A.

CAPE TOWN:
Frantz, A. C. T.

CERES:
De Villiers, S. de V.

DURBAN:
Simpson, R. M. O.

EMPANGENI:
Paull, R. A.

EAST LONDON:
Giles, P. A.

EDENVALE:
Opperman, D. J.

ESTCOURT:
Erikson, J. G. F.

FORT BEAUFORT:
Verscgor, D. R.

GERMISTON:
Lombard, C. G.

GWELO:
Peters, A. G.

HARRISMITH:
Rush, W. G.

HEIDELBERG:
Van Heerden, W. J. B.

JOHANNESBURG:
Leishman, R. W.

KLERKSDORP:
Rautenbach, G. F.

KIMBERLEY:
Mathews, J. A.

KOPPIES:
Ploos-van Amstel, W. F.

KROONSTAD:
Rossler, W.

KRUGERSDORP:
Van den Berg, A. J.

LADYSMITH:
Stevens, F.

MAFEKING:
Te Brugge, E. J.

MEYERTON:
Van Heerden, P. J.
Van Wyk, A. A.

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

NEWCASTLE:
Craig, J. S.

ORKNEY:
Du Toit, P. L.

ODENDAALRUS:
Jantzen, G. H.

LYS VAN LEDE, RAADSLEDE EN BESOEKERS — 1968 TEGNIESE VERGADERING VAN DIE VERENIGING VAN MUNISIPALE ELEKTRISITEITSONDERNEMINGS NA VANDERBIJLPARK.

RAAD EN INGENIEUR-LEDE

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

PAARL:
Lategan, J. F.

PIETERMARITZBURG:
Waddy, J. C.

PIET RETIEF:
Mocke, T. M.

PIETERSBURG:
Inglis, J. I.

PORT ELIZABETH:
Dunstan, R. S.

POTCHEFSTROOM:
De C. Pretorius, E.
Du Plessis, G. C.
(Onder-Ingenieur)

QUEENSTOWN:
Barratt, V. E. O.

RANDFONTEIN:
Cherry, J. R.

ROBERTSON:
Koeslag, H. J.

ROODEPOORT:
Botes, P. J.

RUSTENBURG:
Meintjies, P. A.

STANDERTON:
Potgieter, N. A.

SALISBURY:
Lynch, E. C.

SASOLBURG:
Strauss, J. C.

SPRINGS:
Van der Walt, J. L.
Von Ahlften, J. K.

STILFONTEIN:
Van der Merwe, F. J.

THABASIMBI:
Emslie, G. P.

UMTALI:
Turner, H.

VANDERBIJLPARK:
Theron, G. C.

VEREENIGING:
Turnbull, A. F.

VIRGINIA:
Hobbs, I. L.

VRYHEID:
Buchanan, E. G.

WARMBAD:
Vergottini, P. L.

WELKOM:
Munro, J.
Barton, R. W.

WESTONARIA:
Dreyer, L.

WITBANK:
Van der Merwe, D. S.

AFFILIATES/GEAFFILIEERDES :

| ORGANISATION/ORGANISASIE | NAME/NAAM | TOWN/STAD |
|--|---|---------------|
| A.E.I. Henley (Pty.) Ltd. | J. F. Charles | Johannesburg |
| Alcan Aluminium of S.A. Ltd. | A. H. W. Hugo | Johannesburg |
| Adams, Symes & Partners. | P. B. Power | Braamfontein |
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| First Electric Corp. of S.A. | V. F. Checketts | Knights, Tvl. |
| Fuchs Electrical Industries (Pty.) Ltd. | V. Cohen | Alberton |
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| Jooite R. K. | S.A. Bureau of Standards/S.A. Buro van Standaard | Pretoria |
| Kenneth-Watts A. M. S. | Department of Posts & Telegraphs/Pos-en-Telegraafwese Departement | Pretoria |
| Liebenberg S. J. | Department of Bantu Administration/Bantoe-Adminis- trasie Departement | |
| Messidat T. F. | S.W.A. Administration | Windhoek |
| Middlecote A. A. | S.A. Bureau of Standards/S.A. Buro van Standaard | Pretoria |
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| van Wyk J. D. N. | C.S.I.R. (National Research for Math. Sciences)/W.N.N.R. | Pretoria |
| van der Spuy M. | The Institute of Certified Mechanical Electrical Engineers, South Africa/Die Instituut van Gedeplomeerde Werk- tuigkundige en Elektrotegniese Ingenieurs, S.A. | Johannesburg |
| van der Merwe F. S. | C.S.I.R. (National Research for Math. Sciences)/W.N.N.R. | Pretoria |
| Wannenburg J. G. | Department of Labour/Departement van Arbeid | Pretoria |

NAME/NAAM

OTHER MEMBERS/ANDER LEDE

TOWN/STAD

| | | |
|--------------------|--------------------------------------|--------------|
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| Milton W. H. | (Honorary Member/Ere-lid) | Johannesburg |
| van der Walt J. L. | (Honorary Member/Ere-lid) | Springs |

NAME/NAAM

A.M.E.U. OFFICIALS/V.M.E.O. OFFISIEELE

TOWN/STAD

| | | |
|--------------------------------|---|------------------------|
| Ewing R. G. | (Representing the Secretaries/Verteenwoordiger van die Sekretariaat) | East London/Oos-Londen |
| Brewin Miss E. R. | (Representing the Secretaries/Verteenwoordiger van die Sekretariaat) | Johannesburg |
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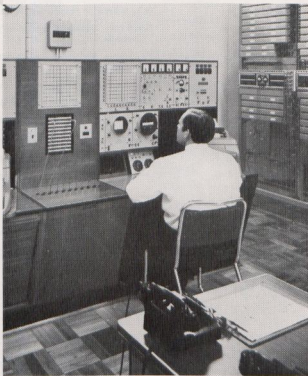
President Kruger ordered this wireless transmitter and receiver unit from Siemens and Halske of Berlin for the Transvaal Government. The equipment had a maximum range of 10 miles and was purchased to transmit messages from the four Kopjes surrounding Pretoria to the Raadsaal in the city. Now on view in the War Museum in Bloemfontein, it is still in full working order.

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Siemens — a world of electrical engineering and electronics

Die 1968 Tegniëse Vergadering van die Vereniging was gehou by die Vaal Driehoek Tegniëse Kollege, Vanderbijlpark, op Donderdag en Vrydag, 9 en 10 Mei 1968. Bywoning by die Vergadering was soos volg: — 60 Munisipaliteite verteenwoordig deur 10 Raadslede en 54 Ingenierslede en geassosieerde lidmate, 2 Erelede (nie 'n verteenwoordiger van 'n Munisipaliteit of van 'n ge-affilieerde lid nie), 1 Verbode Lid; 33 Verteenwoordigers van 26 ge-affilieerde ledemate, 15 Besoekers (Verteenwoordigers van Regerings-departemente, Nutsmaatskappye en ander Organisasies), 4 V.M.E.O. Amptenare 'n totaal van 119 persone.

FIRST DAY

Die President, mnr. G. C. Theron, open die verrigtinge deur al die aanwesige afgevaardigdes te verwelkom by die tweede Tegniëse Vergadering van die Vereniging. Hy verwys na die feit dat dit die eerste keer is dat daar van 'n tweedaagse konferensie gebruik gemaak word en spreek die hoop uit dat dié twee dae baie interessant en leersaam sal wees, dog hy wys daarop dat dit in 'n groot mate gaan afhang van die bydraes van die gegene wat die vergadering bywoon.

'n Besondere welkomswoord word gerig aan die twee Erelede wat teenwoordig is, nl. mnr. Walter Milton (Johannesburg) en mnr. J. L. van der Walt (Springs).

Mnr. Walter Milton antwoord gepas en stel 'n mosie van deelname en goeie wense aan Sy Agbare die Burge-meester van Vanderbijlpark vir sy spoedige herstel van 'n hartaanval wat hy die vorige aand gehad het.

Die President verwys na die toenemende uitdaging van „produktiwiteit” wat vir ingenieurs voor die deur staan en na die feit dat die Uitvoerende Raad ooreengekom het dat die tema van hierdie vergadering sal wees „Produktiwiteit in Munisipale Elektriesiteitsondernemings.”

Mnr. A. C. T. Frantz (Elektrotegniese Stadsingenieur, Kaapstad) gee 'n oorsig van sy referaat, getitel „Inleiding tot die Tema,” wat in Volume 1 van die Verrigtinge van die Vereniging vir 1968 gepubliseer is.

The 1968 Technical Meeting of the Association was held at the Vaal Triangle Technical College, Vanderbijlpark, on Thursday and Friday, 9th and 10th May, 1968. Attendance at the Meeting was as follows: — 60 Councils, represented by 10 Councillors and 14 Engineers and Associates; 2 Honorary Members (not representing Councils or Affiliates); 1 Associate Member; 33 representatives of 26 Affiliates; 15 Visitors (representing Government Departments, Public utilities and other organisations); 4 A.M.E.U. Officials — a total of 119 persons.

EERSTE DAG

The President, Mr. G. C. Theron opened the proceedings by welcoming all the delegates present to this the second Technical Meeting of the Association. He made mention of the fact that this was the first time that use had been made of a two-day conference and expressed the hope that those two days would be both full and interesting but pointed out that it would depend very largely on the contributions of those attending.

A particularly warm welcome was accorded the two Honorary Members present, namely Mr. Walter Milton (Johannesburg) and Mr. J. L. van der Walt (Springs).

Mr. Walter Milton responded and proposed a vote of sympathy and good wishes to His Worship the Mayor of Vanderbijlpark for a speedy recovery from his heart attack sustained the previous night.

The President referred to the increasing challenge of “productivity” facing engineers and to the fact that the Executive Council had agreed that the theme “of this meeting be “Productivity in Municipal Electricity Undertakings.”

Mr. A. C. T. Frantz (City Electrical Engineer, Cape Town) presented a resume of his paper “Introduction to Theme” which was published in Volume 1 of the 1968 Proceedings of the Association.

Die President open die bespreking deur te sê dat die twee sake wat vir hom persoonlik van die grootste belang is, die opmerkings omtrent die vassstelling van kritiese roetes en liniere beplanning, en, in die tweede plek, die kwessie van studietoere en die wisseling van idees is. Hy sê dat hy twyfel of laasgenoemde moontlikhede altyd voldoende deur die Stadsvaders waardeur word en lê klem op die feit dat, indien 'n ingenieur sou ophou om te lees en te studeer, hy binne vyf jaar heeltemal uit voeling met die werklikheid sal wees.

Mnr. A. F. Turnbull (Vereeniging) lewer soos volg kommentaar :—

It is very pleasing to note that some of our larger municipalities and also some of medium size have seen the wisdom of sending their engineers overseas on study tours. For those who are not so fortunately placed, the suggestion of Mr. Frantz for an interchange of ideas and techniques between undertakings is a very good one. We have taken advantage of our larger neighbours in this way but perhaps weren't quite so fortunate as our man gained so much useful knowledge that he promptly accepted a higher-paid job elsewhere!

It's not a great deal of use very small municipalities sending representatives to the large undertakings as

Voortgaande, sê mnr. A. A. Middlecote (Buro van Standaarde) :—

It's interesting to note the definition of "productivity" and the broader term that it's given internationally: it's a long one but I'd like to read it out to you just to stress it:

"It's an attitude of mind; it's the mentality of progress of a constant improvement of that which exists; it's the certainty of being able to do better today than yesterday and less well than tomorrow; it's the will to improve on the present situation no matter how good it may really be; it's a constant adaptation of economic and social life to changing conditions."

I think the way that Mr. Frantz has stressed this matter of human relations, the worker himself, is both very apt and important; the reason being that although, quite rightly, you have to study the benefits of capital expenditure such as that spent on possible mechanisation or automation, the biggest consideration is probably the person himself — all the people in an organisation.

This has led overseas to the most successful people being those who form study circles within their own organisations. Although the motivation for productivity starts at the top with management, it's most important contribution is from every worker himself and unless you foster the right spirit by giving them sound reasons for their improvement, I don't think you'll get very far, particularly (and here I must disagree with Mr. Frantz) since I don't think the "pegging" of salaries has forced an increase in productivity. To my mind it only results

The President opened discussion by saying that the two points of most interest to him personally were the remarks about critical path scheduling and linear programming and, secondly, the question of study tours and interchange of ideas. He expressed doubt whether the latter possibilities were always appreciated by the City Fathers and the fact that if an engineer were to stop studying and reading, he would be completely out of date within five years.

Mr. A. F. Turnbull (Vereeniging) commented as follows :—

they are inclined to be overwhelmed by all the facilities, instruments and so on available there. We are rather fortunate where we're placed in Vereeniging as we have been able to assist some of the smaller municipalities who have on occasion sent men over to us. I think that mutually it has served a good purpose in assisting some of the engineers in overcoming problems which their financial resources didn't permit them to do.

I would definitely like to see our Association encourage this idea and see if we can take some positive steps in this regard.

Continuing, Mr. A. A. Middlecote (Bureau of Standards) said :—

in too many people being paid too little and that is contrary to productivity.

The only suggestion I would like to make to the members of the A.M.E.U. is that they give serious consideration to the forming of study circles of both supervisors and workers within their own organisations to encourage further study and the making of suggestions as to the best way of doing things. You'll find that this will give you very many valuable leads.

Going one step further than that, I would suggest that your whole organisation do an inter-firm comparison — another driving force to make you do better tomorrow than you can do today. You must keep a close watch on each other and this naturally necessitates the keeping of good records, without which you simply cannot gauge productivity with any degree of correctness.

Recently I tried to get some figures from several different bodies to give some indication of the growth of their output with regard to their labour content, but very few could give any record at all. You must, therefore, keep good records and I should say that if you analyse those records and make it one of the features of your conferences, that you compare your outputs (you can measure the units per worker); compare one organisation with another, I'm sure you'll find that your discussions will be fruitful and lead to a better exploitation of methods and utilisation of staff.

Mnr. K. A. H. Adams (Johannesburg) gaan voort deur te sê:—

One thing we must not do is listen too much to economists; they're more or less soothsayers and they say what the Government wants them to say! Inflation even at 1% per annum is a process of robbing the aged and is therefore bad. It gives rise to delinquency and crime and the growth of a number of other unfortunate circumstances.

Inflation is basically due to the compressed income range of employee groups. This is mathematically so and there's no way of avoiding the fact. When we talk of incomes, salary structures, or wage structures, we must take two parameters to measure this; one is the income level and the other the income gradient. If your income gradient is less than 0.2, you'll have a staff turnover which nullifies any improvement in productivity that you might have achieved if they stayed on. I think that if you examine your records and those of the artisans you'll find your gradient between 0.03 and 0.1.

Die direkte bespreking van mnr. Frantz se referaat word beëindig deur die volgende bydrae van mnr. R. M. O. Simpson (Durban):—

As one of the engineers who did introduce "organisation and methods" and "work-study" some few years ago, I would like to comment on the practical aspect of this. Properly used, they can undoubtedly pay very great dividends but there are certain pitfalls to be wary of, particularly in municipalities. The point that must be made quite clear in making use of these facilities, is that they are a tool of Management, not of Council. If you don't do so you find that you get off the rails because, basically, the introduction or use of "organisation and methods" principles — which really amounts to improved management systems — does tend to reduce the costs of operating. Sometimes, however, this can be taken to extremes so that you can find yourself in a position where you are too inadequately staffed to placate the introduction of "O. and M." methods.

That is something you've got to watch very carefully to ensure that every aspect of the job has been studied by these people because (as Mr. Frantz so rightly says) you introduce people from outside to help you but you are bound to bring people in who know less than you do of what you really want but they are better placed to

Mnr. C. Lombard (Elektrotegniese Stadsingenieur, Germiston) lewer hierna sy referaat onder die opskrif: „Half-geeskoolde Arbeid, Bystand aan Ambagslui en Meganisatie,” wat in Volume 1 van die Verrigtinge van die Vereniging vir 1968 gepubliseer is.

Die President open die bespreking met die volgende opmerkinge:—

Here, ek dink u het nou voor u 'n referaat wat die moontlikhede van baie bespreking inhoud, nl. „Hoe ver

Mr. K. A. H. Adams (Johannesburg) followed by saying:—

Another fact that comes up is that an increase in productivity is a flatly-graded group may actually be inflationary, relative to that group. They could be worse off as a result of doing more because there is less remaining to be done; their value falls and you find there are objections from the trade unions to incentive wages on this account.

An increase in gradient gives an increased value to the production of the group and we should really be striving, not for increased productivity, but for an increased value of productivity; for any increase in the value of productivity (relative to money) is deflationary. Also, a steeply-graded group gives a permanent incentive to improve productivity and, without an increase in gradient, the task of improving the value of productivity is hopeless and impossible.

Discussion directly on Mr. Frantz's paper was concluded with the following contribution by Mr. R. M. O. Simpson (Durban):—

carry out a very close study of your requirements, provided all the details are given. That, I think, is a very important point as so often such people on a job try to pick up as much as they can but some particular part that has probably fallen into disuse, or some record that is not being kept, is overlooked and that particular error is perpetuated.

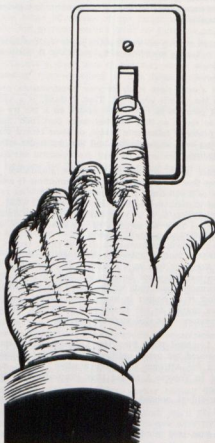
One other point, regarding the use of aluminium: I quite agree that at this particular time aluminium is most attractive as a substitute for copper but we have no raw or natural aluminium deposits in South Africa. What is the effect going to be if we start swinging over to aluminium when we have no supplies of our own, yet we do have adequate supplies of copper?

With regard to mechanisation, here again I think we ought to keep our feet on the ground. It is very nice to mechanise but we've got to keep the costs in view and from information and tests we've carried out in Durban, I still think it is cheaper in many cases (except in very wide open spaces) to use Bantu with picks and shovels than excavators — it still works out lower.

Mr. C. Lombard (City Electrical Engineer, Germiston) next presented his paper entitled "Semi-skilled Labour, Assistance for Artisans and Mechanisation" which was published in Volume 1 of the 1968 Proceedings of the Association.

The President opened discussion with the following comment:—

'n mens gaan met minder-geeskoolde arbeid?" Dit is 'n probleem wat seker vir ons almal voor die deur staan,



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waar om die mense vandaan te kry om die werk te doen? Nou is die vraag: „Waar trek ons die lyn?”

The point in question, gentlemen, is that we are now

Die bespreking word soos volg deur mnr. E. E. de Villiers (Bloemfontein) voortgesit:—

Ek het ongelukkig nie kans gehad om vooraf in besonderhede die referate te bestudeer nie maar daar het verskeie idees by my opgekom wat ek miskien op hierdie stadium aan u kan meedeel.

Eerstens wil ek net meld — dit is nou nie 'n verwyte teen u of my kollegas nie — dat volgens my mening, vele van dié wat vandag hier is 'n geweldige groot voorreg misgeloop het deurdat hulle nie teenwoordig was by die onlangse kortkursus in Bestuur vir Ingenieurs nie. U sal onthou dit was by ons Kongres op Lourenco Marques gebied gewees dat dié kursus sou plaasvind by die Allemanskraaldam-vakansie-oord. Die uitslag daarvan was baie teleurstellend gewees; ek verstaan daar was 'n kwessie van sowat sewe honderd uitnodigings uitgestuur en minder as vyftig ingenieurs het dit bygewoon.

Ek kan vir u werklik sê dit het pertinent by my nou opgekom dat daar 'n groot leemte in ons opleiding as ingenieurs is as ons nie, terwyl ons met die studies besig is, minstens die basiese beginsels van bestuurstegnieke ook daarby kry nie. Wat vir my veral daarop geval het is dat die bestuurder van enige saak behoort op verskeie maniere (ek sal nie daarop ingaan nie) sy werkers moet inspireer met die gedagte van spanwerk; elke persoon moet besef dat hy 'n integrale, 'n onmisbare deel van daardie span is. Dit is vir my een van die kardinale punte om produktiwiteit in die hand te werk.

'n Verdere aspek in verband met beter werkverrigting en hoë produktiwiteit van beskikbare mannekrag, is dat daar altyd gestreef moet word om sover as moontlik op hoogte te bly van die kennis, die werksvermoë en ook die potensiaal van elke werknemer in die saak of besigheid. Wanneer 'n mens dit doen, dan het 'n mens 'n geweldige sterk gereedskap in die hand om dié persone verdere opleiding te kan gee — om te weet presies hoe ver 'n man geneem kan word, en hoe van sy werksvermoë en kennis gebruik gemaak kan word. Dan moet dit natuurlik gedurig opgevolg word om die fasiliteite beskikbaar te stel vir verdere studie en die nodige geleenthede

Mnr. R. W. Barton (Welkom) verwys na die kwessie van slote grawe vir die lê van kables en sê dat die gebruik van hantoearbeid op 'n stukwerkbasis, wat in elk geval by die hantering van die kabel nodig is, in baie gevalle aansienlik goedkoper uitwerk. Hy verwys ook na die gestadige styging in die rentekoers op leningsfondse.

Met verwysing na die opmerkings wat in verband met die gebruik van aluminium gemaak is, sê mnr. A. H. W. Hugo (Johannesburg):—

As far as aluminium is concerned, I would like to point out that it's one of the most common elements in the

looking for better qualified, better trained, and better paid artisans and technicians who can handle and maintain the more sophisticated plant that is being developed to assist productivity.

The discussion was continued by Mr. E. E. de Villiers (Bloemfontein) who said:—

in die persoon se weg te lê om verdere praktiese ervaring op te doen in die rigting waarin hy die beste sal kwalifiseer en die beste werk kan verrig.

'n Punt wat vir my dikwels pertinent na vore getree het is dat vele mense is geneig, as 'n persoon wat wel in hulle diens is en baie goeie werk verrig, 'n verandering van werk soek, om in die weg te staan van so 'n persoon deur hom self verkeerdelk te probeer beïnvloed of selfs ook klippe in die weg te rol van moontlike potensieë nuwe werkgewers. Dit is vir my een van die gevaarlikste dinge as 'n mens op die vlak van nasionale belang die saak beskou. Ek voel so: as 'n mens iemand oplei gaan hy natuurlik van geweldig meer waarde wees as wat hy was in die pos wat hy oorspronklik in die inrigting beklee het. As 'n mens dan nie beter gebruik kan maak van daardie persoon se dienste nie, dan beskou ek dit as noodsaaklik om vir daardie persoon 'n beter posisie te soek waar daar ten volle gebruik gemaak kan word van sy potensialiteite.

Ek mag net miskien raak aan die saak wat mnr. Simpson ook so flussies genoem het in verband met die gebruik van aluminium. Ek glo u is almal bewus daarvan dat dit eintlik staatsbeleid is ('n noodsaaklike beleid) dat ingenieurs, binne redelike perke van ekonomie, gebruik moet maak van ons plaaslike hulpbronne, waaronder koper natuurlik een van die grootste is, in teenstelling met aluminium. Ons kan net nie 'n nasionale belang — feitlik een van ons grootste potensialiteite — oor boord gooi, en op ingevoerde artikels ons toekoms bou nie. Daar moet 'n mens baie versigtig wees.

In verband met die laaste punt wat mnr. Lombaard genoem het, die onderlinge hulpverlening tussen munisipaliteite, dit is 'n uitstekende gedagte. Ek moet vir u noem dat Bloemfontein al vir jare daarmee besig is. Waar ons nou 'n redelike groot sentrale stad is met vele omliggende kleiner dorpie, het ons 'n vaste beleid dat ons hulle uitheer waar hulle in die moelikhede verkeer. Hulle betaal daarvoor maar teen koste.

Mr. R. W. Barton (Welkom) referred to the question of trenching for cable laying and made the point that utilising Bantu labour on piece work, necessary in any case for handling the cable, worked out in many instances considerably cheaper. He also referred to the steady increase in rate of interest on loan funds.

Referring to remarks made about aluminium, Mr. A. H. W. Hugo (Johannesburg) said:—

earth's crust and that the richest sources of aluminium in the world are some of South Africa's best friends.

Also I think it is important that the I.D.C. are building a smelter at Richard's Bay — that is Government sponsored, of course — and that about half its output will be for the electrical industry.

As far as overhead line work is concerned, both high voltage and low voltage, the country is very much committed to aluminium. I would say about 90% of all overhead lines are in aluminium and we, of course, would like to see more use made of aluminium in cables although

In verband met mnr. Frantz se referaat, sê mnr. R. S. Dunstan (Port Elizabeth):—

The improvement of our output — mechanisation is a way of doing it but I think a more advantageous method, a cheaper and quicker method, is the generation of ideas which was introduced by Mr. Middelcote. We have working for us, all of us, various classes of labour from the labourer, the Bantu, at the bottom, right up to the skilled artisan. All of them, regardless, will just do the job as they've been shown or taught to do, or how their superintendent tells them to do it — very few of them use their brains at all. The best method to produce productivity is to get those brains working; if you can get your workmen to think at little bit, they will automatically produce better methods of doing the job. That will increase your production out of all proportion to the effort you've had to put into it.

Now it is impossible to go into detail as to how to stimulate brains into some sort of action! In my opinion, it's mainly a question of getting the men interested in what they're doing; knowing what they're doing and why, i.e. the goal you're aiming for, and they finally reach the stage when they begin to plan how to attain that goal faster. Then they will have reached the stage when they no longer need to be told exactly what to do.

For many years now I've been out of touch with actual practical work but in 1955 when I read a paper to this Association, I gave certain examples to illustrate this point, namely, that if you can make people think, they will automatically produce better and quicker ways of doing a job — and that even applies to a Bantu digging a cable trench.

Mr. Lombard mentioned the training of Bantu and this is quite a touchy point with us in Port Elizabeth where we have some 40,000 Bantu houses in our Bantu townships and are faced continually with the problem of street lighting and supplying electricity in these townships. With the difficulty in obtaining white artisans it has been quite a problem to expand, renew, or even maintain any of these installations. We started to investigate whether we could get Bantu electricians or even Bantu house wiremen to do the wiring in the houses and we've hit so much difficulty that today we're despondent — we've given up hope and simply stopped our efforts.

I've brought a rough summary of the correspondence, extending over a period of 14 months, dealing with this matter of trying to find Bantu electricians:—

(i) We tackled the Department of Bantu Administra-

tion and Development and got no answer . . .

(ii) We tackled the Electricity Department, Johannesburg — and got a very long answer which gave us quite a lot of information as to what they were doing, but then they are a larger municipality than we are and can both afford and spend the time to establish schools to train Bantu which we, unfortunately, cannot.

(iii) We referred to Germiston and Pretoria — who gave us as much information as they could but that didn't help us to get Bantu electricians!

(iv) So it was back to the Bantu Education Department to see what they were doing in the way of training colleges . . .

And so it went on — we were passed backward; and forwards from department to department until we were finally pushed on to the Department of Labour (now this is really passing the buck) and we ended up with the following letter from the Chief Bantu Affairs Commissioner in Port Elizabeth:—

"Vocational training schools, of which you are aware, cater specifically for the training of Bantu artisans to be absorbed in the Bantu Homelands. Unfortunately, no alternative Government training facilities exist which cater for the training of Bantu electricians for municipalities."

In other words — NO HELP.

We also received this information from the Divisional Inspector of Labour:—

"It is also intimated that even if such facilities were provided, it would be for the purpose of training Bantu for employment in the Bantu Homelands only and not for employment in Bantu Townships . . ."

We are now at the stage of being told that we have to use White electricians in our Bantu townships and the result is, under present circumstances, we can do practically nothing about extending the advantages of electricity to the Bantu.

Incentives and task work is all very interesting. We've also tried it but it's inclined to lead to a lot of difficulties. It's very easy, when you have a cable gang, to allocate a certain length of trench to be dug by each labourer but one will hit a stony piece and the other a soft piece — the latter will be gone by 12 o'clock while the luckless

one with the hard piece will still be there at 6 o'clock at night which leads to a lot of dissatisfaction amongst them.

I've come to the conclusion that task work in itself is a very good way of speeding them up, provided that it is worked as a task for the whole gang. If, as a gang, they are shown the length required to be dug that day and then left to get on with it, they will soon begin putting their heads together and helping one another out over the hard patches in order to get the job done faster — far more so than if one were to leave them to dig at their own pace without a goal.

There are a couple of technical points that I'd like to take up with Mr. Lombard: in his paper, on the horse power of internal combustion engines, he gives an example of a 75 cc. engine giving 7.8 hp. — that's 105/106 hp. per 1,000 cc. I drive a fairly fast sports car (some of my

In antwoord op mnr. Dunstan se opmerkinge, sê die President dat geen probleme met betrekking tot die beskikbaarheid van bantoe-elektrisies van kwekelinge in sy gebied ondervind word nie.

Ten einde die kwessie van die perdekrag van die enjin, wat deur mnr. Dunstan aangevoer is, op te klaar, sê mnr. C. Lombard (Germiston):—

I think I've got my facts right — this is a two-stroke engine whereas I think Mr. Dunstan is comparing it with

Mnr. D. S. van der Merwe (Witbank) lewer soos volg kommentaar:—

As far as productivity is concerned, I feel that in the appointment of staff one should try and have a measure of assessment of the type of man you require. For instance, I have found that a person who is loyal, who has some enthusiasm and who is in good communication is far more valuable than the very intelligent type.

Concerning the job itself, the conditions must, of course, be good, though not necessarily as regards money. At present a new steelworks is being erected in Witbank and the feeling prevalent there is that quite a lot of artisan staff will be drawn to this industry. We differ from industry in that despite their better payment, conditions there are often not so good. Most of the extra money is made on overtime and there is a limit to a man's endurance. We feel, therefore, that the greatest benefit is to be derived through the setting up of conditions within your own organisation which will encourage and promote private study along lines of personal advancement.

Let us consider incentive bonus schemes: these are a good idea but only when applied to routine and not jobbing work. The latter requires a very accurate assessment of time as each job differs from another in many ways. I have had the experience where people estimate the time required for the completion of a certain job and then later on have to get another estimator to assess the original estimate! That did not work very well but, apart from

friends facticiously call it a "low-flying machine") but all the manufacturers have been able to get out of it is 65 hp. per 1,000 cc.!

I think that figure should be checked, Mr. Lombard, as it might give some of the people who are considering buying such a machine, the wrong impression in that they can save by buying a cheap, small machine. The snag involved in buying digging or boring machines of any kind is to get a machine with a high enough driving power. It's better to have about five times as much power as you normally need in order to deal with cases of roots or stones in the ground because if a machine is too small a root an inch in diameter will stall the machine and you won't get through it; whereas, with plenty of power, it will just be ripped clean out. There's no doubt about it, with machines you must go for as much power as you can possibly get out of them.

Commenting on Mr. Dunstan's remarks, the President stated that there were no problems concerning the availability of Bantu electricians or trainees in his part of the country.

Clarifying a point made by Mr. Dunstan on the horsepower of the engine, Mr. C. Lombard (Germiston) said:—

a four-stroke engine. It is two-stroke, very high speed.

Mr. D. S. van der Merwe (Witbank) offered the following comments:—

jobbing work, I do recommend the use of incentive bonus schemes for routine work.

Budget Control is another of the small things which we can apply profitably in our undertakings, one and all. We have a system whereby once a month we have a meeting of the heads of departments; the Distribution Superintendent, the Charge Hand, the engineering assistants, and we go from post to post in order to ascertain how much money we've spent on the job to date and whether we are still within our budget. In doing so, we have discovered that we can make do with less people because the supervisors are anxious to cut down on staff so as to get more work per man and, in this way, remain within the budget. This is a very practical way of approaching that point.

Work Measurement is yet another very profitable way of getting more productivity. Previous speakers have mentioned the part played by "organisation and methods" officials, who I think, can come up with some very good advice, providing they are given guidance. We have put these principles into practice in routine work with very good results. For instance, a particular case that comes to mind is where we had to put "bull" insulators in all the stay wires on the overhead lines. The man on the job did a certain number of these per day but after studying the job, going to the site and discussing the work with the man himself, investigating his tools, we were soon

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able to make a considerable improvement in the productivity of this one man. If that can be done in only one small facet of our work it can obviously be repeated and augmented in many more ways.

An important managerial job in promoting higher productivity is the use of proper programming which I think was also mentioned earlier. We have discovered that a foreman programming his work two or three days ahead of time (it is not always possible to do it exactly that way) runs out of work after four days and this after having programmed for only three people when his total staff was six!

The other important line of action which I think would promote enthusiasm amongst workers would be the delegation of responsibility to the juniors. They should learn to be responsible people but, on the other hand, management must ensure that these people understand the

Mnr. R. M. O. Simpson (Durban) sê :—

With the inroads of the higher skills now coming in, particularly in the light current field of communications and control, it is essential that we have the people to carry out maintenance but we do not pay them enough to retain them, and, in this, I think we're only copying private industry. If we're going to carry on running our systems efficiently, I think it's essential that we make a move to split up the standard system for electricians and pay them higher for the higher skills.

The other point I wanted to make was the training of Bantu electrical workers, raised by Mr. Lombard. One of the chief difficulties that we've been up against in Durban is here again, the opposition of the trade union to the use of Bantu working alongside Whites. We have two large Bantu areas there and the European or White has taken exception to working in those areas, part-

Ter afluiging van die bespreking oor hierdie afdeling, sê mnr. H. T. Turner (Umtali):—

In listening to the discussions today on the burning theme of productivity, it occurs to me that we in our present positions are, after all, part of a bigger organisation — the local authority; and that just as productivity is so important in our profession, it must be equally so for the other parts of the set-up: e.g., you can take any one of the several departments, Town Clerk's or Town Treasurer's departments (who are, after all, responsible for the spending of the total funds earned by the local authority) and you'll find (as I have) that where such a department does its utmost to earn the maximum possible amount of surplus on the undertaking, the profits go into a rate fund and I'm not always certain that money is spent to the best advantage.

Without criticising them unduly, I always feel that these two departments often have more staff than they really need and this has a dissipating effect on the efforts that are being made by another, say a technical department.

difference between responsibility and accountability.

Rightly or wrongly, we have applied "organisation and methods" principles regarding the shortage of trained electricians. Recently we were faced with the problem of wiring a number of Bantu hostel units. On investigation, we found that we simply did not have the men to do the job but we persevered and studied the job in hand from a "methods" point of view and concluded that most of the work was pure ordinary manual labour, such as chasing walls and bending tubular pipes (conduits). We decided to standardize: we had a network of pipes prefabricated in the shops and all that remained to be done was to have them put in position; we selected one of our better type of Bantu, trained him for the job and completed the wiring likewise. Thus we simply trained our own people for the job.

Mr. R. M. O. Simpson (Durban) said :—

icularly at night.

So it is a question of training enough Bantu to cope with the volume of work on their own, for the Whites have made it quite clear that, although they are quite willing to help train Bantu electrical workers, the minute trained Bantu are set to work in the Townships, they themselves will leave it. Which puts us in the difficult position of having to train enough Bantu to take over — under White supervision, of course.

Here I do think we expect rather a lot from the Bantu. Under the present training regulations we expect a Bantu to get his J.C., then go to a Vocational Training College for three years to get an NTC Certificate before he receives any pay at all. On that basis, I can't see how we can possibly get enough trained Bantu without a radical change to the system.

Closing discussion on this section, Mr. H. T. Turner (Umtali) said :—

A further example is that in our undertaking the water and light meters are read by the Department of the Town Treasurer which does the accounting as well. I have taken out a rough check from time to time to determine what I would consider to be a reasonable sum for which to debit the Department for the work they're doing. Quite recently I settled on the figure of about £7,000/£8,000 which would adequately cover the staff and part of the administration costs but I notice in the estimates this year that the charges amount to £17,000. Now if one is endeavouring to promote productivity, one must do so throughout the entire undertaking and I for one, would very much like to have the chance to check on where this £17,000 is really going.

Granted the Town Clerk has pretty hefty administration charges which he no doubt earns and deserves, but it does seem that the Electricity Department is constantly looked upon as a source of revenue which can be tapped at will and here I reiterate that if productivity is to be effective

it must be applied throughout the entire organisation as a whole — of which we form only a part.

There are a few minor technical points I'd like to mention — firstly, on this question of transport. I agree with Mr. Frantz that it is desirable that every electrician or workman should have his own independent transport in some form or another. We've tried forming a transport pool and found it a dead loss involving needless waiting around and so on, and the extra money any Council has to spend on providing every man with his own transport is well worth it.

Compression tools: With the change-over to P.V.C. cables, compression tools are ideal but should only be used by skilled electricians as we found that if the settings are not just right, the lug or ferrule can be crimped so much as to damage the conductors.

As far as power equipment is concerned; this is power augers, cable trenchers, excavators, hoisting equipment, I think it is really out of the question for any but the very large undertakings. We have experience on this subject

Hierop lewer mnr. W. W. Martin (Elandsfontein) die referaat oor „Die Onderhoud van Substasies" wat deur homself en mnr. A. S. Bridger voorberei is en wat in Volume 1 van die Verrigtinge van die Vereniging vir 1968 verskyn het.

Sekere punte in die referaat word met behulp van foto's toegelig.

Die President lewer kommentaar oor die probleem van die steeds stygende aantal substasies en mini-substasies wat in ondernemings aangetref word en oor die moontlikheid om in die toekoms vakuüm-onderbrekers in diens te stel, wat geen instandhouding nodig het nie en wat moontlik 'n oplossing vir die probleme sal bied.

Aangesien geneeen van die lede dadelik op hierdie referaat kommentaar wil lewer nie, stel die President aan die orde die referaat oor „Die Lees van Meters, Boekhouding en Invordering van Gelde" deur mnr. L. S. Campbell (Stadsessorier Vanderbijlpark) welke referaat in mnr. Campbell se afwesigheid deur mnr. S. J. Benadie voorgedra word. Hierdie referaat is in Volume 1 van die Verrigtinge van die Vereniging vir 1968 gepubliseer.

Mnr. Benadie sluit sy voordrag van die referaat soos volg af:—

Ek wil die praatjie opsom deur na 'n praktiese voorbeeld te verwys. Menige ingenieur was al met frustrasie vervul as hy op die begroting sien dat die Stadsessorier groot bedrae in berekening bring vir administrasie of departementele kostes. Hierdie onsigbare uitgawes kan slegs deur groter doeltreffendheid en verhoogde produktiwiteit deur die administratiewe personeel enigins in bedwang gehou word. Dit sal hom nooit afdwing nie maar slegs in bedwang hou. Derhalwe is dit nodig dat verbeterde metodes en nuwe idees voortdurend ondersoek en toegepas moet word om te verseker dat effektiewe diens teen 'n realistiese prys gelewer word.

of heavy equipment not being used a lot. Our costing department has the peculiar custom of charging out the cost per mile of any vehicle we use on the amount of work it actually does. Some years ago, we had a case in point where we had a motor bike about three days a month and the charges by the Town Treasurer's Department were about 4/- a mile. Now the same applies to all heavy equipment unless it's being used, unless you have a high load factor for it, I don't think it's a proposition at all for a small authority.

The question of borrowing from other municipalities was also raised. This is both costly and inconvenient in that they frequently require the equipment at the same time as you do, besides which there is always an argument as to who is responsible for repairs and maintenance. So that I think, generally speaking, mechanization in itself can be very much overrated. Unless one has a good load factor or a reasonable amount of work requiring to be done, I'm quite certain that, in the long run, manual labour can equal it.

Mr. W. W. Martin (Elandsfontein) next presented the paper by himself and Mr. A. S. Bridger on "Substation Maintenance" which was published in Volume 1 of the 1968 Proceedings of the Association.

Certain points in this paper were amplified by the presentation of slides.

The President commented on the problem of the ever-increasing number of sub and mini substations in undertakings and referred to the possibility of the introduction in the future of vacuum interruptors requiring no maintenance and which might provide the answer in the future.

In the absence of members wishing to comment immediately on this paper, the President introduced the paper by Mr. L. S. Campbell (Town Treasurer, Vanderbijlpark) on "Meter Reading, Accounting and Collections" which in his absence was presented by Mr. S. Benadie. This paper was published in Volume 1 of the 1968 Proceedings of the Association. Mr. Benadie concluded the presentation of the paper with the following remarks:—

Mr. President, I do not wish to indulge in flights of fancy but one should always endeavour to keep abreast of and be prepared for any situation which may arise, especially in the labour market. The day may come when meter reading is given out on contract, the contract price being so much per meter read or per hundred meters. To increase the productivity of meter readers the payment of a bonus may be considered i.e. for meters read in excess of a certain minimum. So 'n bonusstelsel sal noodwendig aan 'n boetestel gekoppel moet wees ten einde die meterleser te penaliseer vir foutiewe en fiktiewe lesings deur hom geneal.

Mnr. J. L. van der Walt (Stadslerk, Springs, Erelid) neem soos volg aan die bespreking deel:—

Ek het mnr. Campbell se referaat interessant gevind, veral in verband met meterlesings, want ons het ook iets soortgelyks probeer. Produktiwiteit is wel verhoog deur dat ons ons meterlesers van nege na vier verminder het, maar ek wonder (en my vriend mnr. Lombard langs my het dié aanmerking gemaak) wat is die gevolg op goeie verhoudings met jou verbruikers.

Ons het heelwat probleme daarmee en ek wil dit stel dat die gemiddeld uitgewerk is oor 'n jaar, die gemiddelde lesing oor twaalf maande, en die verbruiker is elke maand veronderstel om dit te betaal. Al is daar dié twee maande geen lesings geneem nie, kry die verbruiker nogtans 'n rekening vir R16 (as ek Vanderbijlpark se voorbeeld kan gebruik).

Anders mag dit wel in die somertyd wees wanneer min elektrisiteit gebruik is, of dit mag net wel in die tydperk wees wanneer daar goeie reëns geval het. Nieteenstaande, kom die derde maand wat sy lesings geneem word, dan is die bedrag wat hy moet inbetaal maar omtrent R2—R3. Mnr. Verbruiker is geweldig bly, hy skree „Hoera!“, gooi sy hoed in die lug en betaal net die R3.

So gaan dit aan maar dan kom ons in die winter — of die lentetyd wanneer baie water of elektrisiteit gebruik word en mnr. Verbruiker vind dat die derde maand wanneer sy meter gelees word, hy miskien R28 of R30 moet inbetaal. Hy kondemneer die Raad geweldig — hulle is foutief, hulle verneuk hom, hulle probeer maar net geld inhaal, ens., maar wat hy vergeet is die feit dat

Hierna lewer mnr. F. J. van der Merwe (Stilfontein) sy referaat oor „Die Installering en Werkverrigting van Aardlek-relé's in Huishoudelike Installasies“ wat ook in die Verrigtinge van die Vereniging vir 1968 gepubliseer is.

Ter inleiding van die bespreking oor hierdie referaat, wys die President daarop dat die S.A. Buro vir Standaarde 'n komitee daargestel het wat as sy hoofdoel het die doeltreffende beheer van die nalatige gebruik van elektrisiteit. Hy versoek alle ingenieurs met enige ondervinding in hierdie verband om kommentaar te lewer.

Mnr. D. S. van der Merwe (Witbank) spreek homself soos volg uit:—

Hierdie argument sal seker lank aanhou maar dit is my voorreg om aan my kollega en naamenoot te sê dat ons presies dieselfde ondervinding gehad het. In Witbank het ons ongeveer 800 van hierdie eenhede laat installeer en ons het uitgevind dat die probleme daarmee ondervind was beperk deur hoë sensitiwiteit. Nadat instrumente gemaak is om die sensitiwiteit te meet, het ons in sommige gevalle gevind dat die instrument ager op 'n aardlek so min as 5 m.A. Dit is die eerste saak.

Die tweede probleem lê eintlik by die kontrakteurs veral as dit kom by nuwe installasies. As 'n kontrakteur so 'n lekkasie-eenheid insit, kos dit 'n uurlikse bedrag

Mr. J. L. van der Walt (Town Clerk, Springs, Honorary Member) contributed to the discussion as follows:—

dié maand toe hy net R3 betaal het, moes hy eintlik R16 betaal het om sy gemiddeld op te hou. Maar dit is uiters moeilik om dit aan verbruikers te verduidelik en ek moet u eerlik sê ons verloor heelwat goeie verhoudings met ons verbruikers daardeur. Die eintlike probleem is (soos mnr. Benadie dit gestel het) die tekort aan meterlesers.

If I may bring the principles of productivity to bear on this matter with reference to the previous papers as well, O. and M. officers can do a lot to assist you in reducing staff and thus increasing your productivity. I notice in your papers you've all referred to the purely technical aspect and not much has been said about what happens in the office itself. Well, I think you will find that an O. and M. officer will soon find out that your junior clerk is probably sitting on a desk swinging his legs while whispering sweet nothings into the ear of the typist. She in turn will be whispering sweet "nothing doings" to the junior!

Seriously, though, there are many cases where we can reduce staff with the proper application of O. and M. methods, the difficulty being that the Council always wants documentary evidence that what you have recommended is feasible and inductive to productivity. There are so many factors to be considered and one of the important ones I've mentioned here in connection with meter readings, is the good relationship to be maintained with your consumers.

Mr. F. J. van der Merwe (Stilfontein) next presented his paper on "Installation and Performing of Earth Leakage Relays in Domestic Installation," which was published in Volume 1 of the 1968 Proceedings of the Association.

In opening discussion on the paper, the President pointed out that the S.A. Bureau of Standards had established a committee which has as its greatest problem effective control of the careless use of electricity. He requested engineers with any experience in these matters to comment.

Mr. D. S. van der Merwe (Witbank) contributed as follows:—

vir arbid en as die ding dan nie werk nie, is die bewoner redelikerwys omgekrap. Nog 'n uur of twee word spandeer en uiteindelik eindig dit in 'n argument oor wie die ekstra gelde gaan betaal.

Die eenheid ly daaronder en die veiligheid van die publiek. Nadat 'n paar van hierdie gevalle na ons verwys is, het ons ondersoek ingestel en ons het uitgevind dat sommige van hierdie installasies se aardgeleier is gegroond. Die gevolg daarvan (soos mnr. van der Merwe genoem het) is dat 'n tweede baan gevorm is, dit werk net nie en die kontrakteur is nie opgewasse om dit gou uit te vind nie.

Ons het toe ons kontrakteurs in die dorp van hierdie probleme verwittig en dit is nou vir hulle moontlik om 'n installasie in te sit binne 'n baie kort tydsperk, wat werk, en om daardie rede onderskryf ek dus die bevinding (wat miskien ook eendag 'n voorstel sal word) wat hier bespreek is.

Mr. A. A. Middlecote (S.A. Buro vir Standaarde) gaan voort deur te sê:—

I want to support the appeal made by the President for the sort of information which would be helpful to us on this committee.

Mr. van der Merwe is to be complimented on the very good records he kept which brings us back to the fact that if you keep good records, you can really measure, analyse, and get an answer.

We on our committee are very interested in this so-called "nuisance tripping" that has been mentioned and would like to get some facts on it. The normal lines of communication are bad as one only hears of one isolated incident blown up into a series of incidents and we feel that only good, sound, vouched-for figures regarding nuisance tripping are of any value. We did become a little too sensitive at one stage about earth leakage and I have always felt we went too far, for not only need you not go to a low value, you must always remember that statistically you have many parallel paths, in any case.

The other point I'd like to mention is reliability but we must be levelheaded in this respect. The basic factor one has to accept is that even on the best of apparatus, nothing is zero defect — every component has a probability of failure. Even rockets made to almost what they term "zero defect," occasionally fail.

The point is this, that a simple gadget like a fuse might have a very good reliability factor because it is virtually one component — the bit of wire; it has other great disadvantages. When, however, you come onto the more

Mnr. J. A. Loubser (Carletonville) sê vervolgens:—

Ek is baie bly vir hierdie referaat van mnr. van der Merwe omdat dit vir my 'n alternatiewe moontlikheid oopgestel het. Ons daar op Carletonville gebruik ook aardlek; ons het al 'n hele paar honderd geïnstalleer maar dit is nie deur die Raad daar geïnstalleer nie, maar deur die kontrakteurs self. Ek moet eerlik erken dat ons, veral in die laaste rukkie, baie moeilikheid met kontrakteurs gekry het in hierdie verband. Ek kan hulle nie alleen daarvoor verkwalik nie maar ook die vervaardiger; van die relê's. Dit mag nou klink soos 'n aanval en dit is ook so bedoel. In die afgelope ses maande, bv. moes ons 50% van die relê's van 'n sekere vervaardiger weer aan hulle terugstuur weens foutiewe werk. Die kontrakteur installeer die relê, vind dat dit nie werk nie en moet dan weer teruggaan om 'n ander relê te haal en weer te installeer. Koste gaan daarmee gepaard, die verbruiker weer om dit te betaal en die kontrakteur voel dit is

Wat my 'n bietjie hinder is of die Raad dit sy plig moet ag om hierdie installasies te help finansieer en te onderhou op die wyse wat mnr. van der Merwe geskets het. Ek vrees dit gaan miskien naderhand op baie onnodige uitroep uitloop.

Mr. A. A. Middlecote (S.A. Bureau of Standards) continued:—

sophisticated bits of apparatus where you may have from 20 to 30 parts, the reliability factor is reduced proportionately. For example, if each part has a reliability factor of say 1 in 10,000, then the whole apparatus will have a factor of 0.999 to the power of the number of parts. So that even if your parts are manufactured to a reliability factor of 1 in 10,000 (which is reasonable), the whole product might only be 1 in 100, which constitutes the 1% which you have seen. Now this is not satisfactory and we feel that with good quality control you can come down to something like 0.1% — 0.2%. But to mislead yourselves into thinking that you will not get faulty units is just being unrealistic. Remember, though, that there are other features to be taken into account as well; you must only allow safe, sound apparatus on the market; you must prevent interference by the public; you must ensure that your earthing is good besides watching all the other factors that make for safety. In the Bureau itself we are trying to apply more control to appliances by applying more and more compulsory safety specifications but these all take time to come into effect.

I would like everyone here to examine the nuisance tripping (particularly that of stoves) and the reliability factor. I think it is the general consensus that there is very little nuisance tripping on installations themselves but this is very much in evidence in stoves, particularly in humid atmospheres; and these are the figures that we require.

Mr. J. A. Loubser (Carltonville) went on to say:—

onnodige onkoste.

Nog 'n rede waarom ek ten gunste is van die metode van mnr. van der Merwe, is dat in die afgelope tyd het ons baie moeilikheid gehad van mense wat die uitknikdrade afknip — gewoonlik kontrakteurs. Wat die huisbewoner betref, dink hy by het aardlekbeveiliging maar tot sy onsteltnis ondervind hy eendag 'n skok en hy ontdek dat die relê nie uitknik het nie. Eers dan (wanneer so 'n skok noodlottig kon wees) kom hy met die munisipaliteit in aanraking en as die bedradingsinspekteur die saak gaan ondersoek, vind hy die drade is afgeknip. So wat dit betref, wil ek definitief mnr. van der Merwe se idee om die relê's deur die Raad te laat installeer, ondersteun. Graag sal ek net van hom wil verneem wie die koste van die uitroep betaal indien 'n mens so 'n uitknik van 'n relê kry.

Ek stem ook nie heeltemal saam in verband met die

metode waar hy byvoorbeeld hierdie uitknikdrade laat afdraai en die stoom dan vir 15 minute warm-maak nie. Ek voel die Raad betree dan eintlik die pad van die elektriese kontrakteur. Sou dit nie in so 'n geval beter wees om net eenvoudig die drade, of alans die stroombaan, af te skakel, of die drade te diskonnekteer van die stoom af en dan net vir die verbruiker in kennis te stel dat hy asseblief moet sorg dat die stroombaan reggemaak word. Ek glo nie dit is die Raad se plig om eintlik uit te vind watter plaas van so 'n stoom foutief is nie.

Ook in verband met hierdie metode van kontrakteurs wat die relé's installeer, het ons baie dikwels in ons plaaslike koerantberigte geplaas waarin ons aan die verbruikers vra om asseblief hulle aardlek te toets om te verseker dat dit nog werk. Ek is bevrees dit het op dowe ore geval — die mense het nie gereageer nie. In daardie selfde koerant het ons ook probeer om aardlek te propageer — dit het ook op dowe ore geval. Wat wel waarde gevind het was die besluit van die Raad om lenings te gee aan privaat huiseienaars om sulke relé's te laat installeer — daarmee bedoel ek nou bestaande huise want by nuwe huise is dit in elk geval verplichtend.

Dan het ons nog die geval van kontrakteurs wat byvoorbeeld misbruik maak van die min kennis wat 'n verbruiker het. Onlangs het ek die geval gehad van 'n

Mnr. N. A. Potgieter (Standerton) stel die vraag of dit as noodsaaklik beskou word om sowel die stoom as die warmwater toestel deur middel van aardlek-relé's te beskerm.

Mnr. A. A. Middlecote (S.A. Buro vir Standaarde) antwoord soos volg:—

This is one of the questions we are examining on this committee. Here I cannot give a direct answer since there are several arguments both for and against. Some say you should give the best protection possible regardless while others maintain that some stoves on the market have a higher leakage and may lead to nuisance tripping. To date we have not been able to find any record of an

Mnr. J. G. Wannenburg (Dept. van Arbeid) lewer soos volg kommentaar:—

Ek het nou opgelet dat mnr. Middlecote elke skoot gepraat het van "Normally this, normally that, normally the other," en wat nou as die nie "normally" is nie?

Mnr. P. J. Botes (Roodepoort) gaan voort deur te sê:—

Jare gelede toe dit begin is met hierdie aardlekebeveiliging, toe dit op die mark gekom het, was ek ook vreeslik ontoestasties daaroor veral die installering van aardlekebeveiligingsrelé's. Ek het so ver gegaan om 'n skrywe te rig aan elke verbruiker waarin ek die gebruik van 'n aardlekreël aanmoedig. Iets soos 15,000 briewe is uitge-

Hy word gevolg deur mnr. J. K. van Ahlften (Springs) wat hom soos volg uitlaat:—

man wat 'n relé laat installeer het ongeveer 'n jaar gelede en dié het uitgeknik. Hy het die kontrakteur wat die relé geïnstalleer het, laat roep. Die laasgenoemde sê vir hom die fout is met die relé, dat hy 'n ander relé moet installeer wat hom 'n addisionele R30 sal kos. Eerstens, het daardie verbruiker g'n idee dat meeste van hierdie relé's is vir twee of drie jaar gewaarborg nie en, tweedens, was daar in elk geval g'n fout met daardie relé nie en die kontrakteur wou net op 'n maklike manier geld maak. Hy het op die ou end toe glad nie die relé vervang nie maar wel gesê dat hy dit vervang het. Gelukkig hou ons bedradingsinspekteur baie goeie rekord van die volgnommer van die relé's en ons kon dus die eienaar daarop wys wat die fout is.

Dan is daar nog 'n ander versoek aan die vervaardigers en dit is om relé's te maak vir groter installasies, ek bedoel nou grootmaatvoorsiening. Hulle maak wel aardlekebeveiliging wat groot aardlekstrome kan dra; dit is nou vir die beveiliging van die motore, ens., maar nog nie vir die beveiliging van die mense wat met hierdie masjiene werk, binne-in hierdie groot installasies nie.

Ook net 'n gedagte wat ek in Julie midde wil lê is „wat maak ons as munisipale voorsiensiers in die geval waar ons 'n hoogspanningsaansluiting aan sulke mense moet voorsien?”

Mnr. N. A. Potgieter (Standerton) posed the question as to whether it was considered necessary to protect both stove and geyser with earth leakage relays.

Mr. A. A. Middlecote (Bureau of Standards) answered as follows:—

electrocution from a stove as they are very solidly earthed whereas the apparatuses that give rise to accidents normally rely upon earthing through the three-pin plug and when that fails you have trouble. So it would seem that it is not really urgent to include the stove on the earth leakage system but it is still advisable.

Mr. J. G. Wannenburg (Dept. of Labour) commented:—

Ek wil dit net graag stel dat die Department van Arbeid se gevoel op die oombek is, „die hele lot — of niks!”

Mr. P. J. Botes (Roodepoort) continued:—

stuur en daar is o.a. gevra dat enige verdere nagrae persoonlik na my gerig kan word — ek was bereid om hulle te help. Maar nie 'n enkele persoon het my genader nie, van al die 15,000. Nee, wag, ek is miskien nie heeltemaal korrek nie, mnr. die President — één het my genader, dit was mnr. Wannenburg gewees!”

He was followed by Mr. J. K. van Ahlften (Springs) who said:—

Dit word nou vir my baie duidelik hier is 'n groot onsekerheid in hierdie saal wie is verantwoordelik vir die installasie van die relê. Mnr. van der Merwe het baie duidelik getoon dat dit op die Raad se skouers rus om die eenheid te installeer en in stand te hou. Mnr. Loubser het weer aan sy kant die onus op die kontrakteur geplaas. Nou my vraag is dat: „Wie is verantwoordelik vir die installasie van die relê?”

Aan die anderkant sê die Fabriekswet: „In 'n fabriek

Mnr. J. G. Wannenburg (Dept. van Arbeid) kom tussenbeide en sê:—

Op die oomblik gaan ek nie sê of dit moet Jan, of Pieter, of Koos wees nie. Wat my betref steun ek graag mnr.

Die volgende spreker is mnr. E. de C. Pretorius (Potchefstroom) en hy lewer die volgende bydrae:—

Hier reg in die begin van mnr. van der Merwe se referaat sê hy dat: „soveel nog van mening is dat ons alreeds genoeg verantwoordelikheid dra en nie nog die verbruikers installasie van aardlekrelê's ook op ons skouers kan neem nie.” Ek is een van hulle, mnr. die Voorsitter, en ek sal een van hulle doodgaan.

Alvorens daar nie wetgewing is nie en dit op Regeringsvlak (Staatsvlak), nie munisipale regulasies of provinsiale verordeninge nie, praat ons ons blou in die gesig oor wie eintlik verantwoordelik is vir die installasie. Ek, persoonlik, soos ek dit nou duidelik gestel het, is van mening met oortuiging (en as ek sê ek is oortuig, dan weet ek 90% van die mense wat hier is stem saam met

Mnr. H. Barnard (Brakpan) sê:—

Hierdie eenhede het al baie besprekings uitgelok en ek is ook nou direk betrokke by die ding. Ons het dit verpligtend gemaak in Brakpan en baie mense het vir my gesê: „Jy sny vir jou eie bas 'n lat,” maar dit is nou daar.

Die vraag van die verantwoordelikheid van hierdie eenhede het ook gereeld opgeduik. Mnr. Pretorius van Potchefstroom sê dit is oor sy dooie liggaam dat hy so iets sal laat installeer maar ek sien die saak so: Die eenheid word geïnstalleer om lewens te beskerm, nie om verantwoordelikheid op enige persoon af te druk nie. As die voorsiener, die Raad as sulks, 'n eenheid installeer, dan is daardie eenheid definitief nie sy verantwoordelikheid nie. Die Raad keur mos gereeld installasies goed wat geïnstalleer word (Skakelaars, verwarmers, stowe, ens.) maar die verantwoordelikheid vir daardie stowe en dies meer is nie die Raad as sulks s'n nie.

As daar bv. twee parallelle gevalle is van ongelukke wat voorgekom het as gevolg van elektriese skokke in huise, die een in Brakpan en die ander, kom ons sê bv. in Potchefstroom. In die huis in Brakpan is daar wel 'n grondlekrelê geïnstalleer maar in die geval van Potchefstroom is daar nie ene nie. Dan dink ek (ek praat onder korrektheid) dat die Inspekteur van Fabrieksaansake gaan met 'n beter

is die onus op die verbruiker.” Ek dink ons moet hierdie probleem eers oplos voor ons die saak enigiens verder voer, dat ons 'n duidelike verklaaring kry oor wie die relê's eintlik moet installeer. Is dit die voorsiener? Kom dit onder die Fabriekswet? Gaan dit by wetgewing gedom word, of hoe? Ek sou graag 'n bietjie meer inligting in hierdie verband van die Inspekteur van Masjinerie wil hê, indien hy dit moontlik kan gee.

Mr. J. G. Wannenburg (Dept. of Labour) interjected, saying:—

van der Merwe van Stilfontein dat die verantwoordelikheid moet wees van die munisipaliteit.

He was followed by Mr. E. de C. Pretorius (Potchefstroom) who said:—

my) dat dit die verantwoordelikheid van die verbruiker is.

Meneer van der Merwe en Loubser is in die gelukkige posisie dat hulle ingenieurs is van wat ons noem jong dorpe. Die inwoners van hierdie dorpe is, in my opinie, makliker gekondisioneer of geïndoktrineer as dorpe soos die oudste in Transvaal, Potchefstroom, waar mense 'n tradisie het wat honderd jaar terugstrek. As 'n mens iets op hulle wil afdwing gaan hy probleme kry, al is dit ook die Stadsraad wat dit doen. Daarom sê ek as daardie enigste verpligting kom vir die installasie van aardlekrelê's of as dit verkieslik is dat dit geïnstalleer moet word, dan behoort dit van Staatsvlak te kom; dit behoort ingeskryf te word in die regulasies van die Fabriekswet.

Mr. H. Barnard (Brakpan) said:—

oog kyk na die geval waar daar probeer is om so lëtj te verhoed as na die geval waar daar nie daarna omgesien is nie.

Een van die paar puntjies wat ek afgeskryf het so in die loop van die ding, is die toets van apparaat. Ek het baie moelijkheid ondervind met die apparate toe ons net eers begin installeer het; dit skop net eenvouding links en regs uit. Die onus in Brakpan is op die kontrakteur maar ek het toe self na verskeie van die vervaardigers gegaan en hier wil ek hulle werklik ernstig aanval. Die metodes wat gebruik word om die goed te vervaardig en te toets is nie voldoende nie. Eintlik is daar omtrent vier of vyf vervaardigers maar ek glo nie daar is een van hulle wat hierdie goed onder vragomstandighede toets soos dit wel in 'n huis gebruik moet word nie. Die normale manier wat hulle hom toets is om 'n draadjie deur die koord van hierdie relê te sit en dan 20 m.A. daardeur te stuur. As dit dan werk, is dit korrek en as dit nie werk nie, dan word dit gestel totdat dit dié sensitiwiteit het. Wanneer daar egter 'n vrag daarop gesit is, sien 'n mens dat daardie 20 m.A. verskil soos wat die vrag verskil. As gevolg daarvan vind 'n mens baie groot variasie in die toetse wat voorgeskryf is daarvoor.

Dan kom ons by die diskonnesie van die eenhede.

Dit word net eenvoudig nie toegelaat nie. As daar engins 'n kontrakteur uitgeroep word, kry hy 'n telefoonoproep dat hy nou moet kom kyk want iets het uitgeskop. As hy daar kom en daar is 'n stroombaan of wat ook al foutief, word hy nie toegelaat in Brakpan om die grondlekrelê te dissonneer nie want dit is in ons by-wette aangebring. Hy word net eenvoudig gedwing om die foutiewe stroombaan te soek en te dissonneer. As die hele installasie uitkop op 20 m.A. dan is dit (volgens die Blou Boek) al genoeg grondlekkasie op die installasie waar jy dit in elk geval moet dissonneer, of jy nou 'n relê in sou hê of nie.

Ek dink mnr. van der Merwe van Witbank het hier genoem die bearding van die neutraal na die grondlekrelê. Nou sover ek weet (ek praat onder korreksie) word dit nie toegelaat dat die neutraal geard word aan die verbruiker se kant nie. Volgens die Blou Boek moet die neutraal geard wees aan die voorsiener se kant, so daar kan nie moeilikheid daar kom as die installasie reg opgekoppel was nie.

Dan is daar 'n ander probleem wat ook opduik in verband met die beskerming van lewens. Ek het al baie daarvoor gewonder en ook selfs gepraat met van hierdie vervaardigers. In Brakpan is daar nog geweldige baie bogronde geleiers en ek glo daar is baie ander dorpe wat met dieselfde probleem sit. In meeste van die gevalle waar daar 'n ongeluk gebeur het was dit veroorsaak deur kinders wat op die dak gespeel het. Die geleiers na die dak toe was verveer en daar is twee of drie gevalle van elektroksie gewees. Kan 'n mens nie 'n installasie beskerm van die pale af na die huis toe nie met 'n grond-

Mnr. F. J. van der Merwe (Stilfontein) antwoord soos volg op die bespreking:—

Net in verband met mnr. Loubser se vraag oor die kwessie van wie die koste dra van die uitroep. Ons beskou dit as 'n diens aan ons verbruikers en gevolglik dra die Raad die koste.

Mnr. Potgieter het gevra of dit werklik nodig is om 'n stoof of 'n waterwarmer te beskerm. In verband daarmee wil ek net hierdie voorvalletjie vir u aanhaal:—

Dit het daar by ons plaasgevind in 'n huis waar daar nie aardlekbeskerming was nie. Die kombuis is redelik klein in daardie betrokke mynhuise en daar is gevolglik toeval ook in die kombuis gestaan met spasioe genoeg omtrent tussen die stoof en die yskas (die yskas het per

Die President open die algemene bespreking oor die oggend se referate en mnr. P. J. Botes (Roodepoort) lewer soos volg kommentaar:—

Dit is 'n baie interessante referaat of bydrae van mnr. Frantz en mnr. Lombard oor die kwessie van produktiwiteit. Ek het nou eintlik vanmôre gekom om te kom kyk of iemand nie my probleme vir my kan oplos nie, maar ek is eintlik teleurgesteld want u sien my lenings-program vir volgende jaar is vierkeer so veel as wat dit hierdie jaar is; nou die laaste week het my personeel gedaal met

lekrele wat op die paal gesit is maar wat van die huis af beheer kan word of soortgelyk? Dit sal miskien die feit dat daar lewens geneem word op 'n huis se dak, uitskakel.

Daar is ook op die mark eenhede wat die „de-sensitizing” stelpunt aan hom het. Baie is al gepraat oor daardie eenhede maar ek voel dat die waarde wat daaraan gegee word van 250 m.A. is nie korrek nie. Om dié rede, ek was eenkeer by een van die plekke gewees wat die goed vervaardig en die bogenoemde waarde word nie eers getoets nie. Ek meen dit is nie eers onder die standaardtoets wat die vervaardiger uitvoer nie. Een wat getoets moet word het eers uitgeklink op amper 500 m.A. so daardie waarde wat daar aangegee word op dié tipe is heeltemal buite die kwessie en hulle word net eenvoudig nie in Brakpan toegelaat nie.

Aangaande die vraag: „Is dit nodig om die stoof te beskerm?” My sienswyse is dat dit baie, baie noodsaaklik is. Ons het self 'n stoof wat se plate spiraal-vorm is en as dit skoongemaak word, dan word daardie plaat opgelig, die bakkie binne uitgehaal en die bediende moet haar hand daarin steek om skoon te maak. Net binnekan hierdie plaat is daar lewendige drade en as die drade per ongeluk omgeruil is (die neutraal en die lewendig) sal dit nie onder normale omstandighede uitkop nie maar sodra 'n mens peuter met die stoof of dit skoonmaak sou dit wel lewensgevaarlik kan wees.

Die element binne-in die stoof self, die trek uit as dit op 'n lae hitte aangeskakel is en jy trek hom uit. Dan kan 'n mens ook in die moeilikheid wees daar.

Mr. F. J. van der Merwe (Stilfontein) replied to the discussion as follows:—

vir 'n persoon om deur te kom. Die dame van die huis het dié aand aan die stoof geraak en sy raak terselfde tyd aan die yskas en daar sit sy vas. Gelukkig was haar man byderhand en hy het haar toe darem los gekry. Die volgende dag het ons toe gaan ondersoek instel wat die rede hiervoor was, toe vind ons wel daar sit 'n aarddraad aan die stoof maar dit loop toe baie mooi netjies buite-kant toe en is net aan die geute gekoppel — geen bearding terug na die hoofarde toe nie! Daarom dink ek dit is werklik noodsaaklik dat 'n stoof wel beskerm moet word.

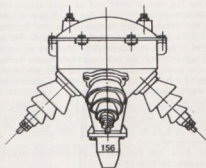
The President opened discussion on the morning's papers in general and Mr. P. J. Botes (Roodepoort) commented as follows:—

25% en ek moet vierkeer so veel werk uitvoer! daar is ook min hoop dat ek meer personeel sal kry.

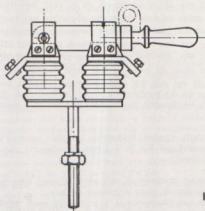
Die gebruik van masjinerie is 'n groot hulp maar word beperk waar daarvan gebruik gemaak word in kliprant en om 'n kombinasie van masjinerie en 'n goeie hand-arkbidskrag daar te stel is nie 'n oplossing van die probleem nie. Gewoonlik werk dit in die hand een masjien

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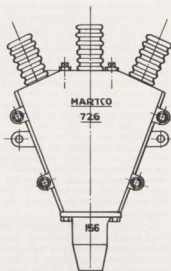
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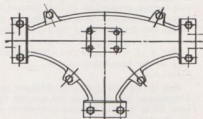
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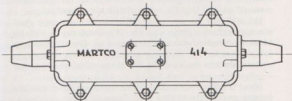
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wat nie voltids gebruik kan word nie en dan is daar die gewoonte van voormanne, wanneer daar hierdie kombinasie is, om maar liewer gebruik te maak van hande- arbeid om hulle besig te hou en dan bly die masjien staan en jy kry nie produktiwiteit op daardie masjien nie. Aan die ander kant wanneer daar net een masjien in werking is, raak dit makliker onklaar en dit werk ook ontwinging in die hand.

Ten slotte kom die volgende bydrae van mnr. A. M. S. Kenneth-Watts (Dept. Pos- en Telegraafweze) :—

One of my observations here this morning is the difficulty that municipalities have, working alone, in obtaining the number of aids available to a central organisation like ours. Take for example, the problem of training: not only must the engineer at the top be kept up to date but this must apply at all levels and this is where the stumbling block is. The difficulty lies in trying to get people of the foreman level, particularly those that are rather old-fashioned in their ideas and have worked there for many years, to be more productive and to come round to our way of thinking.

Then there is the question of training lower down the line and being on the look-out for new techniques. A lot of engineers do not realize the actual job of the man at the bottom may only be putting in bolts but the mere fact of doing so in a different way might increase his productivity and these factors should not be overlooked either.

On the subject of transport, we, of course, tend towards giving a man transport who can justify its usage and I think that is a very good thing. If a man requires to cart round a lot of gear to do his job, a lot of time can be needlessly wasted in waiting around trying to share transport instead of giving him a properly equipped truck.

Another thing we find well worth the expense is the equipping of vehicles for a particular job instead of having the simple truck.

When it comes to the question of mechanical aids, I feel a lot could be done towards some form of pooling. We use this system and have found it is far better to have a good mechanical aid part of the time than merely having a type of all-purpose tool that really does not achieve very much on its own. These aids, however, have

Die President sluit die ogendsitting af deur sy waardering uit te spreek teenoor die skrywers van al die referate en teenoor die groot aantal sprekers wat meegehelp het om die sitting so interessant te maak.

Die President stel Mnr. S. J. Liebenberg (Elektro- niese Hoofingenieur, Departement Bantoe-administrasie en Ontwikkeling) aan die aanwesiges voor en hy liewer sy referaat onder die opskrif „Elektrifikasie van die Bantoe- tuislande“ wat in die Verrigtinge van die Vereniging vir 1968 gepubliseer is.

In sy inleidende opmerkings verwys die President na

Ten einde wil ek net graag melding maak van die stel- ling van mnr. Frantz dat „by 'n munisipale onderneming wat nie self krag ontwikkel nie, ongeveer 50% van sy jaarlikse rekeningsuitgawe op arbeid is.“ Ek wil hom net verseker dit is verkeerd want kyk die aankoop van stroom van Evkom is meer as 50% van hierdie rekening; en ar- beid, sal ek maar raal, is in die omgewing van 40%.

The following final contribution was by Mr. A. M. S. Kenneth-Watts (Dept. of Posts and Telegraphs) :—

got to be robust and one needs to understand in detail the conditions under which they have got to work. In South Africa, particularly, the soil conditions vary enor- mously; you get sand on the Cape Flats; ouklop and all types of rocky outcrops in the Highveld and you need a different type of mechanical aid to handle each class of application. We have had great success in the use of tractors to help our digging process. We tend, in cable laying, to use one of these farming sub-soilers drawn behind a tractor and in that way we have been able to cut out digging labour by as much as 50%. Of course, you cannot avoid the use of compressors now and again but this sub-soiler is really worthwhile in the Transvaal.

As regards the control of productivity, I feel that here a system is essential. Records are very important, quite apart from the engineering methods involved, and the end-result of productivity amounts to cost-consciousness and for that we have got to have figures and try to develop them.

Other suggestions for record purposes that I can think of are the record-keeping of types of apparatus that one requires; to maintain; to have a knowledge of their fail- ures, the parts of the gear that give trouble, so that these things can be sorted out when necessary, when other similar gear has to be purchased at a later stage and also to clear up difficulties with contractors. I feel in many aspects of the power field one has to rely (through lack of this very information) on the experience of people overseas where conditions are not necessarily the same as ours. Although this record-keeping may sound like a lot of work, there may be cases where a municipality could make use of a centralized computer, punched card or other system that it has for its own accounting purposes and I feel a step towards that would help a great deal.

The President concluded the Morning Session by express- ing appreciation to the authors of all papers and to the numerous speakers who had helped to make it so interesting.

The President introduced Mr. S. J. Liebenberg (Chief Electrical Engineer, Department of Bantu Administration and Development) who presented his paper “Electrifica- tion of the Bantu Homelands” which was published in Volume (1) of the 1968 Proceedings of the Association.

In the introduction, the President referred to the fact

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die feit dat, by die 1960-Konvensie in Durban, die kwessie van die elektrifikasie van Bantoeuise en Bantoeorpe in besonderhede behandel is, maar die Uitvoerende Raad was van mening dat, met die oog op die ontwikkelinge wat sedertdien plaasgevind het, die tyd aangebreek het vir die Vereniging om weer oorweging aan huidige praktyke te verleen.

Mnr. Liebenberg vul sekere aspekte van sy referaat soos volg aan :—

We in the Bantu Homelands are doing nothing that you might call "spectacular" or out of the ordinary. We are following well-defined and well-established lines, technically speaking and although we have certain problems which are peculiar to the task, we have to try and meet them in the best way possible. I will give you a few indications of what we do in that respect as I proceed.

I must admit that this morning I missed some of the preliminaries but I think that the choice of papers for this session has been a very fortunate one. It all seems to dovetail very well and handles matters that are of particular interest to my subject. Due to a lack of staff, and a lack of depth in the mass of the population, we find it very difficult to apply some of the things that are common in townships and it's going to be quite useful to me to be able to pass on to my staff, and they in their turn to others, what has been said here.

You speak of the Bantu Homelands for the first time; as I've said before, that is an interesting point because the 'Bantu Homelands' is a name which we as a Department, apply to what is our territory. Other people may use rather derogatory terms for exactly that entity but, regardless of that, they are still the Bantu Homelands.

On page 2 of my address I speak of the relatively small number of people responsible for this task that we have. I think that this smallness or lack of staff is even more pronounced than in most other enterprises.

The reason for this is that, as you know, Civil Service salaries are not quite on a par with the private sector. You have all no doubt seen the recent report by the Professional Engineers' Association which shows a big disparity between professional and service salaries but the peculiar thing is that the Service seems to be a poaching ground for many other avenues of activity. This applies not only to engineers but to civil servants as a whole.

You may not realize that the Civil Service as such gives very good training; it has very good courses, and many people in the Civil Service are trained to a degree to which they are not trained in the private sector, with the result that there is a continual draining away of civil servants into the private sector. This also applies, curiously enough, to Bantu. We find that in respect of training Bantu (of which we have done a good deal), we have no sooner trained one to the point where he is really quite useful, than he is drawn away out of the Homelands into the White area again, either by private contractors or municipalities, the less said about the latter the better.

Earlier on Mr. Leishman was saying to me that there were difficulties involved in the use of Bantu electricians

that at the 1960 Convention in Durban, the subject of electrification of Bantu houses and Bantu townships had been dealt with in some detail, but the Executive had felt that with the developments which had taken place in the intervening years, the time was opportune for further consideration of current practice by the Association.

In augmenting certain aspects of his paper, Mr. Liebenberg said :—

on building work in the White areas. I don't want to go into the matter any further than to say that we have found this to be the case. Now to counter this and also to futher the training of Bantu (a subject which I fortunately missed this morning) there are going to be certain changes which I hinted at on page 3 of my address.

I don't know how many of you read your newspapers carefully or whether your interest sometimes causes you to skip over items that are not of immediate interest to you, but in the Rand Daily Mail of yesterday, Wednesday 8, there appeared an article headed, "Homelands Raise New Training Challenge". This article indicates that the Secretary of Bantu Education was referring to the great need for training more artisans, technicians and people with trades (parametrical workers?) and so on rather than 'white-collar' people of whom there is already a surplus. He indicates that they are going to introduce a bill during this session of Parliament, the contents of which I cannot discuss with you, but which is going to have a very profound effect on the training of Bantu in the Homelands.

You may perhaps know that the idea is to develop these self-governing authorities very much along the lines of the Transkei, with their own separate departments. In the Transkei, for instance, they have what is known as the Department of Roads and Works, which is more in line with what we are discussing this afternoon. The staff-structure of such a department is based actually on the ultimate filling of all posts by Bantu. We all know that it will take time, how much time I do not know, before enough Bantu are trained, and trained in the required directions to be able to fill posts such as even top engineering posts, but the fact is that many posts are on the artisan or foreman level. In all these authorities (and quite a number of them are coming into being at this very moment) these posts are being held open for Bantu. In the meantime, Bantu are being trained by the White staff that we do have, to show their worth. This is a very important consideration because a Bantu or any human being may have gone through an academic career and have all sorts of certificates behind his name, but they might not in practice have the character and the necessary qualifications to make them :—

- (a) good reliable workmen or
- (b) good supervisors, or both.

In our organisation, i.e. Bantu Administration, we already have posts for Bantu foreman and what we call sub-superintendents. The way this works is that we have a few people of the foreman or super-foreman class who issue work to groups of Bantu, some of whom are sub-

superintendants, some foreman; each has his working group and it now emerges that we can leave these people, in most cases, to do work without supervision by Europeans for six weeks to two months, even longer. In other words these itinerant inspectors who cannot be everywhere all the time, have to dispose their time in such a way that they touch at the focal points but these contacts can only be occasional.

The results we have achieved are, in my opinion, extremely encouraging. As I have indicated in this address, we actually use Bantu on 11 KV as well as LV work; we use them on buildings — we've done quite ambitious buildings with Bantu wiremen — and so forth, and I think the possibilities are there of working up a tenable working force which will support the idea of the Bantu Homelands, because without the support from within the Bantu for the Bantu Homeland idea, the thing must collapse. However, I personally do not think that it will collapse but I do think that we who are prepared to make it work, must do all we can to ensure this and, as far as we ourselves are concerned, we most certainly will. We have had help from various directions, from both the private and municipal sectors, for which we are very grateful and I'm sure that in the future we can look forward to further collaboration from these quarters.

This question of human acceptability is something which is engaging our attention more and more. At one stage we were busily going ahead doing all sorts of things; giving all sorts of facilities, building towns, providing sewerage schemes, expensive machinery and so forth, but it soon appeared that that was only part of the story that we had to look at. To prepare the human being for able administration of these things is actually a far more important and difficult task than the technical one. I find myself that if we give a Bantu something like a tractor to operate or maintain, he can do so relatively well after the initial training, although I don't think our training is as satisfactory at this stage as it might be — again due to the fact that the territory is too big and the hands too few. On that basis, when a man deals with something concrete that he can see, like a tractor, he can do quite a reasonable job, but when he deals with something which is invisible, like electricity (except in the form of light), there are problems and one of the problems we have found with Bantu is that they are not at this stage able to handle industrial gear. I don't quite know when they will be able to do so but this inability of theirs is going to be the real knot in the whole procedure. The wiring, linesman work, is not at all difficult for them except that, once again, one has to sort out the people that you're using. I seem to be dwelling considerably on this aspect rather than on the technical side because I feel that it is really of more interest to you than the technical side, which you already know.

Going on to something else: we do, of course, have problems which are not necessarily found in the private sector. Take, for instance, the question of productivity which was raised this morning: we are not interested in productivity in the sense that we want the fewest hands

to do the most work — one of the Department's prime objectives is to find work for the people and for that reason we use handwork as far as we can even when it may sometimes appear ridiculous. If you consider the problem involved in finding work for all the BANTU THAT ARE THERE AND THAT ARE COMING (as you know the birth rate is on the up and up), you will realize that we've got to plan very well ahead.

This is where the idea of Border Industries and other industries comes in. We'll have to do far more than that, but you know, "Rome was not built in a day" and I personally am very satisfied with the progress that has been made so far in the face of all the difficulties of the past. I think an excellent job has been done but, as I say, we're not so much interested in productivity as such.

To ease the problems of the Bantu we've done something else which is perhaps not altogether standard in that we've standardized as far as possible on the type of installation. I don't think I need to elaborate very much on this subject as most of us realize what standardization means to people of that type. At the moment we depend largely on these itinerant groups, at any rate as far as supervisors are concerned, and for them it is particularly advantageous to be able to go from one town to another and find a similar installation to that in the last town. This has helped us to bridge many problems that might otherwise have arisen and although we don't want to become absolutely rigid and are using other people who have free rein in their ideas, we still feel, nevertheless, that standardization is something we must apply as far as possible, if not on a country-wide basis, then certainly on a regional one. When I say "regional" I include such divisional sections as the Northern Transvaal, Western Transvaal, Natal, Port Natal and the Ciskei. South West Africa though technically a region, falls under South West Africa and we treat it as such. We might in the future go on to standardization within regions but at the present we have gone for it on an overall basis, except for these isolated cases mentioned in my address, although they are major cases.

We come now to just one other aspect which I think is one not only always completely understood and that is the question of domestic facilities available to the Bantu. Although street lighting is our first consideration, as well as the provision of power to public buildings and services such as sewerage, water pumping etc., we've endeavoured everywhere to provide limited domestic power supplies. But this latter question is not quite clear to us at this stage and I've requested assistance from those more experienced in this. We feel that in many cases Bantu are not yet earning sufficient to sustain on an even partly economic basis, general provision of domestic services and for that reason we've withheld it except in exceptional cases where the Bantu is able to afford his commitments.

I feel, I may have said too much but forgive me if I've said too little.

There will, no doubt, be an opportunity to expand on any aspect which might interest you particularly. I must

point out, though, that as engineers or people in official positions in municipalities, you'll understand what I mean

Mnr. P. A. Giles (Oos-Londen) open die bespreking deur te verwys na die Mdantsane-bantodorp in die distrik Oos-Londen, ten opsigte waarvan sy Munisipaliteit as die agent van die Departement Bantoadministrasie aangestel is om die distribusie van elektrisiteit waar te neem. Die omvang van hierdie projek blyk uit die feit dat Mdantsane uiteindeelik uit sowat 18,000 huise sal bestaan, soos vergelyke by 17,000 in die huidige munisipale gebied van Oos-Londen.

Mnr. Giles gaan voort deur te sê :—

Obviously, as Mr. Liebenberg has said, the overall or future planning has to be taken into account when the area is laid out and in that case we are very much in the hands of the town planners, who are in the Bantu Homelands as much as they are in the municipalities. They seem to take a delight in curves and variegations in the roads and the disposition of the houses plus any number of confusing ingredients. In the East London area they've divided the whole section into six neighbourhood units (I suppose it is considered people live most happily when separated from one another) and they've followed the contours of the ground and they've got the whole lay-out in curves and every conceivable way of frustrating our objects of economical distribution.

In accordance with standard practice, there must be a masterplan of some sort and that plan has been provided and is based on the maximum possible continuous supply using underground cables, brick sub-stations, LV overhead distribution lines and underground connecting cables to the houses. That is probably a standard feature with which we are all familiar in our work with the municipalities, but the course of events show (as Mr. Liebenberg indicated in his address) that the earning power of the Bantu tenants was too low to sustain the revenue required to provide electric power and lighting in the dwelling houses. It was, therefore decided to commence operations within framework of the main plan and to provide three-phase overhead lines and pole-type sub-stations.

The idea was then that this would be easily convertible later on if the need arose for such a conversion to a masterplan. It was essential, of course, in this developing stage to balance the minimum capital expenditure with reliability and with ease and cheapness of maintenance. A flexible system which could be supplied by the anticipated revenue and developed as the need arose, was an important feature of this early stage of development. Also careful timing and programming of work was developed to meet the objective because the Bantu Department, I think, like the municipalities, suffers from periodic shortages of cash, and finds it very necessary to limit expenditure to so much a year, leaving some balance for the

Mnr. G. Masson (Johannesburg) dra die volgende opmerkings tot die bespreking by :—

when I say that I can only answer questions within the limits of technicalities and not political ones.

Opening discussion, Mr. P. A. Giles (East London) referred to the Mdantsane Bantu township in the East London district for which his Municipality had been appointed agent of the Bantu Administration Department to carry out the distribution of electricity. The magnitude of the project was indicated by the fact that Mdantsane will ultimately consist of 18,000 houses against 17,000 in the present Municipality of East London.

Mr Giles continued :—

following year.

One of the essential features of the timing was the need to avoid incurring expenditure until it was substantially established that the work was indeed essential. The first essentials (as Mr. Liebenberg indicated) were water and sewerage pumping; building construction workshops, administration buildings; street lighting and the present loading for a network of 3,100 poles and 1,700 fluorescent lamps (2 x 40 watts) is 360 kVA. Now I know that that sounds a very small development for such a large area but of course, the houses have been excluded — in the masterplan the houses were put down as an approximate loading ultimately of 1 kVA per consumer.

There are 6000 dwelling houses within the total network and 2000 of these will or can be supplied from a single-phase from the existing pole-type transformers. As a larger number of houses take supply the pole-type transformers are expected to be replaced by the 'package' sub-stations (I won't mention the trade name!) and the low voltage of supply is sectionalised in each section and the HV supply is by radial feeders.

This is the most simple system of supply that we can have. It combines both safety and simplicity for the time when maintenance of the network will be carried out by the Bantu electricians. This consideration has been an important feature both in the design and the selection of the materials and it's quite amazing to find that one can avoid the very sophisticated articles and get a very simple one that works quite safely and the Bantu understand it. The Bantu is a great fiddler by nature and if he pushes a thing forward and you don't want him to push it backward again, you have to prevent it by mechanical means.

The only realm of great saving in this scheme was that the original scheme was planned with copper and was eventually changed over to aluminium, both on the overhead lines and in the cables.

Another point where we've gained considerable experience is with fluorescent lamps and that experience is sufficient to warrant us taking another look into the future and going for 80 watt high-pressure, colour-corrected mercury lamps.

Mr. G. Masson (Johannesburg) made the following contributions :—



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In sy referaat het mnr. Liebenberg gevra om inligting betreffende die opleiding van Bantoe draadwerkers in Johannesburg. Die volgende word verstrek :—

(a) Algemeen.

Nadat die Stadsraad in 1962 besluit het om 'n skema vir die opleiding van Bantoe draadwerkers te onderneem, is toestemming verkry om sogenaamde opleidingsklasse by die Dube-beroepsopleidingsentrum te reël. Hier ontvang die studente onderrig in bedrading, werkwinkel-opleiding sowel as handelsteorie en elektrotegniek om hulle in staat te stel om in die vak „Elektrisies II" te slaag.

Die minimum-vereiste uit toelating is die Junior-Sertifikaat. Na die suksesvolle voltooiing van die kursies by die Beroepsopleidingsentrum, word studente in die Elektrisiteits-afdeling se diens geneem vir 'n tydperk van drie jaar vir praktiese opleiding.

Die getal studente wat jaarliks opgeneem word vir praktiese opleiding, word beperk deur die fondse beskikbaar vir bedradingswerk en die getal gekwalifiseerde draadwerkers beskikbaar vir die studente se onderig. Tot dusver was ons nie in staat om alle studente wat die voorbereidende kursus voltooi het, op te neem nie. In 1964 kon ons agt kwekelinge plaas, een in 1965, vyf in 1966 en agt in 1967.

Die eerste nege Dube-studente wat ons in diens geneem het plus een wat sy opleiding op Vlakfontein gekry het, het die Elektriese draadwerkerseksamen geslaag en is nou in besit van 'n draadwerkerslisensie.

(b) Lone.

Die werksure is 46 ure per week en die loonskaal is soos volg :—

- (i) Eerstejaar-kwekelinge in besit van 'n Elektrisies II-sertifikaat — 24 sent per uur.
- (ii) Kwekelinge wat 2 jaar diens het en 'n bekwaamheidsstoets slaag ontvang 28 sent per uur.
- (iii) Kwekelinge wat na drie jaar nog nie in besit van 'n draadwerkerslisensie is nie, ontvang 32 sent per uur.
- (iv) Bevoegde draadwerkers ontvang jaarliks die skaal R1,056 x R48 tot R1,200 x R60 — R1,260.

(c) Pliete van Bantoe-draadwerkers.

(i) Onderhoudswerk.

Instandhouding van bedrading van 9,000 munisipale huise, administratiewe geboue, hostelle, winkels, „biertuine" ens., vereis die voltydse diens van een bevoegde draadwerker.

(ii) Konstruksiewerk.

Die kwekeling is verantwoordelik vir die bedrading van huise en munisipale geboue, die afmaak van dienskabls en die oprigting van meters. Dienskabls word deur Bantoe-arbeiders onder toetsing van 'n blanke persoon geleë.

(d) Meterlesing.

Sewe Bantoe-meteropnemers is verantwoordelik vir die lesing van die bestaande 20,000 meters in Soweto (die Johannesburgse Bantoegebied). Meters word gebruik weens die sterk teekanting van Bantoe-verbruikers teen enige stroomgrensoewer.

Mnr. Liebenberg en mnr. Giles het gevra omtrent die-

gene wat dit nie kan bekostig om elektrisiteit te gebruik nie: Ons het om en by 4½% van die huise wat ons bedraad het wat nog nie van elektrisiteit gebruik maak nie. Dus in een van die so-te-sê sub-ekonomiese dorpegebiede (en ek dink dit is weens die ekonomiese faktor dat hulle nog nie daarvan gebruik maak nie) vind ons dat die lading naasien by 0.5 kVA a.d.m.d. is.

Mnr. die President, mnr. Lombard het in sy referaat gepraat van die nodigheid om ongeskoolde werkers te gebruik. In die Bantu townships die shortage of really skilled workers and the growing reticence of scarce White labour to fulfil these functions in these townships make it imperative to use Bantu labour and if we are to get our work done, it will be necessary to take advantage of every aid available.

It is agreed that there is no legal obstacle to the indenturing of a Bantu as an electrician, but I wonder if the scope of work available in an urban area Bantu township is wide enough to permit satisfactory training?

It is agreed that students who have received the basic electrical training and have acquired an NTC II certificate or gone further and obtained a wireman's licence, are capable of performing certain types of distribution work in Bantu townships if they are given the approval of the Department of Labour, after having received the necessary training. At present the attitude of the Department appears to be that a competent person can only be one who has had a course of six years training or has served an apprenticeship plus one year's appropriate experience.

The Johannesburg City Council is anxious to train a Bantu standby staff to be available after normal working hours to attend to consumer's complaints, street lighting and power failures, particularly those caused by vehicular damage. To qualify them for this work it is necessary to give them training in low voltage overhead and underground cabling construction and maintenance as well as the operation of a low voltage overhead reticulation network. It is considered that the training periods required to make them competent in this class of work should be :—

- (i) Bantu who are licensed wireman in terms of the Electrical Wiremen and Contractor's Act, 1939 — 2 years.
- (ii) Bantu who have completed the training period prescribed in Clause 10 of the Bantu Building Workers Act, 1951, but have been unsuccessful in the examination for the Electrical Wiremen's Licence — 3 years.
- (iii) Bantu who have no training whatsoever — 5 years.

Whilst it is agreed that a Local Authority can give a Bantu sufficient training to qualify him for the designation "competent person" it seems unfair that he should be required to take such a long course without a recognized trade qualification as a goal.

Apprentices and registered trainees are supervised by competent persons and it is recognized that they must of necessity come into dangerous proximity to live equipment during training. An accident to an unregistered per-

son employed on similar work could possibly result in legal action against the responsible certificated engineer. It might be said that the training of unregistered Bantu

In 'n oorsig van die posisie in die Durban-gebied, sê mnr. R. M. O. Simpson (Durban) :—

We work on simple principles but the whole township is laid out on the basis of ultimate full development; in other words, the siting of the kiosks or transformer positions, the laying of EHT cables etc., follows a pattern that can easily be adopted in future to meet the requirements of full reticulation to these townships.

Another aspect that we've paid particular attention to in Durban is the fact that in an integrated area, from grounds of economy, it's very often preferable (or will be preferable as these areas develop) to be able to interconnect through the township instead of always having to come back to your supply point and keep that particular area isolated from the rest. Our arrangements with the Department of Bantu Development have allowed for this. To date we haven't required to use it because the area is a little isolated.

A further aspect is, as I mentioned this morning, the maintenance of these townships and, for that matter, even the extensions. We've got to do more than we are doing at present in the training of Bantu. We're simply not getting enough of them and there's no doubt about it, the present lack of definitive directive as to how far one can go, is hindering the training of Bantu. I was very pleased to hear Mr. Liebenberg say that there are very interesting developments pending because I personally have been pushing very hard for a long time now to get something more positive to overcome the problems that are going to beset us; particularly the one I mentioned this morning where your White electricians are quite willing to cooperate but (following on Government policy) they do want segregation and once the Bantu start to work in these areas as trained men, they say they must leave as workmen and will remain as supervisors only. From this it is quite obvious that it will be ineffectual to train two or three at a time or simply train them as wiremen and

Met verwysing na die posisie in Vanderbijlpark, laat die President hom soos volg uit :—

We have about 1,500 houses at the moment in Vanderbijlpark that are completely wired, in fact we have had for the best part of 15 years — four lights and two plugs per house, but the amount of illegal wiring found in these houses is terrific. We find that as the standard of living of the Bantu rises so he acquires various articles and appliances and illegal wiring then takes place. In the new area which we are administering for another authority, there will probably ultimately be about 60,000 houses and we're faced with this problem of whether or not it's possible, when doing electrical installations in houses on a fairly large scale (when you start bulk buying), to find

should be restricted to new construction which has not yet been energised but such training would not be adequate for training the Bantu standby staff envisaged.

Reviewing the position in the Durban area, Mr. R. M. O. Simpson (Durban) said :—

nothing more. They've got to be trained as electrical workers (I won't call them electricians) so that they can carry out maintenance on the main items of plant in their establishments.

There is always difficulty in getting somebody to go out at night and one cannot blame the men. I've gone into the townships myself at night to try and encourage them but one can't hold it against them because accidents do happen. They don't like working in those areas at night and the only way to overcome this is to train enough Bantu to take over. This means that when we start an area I would probably want somewhere in the region of 20 straight away otherwise I'd be stuck high and dry with nobody to do the work.

Apart from that aspect, another factor which I think is very restrictive in trying to interest people in this type of work, is the fact that having obtained their J.C. they have to work for a further three years at present before receiving any pay, unless somebody sponsors them. It is unreasonable to expect these people to virtually train themselves before they are given a job. They simply can't afford it.

I would further like to suggest that, when these matters are considered, particularly in legislation form, we get the perspective of a wireman and an electrician onto a proper basis. At the moment there seems to be more prestige in qualifying as a wireman and that seems to be the ultimate goal of every Bantu electrical worker. While they must do that, I think we've got to give them more so that at the end of their period of time they can attain some status in addition to that; in other words, we've got to give them status for other work, otherwise we may tend to let down the other sides such as cable jointing and associated work, to the general detriment.

The President referred to the position in Vanderbijlpark as follows :—

a 15 or 10 amp earth leakage relay to replace the main switch and circuit breaker simultaneously in order to overcome the dangers associated with this illegal wiring. I think the possibility is not quite as remote as it would at first appear when one talks of an earth leakage relay in the vicinity of R26 — R30. I've also had recent information that a fairly extensive scheme of house-wiring was done by a contractor for under R30 i.e. including four light points, two socket outlets, the distribution board and the overhead service. This is certainly a marvellous achievement and I'm still looking into the figures myself to see whether they're absolutely correct. I think it would

be really worthwhile if we could save on the main circuit breaker with an earth leakage relay costing only

Voortgaande sê mnr. R. M. O. Simpson (Durban) :—

I wasn't referring to the individual wiring of houses. I think the information you mentioned there might have come through from the Durban area; in an Indian township and 1,200 houses that we've wired in a Bantu area, we've installed the wiring on a contract basis at approx. R30 per house, excluding the service cable. It was accomplished by virtually doing away with the need for distribution mains inside the house itself. We designed a cast-iron distribution-cum-meter-box to fit into the kitchen and with the aid of the architect putting the kitchen in the right place, we were able to bring the cable straight in to this cast-iron box built into the wall, fit the meter and place the distribution board with two 15 amp plugs (one suitable for a stove) on the other side of the box. If the Bantu wanted a proper stove point for larger than 15 amps, he could have it done at a very low cost right on the spot. The distribution takes place from this distribution board and it is only in this way that we've got these prices down.

Just one other comment on this question of wiring — of providing Bantu domestic supplies: I'm not altogether in step with Mr. Liebenberg when he states that they can't afford it. I think it very possible that if a survey were carried out (I'm not talking about the Homelands as such

Mnr. D. S. van der Merwe (Witbank) verwys na die administratiewe koste van 'n skema en voeg daaraan toe :—

„Eerstens, kan ons syfers daarop kry en, tweedens, hoe werk die skema in sy geheel? — ek bedoel nou in die

In antwoord hierop sê die President :—

In ons geval is daar meters geïnstalleer nadat ons oorspronklik begin het met stroomverbrekers op 'n beperkingsbasis, maar dit het net nie uitgewerk nie. Die Bantoe in die gebiede naby die blanke gebiede wil niks minder hê as wat die blanke het nie. Dit is 'n eienaardige verskynsel maar hy is net nie tevrede daarmee nie — hy wil ook sy meter hê.

Die bespreking word afgesluit met 'n mosie van dank aan mnr. Liebenberg en met sy verwysing na die groot omvang van die projek wat deur die President se Munisipaliteit onderneem word en wat uit 60,000 huise sal bestaan.

ORWEGING VAN VERSLAE

Die Konvensie oorweeg voorts die verslae van die Sub-Komitees en Verteenwoordigers wat in Volume I van die Verrigtinge van die Vereniging vir 1968 gepubliseer is.

about R15. These are the lines that we're thinking along.

Mr. R. M. O. Simpson (Durban) continued :—

now) but the townships adjoining European townships, we'd be surprised at the amount of money spent on fuel and light from other means. I had a survey carried out a few years ago and at that time (it was before decimalization) it was revealed that about R3.50 (35/-) was being spent on an average by the inhabitants of quite a large area in one of our townships. On that basis a Bantu can use quite a lot of electricity with far less inconvenience. I don't say send it to everybody but I do think that it's very possible that fairly large areas could be reticulated with great success at the present time. It will also cut down on air pollution.

There is, however, this problem of the additional cost. I know earth leakage relays have been mentioned frequently today and one is very keen to do all possible to improve on safety but we're up against a problem here in that unless these things are reliable down to about the 0.1% mentioned by Mr. Middelcote, I'm afraid there'll be a lot of tampering with them. In addition to which, one must bear in mind that if you can wire a house for R30 and you are going to spend an extra R30 on an earth leakage unit, you may put the cost, from a capital point of view, beyond the means of the authority that is going to carry out the work and that's a very real problem that we've got to face somehow.

Mr. D. S. van der Merwe (Witbank) referred to administration costs of a scheme and asked :—

geval in inwoners wanneer hulle rekeninge kry, betaal hulle gereeld? Is daar afsluitings ens.?"

In reply, the President said :—

Dit word nou geheel-en-al geadmireer deur die Bantoe-administrasie van die dorpsgebied, die meterlesings en klerklike werk daaraan verbonde word alles deur Bantoe gedoen. Ongelukkig het ek nie syfers hier beskikbaar om vir u te kan gee aangaande die administratiewe koste nie. Die fooie weet ek word ingesamel saam met die betaling van die huishuur.

The discussion concluded with thanks being expressed to Mr. Liebenberg and with his reference to the magnitude of a project being undertaken by the President's Municipality which would comprise 60,000 houses.

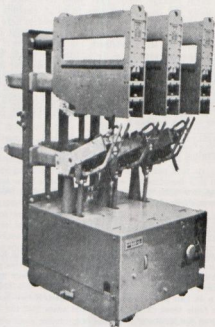
CONSIDERATION OF REPORTS

The Convention proceeded to consider Reports of Sub-committees and Representatives which were published in Volume I of the Association's 1968 Proceedings.

MERLIN & GERIN

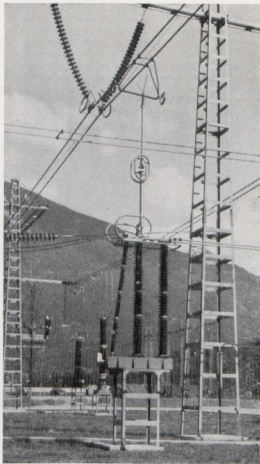
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| CAPE TOWN | PRETORIA | GWELO |
| WELKOM | KIMBERLEY | LUSAKA |
| CHINGOLA | N'DOLA | |

1. Jaarverslag oor die bedrywighede van die S.A. Buro vir Standaarde.

Met verwysing na die Jaarverslag oor die bedrywighede van die S.A.B.S., beklemtoon mnr. A. A. Middlecote van die S.A. Buro vir Standaarde dat Ingenieurs, in ooreenstemming met die tema van hierdie vergadering, die spesifikasies wat die Buro voortgebring het, moet gebruik en sodoende "produktiwiteit" moet bevorder. Hy gaan voort deur te sê :-

As you know we recently completed the specification for the distribution transformers and most people are now working to this specification but many of them aren't working to the voluntary section of this, which is the actual standardization of certain features, particularly the losses. I want to make an appeal to everyone here to for-

In antwoord op mnr. E. de C. Pretorius (Potchefstroom) se vraag, nl. „Wanneer kan ons 'n spesifikasie vermag vir P.V.C.-geïsoleerde kables met aluminium-geleiers?" sê mnr. F. J. Prins (Buro vir Standaarde) :-

We are now at this time collecting and collating information in connection with the revision of 150 and I've actually got somebody working on it at the moment back in Pretoria. From what we know so far, I think we're going to have to split it up otherwise we're going to be biting off more than we can chew in trying to cover everything in one specification - copper and aluminium conductors plus the multi-core armoured types and the de-

2. Jaarverslag van die Registrasieraad vir Elektriese Draadwerkers.

Die Voorsitter van die Raad, mnr. J. G. Wannenburg (Departement van Arbeid) lewer soos volg kommentaar :

Ek is nogal bly om 'n kans te kry om hieroor iets te sê te hê. Op die Raad het ons baie moeilikheid met munisipaliteite en dit spruit voort uit die feit dat so baie munisipaliteite toelaat dat draadwerk gedoen word deur persone wat nie behoorlik gelisensieër is nie. Net gister het ek 'n brief gekry van die inspektoraat in Bloemfontein waarin vir my voorgelê is (ek kan ongelukkig nie name noem nie) dat daar in vyf munisipaliteite kontrakteurs is wat nie een gelisensieerde draadwerker het nie. Sels die persone wat die draadwerk moet inspekteur is nie gelisensieër nie!

Ongelukkig weet ons nou wat die moeilikheid is en in die laaste twee of drie jaar begin ons die skroef 'n bietjie stywer aandraai en die mense wat so onwettiglik werk begin ons nou optel. Maar nes 'n mens hom laat skrik in die een munisipaliteit, hardloop hy na die een langsaan en begin net daar weer met onwettiglik draadwerk voortgaan.

Die ander moeilikheid wat ons het is dit: u is seker almal daarvan bewus dat die wet voorsiening maak vir

1. Annual Report on the Activities of the S.A.B.S.

Referring to the Annual Report on the activities of the S.A.B.S., Mr. A. A. Middlecote of the Bureau of Standards stressed that in line with the theme of this meeting, engineers should use the specifications produced by the Bureau and so promote "productivity". He continued :-

get this lovely theory of applying capitalization formulae to small distribution transformers and to give the manufacturer a chance of longer production runs. I think you would gain by so doing and would get transformers as good at a cheaper price.

In reply to the question of Mr. E. de C. Pretorius (Potchefstroom) „Wanneer kan ons 'n spesifikasie vermag vir P.V.C.-geïsoleerde kables met aluminium-geleiers?"

Mr. F. J. Prins (Bureau of Standards) said :-

velopments for the new HT ones. So we'll probably do an amendment to or a revision of the existing specification for the ordinary LT distribution type 660/1100V and then split off into another specification to cover the HT and armoured types. As I said we are busy working on it and although I wouldn't like to make any rash promises, we hope to have the first draft document out pretty soon.

2. Annual Report of the Electrical Wiremen's Registration Board.

The Chairman of the Board, Mr. J. G. Wannenburg (Department of Labour) commented as follows :-

voorlopige registrasie vir ses maande en dat daardie registrasie kan drie keer hernu word. Maar ongelukkig maak die wet ook voorsiening dat daardie ses-maandelike tydperke nie noodwendig agtereenvolgende tydperke behoort te wees nie. Nou-die-dag het ons die geval gekry van 'n persoon wat in 1945 'n provisionele registrasie gekry het en nou net kort gelede het hy vir die eerste keer (23 jaar later) aansoek gedoen om sy hernuwing! Die belangrikheid van die saak is dit: as 'n persoon ses maande om is moet hy eintlik na regte ophou werk want by het net registrasie gehad vir ses maande en mag dus nie aanpak met werk nie. Sodoende werk hy dan onwettiglik, volgens die uitoefening van die wet.

Ongelukkig is dit nou ook verder so (en dit is dié wat ek sê ons het moeilikheid met munisipaliteite) dat baie van hulle mag bewus wees dat sulke dinge in hulle midde aan die gang is maar hulle laat dit oogluikend toe. Juis is ek verplig om 'n woord van waarskuwing te rig - daardie persone wat so iets toelaat moet net asseblief onthou dat as so 'n onwettiglik werknemer voor die hof gesleep word,

die ingenieur in bevel net so skuldig sal staan voor die hof as diegene wat die werk uitgevoer het.

Dit is ontmoontlik weens die beperkte staf wat ek in Bloemfontein het, dat die inspektors na elke kontrakke en na elke munisipaliteit rondgaan om uit te vind wat die posisie daar eintlik is. Daarom wil ek nou deur u mnr. President, 'n beroep doen op alle ingenieurs en alle plaaslike outoriteite om ons tog te hulp te snel. Dit is betreklik maklik vir 'n ingenieur want hy weet wie by hom geregistreer is as 'n aannemer en om van hulle af uit te vind hoeveel draadwerk verrig en of diegene almal lisensies het; asook of diegene met voorlopige registrasies wel geldig is of nie. As daar miskien 'n geval ontdek is soos van die vyf dorpe wat ek genoem het, waar daar nie een persoon bestaan wat 'n lisensie het nie en dit word gerapporteer aan die Raad, dan kan ons die saak dalk reg stel.

Met die afgelope vergadering (mnr. Lombard sal ont hou) het ons twee persone gehad — die een was 68 en die ander 65 jaar oud — wat nou aansoek gedoen het om geregistreer te word as draadwerkers, albei met meer as 30 jaar se ondervinding as draadwerkers, d.w.s. 30 jaar lank en sedert 1963 (vyf jaar lank) is die werk wat hulle verrig het, onwettig. Dit is 'n skandelige toestand van sake en dit gee aanleiding tot wat ek nou kort gelede gehad het (ek kan ongelukkig weer nie name noem nie) waar die retikulase en bedrading van 'n hele paar munisipaliteite waar ek inspekteur het, in 'n skokkende toestand gevind is, en dit net bloot as gevolg van persone wat toegelaat word om bedrading en sulke werk te doen en nie behoortlik daartoe gelisensieër is nie.

As u regtig wil sien wat die toedrag van sake is, kan u na Olifantsfontein toe gaan waar hierdie afgeneem word en kyk na die klas werk wat daar gedoen word gedurende eksamentyd. Dit sal u skok om te sien dat daar persone is wat nie eers 'n doodgewone apparaat wat hy uitgelê het op 'n tafel kan toets nie; 'n persoon wat nie weet wat 'n 'megger' is nie; wat eers weet wat die verskil tussen 'n 'ohm' en 'n 'megohm' nie. By die onlangse eksamen wat ek bygewoon het is iemand presies daardie standaard

Hierop sê die President :—

Gentlemen, you've heard Mr. Wannenburg, the Chairman of the Registration Board this afternoon. He has laid certain accusations at the door of municipalities, rather serious accusations, and I think we'll all take them to heart and try to assist the Department in every way possible in the best interests of our consumers, who are, after all, the people who'll benefit most if the work is properly and safely done. I don't imagine the facts which Mr. Wan-

Die volgende spreker was mnr. E. E. de Villiers (Bloemfontein) wat hom soos volg uitgelê het :—

Ek is baie bly dat mnr. Wannenburg vanmiddag ook dié saak gepraat het. Mnr. Lombard het 'n mooi uiteensetting gegee van die aktiwiteite waarin hy gedeel het wat die Registrasieraad betref in die afgelope jaar maar ek sou

vraag gevra en hy antwoord toe soos volg: „Mnr. die Inspekteur, 'n megohm is nie 'n miljoenste van 'n ohm nie, dit is 'n miljoen ohm!” Ek sê toe vir die man, „Nou maar goed. Aangesien jy dit so goed geleer het, wat is 'n kilo-ohm?” Toe sê hy, „That's not b fair!”

Mnr. die President, ek wil my versoek aan die plaaslike outoriteite en ingenieurs weer deur u herhaal dat hulle asseblief vir ons moet help in hierdie saak. Ons kan dit nie alleen doen nie en ons kan dit ook nie toelaat nie want ons is naderhand net so skuldig as wat die ander persoon is wat toelaat dat die werk so gedoen word omdat ons dit nie kan bykom nie. Maar ek kan u verseker dat waar ons daarvan hoor slaan ons toe en ons slaan baie hard.

Die lastige kwessie van voorlopige registrasie — of dit nou vir ses maande kan wees maar nie noodwendig vir agtereenvolgende ses-maande-tydperke of drie tydperke van ses agtereenvolgende maande — sou alreeds vanjaar voor die Parlement gekom het. Ongelukkig het ons met die wetgewing 'n bietjie te laat ingekom maar dit is ons vooruitsig dat ons dit in aanstaande jaar se wetgewings sal inbring — dat daardie klousule geskrap sal word en dat dit in stede van die drie, sal dit vyf agtereenvolgende tydperke van ses maande wees.

Die beperking om dit nie agtereenvolgende ses maande te maak nie is oorspronklik ingebring as 'n hulpmiddel vir die immigrante wat taal-moelijkhede het. Maar die mense wat immigrante inneem is baie noulettend dat hulle hul voorlopige registrasies stiptelik hernu as hul ses maande om is.

Dit is ons plaaslike talent wat so misbruik maak daarvan en dit is niks buitengewoon om 'n man te kry (soos ek netnou gesê het) wat 23 jaar lank gewerk het met 'n voorlopige registrasie of soos in 'n brief wat ek gister ontvang het, 'n man wat die afgelope 25 jaar 'n verbeter-leerling was. Dit is tog darem nou iets wat nie geduld kan word nie. Ons het al probeer om dit te beheer, ons het al geskrywe daaroor maar sover is dit alles tevergeefs. Dit is dié wat ek gesê het ek is baie dankbaar dat ek so 'n paar woorde kan sê en ek hoop regtig, mnr. die President, dat ons darem nou 'n bietjie hulp gaan kry.

The President said :—

nenburg has quoted here are general knowledge otherwise I think we'd probably have been more shocked at what is actually happening.

Ek vertrou dat al die ingenieurs wat mnr. Wannenburg vanmiddag aangehoor het, stappe sal doen om toe te sien dat die dinge, waar moontlik, nie voortgaan nie. Dit moet natuurlik geregstel word in hulle eie belang en dié van die verbruikers en die Rade wat hulle verteenwoordig.

The next speaker was Mr. E. E. de Villiers (Bloemfontein) who said :—

baie graag op hierdie stadium (veral na mnr. Wannenburg gepraat het kan ek nie stil bly nie) 'n paar sakkies opper: Eerstens meld mnr. Lombard hier dat reëlings getref is vir die afleë van mondelinge eksamens. Ek moet dit net

noem, 'n paar jaar gelede toe ons op Windhoek kongres gehou het, het mnr. Wannenburg se voorganger dié saak bespreek en hy het my toe meegedeel dat hy al 'n baie lang tyd agiteer het daarvoor maar die owerheid wou dit net nie toelaat nie. Hy moet darem nou geluk sê aan mnr. Wannenburg dat dit wel so gekom het want ek reken dit is 'n geweldige groot stap vooruit, veral met die oog op immigrante wat ons kry in die ambag.

Wat betref hierdie paar sake wat genoem is hier waar sekere werke dan uitgesluit word as draadwerk, dit glo ek gaan ook 'n geweldige verbetering meebring. Ek was maar nog altyd onder die indruk geweest dat dit nie noodwendig is dat 'n gekwalifiseerde persoon elektriese buise hoef te buig nie maar sodra dit in kanale geplaas word of selfs pype gelê is daarvoor, dan is dit draadwerk. Ek glo ons het dit almal so gesien.

As dit uitgekakel kan word dan sal dit al die hoeveelheid werk wat in enige installasie deur 'n gekwalifiseerde draadwerker gedoen hoef te word, geweldig uitkakel.

Mnr. E. de C. Pretorius (Potchefstroom) sê vervolgens :

Dit is nie miskien ter sake nie maar dit sal die probleem oplos wat mnr. Wannenburg hier geopper het. Artikel 22 van Wet. No. 20 van 39 sê dat: 'n voorsiener kan 'n aannemer se lisensie of registrasie vir enige tyd opskort om 'n paar redes wat gegee word en een van die redes is indien die applikant of die houer van so 'n lisensie, draad-

Die President sluit die bespreking oor die verslag af met die volgende opmerkinge :—

Ons laat daardie aanbeveling aan mnr. Wannenburg oor en ek is seker daarvan as hy dit bestudeer het, sal hy miskien met die wysiging wat voorgestel word in die wet, die nodige aandag daaraan gee. Gentlemen, I must point

3. Jaarverslag van die Komitee vir Aanbevelings insake Nuwe Elektriese Ware.

Geen kommentaar.

4. Verslag van die Subkomitee insake Voorsieningsregte en Opwekking.

Mnr. P. A. Giles (Oos Londen) sê :—

The full report is before you but at this juncture I should personally like to thank the members of this sub-committee who met at very odd hours from time to time over quite a lengthy period in order to present this case which is set out here in the form of an abstract report.

Daar is nou onlangs op Bloemfontein 'n Advieskomitee gestig en ek wil my dank uitspreek teenoor mnr. Wannenburg daarvoor dat hulle ons dit toegelaat het. Al is ons maar in die voel-voel-stadium, glo ek tog dat ons baie goeie werk in die toekoms sal kan doen. Dit is eintlik ook na aanleiding van hierdie sake dat groot dinge in Bloemfontein gebeur het: die aannemers is nie baie lief vir ons oor wat ons daar gedoen het nie maar dit was tog baie noodsaaklik gewees. Ons het ook heelwat sogenaamde draadwerkers verloor — hulle het na kleiner dorpe gegaan (soos mnr. Wannenburg genoem het) en daar werk hulle nog onwettiglik.

Ek kan ook nie nalaat om te noem dat mnr. Simpson van Durban ook vir ons baie goeie inligting verskaf het voordat die Advieskomitee by ons te stand gekom het. Ek wil vir hom veel bedank daarvoor want dit was vir ons 'n groot hulp gewees om te sien op watter manier hulle daar te werk gaan en om ons ook aan die gang te kry.

Mr. E. de C. Pretorius (Potchefstroom) said :—

werk op nalatige of onbekommerde wyse, of in stryd met 'n verordening van die voorsiener gedoen of laat doen het. Ek dink daar moet ingevoeg word, of toegelaat het dat bedradingswerk gedoen word deur persone wat nie gelisensieër is nie. As 'n mens die mag het om 'n aannemer se lisensie te kan intrek, mnr. die President, dan maak 'n mens hom seer waar hy die seerste kry.

The President concluded discussion on the report by saying :—

out that Mr. Lombard does not only serve on the Afrikaans Committee of the Registration Board because his name doesn't appear under those of the English Committee — it's just a Typographical error!

3. Annual Report of the Recommendations Committee for new Electrical Commodities.

No Comment.

4. Report of the Rights of Supply and Generation Sub-committee.

Mr. P. A. Giles (East London) said :—

This is only after a gruelling one and a half hours spent at the Government Offices following which we were advised by the Minister that he would answer all the details requested in the report — full paragraphs, 30 of them. To date we've not received that report as far as I know and all I can say is that the matter is pending!

5. Verslag van die Subkomitee insake Warmdompel-Gegalvaniseerde Sinklae.

Ter uitbreiding van die verslag sê Mnr. P. A. Giles (Oos Londen) :-

The Bureau of Standards have divided this particular question of Hot Dip Galvanising over a number of items and they've still to deal with zinc coatings on steel wire, sheet steel and strip. On this particular Committee our Association is considered a user and at all times we strive to get the maximum coverage possible for the protection

6. Verslag van die Subkomitee insake Strategiese Materiale.

Die sameroeper, Mnr. P. A. Giles (Oos Londen) sê dat dit 'n teleurstellende feit is dat 'n aantal ondernemings wat versoek is om inligting te verskaf, nie op die versoek gereageer het nie.

7. Verslag oor die 1967-Kongres van die S.A.N.K.V.

Mnr. P. A. Giles (Oos Londen) verwys na die feit dat die V.M.E.O. nou wederkerige lidmaatskap van die S.A.N.K.V. geniet en spreek die mening uit dat dit 'n waardevolle skakel is. Hy sê verder dat, indien enige lid van die Vereniging nader inligting omtrent die referate verlang, hy, as verteenwoordiger, met graagte hulp sal verleen om sulke inligting te verkry, of daar kan direk met die outeur van die betrokke referaat geskakel word.

Die President spreek die mening uit dat die reëlings met die S.A.N.K.V. van groot waarde vir die Vereniging is.

8. Verslag van die Subkomitee insake die Handhawing van Herveroekingspryse.

Ter aanvulling van sy verslag verwys Mnr. P. A. Giles (Oos Londen) na die agtergrond van die probleem van die handhawing van herverkooingspryse en na die feit dat dit wou voorkom asof 'n Wetsontwerp te geleëner tyd aan die Volksraad voorgelê sal word om beheer uit te oefen oor die aanbieding van eenvormige herverkooingspryse. Die president sê dat hierdie saak ook die daadwerklike aandag van die V.M.B. geniet, en hy versoek ondernemings wat ondervinding van die aanbieding van eenvormige verkooppriese gehad het, om konkrete inligting in verband daarmee aan te stuur, aangesien sodanige inligting vir die V.M.B. van waarde sal wees om hul pogings in verband met dié probleem te steun.

5. Report of the Hot Dip (galvanised) Zinc Coatings Sub-committee.

Amplifying the report, Mr. P. A. Giles (East London) said :-

of the steel where it is in use. The opposition (galvanisers, fabricators and scientists) have firmly maintained that it was impossible to get a thickness such as we asked for. Nevertheless, we have got in some cases $2\frac{1}{2}$ ozs. per sq. ft.; some 2 ozs. per sq. ft. and we've got maximum coverage we can get.

6. Report of Sub-committee on Strategic Materials.

The convenor, Mr. P. A. Giles (East London), stated that it was disappointing to note that a number of undertakings which had been requested to provide information had not responded.

7. Report on S.A.N.C.I. Congress, 1967.

Mr. P. A. Giles (East London) referred to the fact that the A.M.E.U. now enjoyed reciprocal membership with S.A.N.C.I. and expressed the opinion that this constituted a valuable link. He stated that if any member of the Association required further information in relation to the papers he, as representative, would be pleased to assist in obtaining it, or direct contact would be made with the author concerned.

The President expressed his opinion that the arrangements with S.A.N.C.I. were of great value to the Association.

8. Report of the Level Price Tendering Sub-committee.

Amplifying his report, Mr. P. A. Giles (East London) referred to the background to the problem of level price tendering and to the fact that it appeared that a Bill would in due course be submitted to Parliament to control resale price maintenance. The President stated that this problem was being actively pursued by the U.M.E. and requested undertakings which had experience of level price tendering to submit concrete information in relation thereto which would support the U.M.E. in its efforts.

9. Verslag van die Koördinerende Komitee vir Hoogspanningsgeriewe.

Geen kommentaar.

10. Verslag insake die Standaard-Bedradingsregulasies van die S.A.I.E.L.

Geen kommentaar.

11. Verslag van die Subkomitee insake die Opleiding van Ingenieurs en Tegnici.

Geen kommentaar.

12. Verslag van die S.A. Komitee vir Elektrolitiese Verwering.

Geen kommentaar.

13. Die Wêreldkongres oor Krag.

Mnr. R. W. Barton (Welkom) dien die volgende verslag insake die Wêreldkongres oor Krag in :—

Unfortunately, the annual meeting of the South African National Committee was held only a few days ago and there wasn't time to put in a written report. There is not very much to say and what there is, is rather unpleasant: the next International Conference (Plenary Session) of the World Power Conference is due to take place in Moscow in August and last year the South African National Committee agreed that a delegation would be sent over and that papers would be read as usual and as happened

Na afloop van die behandeling van die verslae, heropen die President die bespreking van die referate wat vroeër in die dag gelewer is, en die volgende persone neem soos volg aan die bespreking deel :—

H. Barnard (Brakpan) :—

My gedagtes het nou 'n bietjie gedwaal oor waaroor die saak eintlik ontstaan het, maar mnr. van der Walt van Springs het hier vanmôre genoem dat 'n O. en M. man, volgens sy mening, definitief 'n belangrike persoon is in die werking van 'n plaaslike werheid. Ek staan heeltemaal skepties teenoor 'n O. en M.-man as sulks en ek sal u sê hoekom: die O. en M. beampite is gewoonlik 'n man wat aangestel word om sekere poste te ondersoek, seker werke te ondersoek en aanbevelings daaroor te maak. As so 'n man aangestel is, is daar 'n salaris verbonde aan sy pos

9. Report of the Co-ordination Committee for High Voltage Facilities.

No Comment.

10. Report on the Standard Wiring Regulations of the S.A.I.E.E.

No Comment.

11. Report of the Training of Engineers and Technicians Sub Committee

No Comment.

12. Report of the S.A. Electrolytic Corrosion Committee.

No Comment.

13. World Power Conference.

Mr. R. W. Barton (Welkom) submitted the following report on the World Power Conference :—

at the Tokyo Conference.

Everything was running smoothly, the preliminary application was accepted by the parent body and then suddenly what happened recently with the S.A. Olympic team took place again. In other words, the invitation to us from Moscow simply hasn't been forthcoming in spite of repeated representations and unfortunately nothing can be done about it. So for this year at least we are once more out of the running.

With the conclusion of consideration of reports, the President re-opened discussion on papers delivered earlier in the day the following contributions were made :—

H. Barnard (Brakpan) :—

(nogal 'n groot salaris daarby) en die man voel verplig om op een of ander manier die geld te verdien of dit vir die Raad te spaar sodat hy nie heeltemaal hoef te voel dat die Raad hom dra nie. Hy wil darem wys dat daar is sekere besparings wat hy kan maak. Nou ja, die eerste ding wat so 'n man doen as hy aangestel word, is dat hy in 'n departement begin krap. Hy vind die helfte van die poste wat bestaan is oortollig; drie-kwart van die materiaal wat veel benodig word is ook oortollig; daar is heeltemaal te veel voertuie in die departement, en so aan en so aan.



SENSITIVE CORE BALANCE RELAYS

TYPE MS1

INSTANTANEOUS
FOR PROTECTION
OF PERSONS ON
INDIRECT
CONTACT



TYPE MS2

INVERSE AND
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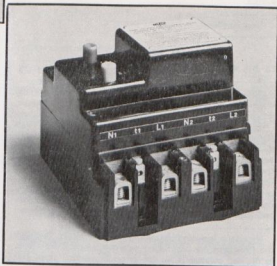
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Ek hou om dié rede glad nie van 'n O. en M. beampte nie maar ek sal u sê waarvan ek hou, en dit is 'n man wat hulle noem 'n doeltreffendheidsbeampte'. Dit is 'n persoon wat aangestel word deur die Raad met die doel om 'n departement te hulp om meer doeltreffend te werk en hy werk in samewerking met die hoof van die departement. As so 'n man 'n departement baie meer doeltreffend kan laat loop sal hy outomaties sy salaris spaar maar hy sal dit nie doen op 'n manier wat vir die departement op die ou end gaan skade berokken nie. Wat ek eintlik bedoel daarby is dit: wanneer so 'n man benodig word is hy tot die beskikking van die hoof van die departement. Die hoof kan nie altyd ondersoek instel na die duisend-en-een dingetjies wat daar is wat ondersoek verg nie; hy het ook nie altyd die nodige personeel om hom by te staan nie en dit is wanneer hierdie doeltreffendheidsbeampte dan

Mnr. J. L. van der Walt (Springs) :—

Ek dink Mnr. Barnard gaan verbaas wees want ek stem honderd-persent saam met hom! Dit is net 'n kwesie van hoe daardie doeltreffendheidsbeampte van hom te werke gaan en ek wil dit aan mnr. Barnard stel hy sal O. en M. metodes moet toepas! Ek is jammer mnr. Barnard het daardie indruk van 'n O. en M.-beampte. Party organisasies noem hom 'n doeltreffendheidsbeampte, ander weer 'n kontrole-beampte, maar sy werk is dieselfde en dit is doeltreffendheidsondersoeke in departemente. Dit is wat die O. en M. daarvoor is — Organisasie en Metodes — en hy kan dus geen ander metode toepas nie.

Ek stem ook saam met mnr. Barnard dat die verkeerde aanstelling kan die dinge teewerbring waarvan hy onlangs gepraat het; as jou kontrole-beampte of doeltreffendheids-beampte (laat ons hom dan nou maar so noem) nie reg te werke gaan nie. As hy gaan om te spioeneer en dwars aanbevelings te maak net om sy salaris te verdien, dan gaan die hele saak heeltemaal misluk; dit is nou baie seker en gewis. Maar die doel van 'n goeie doeltreffendheidsbeampte sal wees om die samewerking van die departement te kry en sy aanbevelings is nie noodwendig altyd 'n besparing nie. As bv. sy ondersoek toon dat meer personeel nodig is sal hy, as hy sýout werd is, nie skroom om dit aan te beveel nie. Soveel so vir die doeltreffendheids-beampte: ek stem saam met die gedagtes wat mnr. Barnard geuit het en 'n mens moet altyd waak dat jy die regte persoon aanstel. Dit is jammer dat alle doeltreffendheids-beamptes nie aan dié vereistes voldoen nie.

Mnr. die Voorsitter, dan wil ek ook net oor hoë produktiwiteit praat:— I'm very sorry Mr. Campbell isn't here this morning so that I could really attack him for nullifying the efforts to obtain more productivity. I see in his paper he has lengthened the shortest bedtime story by adding four "no's" to the proverbial one "NO!"

Another idea as far as productivity is concerned is the organisational structure of any organisation. It seems to be peculiar to South Africa that in most cases (municipal organisations) there is a head of the department and a deputy-head. I think if there is to be an improvement in productivity this sphere of organisational structure is one

in kom. Sy hulp word ingeroep deur die hoof van die departement wat sy probleem eers aan die beampte verduidelik; of dit nou miskien te min voertuie is, of daar te veel tyd gemors word met etensye of wat dit ook al mag wees. Die beampte doen dadelik ondersoek en bring sy verslag uit na die hoof van die departement. Weens hierdie redes kan daar 'n groot bedrag gespaar word deur die departement doeltreffend te laat werk.

Waarom ek vir u sê ek staan skepties teenoor 'n O. en M. beampte as sulks, is dat, as so 'n persoon aangestel word, kan dit baie maklik ontaard (met alle respek teenoor enige Stadsraad) dat die Raad maklik gebruik maak van daardie man vir 'n doel wat heeltemal in teenstelling is met die doel waarvoor hy oorspronklik aangestel is. Dit is waarom ek liever die doeltreffendheidsbeampte ondersteun.

Mr. J. L. van der Walt (Springs) :—

which all organisations could profitably study. In Springs we have tried doing away with deputy heads altogether by giving assistants to each head of a department. In other words, we haven't got the textbook blueprint of the ideal organisational structure consisting of a triangle with the head of the department as the apex after which the organisational structure is divided up with each person with his sphere of influence, his responsibilities and his authority. Normally in these organisations the deputy head is a mere shadow of the head without any clearly defined responsibility and yet he is held equally responsible for everything that happens within the department, which I think is grossly unfair. You should ideally appoint two assistants and divide your organisation accordingly into two divisions, each with its own assistant at its head, either of whom can act as head of the entire department when the other is away. They need not necessarily be on the same salary scale if the division is such that it is not warranted.

Another thing, of course, that you can apply is job evaluation. I do hope Mr. Barnard is not going to be against job evaluation as well because it does allocate to every post in the department its correct responsibilities and accordingly gives the head of the department a lot of information as to where these responsibilities lie and whether or not they are being carried out satisfactorily.

Daar is nog 'n sfeer waar ek dink waar ons baie tekort skiet in meer produktiwiteit en dit is op die vlak van toesighouding. Ek is oortuig ons heg nie genoeg belang daaraan in ons organisasies nie, want 'n mens kan die beste organisasie hê maar as jy nie die regte toesighouer ook daarby het nie, sal daardie werk net nie vlot nie. Ek dink die Amerikaners stel baie meer belang daarin en hulle het geen span werkers, of aantal werkers, sonder daar 'n afgebakende toesighouding is nie. Ons mag wel toesighouers hê, maar ek wonder baie keer of hulle die regte opleiding, die in-diens opleiding kry wat hulle moet kry. Volgens my mening kan ons baie meer aandag gee aan indiens opleiding ook om ons doeltreffendheid te verbeter.

Daar is ook die geval wat ek vanoggend genoem het van

die klerklike of die administratiewe kant. Ons is meer geneig as ingenieurs (as ek nog so mag praat) om meer na die werke-afdeling te gaan en 'n bietjie die administra-

I. L. Hobbs (Virginia) :—

I've listened with great interest to this discussion this morning and I find to my dismay, that my workmen are not like other workmen! They seem to feel that the less work they do the more they should be paid, and I simply can't instill into them productivity as we've discussed it this morning. I've no doubt that all these methods are going to help, organisation, O. and M. etc., but to get back to the workman, the human being, again — for his pro-

K. A. H. Adams (Johannesburg) :—

Can I put my foot in it again? The actual condition that Mr. Hobbs is wanting is achieved by steep gradient i.e. the logarithmic distribution of incomes in the group. This can be done with almost any group but municipal engineers are in rather unfortunate circumstances in that they can't do so because they'd have to work at roughly double their salary! In which case, they wouldn't need any efficiency experts or the application of Organisation and

J. L. van der Walt (Springs) :—

Mr. Adams had a theory that the way to solve Johannesburg's transport problem was to quadruple the Town Clerk's salary. Well, I've tried to persuade my council to

Die President sluit die namiddag sitting af deur sy waardering uit te spreek teenoor almal wat 'n bydrae gelewer het.

TWEDE DAG

Die President stel mnr. G. Masson, Distribusie-Ingenieur (Bedryf) van die Stad Johannesburg aan die vergadering voor, en mnr. Masson lewer hierop sy referaat, „'n Oorsig van die Gebruik van Ondergrondse Hoëspannings-kabelnetwerk in Johannesburg”, wat in Volume I van die Vereniging se Verrigtinge vir 1968 gepubliseer is.

Toe hy sy dank teenoor mnr. Masson betuig, verwys die President na die feit dat die S.A. Buro vir Standaarde nou 'n Komitee aangestel het om die Standaardisasie van mini-substasies te ondersoek.

Die bespreking word geopen deur mnr. E. E. de Villiers (Bloemfontein) wat hom soos volg uitgelaat het :—

Omtrent hierdie kwessie van mini-sub-verspreiding-hoëspanningsverspreiding met mini-subs. — kan ek vir u noem dat ek sewe jaar gelede in samewerking met mnr. Dreyer (wat destyds op Krugersdorp ingenieur was) in taamlike besonderhede op dié saak ingegaan het. Ons het heelwat

sie kant oor die hoof te sien. Ek dink daar kan ook baie verbeterings gedoen word en ons kan kyk dat die klerke meer produktief word as wat hulle vandag is.

I. L. Hobbs (Virginia) :—

ductivity he wants a price and that price is cash. It's of no avail to get them to dig holes and then go home at 10 o'clock in the morning, as a city next door to us is wont to do, because you only get a certain amount of work from him and no more. We actually want more work from this man. I'm not suggesting that this should happen but I should love to see what would be the result if all the workers in the electricity department were to share in its profits then you'd really have productivity!

K. A. H. Adams (Johannesburg) :—

Methods and would therefore save quite a lot of money there.

The other point is that a municipal electrical engineer is considered most efficient when he's got nothing to do! This might sound like a paradox but that is the actual intention behind the application of all such methods in a department and that is how one is going to give the best benefit to the Council one serves.

J. L. van der Walt (Springs) :—

double my salary so as to halve our problem but the Administrator won't hear of it!

The President closed the afternoon session by expressing appreciation to all those who had contributed.

SECOND DAY

The President introduced Mr. G. Masson, Distribution Engineer (Operating) City of Johannesburg, who presented his paper “A Review of High Voltage Underground Cable Reticulation Practice in Johannesburg”, which was published in Volume I of the 1968 Proceedings of the Association.

In expressing thanks to Mr. Masson, the President referred to the fact that the S.A.B.S. had now appointed a committee to investigate the standardisation of mini-substasies.

Discussion was opened by Mr. E. E. de Villiers (Bloemfontein) as follows :—

skemas, dorpsgebiede wat in aanleg sou kom in Krugersdorp, ook in Carletonville, onderwerp aan baie deeglike ondersoek wat betref die normale laagspanningsverspreiding, dan ook met enkelfasehoogspanning met mini-subs, en ook driefase. Ons uiteindelijke bevindings was dat die

driefase mini-sub-stelsel in die eerste plaas, ekonomies die voordeligste is en daarby het ook al die ander voordele gekom wat mnr. Masson teen die einde van sy referaat vir ons gestel het.

Daar is egter een of twee sakes wat hy nie genoem het nie en waaroor ek graag 'n paar besonderhede wil hê: Hy noem nou dat daar op 6.6 KV en ook op 11 KV-stelsels gewerk is maar hy noem nie vir ons die grootte kables wat hy daar gebruik het nie. Dit is nogal vir my van groot belang want op Carletonville het ons die minimum grootte kabel gebruik wat vir ons die maksimum besparing gegee het n.l. 'n 0.0225 spanning. Ek was bewus daarvan dat ons miskien in die moeilikheid kon raak met foutstrome en ek sal bly wees om te hoor van my kollega, mnr. Loubser (wat nou op Carletonville is) of daar enige moeilikhede in die tussentyd ondervind is.

Ons het reeds op die oomblik 'n nuwe dorpsgebied, 'n taamlike groot plek in Bloemfontein, ontwerp daarvoor. My ingenieur, mnr. D. B. Briers, is eintlik verantwoordelik vir die ontwerp daarvan. Ons het dit nog nie geïnstalleer nie maar ons het die gevoel dat ons moontlik 0.06 of 0.04 hoogspanningskables daar moet installeer. Dit sal die koute ook opstoot maar dit sal ons heelwat aan die veilige kant bring wat foutstrome betref.

Net 'n finale opmerking, mnr. die President, in verband met die konstruksie van die mini-sub: dit is vir my verblydend dat u noem dat daar word deur die Buro ingegaan op 'n moontlikheid van 'n standaard-spesifikasie. Die opmerking wat hulle in Johannesburg hier gedoen het, dat hulle in aparte kompartemente ontwerp word, is vir my 'n nuwe idee en dit klink baie aanneemlik. 'n Ander saak wat ek gevind het wat nogal van taamlike belang is, veral in die tye wat vragte gedurig styg en die publiek meer en meer elektrisiteitsbewus word, is dat die eerste tye mini-sub. wat 'n hele paar jaar terug op die mark gekom het

Mnr. J. H. Loubser (Carletonville) gaan voort deur te sê :-

Ek vrees ek moet nou eintlik verkeerde dinge sê! Eerstens moet ek erken dat van die 0.0225 hoogspanningskabel wat ons gebruik het vir miniatur-substansies nog absoluut geen moeilikheid gegee het nie; ons het nie 'n enkele fout in die rigting ondervind nie. Maar dan moet ek ook erken dat ons nou met nuwe uitbreidings in die verband besig is en ek het daar oorgeslaan na 0.06 hoogspanningskabel toe maar net as gevolg van die foutvermoë daarvan.

Wat mnr. de Villiers se aanmerking oor die kerns, die grootte van die transformators, betref, wil ek net sê dat ons in een sekere dorpsgebied 'n probleem daar gehad het

Mnr. R. S. Dunstan (Port Elizabeth) verwys na die menings wat deur mnr. Masson uitgespreek is toe hy gepleit het dat daar van die dorpsreisaar vereis moet word om die koste van die netwerk, of ten minste 'n aansienlike gedeelte daarvan, te betaal.

Voortgaande sê mnr. Dunstan :-

met die transformator 'n integrale deel daarvan, moeilikhede ophewer later wanneer 'n mens die transformator kapasiteit wil verhoog. In dorpsgebiede wat ons daarna gedoen het, het ons 'n mini-sub. aangekoop wat 'n aparte los transformator in het om sê van 'n 50 kVA na 'n 100 kVA of selfs 150 kVA te gaan in geval dit nodig mag wees, en ook 'n bietjie groter op sy laagspanningskant om meer meters te installeer.

Ek mag net noem wat betref die driefasige-verspreiding om die laagspanningsvoorsiening na elke verbruiker se aansluitingskables te neem, het ons ook gevind dat die mees ekonomiese is om 'n kiosk te voorsien vir omtrent 15 — 18 verbruikers; dit was dan normaalweg 100 kVA. Ons het ook terloops straatverligting vanuit dié kiosk ook voorsien. Wat ons daar gedoen het, is waar daar verbruikers aan beide kante van die straat is, dan voorsien ons die drie aan die kant waar die mini-sub. is, direk met 0.0225 laagspanning-twee-aar-kabel — drie van hulle; dieselfde oorkant die straat, en dan aan beide kante van die straat en ook aan beide kante van die kiosk, 'n verdere drie transformators (dit gee vir u 18 verbruikers). Waar daar drie verbruikers dan so gevoer word ons uit die substasie uit met vier-aar kabel (die driefases plus neutral); ons tap af by die eerste verbruiker met die eerste fase en neutral; gaan dan verder met die drie-aar, tap weer die tweede fase by die tweede standplaas af en gaan dan verder met die twee-aar kabel na die derde persoon. Ons het gevind dit is die heel goedkoopste en dat dit geen probleme oplewer nie. So ver ek bewus is het ons ook geen probleme, tot ek daar op Carletonville weg was, ondervind met persone wat graag hulle eie meters wou lees nie en volgens my mening is dit 'n baie goeie fasiliteit om meters op een plek te kan groepeer.

Nietemin wil ek net deur u, mnr. die President, vra as mnr. Loubser miskien kan verder kommentaar lewer of die stelsel nog reg werk daar, sal ek bly wees om te hoor.

Mr. J. A. Loubser (Carletonville) proceeded :-

waar ons mini-sub, al klaar geïnstalleer het toe die dorpsreisaar besluit het hulle gaan nie meer daar uitbrei nie maar wel in 'n ander gebied. Om dit vir hulle meer ekonomies te maak het ons dit nodig geag om van die transformator-kerns net om te ruil en dit was gedoen sonder veel moeite. Dit is eenvoudig 'n geval van die een diskonkteer en uit te haal en weer in die ander teak plaas want die tenks was van standaardgrootte. Dit blyk sê nie heeltemaal noodsaaklik om hierdie aparte drie-skema (een-hoogspannings-kubikel of eenheid en dan die transformator en dan die laagspanning) te hê nie.

Mr. R. S. Dunstan (Port Elizabeth) referred to the sentiments expressed by Mr. Masson when he advocated that the township owner be required to pay the cost of the reticulation or a substantial part thereof. Continuing, Mr. Dunstan said :-

I understood that by this he meant the township owner would make a direct contribution to the costs, which he would not recover.

That is a very sore point with me and I would like us to consider carefully what our real function as an electricity undertaking is. Surely it is to sell electricity and not electricity mains; the latter is done by electrical contractors and contracting firms. If we're going to vary our function from selling electricity to selling electricity mains we'll surely have to re-think the whole business in which we're engaged. A lot of awkward questions could arise should the township owner be required to make a contribution to the cost of the mains, one of which would be the ownership and control of those mains. If a man has paid for something it is morally his and it is to my mind quite immoral and dishonest to then maintain that what he has paid for will not be permitted to become his property.

The remark has been made several times that capital is short and that municipalities can't get capital to carry out reticulation of this kind. I don't agree with that; the capital can always be found and is always found as far as an electricity undertaking is concerned. In the whole municipal set-up we always seem to get first call on the capital funds available, our only serious competitor being water supply. Therefore we're not as short of capital as to require that the township owner make a compulsory contribution towards the cost of reticulation of his township.

For many years most municipalities (as in Port Eliza-

Mr. J. L. van der Walt (Springs) ondersteun mnr. Dunstan se sienswyse omtrent die vordering van gelde van die persoon wat 'n dorpsgebied ontwikkel. Hy sê :—

The main thing is to see that your capital does not lie idle for many years and the way to ensure this is by strict zone controlling: when you draw up an agreement with a township owner there is, or should be, a clause in it whereby he is only permitted to open up zones for selling after the particular zone which you are developing has been built on (not merely sold) to the degree of about 40%, which is a fair figure to my mind.

Quite a few changes have taken place in the Transvaal recently. It has always been argued that the township developer must deposit the full cost of water reticulation without any future refund. This came about in the olden days when water was considered essential for hygienic and health reasons and no township would be approved without a supply of water and there was no basic charge or tariff for water or electricity. Considering the matter of sewerage reticulation, I don't know of one town that demands that the township owner should either deposit free of interest the money for the sewerage reticulation scheme or even pay a portion of it or give it free of interest. Usually the Council undertakes the sewerage scheme fully at their cost, because, in most cases, there is the basic charge based on street frontage or the like, which is not the case for water or electricity.

The Transvaal Local Government Ordinance has now been amended so that basic charges for water and elec-

tricity can be levied should any local authority in the Transvaal wish to do so, and their tariffs amended accordingly. In this way, even if the townships are not developed, the basic charge would be such that the capital would not be lying idle in these townships. I stress again that I fully support Mr. Dunstan in that it is a business undertaking.

At this juncture I want to take up the point of standardization with Mr. Masson as far as making funds available is concerned: normally I'm an ardent supporter of standardization but I'm rather wary in this instance, as there are so many different local conditions to contend with. Johannesburg, for instance, may wish to curb township development (they're too big already!) but there are other towns that are looking for growth and may want to encourage township developers as much as possible.

Some say that developing a township today isn't a very payable proposition. This may have been the case in the past but it is certainly becoming payable again because in the last couple of months (I'm not even talking about years) land prices have just rocketed on the Reef. This development will naturally give an added impetus to township growth, which will be welcomed by several local authorities after the long period of stagnation.

If one insists on the township owner paying certain costs he will only add it on to the land price. One might argue, on the other hand, that, if we undertake the development

Mr. J. L. van der Walt (Springs) supported Mr. Dunstan concerning a charge being levied on a township developer. He said :—

tricity can be levied should any local authority in the Transvaal wish to do so, and their tariffs amended accordingly. In this way, even if the townships are not developed, the basic charge would be such that the capital would not be lying idle in these townships. I stress again that I fully support Mr. Dunstan in that it is a business undertaking.

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If one insists on the township owner paying certain costs he will only add it on to the land price. One might argue, on the other hand, that, if we undertake the development

fully, he certainly won't reduce his price. Mr. President, gentlemen, he has already increased his price and you can't get past that.

We are business undertakings and as such we are look-

Mnr. P. J. Botes (Roodepoort) neem 'n teenoorgestelde standpunt in en sê :-

Twee jaar gelede is standplase op Horisonrif verkoop teen R1,250; vandag sal 'n mens gelukkig wees om 'n standplaas daar te bekom teen R6,000. In Roodepoort het ons ongelukkig die probleem dat daar baie min industrie is — ek meen ons kan nie eers praat van die paar wat daar is nie! Aldus is die grootste deel van die vraag (sê maar 90% van die vraag) van huishoudelike verbruikers en gevolglik is die koste verbonde om 'n elektrisiteitsnetwerk

Ter toeligtig van sy standpunt gaan hy voort deur te sê :-

Daar word gesê dat daar so min dorpe vandag ontwikkel word; wel in Roodepoort wil ons nie meer dorpe laat ontwikkel nie. Op die oomblik is daar 30 nuwe dorpsgebiede wat beplan word — 'n totaal van 10,000 standplase. Die dorpsgebiede is nog in die rowwe stadium, dit is nog eers ingedien by die Direkteur van Plaaslike Bestuur nie, dan is al die standplase al uitverkoop teen hoë pryse. Ons wil net nie meer nuwe dorpsgebiede daar hê nie want regtig-waar, dit gaan dol daarsop en dan is daar ook nog omtrent 15 of 20 ander wat van plan is om nuwe dorpsgebiede te ontwikkel. Ek voel eerlikwaar dat die dorpsenaar sy regverdige deel moet dra daaraan en ek kan nie sien dat ons 'n onregverdige wins dra nie. Munisipaliteite het altyd nog die probleem om by te hou met hul begroting.

Hier het ek nou eintlik van die punt afgedwaal maar ek wil tog graag mnr. Masson bedank het vir die uitstekende, samevattende referaat wat hy gelever het. Soos ek al vantevore gemeld het het ons op Roodepoort ook begin met hierdie miniatuur-substasies. Ons is natuurlik daar in die rante en die koste is dus taamlik hoog maar ek sien dat dit baie goed vergelyk met dié van Johannesburg wat mnr. Masson gegee het.

Nou wil ek net kortliks die miniatuur-substasies skets soos dit in Roodepoort beplan is:

Hoogspanningstelsel

Hooftoevoerkabels:

Twee hooftoevoerkabels (6.6 kV) word na 'n skakelsubstasie binne die dorpsgebied of kompleks van klein dorpsgebiede geneem.

Hoof-skakelsubstasie:

'n Hoof-skakelsubstasie op 'n geskikte perseel, groot 18 vt. x 15 vt., is die enigste substasie-gebou in so 'n dorpsgebied. In hierdie skakelsubstasie word toevoer ingebring na twee olieskakelaars, toegerus met oorstroming en aardlekbeveiliging. Aan die sekondêre kant word die skakelaars elk gekoppel aan 'n afsonderlike vier-weg kompakte verdeelisoelerder, toegerus met twee stelle sekeringe vir die kringe.

Hierdie twee verdeelisoelerders word onderling verbind

ing for growth. We should, however, see that it takes place in an orderly manner and we do have ways of overcoming the problem of having our capital lie idle.

Expressing a contrary viewpoint, Mr. P. J. Botes (Roodepoort) said :-

daar te stel baie hoog. Buitendien is dit nuwe dorpsgebiede en dit lê daar in die rantjies, wat die koste nog hoër laat styg. Indien hierdie koste verminder sou word so dat die dorpsenaar nie so baie hoef te betaal vir sy elektrisiteitskoste nie, of daar toegewing gedoen moet word aan hom, dan sal ons definitief die tariewe op Roodepoort moet verhoog.

Illustrating his point, he continued :-

en onder normale toestande word hierdie verbinding ooggelaat. Indien een van die hoof-toevoerkabels of sy skakelaar sou fouteer, kan hy dus geïsoleer word en die toevoer wat by normaalweg dra deur middel van die verbindingkabel vanaf die ander verdeelkabel af gevoer word.

'n Kring met 'n sekere hoeveelheid miniatuur-substasies word op elk van die verdeelisoeler-skakelaars geplaas, beveiligt deur sekeringe.

Kringe :

Die grootte van die kabels vir die kringe word bepaal deur die hoeveelheid substasies asook die kortsluitvermoë en is normaalweg 0.0225 of 0.04 vk.dm. deursnit-geleiers. Elke miniatuur-substasie word toegerus met 'n drie-weg verdeelisoelerskakelaar. Normaalweg word die kring by die miniatuur-substasie wat naastenby in die middel van die kring is, ooggelaat. In die been in elke miniatuur-substasie, weg van die hoof-skakelsubstasie, word 'n aardfout-aanwyser of fasestromfoutaanwyser geïnstalleer. Dit is baie belangrik, vername as daar 'n hele klomp epoksiharslaste op die stelsel is, want dit is geneig om op te blaas! Die drie-weg-isoelerskakelaars kan verkyr word met 'n meganiese foutstroomaanwyser op elke fase.

Miniatuur-substasies:

Daar word gestandaardiseer op 100-kVA drie fasige miniatuur-substasies en tussen 18 — 24 verbruikers word per substasie aangesluit. Miniatuur-substasies word op die grens tussen twee persele geplaas en 'n stuk van 6 vt. x 6 vt. word uit elke hoek van 'n standplaas gesny om 'n miniatuur-perseel te vorm van 6 vt. x 12 vt. lank. Die beton voetstuk van so 'n miniatuur-substasie word gegiet sodat die substasie + 9 — 12 duim bo die natuurlike grondoppervlakte staan.

Die miniatuur-substasie bestaan uit 'n hoogspanningskant waarin 'n drie-weg kompakte verdeelkaskelaar geplaas word, 'n transformator-kompartement en in die laagspanningskant word sekeringe van 150 ampere gebruik om die transformator te beskerm.

Laagspanningsverspreiding:

In die beplanningstadium word die miniatuur-substasie

beplan in die middel van die vraag-kompleks en van hier af word hooftoevoerkabels gebruik.

Die stelsel is 'n afwyking van dié wat in Johannesburg gebruik word, in dié sin dat nie elke verbruiker vanaf die substasie aangesluit is nie, weens die hoë koste daarvan. Dit is 'n goeie idee om hoogspanning by die verbruiker aan te bring maar om die vraag elke keer daarvandaan na die onderseke persele te neem deur middel van 'n 0.0225 kabel is baie ingewikkeld, want die uitslag daarvan is 'n ergerlike opeenhoping van kabels in die straat, tesame met waterpype, poskantoor-kabels ens. Dit baan die weg na wat ons noem (in die eeu van 'mini's') 'n mini-veselglaskas wat in Germiston ontwerp is en waarvan omtrent 4 — 6 verbruikers gevoer word.

Die toevoerkabels na hierdie mini-kaste is gewoonlik 0.04 of 0.06 in dié, saam met die transformator, word net vir foutstroom en nie vir die oorvrag nie beskerm, en dié beskerming geskied enkelafasing.

Die verbruiker se meter en stroombreker word ook op die perseel in die kabelaansluitingkas geplaas omdat daar ook 'n rimpelrelê geïnstalleer word en die meterlesers in elk geval die perseel moet besoek om die watermeter te lees. Ek kan nie juis sien dat daar veel van 'n besparing is nie alhoewel dit dalk makliker mag wees om net in 'n mini-substasie meters te installeer.

Straatbeligting:

Elke miniatuur-substasie voer net sy voorsieningsgebied

Mnr. I. L. Hobbs (Virginia) verwys soos volg na dié kwessie van serwitute :—

We have an underground system and reserve servitudes on either side of the stand, but not along the back boundary because we don't really require them. These servitudes

Mnr. Hobbs verwys na die bepalinge van die Transvaalse Ordonnansie op plaaslike Besture in verband met die heffing van basiese gelde vir water en elektrisiteit en spreek die mening uit dat gemelde bepalinge onwettig is. Hy baseer hierdie stelling op die uitspraak in 'n saak wat voor die Appélhof gedien het.

Mnr. R. W. Barton (Welkom) gaan soos volg voort :—

In our native township we are installing the reticulation on a mini-sub. basis, more or less the same as in European areas but somewhat modified, in that we're working on a demand per consumer of 1 kilowatt. There are some 4,000 stands involved and the total cost is expected to be in the region of R800,000, including house wiring. You might think this cost very high for a Bantu township but it's made economically possible by the fact that the only thing we have to pay for (in other words, the only thing the consumer has to pay for) is the service connection, which is recovered through the tariffs. All other capital costs are met in various ways from Native Services' levy and from Bantu Beer profits which certainly makes life a lot easier as far as the supply authority is concerned. The tariff (still only a recommendation to be approved)

met straatligte. Aangesien net 'n klein aantal straatligte gevoer word, word 'n 0.007 vk.dm. x 2-aar-kabel gebruik. Die kabel word in die voetstuk van die betonpaal afgemaak en voer van paal tot paal. 125 Watt-kwikdampplampe word gebruik en die spasiering tussen pale is ongeveer 150 voet. Volgens die Kode opgestel deur die S.A.B.S. moet hierdie afstand eintlik 100 voet wees om te voldoen aan hulle vereistes, maar dit sal die koste verskriklik hoog opstoot en ons voel dat die Kode hier 'n bietjie streng is. Volgens my sienwyse is 150 voet spasiering tussen pale oorgenoeg en dit lewer 'n baie goeie dienslig.

Vergelyking van koste:

In Horisonpark en Ontdekkerspark, met 224 en 260 persele onderskeidelik, het die totale verspreiding, insluitende hooftoevoerkabels en staatbeligting, R63,349 en R61,414 onderskeidelik gekos. Dit gee 'n gemiddeld van R282.80 per perseel onderskeidelik.

Horison-uitbreiding, met 409 persele, wat tussen hierdie twee dorpsgebiede geleë is, en met 'n gedeeltelike bogronde en ondergrondse stelsel bedien is, het R83,807 gekos, teen 'n gemiddeld van R204.90 per perseel.

Die koste van miniatuur-substasies is dus 'n bietjie hoër, maar, alhoewel dié stelsels meer uitwerk per perseel as dié van Horison-uitbreiding, moet gemeld word dat oor 'n aantal jaar meer substasies ingeboet sal moet word op laasgenoemde stelsel.

Mr. I. L. Hobbs (Virginia) referred as follows to the question of servitudes :—

are written into the conditions of establishment of a township and we don't actually register them, although I suppose we should do so when we come to use them. We don't make a lot of use of them but they are there if required.

Referring to the provisions if the Transvaal Local Government Ordinance allowing for the levying of basic charges for water and electricity, he stated that it was illegal. He based this statement on the judgement in a case decided in the Appeal Court.

Mr. R. W. Barton (Welkom) continued :—

is to be a basic charge of R1.50 per month, plus 0.625 cents per unit, which we think will be a completely payable proposition.

As far as the European townships are concerned, I must admit to ideas Mr. Barnard gave us in his paper at the Johannesburg Convention.

In a small township (125 stands) we found that the overall cost was approximately R300 per stand, i.e. for 100' frontages. That, compared with more or less R400 per stand in our existing townships with underground low tension reticulation, amounted to a saving of about a third.

We didn't implement the scheme exactly as Mr. Barnard had planned, but worked out various schemes until we finally decided that a three phase HT cable with single phase transformers was more economical for our partic-

ular application. It doesn't seem as though one can follow any sort of standard method, as it depends entirely on the width of the stands and the streets, the number involved and so forth. For instance, in our Bantu townships the streets are only 30' wide and the average width of stands

Mnr. F. Stevens (Ladysmith) se :-

We in Ladysmith adopted a practice of Johannesburg which Mr. Masson omitted to mention and which has saved his municipality a large sum of money, namely, the use of existing 6.6 kV cable for 11 kV operation. In our case, we first subjected each piece of cable to 17 kV phase to earth being twice the proposed working pressure, plus 2 kV, and 30 kV between phases, being the limit of our test set.

We then energised it without putting it on load for periods of up to two months and did not experience a single failure. We have, however, had one breakdown since that was on a cable that had been lifted and then re-

Mnr. F. S. van der Merwe (W.N.N.R.) lewer soos volg kommentaar :-

Daar is eintlik twee faktore waaraan ek net wil raak. Die eerste is dat mnr. Masson gepraat het van die onoeglike voorkoms van die bogronde lyne. Ek moet erken dat dit in baie dorpe nie baie aangenaam lyk nie maar ek voel dat dit nie eintlik van soveel belang in die platteland is nie. Wat ek eintlik van mnr. Masson wou geweeet het, is: wat is die prinsipie waarop hulle te werke gaan om te skat wat is die eintlik onoeglikeheid van so 'n lyn in die geval van dorps- of stedelike gebiede.

Dan tweedens is daar die faktor wat nou baie verband

Mnr. E. C. Lynch (Salisbury) vra duidelikheid omtrent die vraag of die verspreidingsnetwerk in die Johannesburgse stelsel by die grens van die perseel ophou. Met verwysing na die Standaard-verspreidingsstelsel wat in Salisbury in swang is, se hy :-

In the good class residential areas with stands from $\frac{1}{2}$ — $\frac{1}{4}$ acre and with the same after diversity demand mentioned by Mr. Masson (about 3 $\frac{1}{2}$ — 4 kilowatts per house) the standard reticulation system consists of an overhead line along the rear stand boundary on reinforced concrete poles, underground services into the houses with plastic cables made locally, and for a really deluxe effect, we go underground where we cross roads. After a year or two the plot owners have trees along their rear boundaries, the general effect is quite pleasant and the reticulation itself is relatively cheap and unobtrusive.

I should hate to lay a cable in a servitude along the rear boundary of a stand and then have to dig it up a few years later because of a fault which couldn't be accurately located. My consumers would be livid as it would invariably be a case of disturbing priceless Bougainvillea or cacti, which is another reason why I should be wary of putting underground cables along the rear stand boundary.

about 40'.

Regarding cable sizes we found that in every case this was determined not by the load or voltage drop but by the short-circuit capacity of the system; they are all slightly larger than they might otherwise have been.

Mr. F. Stevens (Ladysmith) said :-

laid but it appears to have settled down now. The total length of such a cable in use is approximately $\frac{1}{2}$ — 2 miles and since some of it was first commissioned in 1928, it does not owe the Council anything. The actual change-over, in our case, commenced four years ago and was completed this time last year.

Some of the credit for the success we have experienced must go to the early cable layers and jointers and of course to the manufacturer. Incidentally, the cable in question comprises both early and late vintage.

Mr. F. S. van der Merwe (C.S.I.R.) commented :-

staan in tekening van kables, en dit is die tegelykingsvermoë van grond. Ek weet dit is nie werklik van soveel belang altyd omdat die spanningsval en kostheidsvermoë van die kabel juis meer belangrik is. Ek wil egter net u graag noem dat die W.N.N.R. besig is om 'n apparaat te ontwikkel wat 'n mens redelik maklik in staat sal stel (of so hoop ons te minste) om die tegelykingsvermoë van die grond mee te bepaal. Ons sal seker ook in staat wees om meters te kan doen vir firmas wat dit benodig.

Mr. E. C. Lynch (Salisbury) asked for clarification as to whether in the Johannesburg system reticulation stopped short at the stand boundary. Referring to the standard reticulation system adopted in Salisbury, he said :-

An interesting case arose recently when the Council decided to develop a very high standard of residential stand. Their aim was to get houses to the value of R20,000 or so built in a newly-developed residential area and they decided not to have any overhead LT reticulation in that area (the HT is already underground, 11 kV). I stood my ground and insisted in that case that the stand developer (as it happened, my own Council) must pay the extra cost and add it on to the cost of the land.

In a case such as this I think the extra is justified since it was only provided on amenity grounds. The extra cost involved in departing from the standard system described and instead laying the cables along the road in front of the houses and thus having long underground service cables to the houses, came to R300 per house. This serves to give you some idea of the extra cost of fully undergrounding, as compared with the system normally adopted in Salisbury.

Mnr. C. Lombard (Germiston) stel die volgende vraag :-

In the normal township agreement for the reticulation of townships, provision is made for the township owner to pay an initial deposit, which may amount to a certain percentage of the estimated cost — in a small township

Mnr. F. J. Prins (Buro vir Standaarde) haal soos volg aan uit mnr. Masson se referaat :-

Due to shortage of stocks of P.V.C. cable a certain amount of paper-insulated cable was used to supply street lighting and whilst no fault developed on the P.V.C. insulated cables, a number of paper-insulated cable ends

Hy gaan voort deur te sê :-

We know that the cable manufacturer goes to a lot of trouble, in the case of the impregnated paper-insulated cable, to keep moisture out of that cable. Unfortunately, we also know that, in the case of low voltage reticulation, we can get away with murder as to how you terminate. The fact still remains, though, that if a cable is properly terminated one can put it down and simply forget about it,

Die President lewer soos volg kommentaar :-

We've also experienced that very same problem. Our difficulty was that, in certain street lighting poles, there was so little room that we couldn't get the cable end-box into it. We discovered later (rightly or wrongly) that an easier and less expensive method of doing it was to make

Mnr. E. de C. Pretorius (Potchefstroom) lewer die volgende hydrae :-

Johannesburg word baie keer, reg of verkeerd, beskuldig van uitermatige konserwatisme — die moderne woord daarvoor is 'verkramptheid!' Maar laat ons hulle darem lof toeswaai vir die pionierswerk wat hulle gedoen het op die gebied van ondergrondse hoogspanningsverspreiding. Ook my kwota van dank vir die inligting wat hulle so geredelik beskikbaar gestel het, eers deur mnr. Barnard by 'n vorige konvensie en nou deur mnr. Masson.

Deur hierdie inligting te ontleed kan 'n mens daarop voortbou en deur die ónsynlike foute of tekortkominge of wat u dit ook al wil noem, wat hulle in my opinie begaan het, uit te skakel. As 'n mens dit doen dan dink ek kan 'n mens so na as moontlik aan 'n volmaakte stelsel kom. Ons moet darem erken ons maak almal foute, veral as ons eksperimenteer; ons het ook selfs baie foute begaan, tensypte daarvan dat ons probeer het om Johannesburg se stelsel met ons wysings na te volg. Gelukkig is die fout wat ons gemaak het teen 'n geringe koste weer reggemaak en dit ook sonder veel moeite.

Mr. C. Lombard (Germiston) posed the following question :-

it may be as much as 100%; in a very large one, as low as 20%. Now where the deposited amount called for is less than 100%, what protection is there for the Council in the event of the township owner going into liquidation?

Mr. F. J. Prins (Bureau of Standards) quoted as follows from Mr. Masson's address :-

failed at the crutch inside the street lighting pole bases. These cables had been made off with dry ends and it seems that sweating at the base of the pole was responsible for the failures.

He continued :-

whereas taping, as was mentioned here, will gradually deteriorate at a rate determined by the conditions (dryness etc.) surrounding it. I've seen cables like that at 660 volts that have gone. As I've said, it may take a number of years but it makes just that bit of difference in having a cable that will last practically a lifetime and one that will eventually have to be replaced.

The President commented :-

off the paper-insulated cable, put a small tube of paper or cardboard around it and then fill it up with epoxy resin. This method works excellently in the case of street lighting where the cable is rated at about 1,100 volts and you're only putting 250 — 380 volts on it.

Mr. E. de C. Pretorius (Potchefstroom) contributed as follows :-

Ek moet ook hier noem dat 'n sekere Engelse elektriese firma ons ook baie gehelp het met die beplanning en ontwerp van die eerste stelsel wat ons in Potchefstroom begin installeer het in 'n dorpsgebied met die naam van Baileypark. Ek wil u graag kortliks besonderhede gee van hierdie dorpsgebied. Die hele dorpsgebied bestaan uit nagenoeg 700 erwe maar omtrent 250 daarvan is tien jaar gelede met konvensionele metode geretikuleer met bogronde geleidings. Dit sal u miskien interesseer, om te weet dat die koste daar tussen R340 en R350 per standplaas was — dit was in die goedkoop tye. Julis 'n week of wat gelede het ons die skema voltooi vir die res van Baileypark, wat ons volgens die ondergrondse hoogspanningsverspreidingsstelsel geretikuleer het, en die kostes het uitgewerk op ongeveer R265 per standplaas. Die standplase is gemiddeld 13,000 vk. voet, die gemiddelde straatfront 90 vt; ons het gemiddeld een subsentrale (75 kVA) vir elke 12 persele; die hoogspanningverdeelstelsel is basies drie-fase en enkel-fase toevoer na huise.

Koste is min of meer soos volg saamgestel :—

| | | |
|---|------|-----|
| Subsentrale volledig geïnstalleer met straatligkontrole waar nodig (per erf) | R105 | 40% |
| Hoogspanningsnetwerk (insluitende die hoogspanningsruggraat wat 'n 0.15 drie-kern 11,000 volt-kabel is) | R75 | 28% |
| Laagspanningsstelsel (insluitende die laagspannings-kabels vanaf die sentrale tot by die erfgrêne | R45 | 17% |
| Straatverligting — per standplaas | R40 | 15% |

Ons het voortgebou op wat Johannesburg gedoen het maar dit is jammer dat hulle, myns insiens, die grootste tekortkoming in hulle beplanning vererwig — dit is die enkelfasige hoogspanningsdistribusie. Ek dink mnr. Masson het teen die einde van sy opmerkings ook dié feit half erken.

Sover dit straatbeligting betref wil ek mnr. Botes ondersteun. Dié het ons beplan soos volg:— ons het 'n 200 watt gloeidraad-tipe lamp gebruik op 'n paal wat 'n monterings-hoogte gee van 18', spasiëring 150' — 200'. Daar sal baie wees wat miskien sal vra, „Maar wat van die S.A.B.S. se gebruikskode?“ Volgens my mening word state in woon-gebiede nie geklassifiseer onder state waarvoor 'n „B“-installasie aanbeveel is nie. As ek miskien wel ongeluk het, dan hou ek vol dat die vereistes van die Kode onrealisties en buitensporig is. Dit behoort net uitgevoer te word in streng residensiële gebiede. Ons vergun die uitgangspunt dat straatbeligting in die dorpsgebied primêr vir sekuriteit sal wees en genoegsame lig sal verskaf vir die inwoners wat saans gaan wandel.

Ons sienswyse is dat straatbeligting teen straatkoste gedebiteer behoort te word. Ons het dus die straatligkoste by die totale koste ingevoeg; juis daarom is dit by die stigtingsvoorwaardes so ingeskrywe dat die koste van straatbeligting altans 'n basiese straatbeligting, by die elektriese retikulasie ingesluit word. Dit is so deur die dorpsrekenars aanvaar en ook deur die Administrateur goedgekeur.

Daar is hier melding gemaak van serwitute : dit is ook ingeskrywe by die stigtingsvoorwaardes dat die Raad 'n serwitute op enige een erfgrens, uitgesonder die straatgrens het, en ons maak, waar nodig, gebruik hiervan. As dit dalk nodig word om twee kante van 'n erf te gebruik vir ondergrondse kabels, dan handel die Raad volgens Artikel 84 (?) van die Plaaslike Bestuursordinansie. Ingevolge daarvan gaan hulle eenvoudig na die dorpselenaar toe, gee hom 'n tjeek en gee kennis aan hom dat daar binne 30 dae 'n kabel daar gelê gaan word. Hulle het nooit enige beswaar daarteen en in daarmee het ons geen moeilikheid gehad nie.

Betreffende die bouplanne het ons ook ekstra werk op die hals gehaal en ek glo dit is iets wat ander plaaslike besture en elektrisiteitsondernemings ook met voordeel kan oorweeg om hierdie probleem te probeer oplos. In die dorpsgebiede word die planne na ons Departement toe gestuur en ons dui op die liggingplanne aan die ligging van die ondergrondse kabels met 'n note daarby wat net 'n uittreksel is van die stigtingsvoorwaardes — geen geboue mag in daardie serwitute opgerig word en geen groot-

wortelbome (wat dit ook al mag wees!) mag daar geplant word nie. Die eienaar van die standplaas is dus deeglik bewus van die ondergrondse kabels wat daar is en hy kan nie later onbewustheid pleit daarvan nie.

'n Ander saak waarvan ek 'n nota gemaak het, is die kortsluitingsvermoë van kabels. Die probleem het ons soos volg probeer oplos:— Ons het 'n sekondêre 11 kV-distribusiestelsel wat omtrent 12 van die subentrales bedien en 0.0225 drie-kern-kabel gebruik ($\frac{1}{2}$ kV). Mnr. Lombard sal seker wil oor die aardfoute maar ons het die gewoonte om 'n sekeringskakelaar te gebruik om die kabel te beveilig. Daar is dus geen gevaar dat die kabel kan beskadig word tydens 'n kortsluiting nie en dit is ook redelik goedkoop en, om dié redes, heeltemaal voldoende.

Ons het nog nie probleme gehad met aardfoute op die kabels nie maar wel tussen-fase-foute. Daar word met reg gesê dat 'n mens foute maak en siegs deur skade of skandale wys word. Ons het geen beskerming nie aan die hoogspanningskant waar die ringtoevoerkabels ingebring word en met koperskakels aanmekaar gebind is; daervandaan word dit bloot gebonde geneem na die hoogspanningskant van die transformator. Die probleme wat ons daar gehad het is veroorsaak deur die feit dat ons nagelaat het om die gat in die fondement toe te maak, met die gevolg dat ons die afgelepe winter en daarna geweldig las ondervind het met rotte en muis. Sedertdien het ons dié openings toegemessel of toegemaak met plate en so daardie moeilikheid opgelos.

Hier is net 'n paar vrae oor punte in mnr. Masson se referaat: sover dit verbruikersaanvraag betref, moet ek sê dat ons min of meer dieselfde te werk gaan as hulle. Dit sal u interesseer dat ons op die grondslag werk van 5 — 10 verbruikers op 'n basis van 7½ kVA — dit is die gediversifiseerde hoogsaanvraag — 10 — 20 verbruikers, 6 kVA; en 20 — 50 verbruikers, 4½ kVA. Ons oorweeg dit nou om in 'n ander dorpsgebied wat ons beplan het, van 12 tot 24 verbruikers per sentrale om te ruil en dan 'n 150 kVA transformator te gebruik. Daar is die beraamde koste R265 per erf, terwyl ons werklike koste hier sê R265 is. 'n Mens kan dit dus wel oorweeg, want, alhoewel dit dan nodig word om swaarder of groter kabels aan die laagspanningskant te lê, wen 'n mens geweldig daarby, deurdat die koste per standplaas van die subentrale alleen (wat nogal taamlik hoog is) in 'n groot mate afgeboring word.

Ek het opgelet mnr. Masson maak staat op die miniatur-stroombreker vir die oorlasbeveiliging van die transformator. Ek weet nie of dit so 'n goeie manier is nie, want ek dink die totaal van die miniatur-stroombrekers is seker aansienlik hoër as dié van die transformator. Wat ons doen en spesifiseer, is 'n laagspannings sekering tussen die laagspanningsaansluitklemme en die geleierstamme en dié sekering se karakteristiek is min of meer in ooreenstemming met die oorbelastingvermoë van die transformator.

Omtrent straatbeligting wil ek net vir mnr. Masson die besonderhede gee van wat ons daaromtrent doen. Ek sal eers graag van hom wil weet (met verwysing na afbeeldings 3 en 4) watter soort standplaas-armatuur gebruik word,

wat die monteringshoogte is, asook die afstand tussen die armature.

Nog 'n opmerking wat ek wil maak, is dat ons in hierdie land werklik te min gebruik maak van die inherente kort-tyd oorbelastingsvermoë van transformators, want aansienlike kostes word daardeur bespaar.

Mnr. Masson sê dat die Triomf-skema ongeveer R50 per standplaas dunderd sou gewees het indien die skema sê

Hierop sê die President :

Die syfers wat u en die ander sprekers van tyd tot tyd aan ons bied is 'n waardevolle bydrae om ons argiewe en verrigtinge te voltooi. Ek is seker daarvan dat ons dit

Mnr. J. A. Matthews (Kimberley) verwys na die ontwikkeling van 'n dorpsgebied in Kimberley, wat bestaan het uit 600 persele vir 'n goedkoop beshuisingsskema. Hy gaan soos volg voort :

As this area was situated some distance from the rest of the built-up area, it became necessary for us to give earnest consideration to the cost of reticulation, especially as we had started with the unfavourable position of having to bring power from a considerable distance. We set to work on a plan basis of 6 kVA after-diversity demand and decided that it would be as well to include about 50 of these mini-substations (mini-kiosks), which would adequately cope with the 600 erven. The scheme is not noteworthy for any outstanding features, but we are indeed grateful for the guidance received in this matter from previous papers given by Mr. Barnard and various other pieces of information.

Unfortunately the scheme didn't get off the ground as we'd hoped it would do and to date only about 120 of the erven have been built on, leaving us with a completely

Mnr. R. M. O. Simpson (Durban) sê :

With regard to the use of single phase, this particular type of system (but on an overhead basis) has been in use in principle in the Durban area for many years and has proved very effective.

It's quite interesting, though, to see what has been happening of late in the suburban areas where such places as chicken farms and small dairies are mechanizing, the same as we've been advocated to do, and they're therefore demanding very much more power. Fortunately we do have an overhead system which enables us to run the third EHT phase down to supply the load. It would be rather awkward for all concerned if we told them that they had to put 10/15 h.p. motors purely on single phase. But it has done for a number of years very effectively; we've had the minimum LT distribution and it has been single phase/three wire which has a similar efficiency to three phase/four wire.

There is one point I would like to make as far as the use of single phase in towns is concerned: in the Durban

ontwerp was dat dit vir 'n m.n.v.a. van 6 kVA per standplaas voorsiening gemaak het. Dit klink vir my uit verband en ek glo nie die verskil in koste is so groot nie. Die koste van 'n 50 kVA-miniatursubsentrale is naastenby R1,000 en van 'n 75 kVA, sê nou maar R1,100. Daar is dus nie 'n groot verskil in die kostes van die subsentrale nie, maar ek weet nie of die hoër kostes dalk by die laagspanningskabel kom nie.

The President then said :

almal verwek om dit mettertyd sal kan verteer by die huis en gebruik maak daarvan.

Mr. J. A. Matthews (Kimberley) referred to the development of a township in his city, consisting of 600 stands for a low-cost housing scheme. He continued :

unbalanced scheme. When the remaining erven are to be built on, I'm not in a position to say or even guess at.

I don't know whether this problem has been experienced by others but it is obvious that when a Council decides to change its mind in the middle of such a scheme, it can result in having a terrifically uneconomic project on its hands and, in this case, it's not possible to suggest any cost at all per erf.

This problem of having an extremely unbalanced load, whilst at this stage yet a very small one, will remain with us for some considerable time. I can assure Mr. Masson, though, that we have experienced no technical problems or difficulties of that nature but this is obviously the chance one has to take in the construction of these single-phase schemes and if the scheme goes through to its full completion, such a problem will apparently not arise.

Mr. R. M. O. Simpson (Durban) contributed as follows:

area and the main parts of Durban itself we are now starting to meet up with fairly heavy demands for air-conditioning and individual central plants are being installed in houses with demands of anything from 10 — 20 hp. Here again we were fortunate in having a three phase system to cope with the situation. Many years ago we had single phase/three wire at which stage I think the after-diversity demand for individual homes was very low indeed. However, John Roberts far-sightedly extended this single phase/three wire system by supporting it with a single phase HT system obtained from star-connected transformers on the 6000 V/three phase system. In this way he maintained it and was able to meet up with the very heavy and rapid rise in electric cooking, because it was then possible to establish very small substations at pretty well every street corner with 50 — 100 kVA transformers in them.

But those days have gone and the after-diversity demand today is rising very rapidly — in some areas in Westville it's as high as 12 kVA in a limited number of houses

(there may be no more than 20) and it has now reached the stage when we have to consider something more than single phase.

My only criticism of the paper, if any, is that I think that, if one can control the development of an area, there may be justification for designing a system today at three phase, but, unless you can ensure this, you are bound to

Met verwysing na Vanderbijlpark, sê die President :

The actual policy that has been laid down here is that it should not be necessary for the consumers in old-established townships to pay higher tariffs due to the higher cost and interest rates payable for the development of new townships. This is based on the assumption that it should be economical on the existing tariffs. If a new township owner should decide to develop another township, the cost of such a development would then be estimated and the township owner requested to make a capital contribution to foot the difference in expenditure in order to make the scheme as a whole economical on the existing tariffs. Naturally the rising rate of interest and the rising cost of materials are taken into account in this estimation and we have found it to work very well so far and we do not anticipate any future problems in that respect.

We apply the same policy to small extensions on agricultural holdings. An individual or group consumers is

Mnr. C. J. Lombard (Germiston) sê dat sommige transformators in sy stad wel ondergronds geplaas is. Dit het omtrent ses jaar gelede gebeur toe 'n stelsel in 'n ou gevestigde gebied versterk moes word en daar geen persele vir substasies beskikbaar was nie. Hy gaan voort deur te sê :

We called for tenders, leaving the specification fairly loose so that tenderers could offer what they felt would be most suitable at the time. We ordered transformers from a local manufacturer, up to 350 kVA with forced air cooling, and found them most satisfactory. Extensive tests were carried out initially when these transformers were installed and they were, in our opinion too conservatively rated.

The transformers are buried in the ground, resting

Mnr. L. Foster (S.A.N.K.V.) lewer soos volg kommentaar oor die kwessie van straatverligting :—

I must refer to the South African Code of Practice. We're concerned with the Group "B" type of lighting installation and it states here: "Suburban and side roads carrying mainly local traffic, service roads — a luminance of 0.025 is required." and further on, on page 25, that, for the medium surface the conversion factor is 13, (this works out to 0.325 lumens per sq. ft.). Mr. Botes mentioned that it was neither possible nor economical to go down to say

have trouble with an underground system of HT — you've got to meet individual demands, say for a 10 hp. or 15 hp. motor in an essentially residential area or a demand for sewerage pumping, which also requires three phase. I would like to know what provision Mr. Masson has made for dealing with this particular type of growth in the future.

Referring to Vanderbijlpark, the President said:

assessed on the basis that it must be economical on the existing tariffs and it should be necessary (as in the case of a single consumer or if the number of consumers is too small to justify the capital expenditure) they must pay in the difference. In that way you have fairly good control of the actual development at the same time, since they are then inclined to group together to make it more economical and to avoid paying a capital contribution.

There's one other point I would like to ask the author of this morning's paper : we've been reading a lot lately that the Americans are becoming up to date with what they call "undergrounding" and I've noticed that in several cases they've put forward the idea of burying the transformer underground in a special type of box. I'm wondering whether Johannesburg has perhaps been thinking along those lines or whether anybody else in South Africa has any experience in this matter.

Mr. C. J. Lombard (Germiston) said that in his city some transformers had been placed underground. This had taken place about six years ago when a system in an old established area had to be reinforced and no substation sites were available. He continued :

on a concrete platform with the coolers above ground. In the case of the 250kVA transformer natural air cooling is used but in the case of the 350 kVA we have forced cooling, the fans being switched on by a thermostat.

The cost is rather high and on the basis of the tenders received, it also appeared that the cost of silicone-insulated transformers used on a considerable scale overseas, is considerably higher than that of the type we ordered.

Mr. L. Foster (S.A.N.C.I.) commented on the street lighting aspect as follows :—

100' spacings — which would be the spacing required to provide this value of luminance. Gentlemen, it's simply a matter of whether you want to meet the Code of Practice or not; a question of economics versus the Code of Practice. There are very few if any street lanterns capable of providing this level of illumination at 150', it's more in the order of 100/110'.

Mnr. D. H. Pieksma (S.A.N.K.V.) sê :—

In the first place I want to support Mr. Foster concerning street lighting. I was not a little worried to hear that one gentlemen in particular was quite satisfied by the light produced by 125 watt mercury lamps 150' apart. The

Mnr. P. J. Botes (Roodepoort) gaan soos volg voort :—

As 'n mens met straatbeligting besig is dan kan mens feitlik onbeperk gaan met die uitgawe wat daaraan bestee kan word. Ek het nie verwys na die lumen per voet nie, maar na die utiliteitsfaktor — ek dink dit is 1 in 6. As die pale 150' uitmekaar uit is kan mens nie daardie utiliteitsfaktor kry nie. Daar sal wel lig-kolle en swart kolle wees maar daardie gelykheid is nie verkrybaar met 150' spaëring nie en daarom voldoen dit nie aan die Kode nie. Wat betref mnr. Pieksma se stelling dat dit nie goed ge-

Mnr. A. F. Turnbull (Vereeniging) som die posisie met betrekking tot straatverligting soos volg op :—

The Committee has done a vast amount of research to obtain the standards set down in the Code, which, as you know, has been in effect for a number of years. However, the point that seems to be missed by most people is that the Code caters for street lighting, whereas most of the

Mnr. Masson antwoord soos volg op die bespreking :—

Mnr. de Villiers het eerstens gevra van die tipe kabel wat ons gebruik: ons gebruik 0.06 kabel om die nodige foutvermoë te voorsien. In ons transformator-mini-kiosks het ons geen voorsiening gemaak om 'n groter kern en ontwikkeling in die substasie in te sit nie. Tensy ons 'n driefase-kern insit kan ons nie 'n groter kapasiteit kry nie.

Mnr. Botes, ek dink ek stem saam met u in verband met die hoeveelheid kabels in 'n sypaadjie. In Triomf, waar ons 20 verbruikers per mini-kiosk voorsien, is daar dele van die sypaadjie wat minstens 10 dienskabels moet dra en dit maak definitief 'n nou sypaadjie nogal vol, veral as 'n mens die ander dienste in gedagte hou — watertype ens.

Ek was geïnteresseerd in mnr. Botes se beskrywing van sy kompakte stroombrekerskakeleers. Dit klink bra aantreklik maar ek twyfel daarvoor in 'n staal substasie, om dat ons vind dat hulle verskriklik warm word van binne, veral na die westekant. In verband met die kabels het ons gevind dat die samestelling (compound) wat in kabelkassies gebruik is, so warm word dat dit vanself uittoot.

I think Mr. Barton's comparison of the costs of high voltage distribution and low voltage underground distribution tie up with our own experience. There is no doubt about it that the reason for the economy in the high voltage distribution is the saving in the copper that one puts in the ground. If you have to provide heavy low voltage

Mr. D. H. Pieksma (S.A.N.C.I.) commented :—

safety aspect must continually be taken into consideration on roads where there is traffic and people and the lighting for streets such as these can simply never be good enough.

Mr. P. J. Botes (Roodepoort) continued :—

noeg is nie: ek nooi hom uit om 'n bietjie na Roodepoort te gaan. Daar is 'n hele paar nuwe dorpsgebiede waar daar net voetpaale is wat nog nie geteer is nie, maar hulle is wel belig met 125-watt lampe wat 150' uitmekaar uit is. Die beligting is daar baie goed, in dié opsig dat dit sekondêre paale, sypaale is wat weg van die hoofpad is en waar daar nie baie verkeer of spoed behoort te wees nie. Ons vind dit heeltemaal bevredigend.

Mr. A. F. Turnbull (Vereeniging) summed up the position of street lighting as follows :—

townships today only provide security lighting, the standards for which are very fluid and the engineer can use whatever type of lighting he chooses and space them as far apart as he wishes.

Mr. Masson replied to the discussion as follows :—

copper cables, a lot of capital is literally sunk into the ground.

Mr. Lynch's remarks were very interesting, for which I thank him. He asked particularly where the saving comes in between single phase and three phase. We appreciate the savings between transmission of three phase and single phase, but I think what made us favour single phase so strongly was the tremendous difficulty in obtaining a reasonable balance in domestic townships. As you all know, if one provides a three phase connection for a consumer and he then puts his oven on one phase, the plates on another and the geyser on the third, you never get a satisfactory balance.

We used to provide a two phase neutral for consumers with electric stoves or water heaters, but even after sending a man to balance the loading, there would be endless complaints of a recurring imbalance.

Our distribution naturally is three phase HT₂ to the substation, from which single phase is distributed for this mini-kiosk system and the distribution is only single phase in so far as that little township is concerned. We find in this way that if you've got sufficient rings and can divide up the number of kiosks reasonably over the three phases, you can get an excellent balance.

I was particularly interested in Mr. Lynch's remarks about the trees that screen his overhead lines so nicely, as we also have that trouble over lines on the street. I

could also tell Mr. Lynch a great deal about the vandals who hack a tree to pieces to 'get it away from their lines'. I've no doubt, though that he, too, has experienced them. Quite how one would 'hack a tree to pieces' on the rear boundary, I don't know, but it must be quite a problem if the consumers are anything like those in Johannesburg, who can be very difficult.

Mr. Lombard enquired about the percentage laid down to be paid by the township owner in a case of township reticulation. We don't actually lay down any particular percentage but merely state in the standard agreement that the owner shall pay whatever he is called upon to pay when we require it! I think it works out extremely well for the township owners because they pay so reluctantly! From our point of view, though, it does work reasonably well, though not perfectly.

Mr. Lombard also asked how we prevented the absconding of township owners. That, fortunately, has been taken out of our hands by the City Treasurer and the Town Clerk who look after that aspect of it. If they think the township owner is a 'man of straw' they insist on a full guarantee at the start of a job; if he appears reasonably sound no guarantee is required of him. This policy has been criticized, particularly by the Peri-urban Areas Board, for whom we do quite a lot of township reticulation. They insist that a township owner should pay the full amount or at least provide a guarantee of payment.

The description of the underground transformers by Mr. Lombard was most fascinating. I see the Americans are now advertising "Kleen Looks!" Incidentally, we've also tried burying standard transformers under differing atmospheric conditions, but to date none of these experiments have been successful. It appears to be essential to have a specially designed transformer if it is to be buried underground. I personally am not all that keen, because my experience with underground chambers has been somewhat painful!

To return to Mr. Lynch, who is an ardent advocate of the overhead system; I must confess that I too have a very soft spot for them, and there's certainly nothing wrong with a well-constructed overhead line. We do find, however, in Johannesburg today that, unless one can keep an overhead to a maximum of 600', there is the voltage drop to contend with.

I quite expected Mr. Prins' criticism of our 'dry ends'. I agree with him in principle but perhaps I was a little too brief in my explanation. We are very fortunate with our climate in Johannesburg, which does make a difference. By 'dry ends' I don't mean just the open papers; these ends were actually taped off with a PVC or black adhesive tape. We have many tens of thousands of paper insulated cables on overhead reticulation systems that are merely taped in this way and 'swan-necked' on the top of the pole. The trouble we have experienced with these is negligible and, for the most part, can be attributed to lightning rather than moisture. I suppose one could say that that speaks highly of the cable we're using, or perhaps that the cable has too good an insulation, but we haven't had any troubles with LT cables and, unless it is a

feeder from a load centre, we've never found it necessary to go to the trouble of making them off in a box and then filling it with compound. We've simply used 'dry ends' and got away with it in my 35 years of experience in City Council service. And so it will carry on, I suppose, until somebody feels more strongly about it than I do.

Mr. Pretorius, ek wil u ook bedank vir u beskywing. Iets wat ek nie melding van gemaak het nie (ek dink dit het gekom in mnr. Barnard se referaat) is dat ons 'n 300 ampere-sekering het wat die transformator beskerm — 'n laagspanningssekering. Ons vertrou dus nie heeltemaal op die miniatuur-stroombrekers vir die beskerming van die transformator nie.

Mnr. Pretorius het ook gevra van die montering van ons straatbeligtingsarmature: dit is 20' met 'n 40-watt gloeibuislamp. Dan is daar ook sy kritiek dat die ekstra prys vir die hoër voorsiening van krag te hoog is. Ons het besluit om die mini-kiosks so klein soos moontlik te maak (ons s'n is maar net 7' x 4' x 2'). As 'n mens nou 'n groter kapasiteit as 75' wil hê, is dit onmoontlik verkrybaar in 'n kiosk van 2' diep. As 'n mens gewillig is om van 'n groter kiosk gebruik te maak, sal dit natuurlik goedkoper wees om liever 'n 100 kVA transformator te verkry as die 250 kVA. My beraming was eerder daarop gebaseer 'n addisionele transformator-kiosk in te sit in plaas van 'n groter een.

Mr. Simpson inquired as to the provisions we're making for growth and three phase connections: I must qualify this, in that we are only introducing this mini-kiosk system into purely residential townships and are not considering extending it to places where the consumer's a.d.m.d. will exceed 5-6 kVA, which gives a before-diversity figure of something like 15. So there's no real likelihood of our running into trouble with somebody requiring three phase connections, but, at a pinch, I think we could "maak 'n plan".

To come to Mr. Dunstan: first of all he states that he has no great difficulty in getting capital, since his only competitor is the water branch. Well, he can consider himself very lucky not to have such things as major roads and expressways that drain all the available capital.

In considering Mr. van der Walt's and Mr. Dunstan's criticism of my suggestion that the township owners should be called on to pay more, I should first of all like to make it clear that this is entirely my own opinion. I've attended many township board meetings and listened to Town Clerks and their representatives saying that they're not getting enough endowment, that they want ground for cemeteries, a contribution towards the Native location, a further contribution towards this and that. I agree with Mr. Theron that electricity departments are business undertakers; and if, as such, they have to subsidize township owners to establish a township, they can only do so at the expense of the present consumers and it is they who have to pay for these high township development costs that we're faced with.

As business ventures we have to make our organisations pay but, of course, the township owners' developments are also business ventures and I've never yet heard of one



Photo by courtesy of Fisons, showing part of the new Nitrogenous Fertilizer Factory at Milnerton.

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who doesn't get his pound of flesh out of his township scheme. Mr. van der Walt mentioned the lag in township development. I don't think that was brought about because of the high costs involved but because there just wasn't the demand. In all my considerable experience in Johannesburg, I've known only one honest township owner who sold stands for x rands (in nice big letters at the top) and then right at the bottom in small print he had the following, "cost to bring electricity to the stand is R200". Thus when you bought your stand you paid x rands but as soon as you wanted electricity you had to pay him another R200. So it's quite obvious that township owners include the cost of electrical reticulation in their estimate of the cost of the scheme to themselves. The point is the actual amount that they do include. For instance, some might compute that they're going to lose 15% — 20% of their money anyway, some might even say 50% and I'm quite sure that some of them take a chance on 100%, which they then add on to the price of their stands.

I definitely think it should be the responsibility of the township owner (and through him the purchaser of the stand) to pay the establishment costs. On the other hand, in making this remark, it does seem to me to be a good idea to have standard arrangements to avoid the randomness caused by people constantly referring to the practice in other parts of the country. They will, for instance, make such wild statements that Escom reticulates for nothing, not realizing that they demand a minimum monthly

payment for ever, and not for a mere couple of years as we do.

I am still of the firm opinion that the contribution made by these township owners relative to their profit on these stands is very small. Undoubtedly these township owners have considerable costs to face and I quite believe that, if such a man pays x rands for ground which he wants to develop as a township, he will have to sell his stands at $3 \times X$ to recover his money. I am equally certain, though, that the majority of township owners today are asking for something more like $10 \times X$.

At the moment then, they are contributing something. If we now say that they should not be required to pay anything at all, then why make them pay a deposit? Why not merely do as has been suggested and have an agreement whereby only portions of such a township may be developed at a time. Although how that would work I dread to think, because when one is discussing this question of provision of supplies with township owners they will promise one anything but you invariably find that the first house is built in the north-east corner of the township and the second in the south-east. They never stick to a section and build it up, unless there is some way of tying them down to developing systematically. At present I would estimate that a township owner loses something in the region of 15% of his money. I would far rather have it that they pay that as a contribution towards the high cost of establishing these services.

TWEEDE DAG — NAMIDDAGSITTING LEDEFORUM

Mr. P. A. Giles (Oos Londen) tree as Vraesteller op. Die vrae wat behandel is, is in Volume I van die Vereniging se Verrigtinge vir 1968 gepubliseer.

Elektrisiteitsondernemings.

Vrae 1, 2 en 3 word voorgelê. Mr. J. A. Loubser (Carletonville) sê :—

Ek wil eintlik net graag, voor ons daarmee aangaan, hoor of die Inspekteur van Masjinerie nie iets oor hierdie onderwerp wil sê nie. Mag dit gebeur dat twee sulke elek-

Mr. J. G. Wannenburg (Departement van Arbeid) spreek die volgende menings uit :—

Let us consider this trouble of engineers. Naturally it is not just you people who have the trouble, I have the same trouble too. But I would like to point out that we have various ways of overcoming this difficulty. Firstly, we have amended Regulation c (1) because, as it stands at the moment, it is rather difficult to apply. What we have done is to raise the horse power limit from 1000 to 1500, with the reservation that, as in the past, the h.p. limit remains 1000 for just a competent person; over 1000 still a certificated engineer and between 1000 and 1500 it rests with Head Office i.e. my good self, to decide whether it should be a certificated engineer or a competent person.

SECOND DAY — AFTERNOON SESSION MEMBERS' FORUM

Mr. P. A. Giles (East London) acted as Quizmaster. The questions dealt with were as published in Volume (1) of the 1968 Proceedings of the Association.

Electricity Undertakings.

Questions 1, 2 and 3 were submitted. Mr. J. A. Loubser (Carletonville) said :—

trisiteitsondernemings die pligte kan verdeel? Ek is nie seker nie.

Mr. J. G. Wannenburg (Dept. of Labour) submitted the following views :—

Now the reason we haven't gone higher than 1500 is this. Unfortunately the Regulations are not written just for municipalities but for the rest of the industrial world as well. You will agree with me that you could have a factory with, say, 800 h.p. which could be more in need of an engineer than a factory with 2000 h.p. A case in point is the broadcasting station at Bloemendal where they've got 4000 h.p. but there are not two wheels turning. If the average engineer, myself included, were offered that job, he wouldn't take it because he would know very little, if anything, about it, since it's all electronics.

Then secondly, the way we get past this is to offer

people certificates of limited scope and quite a number of municipalities have already been helped in this way. For the limited scope certificate the candidate is merely required to write the Regulations and the Factories' Act. We expect that of him because it would be unfair for a person to take a job as an engineer or as a responsible person, not knowing the requirements of the Act. Should he land in trouble, then naturally he would be in serious trouble indeed and any plea that he didn't know any better would be dismissed on the grounds that ignorance of the law is no excuse. But we have helped, as I've said, quite a number and there are several people here who hold the limited scope certificate, which is very handy.

The other subject under discussion is the possibility of grouping municipalities together. This is rather difficult because, according to the Regulations, an engineer has to be appointed on a permanent basis and is not allowed to take responsibility for any machinery other than that in his own municipality or his own factory. But we have done it for factories. Where we have a factory running, say, about 1200 h.p. and, shall we say, a sister factory with the same h.p. and only 2 — 3 miles distant, it is quite in order to appoint one engineer in charge of the two factories jointly. The provision made there is that there must

Die vraesteller versoek mnr. Wannenburg om sy menings omtrent die eksamens vir die Regeringsertifikaat van Bevoegdheid te lug. Hierop gaan mnr. Wannenburg soos volg voort :—

I do have insight into the results of all the examinations. On an average we have 500 to 600 candidates per sitting and if we have a crop of 10% we are very proud of ourselves! At the last examination, if I remember correctly, there were something like 42 candidates, of which only 4 came up from the bench. The others were students with B.Sc. Engineering degrees and were only required to write Law. You'd be surprised to know how many failures we have amongst these B.Sc. and even M.Sc. graduates who cannot pass Law.

As regards the examination itself, I think there is something basically wrong with the way it is conducted. I cannot say very much about that at the present moment, except to tell you that Mr. Gibbs, the Government Mining Engineer, has decided to appoint a commission to go into the methods and the ways of holding the examination.

From experience I know that a person with an NTC II or NTC III qualification will never pass the examination. Last time we had one candidate who had his thirtieth attempt. He's been trying now for fifteen years — two attempts per year — and he still couldn't manage to get more than 20% for each paper.

What I think should be done is to raise the qualification and say that no person shall write the examination unless he holds an NTC V (the old ATC II) certificate. At the moment, it boils down to expecting a High School child in Std. 6 to write matriculation after only a year and pass it. He hasn't been led up to it and he hasn't gone through the paces 6 — 10 and consequently will not be able to pass

be a competent person appointed at each factory to take charge when the engineer is not on the premises.

I don't know how it would work in municipalities. I think now of two municipalities in Natal — Dundee and Glencoe — which are only 5 miles apart. It has been suggested in the past that one engineer should take charge of these two municipalities. In a case like that I say maybe it could be done because they're close to one another, but you cannot serve two masters. If the engineer at Dundee were to be appointed as joint engineer for the two municipalities, which one would he serve best? That is our biggest difficulty.

Take two other municipalities which are, say 50 miles apart. How is the responsibility of the engineer to be split between the two municipalities and would he be available at very short notice if his services are required at point A. and he is at point B? That is another difficulty that crops up.

Basically I don't think there is anything wrong with the idea but there are those two factors to be considered:—

- (i) the distance apart.
- (ii) the regulation stipulation that an engineer only be responsible for (or be appointed on a permanent basis at) one factory, premises or municipality.

The Quizmaster asked Mr. Wannenburg to give some thoughts on the examinations for the Government Certificate of Competency. Mr. Wannenburg then continued :—

the examination. That is exactly what happens to candidates in the engineering examination. Unless they come up by way of NTC I — V and possibly the National Engineering Diploma, they stand very little chance of passing the examination. Those who do pass normally have the National Engineering Diploma or NTC V (the old ATC II) and a very few the NTC IV (the old ATC I). Singularly few ever manage to pass on the NTC III and the big stumbling block there is their insufficient knowledge of mathematics.

You give them a formula, as is being today, even the formulae are given in the papers, say the common h.p. formulae p.l.a.n. and ask them to work out the h.p. and

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they'd be able to do so. But for goodness' sake don't confuse the issue by giving 'p' in kilograms per sq. centimetre, 'l' in inches and 'a' in sq. feet and don't even mention whether it's a two-stroke or a four-stroke engine, because then they're completely bewildered! Give them the h.p. and give them 'p', 'l' and 'n' and ask them to work out 'a'. They are simply not capable of transforming the formulae in order to work out what is required, so it's hopeless to even ask them.

Those are the main stumbling blocks and those are the things we are going into at the present time.

Another thing I feel is that the examination syllabus is not clearly defined. For instance, in electricity they talk about induction motors, direct current motors, trans-

formers, transmission etc. One could write a separate examination on each of these. Unfortunately all the examiners have B.Sc. degrees and they set a paper which is

Mr. J. A. Matthews (Kimberley) sê :-

In the Northern Cape there are some six or seven small towns where the total annual revenue account is only of the order of R20,000 — R30,000. They only pay on an average 7c — 8c per unit and consequently these communities cannot afford very much in the way of salaries and, since they are economically on the poor side, they rely mainly on the surrounding farming communities to keep them going. The Councils of these small towns are finding it increasingly difficult to attract staff of sufficient competence to keep their networks going. The class of person generally found is one who may have served an apprenticeship, but more likely has been a learner shiftsman in the power station, where he has acquired sufficient skill to do the work required to keep the network in order. By legal standards he cannot be considered competent, yet if he should leave this Council they would invariably be without any person capable of doing the work, apart from old Frans who has been the 'handlanger' there for many many years.

Under these conditions, it is small wonder that we in Kimberley have been asked to provide assistance to these

Mr. R. S. Dunstan (Port Elizabeth) sê vervolgens :-

The way question 1 is worded, it refers to engineers. I've been reading that word as certificated engineers and I think that is the correct interpretation that should be placed on it. The main thing is that we've got a certain number of certificated engineers and the problem is how their services can be best spread to cover the requirements of the whole country and of our industry.

Mr. Matthews has just given us details of an idea he had for the Kimberley area. That idea has been in my mind for the last six or seven years for the Port Elizabeth /Uitenhage area. I fail to see why the Department of Labour should raise any objection to it, because it really amounts to a number of municipalities forming themselves into one electricity supply corporation. Surely that corporation could employ an engineer who could attend to all its plant, regardless of the fact that its plant might be spread over quite a wide area. Take a large municipality like Pretoria which has the largest municipal area in the country. There's only one engineer in charge of that whole area and the distance across his area of control is very large. It's probably comparable with the area we've been told about in the Kimberley district. That's the first thing.

The second thing is that I feel very strongly that no steps should be taken to reduce the standard required of a certificated engineer. Mr. Wannenburg mentioned that

Hierop antwoord mr. Wannenburg soos volg :

I think I've been misunderstood. I never said that we were going to lower the standard of the examination. What

practically the equivalent of third year B.Sc. Engineering. It's just impossible to expect a person with NTC III qualifications to write that examination.

Mr. J. A. Matthews (Kimberley) said :-

small towns, to the extent that it's almost becoming an impossible situation and we are virtually forced to create a separate department of outside assistance. For this reason, I suggested some four years ago that all the local authorities should form a non-profit utility company amongst themselves, with sufficient capital to afford engineering staff and workmen to undertake servicing and even minor construction projects on behalf of each of the members. This idea found favour with them as it did with the Provincial Administration. However, when the idea was put to the Department of Labour, they were quite unwilling to support it, on the grounds that it was wrong for a responsible person to spread his responsibility over an area many miles apart. The result of this was that we had to drop the idea altogether. Surely though, Mr. Quizmaster, even if the supervision and the authority is spread out over a large area, it's far better than the existing situation where there is a complete absence of responsibility, supervision or competency, and this condition is likely to become even more noticeable in the future.

Mr. R. S. Dunstan (Port Elizabeth) went on to say :-

the level at which a certificated engineer is required, has been raised from 1000 to 1500 h.p. That is not going to make a great deal of difference. There are very few organisations I think that lie between that, maybe a few factories, but not a great number of places. It wouldn't affect very many municipalities and therefore it cannot have a great effect. If the standard of the examination is lowered, I think that's an extremely retrograde step.

A better line of attack might be to revise the syllabus completely. At present the syllabus for the electrical certificate of competency includes the subjects of strength of materials and power driven machinery. In my day when we wrote the certificate, we had to write the whole lot and pass them together, but for the electrical certificate most of the work you were doing was mechanical. Well, surely a better line now would be to rewrite the syllabuses so that those taking the electrical certificate are dealing with electrical subjects almost entirely and those taking the mechanical certificate deal mainly with mechanical subjects. You would then limit the scope that a man must get his brain round before he's in a position to write the examination. He wouldn't require such a broad knowledge and yet his knowledge of the particular branch he's in would be deep enough for the purpose.

Mr. Wannenburg replied :

I said is that we're going to raise it, if anything. In the first instance, putting up the qualification required for

the person to enter for the examination is not lowering the standard. And secondly, neither is demarcating the different syllabuses and subjects clearly, so that the person studying them knows exactly what is required of him. That is the point.

The amended regulations that I mentioned earlier, have not yet been promulgated, but they have been sent through to our law advisors and we are expecting them to go through within the next month or so. In those regulations we have made provision for the appointment of a person at Bloemendal. It reads more or less that "where on account of the class of work which is being done, the class of activity or the type of machinery, etc., the situation requires it, it is to be decided what type of engineer or competent person should be appointed," —

In antwoord op mnr. Wannenburg se opmerking, sê mnr. Dunstan :

I would like to apologise to Mr. Wannenburg for not expressing myself clearly. When he spoke the first time it was quite clear that he was with us and that he does not want to lower the standard. That was perfectly clear from his remarks.

Mr. Wannenburg also mentioned that Mr. Gibbs, the Government Mining Engineer, was appointing a commis-

Toe mnr. Wannenburg weer antwoord, sê hy :

Although I am not actually a member of this commission, I will be called upon to give evidence before it, but if this organisation would prefer to give evidence, it could do so. Mr. Moerdyk, the chairman of the commission, told me about two weeks ago that he had already sent out

Mnr. J. L. van der Walt (Erelid) spreek die volgende menings uit :

Metropolitaanse ontwikkeling kom natuurlik baie na vore in die laaste tyd en ek dink ons provinsiale owerhede is ook geneig om in daardie rigting te dink. Kort-kort steek dit in die Transvaal kop uit en die LUK belas met plaaslike besture sal graag wil sien dat die metropolitaanse stelsel hier in Suid-Afrika ontwikkel word, veral omdat die Rand hom blykbaar daartoe leen.

Ek persoonlik twyfel of die tyd ryp is daarvoor. Die stelsel het in Amerika begin en die voorbeeld wat vir almal genoem word is Toronto, maar die bevolkingsgroep van die enkele stad is baie groter as wat die totale blanke bevolking van die hele Suid-Afrika is. Daarom wonder ek of die getalle al in ons land sodanig is dat dit 'n metropolitaanse stelsel regverdig.

Om terug te kom na die tekort aan ingenieurs : dit is 'n feit wat ons nie kan betwis nie, en 'n oplossing moet daarvoor gesoek word. Ek glo tog wel dat daar sekere dorpe is wat geografies só geleë is dat hulle maklik 'n eenheid kan vorm, veral in die geval van gebiede soos die Witwatersrand en die Kaapse Skiereiland. Dit werk doeltreffend in gebiede waar die stelsel wel in swang is,

which competent person might not even be a competent person as described or defined in the Act. I'm thinking of the case of certain factories, where it would be possible, under those regulations, to appoint a chemical engineer in charge of the chemical section of the plant. At present the mechanical or electrical engineer in that section has to look after the machinery and is held responsible for anything which may happen during a process. So that if an explosion or a fault occurs, resulting in an injury or even a death, the engineer gets it in the neck for something about which he knows nothing, which is rather unfair. In order to remedy the situation we have made provision for the appointment of persons at places like Bloemendal, chemical factories and so on, but it has not yet been promulgated.

In response, Mr. Dunstan continued :

sion to examine the conditions of the examination for the Certificate of Competency. I don't know whether Mr. Wannenburg will be represented on that commission, but if he isn't, he will probably have a better opportunity than any of us of expressing views to it and I would like him to express our views to that committee that we would definitely not like the standard of the certificate lowered.

Again replying, Mr. Wannenburg said :

letters asking for people who so desired, to come and give their ideas on the examination. That will be in the running very shortly and anybody will be welcome to give ideas and evidence before the commission.

Mr. J. L. van der Walt (Honorary Member) submitted his views as follows :

bv. in Kaapstad, waar hulle verantwoordelik is vir die verspreiding van elektrisiteit oor die hele Skiereiland. Dan is daar ook die gebiede Port Elizabeth/Uitenhage en die satelliete om Durban, waar die Durbanse Korporasie vir die verspreiding verantwoordelik is. Die praktyk het dus gewys dat dit wel moontlik is om gebiede saam te groepeer en dit dan as 'n metropolitaanse stelsel te bestuur, maar die vraag wat ek nog nie vir myself uitmaak het nie, is of dit eintlik die tekort aan ingenieurs gaan oplos of nie. Ek twyfel daaraan want die hoofingenieur van 'n gebied sal wel tog nog gebieds-ingenieurs moet hê, soos in Johannesburg self, en dit is nog nie die eintlike oplossing van die probleem nie.

Myns insiens (en ek beklemtoon dit sterk waar moontlik) is dat die oplossing slegs te vinde is in die feit dat ons ingenieurs gebruik waar ons met tegnici kan klaar-kom en ons lei nie genoeg tegnici op nie. Die Straszacker-verslag het bevind dat ons maar omtrent 2.8 tegnici oplei teenoor elke ingenieur; in Amerika meen ek die syfer is so hoog soos 7; maar 'n goeie syfer wat vir Suid-Afrika gegee word, is 3 vir elke ingenieur. Nou het die Departement

ment van Onderwys so pas bevind dat die Straszacker-komitee se verslag van 2.8 nie juis is nie, dat hulle baie tegnici tweemaal getel het; met ander woorde, ons lei nie in werklikheid 2.8 tegnici op vir elke ingenieur nie, en hulle sê dit kan so laag wees soos 1 tot 1.

Die aanbevelings van die Straszacker-komitee is gedoen om die tekort aan ingenieurs alleenlik op te los. Die moontlikheid is daar, soos dr. van Zyl nou onlangs in Stellenbosch gesê het, dat ons genoeg ingenieurs in die toekoms gaan oplei, maar ons lei nie genoeg tegnici of die hoër klas vakleerlinge op waaruit die eersgenoemde eintlik opgelei is nie. Ek wil persoonlik bepleit dat ons ingenieurs meer van tegnici gebruik maak om die verspreiding van ingenieurs beter te laat geskied.

Mnr. D. J. R. Conradie (Bloemfontein) vertel soos volg van sy ondervindinge in die Suid-Vrystaat:

Six towns there formed a utility company to supply themselves with power from Bloemfontein. The company actually buys power from Bloemfontein and then resells it, either to itself or to the six municipalities who are shareholders of the company.

The company was formed purely on a utility basis, but when it came to the actual operating of the same the problem of having an engineer cropped up. Not having a very big income, with only the six small towns to supply, they approached me, as their consultant, and asked if I would also act as engineer on the system. The appointment was approved by the Department and I am now in charge of the entire system (HT, 66kV) running from Bloemfontein right down to the Verwoerd Dam. There are several electricians down the line, with whom I am in constant radio contact should any emergency arise.

Then there is the question of the six towns themselves, each of which is supplied by the system and all have the

Mnr. J. A. Loubser (Carletonville) sê volgens :-

Ek het eintlik hierdie vraag aan die Inspekteur van Masjinerie gestel omdat ek presies daardie probleem op hierdie stadium het. Een van die naburige dorpe het 'n brief aan my Raad gerig en gevra of hulle my dienste kan deel 'en ek weet glad nie watter standpunt om in te neem nie. Aan die een kant voel ek dat, as daar net 10% van die kandidate wat jaarliks inskryf vir so 'n eksamen, daarin slaag, dit beteken dat daar darem 'n redelike hoë standaard gestel word en die persone wat wel slaag, dit met moeite gedoen het.

Mnr. J. L. van der Walt (Erelid) spreek die volgende verdere gedagtes uit :

We're trying to solve the shortage of engineers here and all we've done so far is to make it worse! Mr. Wannenburgh is going to put up the standard of the examination, we're not going to share engineers and we're simply not solving the problem.

Ek wil net graag verwys na die verklaring van mnr.

Plaaslike besture in buitekringe, waar ek baie kom, word deur die leek op straat beskuldige dat ons te veel ingenieurs in ons organisasie het en dat daar 'n kunsmatige tekort geskep word.

Ek is baie ten gunste van die opleiding van tegnici en ek dink ons moet baie aandag in die toekoms daaraan gee. Natuurlik is tegnici ook nie altyd so slim as wat hulle voorgede dat hulle is nie, soos die elektrisiseer wat die huisbedrading moes doen en kort-kort vir die vrou gevra het : „Mevrou, waar moet ek hierdie skakelaar sit? Waar wil Mevrou hierdie lig hê?“ Naderhand raak sy kwaad vir hom en sê toe: „Meneer, gebruik asseblief jou gesonde verstand!“ Hy antwoord toe knap: „Mevrou, gesonde verstand is 'n gawe van Bo; ek is maar net 'n tegnikus!“

Mr. D. J. R. Conradie (Bloemfontein) submitted experience gained in the Southern Free State. He said :

same problem in common, namely, that of getting an engineer to look after their respective systems. To my mind it is impossible for one man to look after six towns spread over a distance of 120 miles. At the moment I do manage to look after the HT system as it is now, because the stations are unattended. When anything goes wrong my electricians, who are in radio contact with me, can usually cope with the situation, failing which I can give them the necessary instructions or be there myself within a few hours.

However, I don't think it would be possible for one man to control too many of the smaller systems when there is an LT distribution system with a lot of substations. As Mr. Wannenburgh quite rightly says, the distance is the problem. I can't see how it can work if the towns are too far apart. It is only very strict control and a tight communication system that enables me to maintain the system from Bloemfontein to the Verwoerd Dam.

Mr. J. A. Loubser (Carletonville) next spoke :

Sou dit beteken dat, as ek so 'n betrekking (sal ek dit so noem) aanvaar en al die gediplomeerde ingenieurs in ons land dit ook doen, die aantal gediplomeerde ingenieurs wat nodig is, onmiddellik met die helfte gesny sal word? Ek voel dit is miskien nie heeltemal reg teenoor die beroep nie. Die skaarste aan ingenieurs kan die beroep van gediplomeerde ingenieurs net goed don, nie sleg nie. Ek wil graag hê dat hierdie vergadering 'n meer definitiewe standpunt in verband met die saak moet inneem.

Mr. J. L. van der Walt (Honorary Member) submitted further thoughts as follows :

Loubser: dit is 'n bietjie gevaarlik om te sê dat die skaarste aan ingenieurs net die beroep goed kan doen. Dit is ook 'n baie selfsugtige denkwysie. Ons as ingenieurs is daar om die publiek te bedien en ons moenie die skaarste probeer uitbuit tot ons voordeel nie, maar wel ons koppe bymekaar sit om 'n oplossing daarvoor te vind.

To return to the technical assistants, I would like to refer to what one reads is being done in Europe. There they are given a higher status than here. You might be somewhat shocked to learn that they are all referred to as engineers. They do, however, have two classes of engineers in Europe: they have what we here would call an engineer — a qualified or certificated engineer known as a professional engineer or a diploma engineer or something to that effect; then they have the technicians (our NTC V's) whom they call simply "engineers." This gives

Mnr. E. E. de Villiers (Bloemfontein) sê voorts :

I don't think any of the speakers have really answered the question posed here, viz. whether the Association (or anybody else for that matter) should pursue the suggestion that closely situated undertakings be co-ordinated on a regional basis.

The problem put by Mr. Louber is one that cropped up some years ago when I was still the engineer at Carletonville. At the time my Council suggested to the towns concerned that I do certain consulting work for them on a consulting-engineer basis, the funds to be paid to the

Ter opsomming van die bespreking tot op daardie stadium, sê die vraesteller :

Gentlemen, we've covered the fringes of the subject and we've broadened the basis of the discussion by referring to the shortage of engineers but we've not as yet formulated a plan as to how we can alleviate this shortage by spreading their work and, in effect, creating a different hierarchy. At the moment we have one certificated engineer in charge of an undertaking, apart from places like Johannesburg, which has district engineers

Hierop stel mnr. F. Stevens (Ladysmith) voor dat die saak na die Uitvoerende Raad verwys word. Hierdie voorstel word aanvaar.

In 'n latere stadium van die verrigtinge, toe daar weer 'n geleentheid gebied word om Vraag 1 verdere te bespreek, lewer mnr. H. T. Turner (Umtali) die volgende bydrae :

As I see the question, it has been apparent for some years in Rhodesia that the distribution of energy is not as efficient as it might be. Since the days of the Central African Federation, various governments and departments have tried to impress upon the Government that there are better methods of distributing energy throughout the country than through the present set-up, which is done partially by local authorities and partially by the Electricity Supply Commission.

The way this question is headed here, it appears that generation is vested in the central authority in this country. That is virtually the case in Rhodesia now, since the advent of Kariba, which is governed by the Central African Power Corporation. They, in their turn, have the say on the operation of local authority or ESC stations

them added status and, needless to say, makes the obtaining of such a qualification very attractive. I repeat, we will not solve the shortage of engineers until we do something about using more technicians and increasing the number of technicians towards the engineer level.

There is a peculiar tendency among the youth today, in that they are inclined to swing away from the sciences in general. I think that to combat this something must be done to try and draw them back to the sciences and thus give them added status. I put that as a suggestion.

Mr. E. E. de Villiers (Bloemfontein) continued :

Council. I could foresee what would happen — I would do all the work and get nothing for it! As it happened they dropped the matter there and appointed a private consultant for that particular job.

Mr. Wannenburg has, I think, given some indication of what could be done; this particular town is only a matter of 10 — 12 miles from Carletonville as such and I suggest that Mr. Louber and his Council investigate the possibility of taking over their entire electricity scheme and making that supply point the third of his Council.

Summarising discussion at this point the Quizmaster said :—

who are also certificated engineers. These larger centres have a number of highly paid certificated engineers and everything is working to the Labour Department's requirements. In the country districts where distances are involved, it's quite a different story: the salaries are not nearly as high and most of these places are, in fact, being run by what one could call "competent persons."

Mr. F. Stevens (Ladysmith) then proposed that the matter be referred to the Executive Council. The proposal was adopted.

At a later stage in the proceedings, when an opportunity for further discussion on Question 1 was presented, Mr. H. T. Turner (Umtali) submitted the following contribution :

in the country. Once there is a central generating authority, it becomes more and more apparent that some improvements should, and indeed could, be made to rationalize the whole system for the benefit of the consumers.

Towards the end of the Federation, the Federal Ministry of Power appointed a working party to go into the whole question to find out whether the present system of distributing energy in Rhodesia (which is very similar to your own) could be improved upon, and the following three suggestions were put forward:

- (i) to leave it as it was (or as it still is now, in fact) i.e. that the urban areas are supplied by the local authority and the outlying areas by the Electricity Supply Commission.

This has certain disadvantages, in that geographical barriers are raised which bear no relation to the supply and cost of energy and there's the question of the duplication of manpower and stores, etc.

- (ii) to form area boards in much the same way as is done in the United Kingdom. The idea was to have possibly three or four of these area boards: one to embrace Bulawayo on the western side; one in Que which would probably have Umtali as an adjunct or Que in the Midlands area; and one in Salisbury, which would probably have Umtali as an adjunct or sub-area in the Eastern districts.

I was a member of the particular working party on this subject and there was a lot of evidence to indicate that this idea was certainly one worthy of consideration. There were, however, certain inherent flaws in it, because in a vast country such as Rhodesia there might be one very prosperous area, say in the Midlands, where the area board would be working at a surplus and therefore viable, whereas the one, say, in Bulawayo or towards Salisbury, being agricultural regions, could suffer drought conditions and become somewhat depressed economically.

- (iii) to form an amalgamation of all the electricity undertakings throughout the country into one concern, possibly the present Electricity Supply Commission. This is actually the policy of the present Rhodesian Government, their manifesto in fact, but it is not mandatory as yet. Quite recently the City Council of Salisbury, in compliance with this as yet unofficial policy, called in consulting engineers to go into the question of amalgamating the whole of the Salisbury Undertaking with the Electricity Supply Commission.

Geen verdere bespreking vind plaas nie en daar word ooreengekom dat Vrae 2 en 3 na die Uitvoerende Raad verwys word vir die nodige aandag.

Verbruikersinstallasies.

Daar word voortgegaan met die bespreking van Vraag 4. Mnr. R. S. Dunstan (Port Elizabeth) lei die bespreking soos volg in :

Six or seven years ago this problem cropped up in Port Elizabeth: when a person moved into a house, they moved their stove in with them and had it connected by an electrical contractor. We were then immediately required to inspect the installation and would more often than not find something wrong and, in some cases, condemned the whole installation. The new consumer naturally felt very aggrieved at having had his stove disconnected and then at having to have the whole installation rewired. This would never have happened had we not been required to inspect the stove and everything would have gone on quite happily without any danger involved and there would have been no unnecessary unpleasantness.

We decided that the best way out was to avoid inspecting the stove at all and we proposed to achieve that by

As I see it, this is an excellent concept because there are far more consumers in the peri-urban areas of Salisbury than in the city itself.

A type of metropolitan board for the whole area has many advantages but, as you all probably know, it was turned down by the City Council because the Rhodesian ESC felt that the only way to do it at all would be for them to absorb the whole undertaking themselves and there would then be no thought at all of having an area board as such.

So we now have the position in Rhodesia where it is Government policy that local undertakings be absorbed and amalgamated with the Electricity Supply Commission. We've been given a great deal of evidence from different people in favour of amalgamation, much the same as that given some years previously to Sir John Hatting and Mr. Stanley Clinton, who were engaged by the Federal Government in a similar exercise.

It was quite apparent that there was not one shred of evidence to indicate that a complete amalgamation with Escom (or ESC) would have any advantage at all over the present system where each local authority undertakes the distribution in their own area, with Escom responsible for the rural and mining industrial supply. It was felt that local authorities were quite efficient in their own way and that amalgamation with a large undertaking had no justification at all. What does, however, have merit, and I think might have particular merit in this country perhaps in the Reef complex, is an Area Board embracing all the consumers in a built-up or large urban area who are now supplied either by local authorities or by Escom to form a complete and entirely separate entity on its own.

No further discussion took place and it was agreed that Questions 2 and 3 be referred to the Executive Council for attention.

Consumers' Installations.

Discussion proceeded on Question 4. Mr. R. S. Dunstan (Port Elizabeth) introduced discussion as follows :

introducing the 40 amp. (three-pin) plug and socket outlet for stoves. In time all stoves in the Port Elizabeth area will be fitted with these plugs, which will enable the consumer to move into any house and simply plug his stove in without any fuss or bother. In that way everybody is happy.

We started on the basis of the standard four-pin plug as given in the Standard Wiring Regulations. We then got manufacturers to design us the innards capable of carrying 40 amps. and that is the plug and socket outlet we're using today. I believe its use has spread to Uitenhage and East London and I think it high time it be adopted as a standard and placed in the Standard Wiring Regulations.

Mnr. F. Stevens (Ladysmith) ondersteun mnr. Dunstan se sienings, terwyl mnr. A. A. Middlecote (Buro vir Standaarde) homself uitspreek ten gunste van die gedagte dat die probleem van gebruikte stowe in die eerste plek by die Buro vir Standaarde tuishoort en nie deur plaaslike owerhede oorgeneem behoort te word nie. Die bespreking word deur mnr. R. Leishman (Johannesburg) en R. S. Dunstan (Port Elizabeth) voortgesit en word gesluit toe mnr. Dunstan onderneem om skriftelike voorstelle vir die wysiging van die Standaard-bedradings-regulasies in hierdie verband aan mnr. Leishman voor te lê.

Spesifikasies van toepassing in Regulasies.

Die bespreking van Vraag 5 gaan voort.

Mnr. A. A. Middlecote (Buro vir Standaarde) lewer die volgende hydrae :

The safety specifications that apply to the wiring of premises are all compulsory, while all the others refer to portable appliances. The difficulty here, though, is how an inspector can verify whether a product complies with the S.A.B.S. specification when no such specification exists.

The answer is quite simple — the easiest thing to do is to look for the mark. If on the other hand, there is no mark, one can build up a library of knowledge from experience to equip one to discriminate carefully. I have no solution to offer than the fact that the inspectors are quite well informed as to whether certain imported or locally made equipment do comply with S.A.B.S. specifications.

We all know that no one can claim compliance with an S.A.B.S. specification unless they have a permit to use the mark on their goods. Such a person cannot actually advertise the fact as such, but there is nothing to prevent a contractor buying something from him that he thinks does comply or seeing that a test has been carried on one of the samples to ensure that it does comply and in this

Die bespreking van Vraag 6 word soos volg deur mnr. Wannenburg (Departement van Arbeid) geopen :

I think if you refer back to your meeting held in Bloemfontein two years ago, you will remember that this question was raised there too and I explained it at the time, but I don't mind doing so again.

We have the two Acts — the Wiremen and Contractor's Act and the Factories' Machinery and Building Work Act. Regulation c(61) is the one referring to the earthing of buildings, gutters and roof pipes, etc. It is important to remember, though, that an Act takes precedence over a Regulation and a specific Act takes precedence over an Act.

The Wiremen and Contractor's Act, which is a specific Act to deal with wiring and which refers to earthing in Section 19, takes precedence over the Factories', Machinery and Building Works Act, simply by virtue of its being

Mr. F. Stevens (Ladysmith) supported the views of Mr. Dunstan, and Mr. A. A. Middlecote (Bureau of Standards) supported the thought that the problem of second hand stoves was essentially one for the Bureau of Standards and should not be taken over by local authorities. Discussion proceeded between Messrs. R. Leishman (Johannesburg) and Mr. R. S. Dunstan (Port Elizabeth) and was closed when Mr. Dunstan undertook to submit written suggestions for the amendment of the Standard Wiring Regulations in this regard to Mr. Leishman.

Specifications Applicable in Regulations.

Discussion proceeded on Question 5.

Mr. A. A. Middlecote (Bureau of Standards) submitted the following contribution:

way a library of knowledge is built up as regards the different manufactured articles.

The same holds good for the Bureau of Standards. If someone claims that any particular product either complies or does not comply with the standard specifications, it is our task to prove it one way or the other. In this way these matters gradually come to light and the inspectors come to know which products comply and can give valuable advice on the subject. The Recommendations Committee are also very helpful in that they give advice where there is no actual specification.

It's quite interesting in this regard to see just how much these specifications can assist one. Take, for instance, the recent specification for fluorescent ballasts: this is a very good thing, because, as those of you who know anything about it will realize, the poor type of fluorescent ballasts only give you about 60% of the light output. So one might just as well use incandescent lamps as non-standard ballasts.

Discussion on Question 6 was opened by Mr. J. G. Wannenburg (Department of Labour) as follows:

a specific Act.

As you know, Sections 6 and 56 of the Factories' Act bind the State. The Red Book Act, (the Wiremen and Contractor's Act) does not bind the State and does not say that it binds the State, although I'd very much like to see that it does. Why should the State be free of this, and the other thing which is binding on other people?

I've argued very extensively with our clever people who deal with the law every day and I've asked them if, where there's only one particular section which says, "this shall not apply (earthing) and that it is not necessary for a government building to be inspected by a municipal inspector", how do they come by it that the rest of the Regulations are not applicable to the State? Surely if it mentions in only one specific case that it is not applicable to the State, the rest must be applicable. That is my way

of reasoning, but they disagree and say that, unless it actually states that it binds the State, it does not do so.

Die President lê die volgende regsmening wat deur sy Raad ingewin is, voor :

Die vertolking van Artikel 19 van die Wet op Elektrotegniese Draadwerkers en Aannemers, 1939 en Regulasie c 61 (2) van die Regulasies uitgevaardig kragtens die Wet op Fabriek, Masjinerie en Bouwerk, 1941:

Voordat oorgegaan word tot die vertolking van bogenoemde twee bepalings kan die regsposisie kortliks soos volg uiteengesit word.

In Chotabhai v. Union Government and Another 1911 A.D. op bladsy 24 word verwys na die reël dat —

“the language of every part of a statute should be so construed as to be consistent, as far as possible, with every other part of that statute and with every other unreppealed statute (or regulation) enacted by the same (or other) Legislation.”

Na die eerste deurlees van bogenoemde twee wettepalinge, wou dit voorkom asof die bepalings botsend van aard is en dat dit dus vertolkingsmoelikhede skep. By nadere ontleding en ondersoek word dit egter duidelik dat artikel 19 dit onder andere het oor die ondersoek, toetsing en goedkeuring van draadwerk deur iemand in diens van die voorsiener. Die betrokke draadwerk as geheel moet dus ondersoek, getoets en goedgekeur word voordat die verbindingswerk met die bron van elektrisiteitsvoorsiening aangepak word. Dit is duidelik dat sodanige ondersoek onder andere ook 'n ondersoek na aarding sal insluit.

Ingevolge die voorbehoudsbepaling by artikel 19 is die regsposisie dan dat so 'n omvattende ondersoek, toetsing en goedkeuring van die draadwerk by staatsgeboue nie nodig is nie en nie uitgeoefen hoef te word nie. Dit wil egter nie sê dat, omdat 'n omvattende ondersoek ens. nie nodig is, dat 'n minder omvattende ondersoek (soos 'n ondersoek na aarding alleen), wat ingevolge 'n ander regs-

In antwoord hierop sê mnr. Wannenburg :

I fully agree with what the legal advisors say there, with this exception: I've been to our legal advisors and they say that if the Specific Act says that it does not bind

Mnr. E. E. de Villiers (Bloemfontein) sê :

In c(61) Regulasies word dit nou hier gestel dat „geen leweransier mag elektriese toevoer koppel aan 'n gebou uitgesonderd ens.” Ek wou eintlik die vraag gestel het of gehoor het wat Mnr. Wannenburg se opinie daaromtrent is. Indien 'n leweransier wat, sê nou in ons geval 'n munisipaliteit is, kragtoevoer aan 'n staatsgebou moet gee en nou nie enige toetse uitvoer nie, veral wat die beaarding betref, of daardie Artikel en Regulasie tog nie van toe-

So unfortunately you'll have to abide by the Red Book, i.e. the Wiremen and Contractor's Act.

The President submitted the following legal opinion obtained by his Council :

bepaling vereis word, ook nou uitgesluit word nie.

Dit word aanvaar dat die opsteller van artikel 19 bewus was van die bepalings van regulasie c 61 (2) tydens die opstelling van die artikel. (ons hoop so!)

Die Staat is gebind deur die Wet op Fabriek, Masjinerie en Bouwerk, 1941, asook deur die regulasies kragtens die genoemde Wet uitgevaardig. (Sien artikel 56 van die Wet asook die woordomsyrywing van „hierdie Wet.”) Die betrokke staatsinstansie as „gebruiker” sal dus moet voldoen aan die bepalings van Regulasie c 61 (1) wat handel oor aarding.

Die leweransier mag egter, ingevolge die bepalings van regulasie c 61 (2) (a), nie elektriese toevoer koppel aan 'n gebou (staatsgeboue ingesluit) voordat hy met oortuig het dat aarding ten opsigte van die gebou gedoen is nie. Hier moet daar gelet word op die feit dat die leweransier nie die draadwerk as geheel ondersoek, toets en goedgekeur nie maar slegs dié draadwerk nagaan ten opsigte van aarding, sodat hy kan vasstel of die elektriese installasie ens. gearard is.

Die mening word dus gehuldig dat die twee regsbepalings waarna hierbo verwys word, nie botsend van aard is nie en dat aan beide van hulle gevolg gegee moet word bv. ten opsigte van privategeboue. By privategeboue sal 'n ondersoek, toetsing en goedkeuring ingevolge artikel 19 egter outomaties ook 'n ondersoek ens. van aarding wees, sodat outomaties ook aan regulasie c 61 (2) voldoen sal word. By staatsgeboue hoef die voorsiener nie te voldoen aan artikel 19 nie, maar sal die leweransier moet voldoen aan regulasie c 61 (2) d.w.s. die leweransier (soos bedoel in die regulasie) moet homself oortuig dat alle metaaldakke ens. gearard is voordat hy die elektriese toevoer aansluit.

In response, Mr. Wannenburg said :

the State, one cannot make use of another Act to bind them. That is unfortunately the point of view of the Department's legal advisors.

Mr. E. E. de Villiers (Bloemfontein) said :

passing is op die Staat self en op die persone in beheer nie, m.a.w. is dit nie nodig dat die ingenieur in bevel, in diens van die Staat, homself tevrede moet stel dat die beaarding wel korrek is, voordat hy die aansluiting of die werklike aankoppeling van die krag aanvaar by die leweransier nie?

Ek sal graag op hierdie punt sekerheid nou gehad het, want ek vermoed dit is tog sekerlik van toepassing.

Mr. Wannenburg antwoord :-

I think that is exactly why government buildings have been excluded, because the Government has its own engineers, inspectors of works and what have you. They are supposed to do the testing of the whole system and see it that the earthing is correct.

In antwoord op 'n versoek van die vraesteller om 'n definisie te gee van die begrippe „geboue" en „perseel", sê mnr. Wannenburg :-

I can only give you the official interpretation of the Department. It is very often called for by letter and I believe certain municipalities have already had rather fierce discussions on this very subject.

The way we look at it is this: Premises, when referring to a municipality, are whatever lies between the municipal boundaries, unlike a factory where the one building would be the premises, e.g. here at Vanderbijlpark one would surely not refer to the blast furnace section, the rolling section, the casting of I.S.C.O.R. as separate premises. Very often at the site of a factory there is a sign at the gate saying, "No Admittance to These Premises Without a Certificate" or something like that.

Now the other point of view, often raised, is this. Recently we received a letter from somewhere in the Cape where two engineers of one of the larger towns seemed to be at loggerheads over this same question. They look upon it this way — a power station, for instance, would be one premises, the abattoir another, the sewerage works yet another, and so on.

If that is the general point of view, viz. that premises do not constitute everything within the limits of the municipal boundaries, then I'm afraid there is not a single municipality which is on the right side of the law at the moment.

Imagine what would happen in East London for example. The engineer there would have to be appointed

Straatverligting.

Vrae 7, 8 en 9 verwys.

Mnr. D. H. Piekma (S.A.N.K.V.) behandel Vraag 7 en sê dat 'n Raad kan weier om 'n straatlig af te skerm, maar dat dit tog wenslik kan wees om dit wel te doen waar mediese getuienis is dat die onafgeskermdes lig skadelik vir 'n persoon se gesondheid is. Hy wys daarop dat afskerming aan die agterkant nie so ernstig is as afskerming aan die voorkant nie, aangesien laagsenome die hele verligtingstelsel affekteer.

Met verwysing na Vraag 8 sê hy :-

From the question it is quite clear that we're only referring here to incandescent lamps, of which the rated life is about 1,000 hours. However when we take into account the mortality curve we find that 50 % of these lamps are not burning after 1,000 hours. Allowing a mortality rate of 5%, the lamps should then be changed after 600 hours;

Mr. Wannenburg replied :-

Maybe that is one reason, but there is another point of view to consider. There is the possibility that, in the re-writing of Regulation c (61) in the Amended Factories' Act of 1963, sight was lost of the content of Section 19 in the Contractor's Act.

Requested by the Quizmaster to give a definition of "building" and "premises", Mr. Wannenburg said :-

for each and every so-called "premises" and he would also have to get permission from my office in Pretoria to be appointed in charge of machinery on more than one 'premises'. So I am convinced that that was definitely not meant to be the interpretation or definition of 'premises'.

Consider your electrical reticulation system, which spreads over the entire town or city. Where are your premises now? Surely whatever you have within the municipal boundaries constitutes the premises. One cannot talk about 'premises' in regard to electricity as being everything within the boundaries and then refer to the power station as a separate 'premises'. It is illogical.

I have also been asked several times why they say 'premises includes any land, building, vehicle or vessel'. How could a vehicle be a 'premises'? That is easily explained. Say, for argument's sake, that you have a portable compressor or a compressor built onto a lorry. Whilst this lorry is in transit from point A to point B, it would be regarded as a vehicle, but the minute you stop and start the compressor, the lorry becomes the premises on which the compressor is situated.

Similarly a tractor on a farm is regarded as machinery, but when hauling something such as a trailer, it is regarded as a vehicle. The minute you stop the tractor and drive a pump or any other machine, the tractor becomes a machine on wheels. I think it should be clear now how it is worked out.

Street Lighting.

Questions 7, 8 and 9.

Mr. D. H. Piekma (S.A.N.C.I.) dealt with Question 7 and he indicated that a Council could refuse to shade a street lamp, but that it might be advisable to shade it where it was medically confirmed that the unshaded light was detrimental to health. He pointed out that back shading was not as serious as front shading, which affected the whole lighting system.

Referring to question 8, he said :-

and for 20% mortality, after 800 hours. These figures refer, of course, to lamps running at a rated voltage, since the life of a lamp is very dependant on the voltage regulation of the system. A 5% drop in voltage, for instance, almost doubles the life of the lamp but also reduces the lumen output by approximately 20%. Most authorities pur-

chase 230 volt lamps for use on 220 volt, plus or minus 5% supply. This immediately increases the life of the lamp at the expense of the light output, which is a false economy.

It's quite clear that the following factors must be taken into consideration when determining the economics of group replacement, the first of which is voltage regulation, which in turn affects:

- (a) the life of the lamp and
- (b) the lumen output of the lamp.

My conclusion is that group replacement should only be done with gas-discharge lamps, except in the case of a very small town. In a city with 30,000 incandescent lamps, the burning hours per year are, say, 4,000 hours, which assuming that all the 100 watt incandescent lamps burn 1,000 hours, means that 120,000 lamps have to be replaced. Should these lamps be replaced, for instance, by 80 watt colour-corrected mercury lamps, having a life span of 12,000 hours, only 10,000 lamps would require to be re-

Vervolgend behandel mnr. Pieksma vraag 8 en in verband daarmee sê hy :-

The 'best method' is dependant on many different factors and may therefore vary considerably from town to town. In some cases a special staff is employed solely on street lighting; in other cases the labour is split between, say, maintenance of mains, complaints of no supply and street lighting maintenance. It may be possible in the first case to reduce labour costs with group replacement because fewer labourers are needed to do it, whereas, in the second case, labour saving is not possible, as the man

Die bespreking omtrent die vervanging van gloeilampe in groepe word voortgesê deur 'n ongeïdentifiseerde spreker, wat die mening uitspreek dat daar skynbaar verwarring bestaan omtrent wanneer die vervanging behoort plaas te vind. Hy laat hom soos volg uit :-

In the case of mercury vapour discharge lamps it has been found that group replacement is always more economical; but this is definitely not so with incandescent lamps.

Today we are quoted life-times from 6,000 — 24,000 hours. We should, however, consider the actual time that we perform or execute group replacement. The South African Code of Practice clearly indicates that all values are maintained values, which means that the illumination level, the average level, has to be maintained to the end of the economic life. This occurs when the luminous flux drops to less than 20%. On looking at the curves of depreciation of luminous flux of various manufacturers one finds (and here I usually contradict American statements) that 12,000 hours for a mercury vapour lamp is the time when it ceases to function economically. I think a lot of lamps burn for 24,000 hours, but the lumen depreciation drops down to about 40%. We should, therefore, take

placed per year, which represents a considerable saving in labour and transport costs.

The advantages of the mercury vapour lamps are as follows :-

- (i) reduced labour and transport costs
- (ii) increased light output (approx. 200% more).
- (iii) increased life (approx. 12 times longer than that of the incandescent)
- (iv) reduced energy consumption and maximum demand, approx. 15%.
- (v) general reduction in the number of premature failures during the life of a lamp because they have a more rigid construction and are therefore more reliable.

The disadvantages are :-

- (i) Higher initial cost.
- (ii) Higher cost of lamp replacements.

All these factors must be taken into account when you are considering group replacements.

Dealing with Question No. 9, Mr. Pieksma said :-

is still required to be there to perform the other duties. So it's not impossible to lay down a most economical method of street lighting maintenance to suit all circumstances, but the main things to be borne in mind are :-

- (i) the size of the town.
- (ii) the method of working.

Each case has to be calculated individually on its own merits.

Discussion on group replacement of lamps was continued by an unidentified speaker who felt that there appeared to be confusion as to when replacement should be undertaken. He said :-

12,000 hours as a stable datum for group replacement.

The question arises as to what happens to the mortality curve. When a group replacement is done, obviously a number of lamps will have failed prematurely to that and the percentage of such at 12,000 hours is quite considerable i.e. more than 20%; at 10,000 hours, however, it is only 10% and the quality of mercury vapour lamps today is such that these lamps that fail, can be discarded.

I think the fact that group replacement is not so much in use in South Africa is due to the fact that we still have a large number of incandescent installations. Overseas, where wages are much higher and labour more scarce than the material itself, group replacement is much more vital. In my opinion the mercury vapour lamp is not an expensive item considering the life-span and the fact that to replace this lamp is much more costly than the material itself.

Mnr. L. Foster (S.A.N.K.V.) spreek die mening uit dat daar 'n morele verpligting op die voorsienende owerheid rus om óf straatligte daar te stel wat nie die privaathed van die verbruiker se tuiste binnedring nie óf die straatligte af te skerm waar dit nodig sou blyk.

In verband met die vervanging van straatligte in groepe, sê mnr. Foster :—

It might be as well to remember that the common electric lamp is the only commodity on the market today that has reduced its price and yet increased its quality over the last 30 years. This same lamp contains no fewer than 28 component parts, two different types of glass, four different types of metal, each component part is a piece of engineering precision. This latter is essential for the filament to operate at 350 degrees Centigrade and coils so accurate that the turns are measured in ten-thousandth parts of an inch. It has to meet up to the rigid specification of the S.A.B.S. 56/1959, which covers light output, life, quality, cap, cement, solder and a host of other things.

Mnr. K. J. Murphy (Cradock) sê dat hy die ondervinding gehad het dat 20% van die lampe wat vervang moes word, as gevolg van vandalisme beskadig is, en dat groepsvervanging in die lig hiervan sinneloos is.

Mnr. R. M. O. Simpson (Durban) verwys na die afskerming van straatligte en haal die volgende insident aan :—

We had just replaced some lights when we had a demand to shade one immediately. Everyone else seemed happy enough, but to deal with this problem we put up quite a big sheet of metal at the back of the lamp (about 3' x 2') which seemed to satisfy the complainant com-

Mnr. E. E. de Villiers (Bloemfontein) verwys na 'n praktiese metode om teenkantiing teen die daarstelling van 'n straatlig te oorkom, nl. om toe te stem om dit af te skerm dog die klaer vir die afskerming te laat betaal. Dit lei gewoonlik tot die uitskakeling van die klage.

Uit die verdere bespreking blyk dit dat daar tans 'n groot verskeidenheid nuwe materiale op die mark is wat gebruik kan word om rondom straatligte te plaas en wat vir alle praktiese doeleindes nie stukkend gegooi kan word nie.

Mnr. R. W. Barton (Welkom) verwys na die lang lewensduur van fluorasserende verligtingsbuise, wat die neiging openbaar om nie, soos gloeilampe, uit te brand nie, dog om algaande minder doeltreffend te word. Met die oog hierop is groepsvervanging noodsaaklik.

Mnr. J. A. Matthews (Kimberley) sê dat, ten einde die voordele van verligting vir veiligheidsdoeleindes te handhaaf, groepsvervanging noodsaaklik is. Hy gaan voort deur te sê dat die lewensduur van straatlampe langer is waar die spanning van die tevoer laer is as die ontwerpvermoë van die lampe.

Mnr. E. E. de Villiers (Bloemfontein), mnr. G. F. Rautenbach (Klerksdorp) en mnr. A. F. Turnbull (Vereenig-

Mr. L. Foster (S.A.N.C.I.) contended that there was a moral obligation on the part of the supply authority to either provide lanterns which did not invade the sanctity of the consumers' home or, if necessary, to shield the street lights.

Dealing with group replacement of lamps, Mr. Foster said :—

It follows, therefore, that, with the rigid control in manufacture, the life expectancy of the lamp, which is of 1,000 hours, is more likely to be 13,000 hours and that all these lamps will fail in service at about the same time, which makes it only logical to replace them in groups. It must work out less costly to batch replace these lamps, as opposed to indiscriminate replacing whenever they fail.

I'd like to ask the large users for their comments on the practical aspects of group replacement. And lastly, we've been hearing of 6,000 hours, 12,000 hours and umpteen thousand other hours for the mercury vapour lamps but I say let them prove these longevity claims first.

Mr. K. J. Murphy (Cradock) stated that his experience was that 20% of lamps replaced resulted from vandalism, which rendered bulk or group replacement pointless.

Mr. R. M. O. Simpson (Durban) referred to shading of street lights and quoted the following incident :—

pletely. Then it appears that every few days somebody went along with a pair of tin-snips and gradually reduced the size until finally, in about three months it had completely disappeared and we haven't heard another word.

Mr. E. E. de Villiers (Bloemfontein) referred to a practical method of overcoming opposition to the presence of a street light, viz. to agree to shade it at the expense of the complainant. The complaint was usually thereby overcome.

In discussion it was stated that many new materials for the covering of lanterns were now available, which made them virtually missileproof.

Mr. R. W. Barton (Welkom) referred to the longevity of tubular fluorescent lights, which tended not to fail but which eventually became more and more ineffective. This made batch replacement essential.

Mr. J. A. Matthews (Kimberley) said that to maintain the advantages of lighting for security purposes, individual replacement was essential. He continued by referring to the increase in longevity attained when the voltage of the supply was below the rating of the lamps.

Messrs. E. E. de Villiers (Bloemfontein), G. F. Rautenbach (Klerksdorp) and A. F. Turnbull (Vereeniging) com-

ing) lewer kommentaar oor die groepsvervanging van die lampe in verkeersligte en uit die bespreking blyk dit dat hierdie prosedure gevaarlik kan wees.

Elektrisiteitsverspreiding.

Mnr. R. W. Barton (Welkom) open die bespreking van Vraag 10 deur te sê :—

In our part of the world, the original township establishment agreements in respect of all the existing townships contained a provision that we could have a six-foot servitude on any single boundary of any stand. In other words, we could run across every stand but only along one side of it. That, of course, worked very well, but in a township

Mnr. E. de C. Pretorius (Potchefstroom) sê dat 'n Raad, ingevolge die bepalinge van Artikel 84 van die Transvaalse Ordonnansie op Plaaslike Bestuur, die reg het om, na kennisgewing van 30 dae, 'n deurgangreg te verkry wat nie geregistreer hoef te word nie. Hy haal aan :—

The Council may, after giving 30 days notice in writing to the owner . . . of their intention to carry mains, pipes, wires or cables through, across, under or over any private land within or outside the Municipality, making due com-

Mnr. C. Lombard (Germiston) wys daarop dat so 'n kennisgewing deur 'n Raadsbesluit gedek moet word en mnr. D. L. van der Walt (Ereld) spreek die mening uit dat die Plaaslike Bestuursordonnansies van die ander provinsies soortgelyke bepalinge bevat.

Mnr. K. A. H. Adams (Johannesburg) open die bespreking van Vraag 11 en wys daarop dat die koste verbonde aan die herwikkeling van 'n transformator gewoonlik ongeveer 60% van die aanvanklike koste van so 'n transformator beloop, en dat die herwikkeling van 'n transformator dus gewoonlik 'n ekonomiese proposisie is.

Mnr. A. F. Turnbull (Vereeniging) sê :—

I assume here that the usual considerations have been given to the type and size of the transformer. At present prices a 200 kVA standard loss transformer has an approximate copper content of 362 lbs. and is valued at R187; the core contains approx. 815 lbs. of iron and its value is about R250. The labour cost of a rewind (as Mr. Adams said) may be taken as approx. 60% of that for making a new transformer, so technically there is no reason why a transformer should not be rewound. Partial rewinds, however, are not economical generally and are not, therefore, advisable. In the long run, the economics resolve upon the facilities available for rewinding the transformer or, alternatively, on finding somebody to undertake these repairs satisfactorily.

I'm not quite sure what is required in this question, as

mented on the group replacement of robot lamps and it appeared from the discussion that this practice might be dangerous.

Electricity Distribution.

Mr. R. W. Barton (Welkom) opened discussion on Question 10 by saying :—

that we are now busy establishing, we've been told that this is no longer legal and that we have to decide in advance where we want any particular servitude and then register it at that time. If this is not done then we have no rights at all in the future.

Mr. E. de C. Pretorius (Potchefstroom) stated that a Council, by virtue of Section 84 of the Local Government Ordinance for the Transvaal, has the right, by giving 30 days notice, to obtain a right-of-way which need not be registered. He quoted :—

compensation for any damage done, the amount of compensating default of agreement to be determined by arbitration.

Mr. C. Lombard (Germiston) pointed out that such notice must be covered by a Council resolution and Mr. J. L. van der Walt (Honorary Member) believed that Local Government Ordinances in other Provinces made similar provisions.

Mr. K. A. H. Adams (Johannesburg) opened discussion on Question 11, indicating that the cost of rewinding a transformer was usually about 60% of its initial cost and that, therefore, rewinding was normally an economic proposition.

Mr. A. F. Turnbull (Vereeniging) said :—

I don't know how one would go about drawing up such a series of curves.

In Bantu townships we have sub-economic and economic housing schemes as well as privately built ones. The diversity of types of people living in these houses is so great that I think one can only use one's practical experience. One could take as a guide the wage standards of the people living in these houses, but I haven't yet struck anybody with courage enough to draw up curves and say that this applies to a certain type of house. In Johannesburg we have houses that probably take a before-diversity demand of 7 or 8 quite easily but this particular area I'm thinking of has an after-diversity demand of at least 3. By and large, though, my experience is that in both economic and sub-economic housing schemes the demand is something of the order of 5 kVA.

Vraag 13 word nie behandel nie.

Die President sluit die Tegniiese Vergadering af deur in die eerste plek mnr. Giles te bedank vir die behartiging van die Forum, sowel as die skrywers van die referate en almal wat tot die bespreking bygedra het. Aan die Erelede wat teenwoordig is, dra die President sy besondere waardering oor vir hulle ondersteuning.

Hy spreek ook sy opregte dank teenoor die Hoof van die Vaaldriehoekse Tegniiese Kollege uit, sowel as sy opregte waardering teenoor die Stadsraad van Vanderbijlpark vir die onthaal en vir die voorsiening van vervoer. Hy bedank ook sy kollegas en sy personeel vir hulle hulp en rig 'n spesiale woord van dank aan die Sekretariaat en aan die firma Sonarep vir die voorsiening van omslae vir die berging van dokumente.

Hy sluit soos volg af :—

I thank you all very much for your kind attention, gentlemen, and wish you a safe return home. Baie dankie vir u aandag en die mooi opkoms wat ons gehad het en ek

Die laaste sprekers is mnr. R. W. Barton (Welkom) wat die President soos volg aanspreek :—

On behalf of us all I should like you to accept our sincere thanks for the wonderful manner in which you personally have conducted this meeting. I think it's been an

En mnr. J. L. van der Walt (Ereled) wat hom soos volg uitlaat :—

Mnr. die President, ook 'n paar woorde, asseblief. Ek wil ook dankie sê vir daardie mooi woorde, ook dat ek nog welkom onder u is, want ek geniet dit baie. Ek wil vir u

Question 13 was not dealt with.

The President closed the Technical Meeting firstly by thanking Mr. Giles for handling the Forum and the authors of all papers, as well as the contributors to discussion. To Honorary Members who were present the President conveyed particular appreciation for their support. He also expressed sincere thanks to the Principal of the Vaal Triangle Technical College and appreciation to the Town Council of Vanderbijlpark for their entertainment and the provision of transport, as well as to his colleagues and staff for their assistance. Special thanks were also extended to the Secretaries and he expressed appreciation to Sonarep for providing conference folders.

He concluded :—

wens u almal 'n veilige terugkeer ten spuite van die reën. Dankie.

Final speakers were Mr. R. W. Barton (Welkom) who addressed the President as follows :—

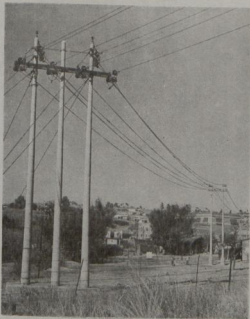
extremely useful and happy one, as I'm sure we all do. Thank you very much indeed.

And Mr. J. L. van der Walt (Honorary Member) who said :—

sê dat ek baie konferensies bywoon maar die gehalte en die aard van hierdie een bly vir my nog Nommer Een! Dankie.

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