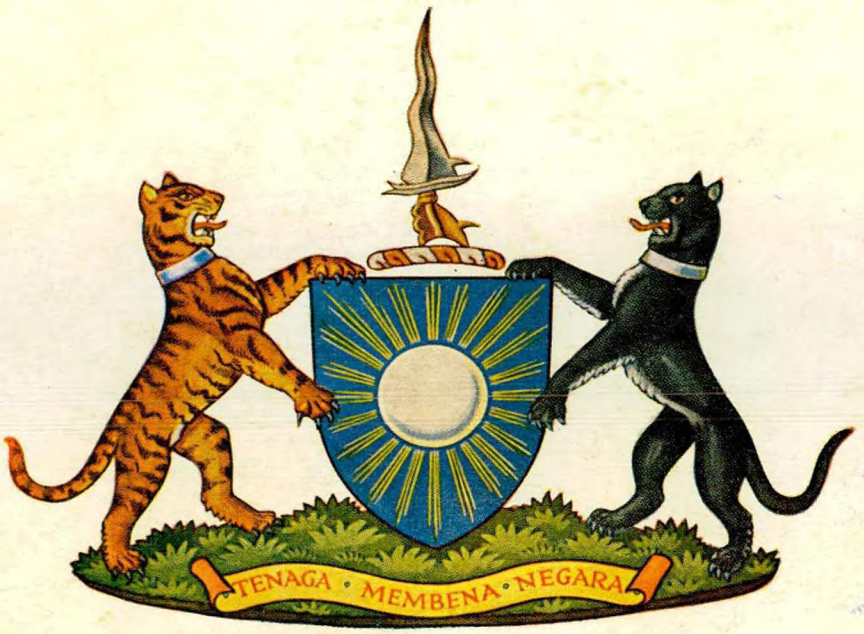
NATIONAL ELECTRICITY BOARD

of the

STATES OF MALAYA



THE SIXTEENTH

ANNUAL REPORT

1st September, 1964 : : 31st August, 1965

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Printed by
The Khee Meng Press,
214, Jalan Bandar,
Kuala Lumpur.

The Board

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DATO KURNIA JASA HAJI OSMAN BIN TALIB,
D.P.M.P., D.P.M.PS.

Deputy Chairman:

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J.M.N., J.P., M.I.E. (M)

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MR. P.P. NARAYANAN.

THE HON'BLE TENGKU INDERA PETRA, TENGKU BESAR INDERA RAJA IBNI AL-MARHUM SULTAN IBRAHIM, D.K., P.M.N.

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INCHE' MOHD. TAIB SABRE BIN ABU BAKAR, P.J.K. (from 1.3.1965).

INCHE CHONG HON NYAN, K.M.N. (from 7.6.1965).

MR. F.R. WARDROP was appointed Temporary Deputy Chairman and Temporary Member of the Board for the period 28th May 1965 to 26th July, 1965 during the absence from the States of Malaya of Y.M. RAJA ZAINAL BIN RAJA SULAIMAN, J.M.N., J.P.

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Adviser:
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Senior Engineer, Head Office	..	INCHE WONG WAI KHEONG, A.M.I.E.(M), A.M.I.E.E.
Area Managers	..	INCHE J.A. ELDER, B.SC., A.M.I.E.E.
		Y.M. TENGKU DAUD BIN TENGKU BESAR BURHANUDDIN, D.L.C., G.I.E.E.
		INCHE E.R.J. ANNIS, B.SC., M.I.E.(M.) A.M.I.E.E.
		INCHE M. RAJENDRA, A.M.I.E.E.

HYDRO ELECTRIC DIVISION:

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Deputy Chief Engineer (Hydro)	..	INCHE P.G.D. SHALLOW, M.A., M.I.C.E., M.I.W.E., M.ASCE.

FINANCIAL DIVISION:

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ADMINISTRATIVE DIVISION:

Secretary	..	INCHE G.R. WHEELER, M.M., B.SC. (Econ.)

INSPECTORATE DIVISION:

Chief Electrical Inspector	..	INCHE ABU ZARIM BIN HAJI OMAR, D.L.C., M.I.E.(M), A.M.I.E.E.

Consultants to the Board

PRINCIPAL CONSULTANTS

MESSRS. PREECE, CARDEW AND RIDER, LONDON AND KUALA LUMPUR.

CIVIL ENGINEERING CONSULTANTS

MESSRS. BINNIE AND PARTNERS, LONDON AND KUALA LUMPUR
MESSRS. FREEMAN, FOX AND PARTNERS, LONDON
MESSRS. SIR BRUCE WHITE, WOLFE BARRY AND PARTNERS, LONDON.

AUDITORS:

MESSRS. PRICE WATERHOUSE & CO., KUALA LUMPUR.

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Appendices

Abbreviations

AC	=	Alternating Current.
BHP	=	Brake Horse Power.
BPS	=	Bungsar Power Station.
BS	=	Bulk Supply
BTU	=	British Thermal Unit.
CBPS	=	Connaught Bridge Power Station.
NEB	=	National Electricity Board.
DC	=	Direct Current.
D/C	=	Double Circuit.
HE	=	Hydro-Electric.
HV	=	High Voltage.
IBRD	=	International Bank for Reconstruction and Development.
IFOV	=	Impulse Flash Over Voltage
KED	=	Kinta Electrical Distribution Co., Ltd.
kV	=	Kilovolt (1,000 Volts).
kVA	=	Kilovolt Ampere
kW	=	Kilowatt (1,000 Watts).
kWh	=	Kilowatt Hour (1 Board of Trade Unit).
LV	=	Low Voltage.
MVA	=	Megavolt Ampere (1,000 Kilovolt Amperes)
MW	=	Megawatt (1,000 Kilowatts).
OCB	=	Oil Circuit Breaker.
OE	=	Oil Engine.
O/H	=	Overhead.
PRHEP	=	Perak River Hydro-Electric Power Co., Ltd.
PS	=	Power Station
p.s.i.g.	=	Pounds per square inch gauge.
PVC	=	Polyvinychloride.
PWD	=	Public Works Department.
RHT	=	Rahman Hydraulic Tin Ltd.
SCA	=	Steel cored aluminium.
ST	=	Steam Turbine.
s.w.g.	=	Standard wire gauge.
TC	=	Transformer Capacity.
U/G	=	Underground.
ULPS	=	Ulu Langat Power Station.
V	=	Volts.
VHF	=	Very High Frequency.

Pendahuluan

KELUARAN ini ia-lah keluaran Penyata Tahunan yang ke-Enam Belas bagi "Lembaga Letrik Negara, Tanah Melayu" atau dalam Bahasa Inggeris "The National Electricity Board of the States of Malaya". Pertukaran nama yang dahulunya Lembaga Letrik Pusat Persekutuan Tanah Melayu yang di-tubohkan di-bawah Ordinance Letrik No. 30 tahun 1949 telah di-kuat-kuasakan mulai 22hb. Jun 1965 oleh suatu Act Parlimen yang telah mendapat Persetujuan Di-Raja.

Anggota Lembaga pada masa ini terdiri daripada sa-orang Pengerusi, Timbalan Pengerusi dan sembilan orang ahli2 yang lain. Di-bawah Ordinance itu tidak lebeh daripada dua orang daripada ahli2 yang lain itu di-benarkan daripada pegawai2 awam. Ordinance itu menyerahkan kapada sa-orang Menteri tugas bagi melantek ahli2 Lembaga dan pada masa ini Menteri Perdagangan dan Perusahaan menjalankan kewajipan ini.

Pengerusi Lembaga yang pertama ia-lah Inche W.D. Godsall (1949-1952) yang pada masa itu memegang jawatan Setia Usaha Kewangan Kerajaan Persekutuan Tanah Melayu. Inche O.A. Spencer (1952-1955) dan sa-lepas itu Inche C.G. Harrison pula mengambil tempat Inche Godsall. Pada 1hb. September, 1956, Inche O.A. Spencer (kemudian-nya Dato O.A. Spencer, P.M.N., C.M.G.) telah di-lantek sa-mula menjadi Pengerusi dan telah terus memegang jawatan tersebut hingga 31hb. Mach, 1960 manakala beliau telah meninggalkan Tanah Melayu untok bersara daripada perkhidmatan Kerajaan Persekutuan. Dato Kurnia Jasa Osman bin Talib yang terdahulu daripada itu telah memegang jawatan sebagai sa-orang daripada dua orang Timbalan Pengerusi Lembaga, telah di-lantek sebagai Pengerusi mulai 1hb, April, 1960.

Tujuan dan tugas2 Lembaga ada di-bentangkan dalam Sekshen 15 Ordinance Letrik dan ia-lah untok:-

(a) mengurus dan menjalankan pembekalan2 letrik yang di-pindahkan kapada Lembaga oleh Ordinance tersebut dan pembekalan2 dan alat2 perkakas lain yang sa-umpama itu yang di-ambil aleh oleh Lembaga di-bawah sharat2 Ordinance tersebut.

(b) menuboh, mengurus dan menjalankan pembekalan2 letrik sa-umpama itu yang mana pada fikiran Lembaga mustahak di-tubohkan.

(c) memaju serta menggalakkan penjanaan tenaga letrik dengan tujuan untok mengembangkan ekonomi Persekutuan Tanah Melayu.

(d) menetapkan bekalan tenaga letrik dengan harga yang berpatutan.

(e) menubohkan peratoran2 mengikut sharat2 Ordinance tersebut menguasai penjanaan kuasa, pengaliran, pembahagian dan penggunaan tenaga letrik.

(f) menasihati Menteri atas segala perkara berkaitan dengan penjanaan kuasa, pengaliran, pembahagian dan penggunaan tenaga letrik.

Bagi maksud pentadbiran dan perjalanan kerja2, Lembaga telah menubohkan empat kawasan seperti yang di-tunjokkan di-dalam peta pada penghabisan Penyata ini. Ibu Pejabat-nya di-tubohkan di-Kuala Lumpur, ia-itu Ibu Kota Tanah Melayu di-mana kawalan pusat bagi kewangan di-jalankan (termasok membeli dan setor) penjanaan kuasa di-setesen2 janaletrik besar (Jambatan Connaught, Cameron Highlands, Melaka, Johor dan Ulu Langat), pengaliran dan kawalan, peranchang dan kerja2 pembinaan yang besar, reka bentok dan pembinaan semua bangunan, jangka tenaga dan pelindongan, pentadbiran 'am, kahitangan dan kebajikan serta pentadbiran Ordinance Letrik.

Lembaga berkuasa mengeluarkan lesen2 kapada orang2 untok menjalankan pembekalan2 letrik untok membekalkan tenaga letrik bagi kegunaan sendiri atau orang ramai, dan di-kehendaki menyatakan di-dalam lesen2 itu tempoh lesen itu, kawasan bekalannya, volta yang di-akui dan perubahan yang di-benarkan daripada-nya, harga tertinggi di-bayar oleh pengguna2, dan perkara2 lain sa-umpama itu yang di-fikirkan oleh Lembaga patut di-masokkan. Sementara itu, sharat2 khas ada termaktub dalam Ordinance tersebut yang membolehkan Majlis Bandar Paya George Town meneruskan perjalanan usaha2-nya sendiri.

Banyak lesen2 telah di-keluarkan oleh Lembaga bagi pembekalan berbagai2 chara di-dalam Tanah Melayu, pemegang2 lesen yang utama bagi bekalan untok orang ramai ia-lah:-

Sharikat Kuasa Letrik Haidero Sungei Perak Berhad.

Sharikat Pengeluaran Letrik Kinta Berhad.

Sharikat Huttenbachs Berhad (hingga 29.2.1964).

Lembaga mengeluarkan kira2 58.2% daripada jumlah bekalan tenaga letrik di-Tanah Melayu dalam tahun yang di-kaji sa-mula ini. Penyata ini, pada am-nya, terhad kapada urusan2 Lembaga dan tidak menyatakan tentang hal ehwal Pelesen2, kechuali dalam Bab IX, Pertadbiran Ordinance Letrik dan dalam Lampiran VI, XIII, XV dan XVI.

Introduction

THIS is the Sixteenth Annual Report of the "Lembaga Letrik Negara, Tanah Melayu", or in English "The National Electricity Board of the States of Malaya". This change of name from the then Central Electricity Board of the Federation of Malaya which was established under the Electricity Ordinance No. 30 of 1949 was effected on 22nd June 1965 by an Act of Parliament which has received the Royal Assent.

Membership of the Board at present comprises a Chairman, a Deputy Chairman and nine other members. Under the Ordinance not more than two of the other members may be public officers. The Ordinance lays upon the Minister the duty of appointing Board members and at present the Minister of Commerce and Industry exercises this function.

The first Chairman of the Board was Mr. W.D. Godsall (1949-1952), then Financial Secretary of the Government of the Federation of Malaya. Mr. O.A. Spencer (1952-1955) and Mr. C.G. Harrison in turn succeeded Mr. Godsall in office. On 1st September, 1956, Mr. O.A. Spencer (later Dato O.A. Spencer, P.M.N., C.M.G.) was reappointed Chairman and continued to hold office until 31st March, 1960, when he left Malaya on retirement from the service of the Federation Government. Dato Kurnia Jasa Osman bin Talib, who had previously served as one of the two Deputy Chairman of the Board, was appointed Chairman from 1st April, 1960.

The functions and duties of the Board are set out in Section 15 of the Electricity Ordinance and are:

(a) to manage and work the electrical installations transferred to the Board by the Ordinance and such other installations and apparatus as may be acquired by the Board under the provision of the Ordinance;

(b) to establish, manage and work such electrical installations as the Board may deem it expedient to establish;

(c) to promote and encourage the generation of energy with a view to the economic development of the Federation ;

(d) to secure a supply of energy at reasonable prices;

(e) to make regulations, in accordance with the provisions of the Ordinance, governing the generation, transmission, distribution and use of energy;

(f) to advise the Minister on all matters relating to the generation, transmission, distribution and use of energy;

For administrative and operational purposes the Board has established four Areas

which are shown on the map at the end of this Report. Its Headquarters are established at Kuala Lumpur, the capital of the States of Malaya, where centralised control is maintained of finance (including purchasing and stores), generation at the major power stations (Connaught Bridge, Cameron Highlands, Malacca, Johore, and Ulu Langat), transmission and control, planning and major construction work, the design and erection of all buildings, meters and protection, general administration, personnel and welfare and administration of the Electricity Ordinance.

The Board is empowered to grant licences to persons to operate electrical installations for the supply of electrical energy for private or public purposes, and is required to set out in such licences the period of duration of the licence, the area of supply, the declared voltage and the variation permitted therefrom, the maximum charges payable by consumers, and such other matters as the Board may consider desirable. Special provision, however, was made in the Ordinance which enables the City Council of George Town, to continue operating its own undertaking.

Many licences have been granted by the Board for supplies of various types in the States of Malaya, the principal holders of licences for public supplies being:

The Perak River Hydro-Electric Power Co., Ltd.
The Kinta Electrical Distribution Co. Ltd.
Messrs. Huttenbachs Ltd. (until 29.2.1964)

The Board distributed about 58.2 per cent of the total electricity supplies of the States of Malaya during the year under review. This Report is, in general, confined to the activities of the Board and does not deal with the affairs of Licencees, except in Chapter IX, Administration of the Electricity Ordinance and in Appendices VI, XIII, XV and XVI.

Bahagian Satu — Ulasan 'Am

TAHUN yang di-kaji sa-mula ini ia-lah satu lagi tahun yang mengandongi kemajuan tetap bagi Ranchangan2 Letrik Haidero, Setesen2 Janaletrik Setim dan projek2 aliran letrik yang berkaitan dengan-nya yang di-usahakan oleh Lembaga Letrik Negara.

Penyiasatan Ranchangan Letrik Haidero Hulu Perak telah berjalan terus sa-panjang tahun itu.

Satu Laporan kemungkinan dari segi ekonomi bagi beberapa chara lain untok mengembangkan bakal tenaga letrik haidero sungai2 Sia, Liang dan Sempam di-Daerah Raub telah di-siapkan oleh Jurutera2 Lembaga. Laporan itu berpendapat bahawa puncha2 Letrik Haidero bagi ketiga-tiga sungai ini boleh di-kembangkan dengan belanja yang sedikit dan boleh menghasilkan kira2 175 juta yunit pada tiap2 tahun.

Di-Port Dickson penyiasatan permulaan bagi tanah lapisan bawah dan pemereksaan tapak chadangan penchawang letrik telah di-jalankan dan persiapan untok menentukan alat2 perkakas janakuasa dan alat2 berkaitan dengan-nya sedang di-siapkan oleh Perunding2 Lembaga.

Jumlah bilangan yunit yang di-jana dalam Tanah Melayu pada tahun itu ia-lah 2,127 juta yunit (1,851 juta yunit pada 1963/64). Ini merupakan tambahan sa-banyak 14.9% berbanding dengan 9.15% bagi tahun lepas. Bahagian yunit yang di-jana oleh Lembaga ia-lah sa-banyak 1,240 juta yunit, ia-itu tambahan sa-banyak 15.8% kapada 1,071 juta yunit yang di-jana pada 1963/64.

Yunit yang di-jual oleh Lembaga berjumlah 1,073 juta yunit berbanding dengan 918.7 juta yunit pada tahun lepas. Ini merupakan penambahan sa-banyak 16.8% daripada tahun yang lepas. Bilangan pengguna telah bertambah daripada 288,199 kapada 314,050 merupakan tambahan sa-banyak 9.0%. Kechuali Kawasan Selatan, tambahan peratus bagi yunit2 yang di-jual di-ke-empat2 kawasan ada-lah akan2 sama sahaja, ia-itu 13.7% di-Kawasan Timor, 14.9% di-Kawasan Tengah, 13.4% di-Kawasan Utara. Di-Kawasan Selatan tambahan-nya ia-lah sa-banyak 18.0%.

Pembekalan Letrik Luar Bandar

Dalam tahun itu 75 buah kampong lagi telah di-beri bekalan letrik dalam perengkat akhir Ranchangan Pembekalan Letrik Luar Bandar Lembaga di-bawah Ranchangan Pembangunan Lima Tahun yang ke-Dua Kerajaan Persekutuan, 1961/1965. Kesemua-nya sa-banyak 422 buah kampong telah mendapat bekalan letrik di-bawah Ranchangan ini dengan jumlah belanja sa-banyak $16 juta. Lembaga telah menyedia serta mengemukakan kapada Kerajaan chadangan-nya bagi Perbekalan Letrik Luar Bandar di-bawah Ranchangan Malaysia Pertama, 1966/70. Di-bawah ranchangan ini ada-lah di-chadangkan untok di-beri bekalan letrik ka-343 buah kampong lagi di-seluroh Tanah Melayu.

Modal Pembangunan

Perbelanjaan Modal dalam masa tahun itu berjumlah $84.0 juta berbanding dengan $73.9 juta dalam tahun lepas. Daripada jumlah wang ini sa-banyak $45.0 juta telah di-belanjakan untuk Pembangunan Tenaga Batang Padang dan Prai dan dengan ini jumlah perbelanjaan bagi projek itu sa-takat 31hb Ogos, 1965 meninggat hingga $74.9 juta.

Setesen Janaletrik Lembaga yang berkuasa 6 MW di-Pasir Mas, Kelantan telah di-buka dengan rasmi-nya oleh Duli Yang Maha Mulia Sultan Kelantan pada 19hb. April, 1965.

Konterek telah di-beri bagi kerja2 awam, jentera dan letrik yang berkaitan dengan empangan2 dan Setesen Janaletrik bawah tanah di-Woh bagi Panchangan Letrik Hai-dero Batang Padang dan juga Kerja2 berkenaan dengan pemasangan Tarbin Ulang Alek 10 MW yang ke-empat di-Setesen Janaletrik Melaka.

Kerja2 awam berkaitan dengan tambahan pertama bagi Tarbin Ulang Alek 30 MW dan jentera dandang yang berkaitan di-Setesen Janaletrik Sultan Ismail, Johor Baharu telah di-mulakan pada tahun itu.

Pembinaan Setesen Janaletrik Setim baharu di-Prai terus berjalan dengan memuas-kan sa-panjang tahun itu. Ada-lah di-jangka Setesen ini akan bermula berjalan pada bulan Oktober 1966.

Hasil2 Kewangan

Hasil2 kewangan bagi tahun 1964/65 sa-kali lagi sangat memuaskan sa-telah menje-laskan belanja2 bagi mengendalikan dan bayaran2 perbelanjaan modal. Lembaga telah menerima pendapatan berseh sa-banyak $12.0 juta yang mana telah di-gunakan sa-mula sebagai penanaman modal dalam perniagaan dengan mencharumkan-nya kapada wang chadangan.

Pendapatan daripada penjualan tenaga letrik bagi tahun itu berjumlah $97,829,831 ($84,424,271) dan pendapatan lain sa-banyak $2,588,975 ($2,147,597) menjadikan jumlah pendapatan sa-banyak $100,418,806 ($86,571,868). Belanja2 kendalian berjumlah $70,208,274 ($63,300,571), termasok susutan (depreciation) ber-jumlah $17,296,192 ($15,980,399) sementara faedah sa-banyak $13,657,805 ($16,878,401) telah di-bayar atas modal pinjaman, saham biasa dan ober-deraf bank. Sa-telah di-masokkan ka-dalam kira2 pendapatan wang sa-banyak $460,000 yang telah di-ketepikan pada tahun lepas untok chukai "turnover" yang tidak lagi di-kehendaki, maka pendapatan berseh ada-lah berjumlah sa-banyak $12,012,727 ($5,932,896). Daripada jumlah wang pendapatan berseh ini sa-banyak $10,612,727 ($5,032,896) telah di-pindahkan kapada kira2 Modal Pembangunan dan $1,400,000 ($900,000) telah di-charumkan kapada chadangan 'Am. Angka2 yang di-tunjokkan dalam kandon-gan merupakan jumlah wang pada tahun yang berakhir 1963/64.

Kemalangan2 Letrik

Ada-lah melegakan hati kita untok mengetahui bahawa sunggoh pun dalam tempoh dua tahun yang lalu bilangan kemalangan2 letrik maut dan kemalangan2 letrik tidak maut telah bertambah tetapi bagi tahun yang di-kaji ini bilangan kemalangan2 letrik maut dan kemalangan2 letrik tidak maut telah kurang kapada 67 berbanding dengan 71 pada tahun terdahulu daripada-nya. Enam belas daripada kemalangan2 itu telah meng-akibatkan kematian 16 orang dan sa-ekor lembu. Sebab2 yang utama mengapa banyak

daripada kemalangan2 itu berlaku, sabagaimana yang di-laporkan oleh Ketua Pemereksa Letrik, ada-lah sa-kali lagi kerana kechuaian dan alat2 perkakas letrik yang chachat, sementara yang lain2-nya pula di-sebabkan sambongan2 haram dan kerana kejahilan.

Kakitangan dan Pewarganegaraan

Jumlah bilangan kakitangan Lembaga telah bertambah 5.4% daripada 7,498 kapada 7,899.

Sa-ramai 24 Jurutera2 Pelajar, sa-orang Akauntan Pelajar dan sa-orang Ahli Kimia Pelajar telah menamatkan latehan lepasan Siswazah (post-graduate) dan telah di-naikkan pangkat mereka kejawatan Bahagian I.

Pada hujong tahun itu, sa-ramai 62 orang2 Malaysia telah menjalankan latehan pelajaran di-Tanah Melayu dan di-Seberang laut sementara sa-ramai 22 orang Jurutera2 Pelajar termasok 12 orang di-United Kingdom dan 10 orang di-Tanah Melayu, 2 orang Akauntan Pelajar dan 2 orang Kedet Pegawai Pentadbir telah menjalankan latehan lepasan Siswazah (post-graduate). Sa-lepas menamatkan latehan mereka, pegawai2 ini akan mengambil aleh tugas2 sebagai pegawai2 Bahagian I yang berkelayakan penoh. Selain daripada pegawai2 ini Lembaga telah juga menghantar sa-ramai dua orang Pegawai Pentadbiran ka-United Kingdom untok kursus latehan pendek.

Pewarganegaraan jawatan2 kanan dalam Lembaga telah meningkat daripada 74% kapada 82%. Jumlah pegawai2 dari Tanah Melayu dan pegawai2 Dagang sa-takat 31hb. Ogos 1965 ia-lah masing2 sa-ramai 206 dan 45 orang berbanding dengan 182 dan 63 orang pada tahun lepas. Ada-lah dasar Lembaga untok menyelesaikan ranchangan Pewarganegaraan-nya menjelang akhir tahun 1967.

Meshuarat2 Majlis Perusahaan Bersama L.L.N. selalu di-adakan sa-panjang tahun itu. Dalam semua rundingan terdapat suasana ramah tamah dan saling bantu membantu yang mana kepujian harus-lah di-beri kapada wakil2 kedua2 pehak Majikan dan pehak Pekerja kerana kesabaran mereka.

Sa-kali lagi Lembaga ingin menguchapkan terima kaseh atas kesetiaan dan kegiatan kerja2 yang di-beri oleh semua kakitangan-nya di-segala perengkat yang telah membolehkan perkembangan yang chepat di-perolehi bagi semua usaha2-nya dengan tidak mengurangkan kechekapan dalam penyenggaraan perkhidmatan2 yang ada sekarang ini. Terutama sa-kali kepujian harus-lah di-beri kapada kesemua, termasok Jurutera2 tempatan bagi Jemaah Perunding dan Konterekter2 yang telah bertugas bagi menjalankan Ranchangan2 Letrik Haidero, Setesen Janaletrik Setim dan projek2 aliran2 letrik yang berkaitan yang di-usahakan dalam tahun itu.

Chapter One. General Review

THE year under review was yet another year of steady progress made on the various Hydro Electric Schemes, Thermal Power Stations and associated Transmission projects undertaken by the National Electricity Board.

Investigation of the Upper Perak Hydro Electric Scheme continued throughout the year.

A report on the economic feasibility of a number of alternative methods of developing the hydro electric potential of the Sia, Liang and Sempam rivers in the District of Raub was prepared by Board Engineers. The report concluded that the Hydro Electric resources of these three rivers could be developed economically and would be capable of producing about 175 million units per year.

At Port Dickson, preliminary sub-soil investigation and exploration of the proposed power station site were carried out and preparation of the specifications for the generating and ancillary equipment is being prepared by the Board's Consultants.

The total number of units generated in the States of Malaya for the year amounted to 2,127 million units (1,851 million units in 1963/64). This represented an increase of 14.9% as compared to 9.15% in the previous year. The Board's share of units generated amounted to 1,240 million units, an increase of 15.8% over the 1,071 million units generated in 1963/64.

Units sold by the Board amounted to 1,073 million units as compared with 918.7 million units in the preceding year. This represented an increase of 16.8% over the previous year. The number of consumers increased from 288,199 to 314,050 representing an increase of 9.0%. With the exception of Southern Area the percentage increase in units sold in the four areas has been fairly uniform, being 13.7% in Eastern Area, 14.9% in Central Area, 13.4% in Northern Area. In Southern Area the increase was 18.0%.

Rural Electrification

During the year 75 further villages were given supply in the last phase of the Board's Rural Electrification Programme under the Federal Government Second Five Year Development Plan, 1961/65. Altogether 422 villages have received electricity supply under this plan at a total cost of $16 million. The Board has prepared and submitted to Government its proposals for Rural Electrification under the First Malaysia Plan, 1966/70. Under this plan it is proposed to give electricity supply to a further 343 villages throughout the States of Malaya.

Capital Development

Capital expenditure during the year amounted to $84.0 million compared with $73.9 million during the previous year. Of this sum $45.0 million was spent on the

Batang Padang and Prai Power Development, bringing total expenditure on the project up to 31st August 1965 to $74.9 million.

The Board's 6 MW Diesel Power Station at Pasir Mas, Kelantan, was officially declared open by His Royal Highness the Sultan of Kelantan on 19th April, 1965.

Contracts in connection with civil, mechanical and electrical works associated with the dams and Woh underground Power Station of the Batang Padang Hydro Electric Scheme as well as those in connection with the installation of the fourth 10 MW Turbo-Alternator at Malacca Power Station were awarded.

Civil works in connection with the first extension of a 30 MW Turbo-Alternator and associated boiler plant at Sultan Ismail Power Station, Johore Bahru, have been commenced during the year.

Construction of the new Thermal Power Station at Prai continued satisfactorily throughout the year. It is anticipated that this Station will be commissioned in October, 1966.

Financial Results

The financial results for the year have once again proved to be most satisfactory: the Board, after meeting its operating expenses and capital charges, earned a net revenue of $12.0 million, which it has re-invested in the business by contributing it to reserves.

Income from sales of electricity for the year amounted to $97,829,831 ($84,424,271) and other income to $2,588,975 ($2,147,597), making a total income of $100,418,806 ($86,571,868). Operating expenses amounted to $70,208,274 ($63,300,571), including depreciation of $17,296,192 ($15,980,399), while interest of $18,657,805 ($16,878,401) was paid on loan capital, ordinary stock and bank overdraft. After bringing into revenue a sum of $460,000 which was set aside in the previous year for turnover tax and is no longer required, net revenue amounted to $12,012,727 ($5,932,896). Of this amount of net revenue $10,612,727 ($5,032,896) was transferred to Capital Development Account and $1,400,000 ($900,000) was contributed to General Reserve. The figures shown in brackets refer to the corresponding amounts for the year ended 1963/64.

Electrical Accidents

It is gratifying to record that although during the past two years there was an increase in the number of both fatal and non-fatal electrical accidents, the year under review shows a decline in the number of fatal and non-fatal electrical accidents to 67 as compared to 71 in the previous year. Sixteen of these accidents resulted in the death of 16 human beings and a cow. The main causes of the majority of these accidents as reported by the Chief Electrical Inspector, were again due to carelessness and faulty apparatus while the remainder were caused by unauthorised extensions and ignorance.

Staff and Malayanisation

The total number of employees of the Board increased by 5.4% from 7,498 to 7,899.

24 Pupil Engineers, 1 Pupil Accountant and 1 Pupil Chemist completed their post-graduate training and were promoted to Division I posts.

At the end of the year, 62 Malayans were undergoing academic training in Malaya and overseas whilst 22 Pupil Engineers including 12 in the United Kingdom and 10 in Malaya, 2 Pupil Accountants and 2 Cadet Administrative Officers were undergoing

post-graduate training. On completion of their training these officers will take over duties as fully qualified Division I officers. Besides these officers the Board has sent two Administrative Officers to the United Kingdom for short training courses.

Malayanisation of the Senior posts of the Board rose from 74% to 82%. The total number of Malayan and Expatriate officers as on 31st August, 1965, were 206 and 45 respectively as compared to 182 and 63 in the preceding year. It is the Board's declared policy to complete its Malayanisation programme by the end of 1967.

Meetings of the H.E.B. Joint Industrial Council were held regularly throughout the year. In all negotiations an atmosphere of cordiality and mutual helpfulness prevailed, for which credit must be given to the patience and tolerance of the representatives both of Management and of the Staff Side.

Once again the Board wishes to express its great appreciation of the loyal and conscientious work put in by its staff at all levels, which has enabled the rapid expansion of the undertaking to take place without loss of efficiency in the maintenance of existing services. In particular, tribute must be paid to all those, including the Resident Engineers of the Consultants and of the Contractors, who have been engaged upon the Hydro Electric Schemes , Thermal Power Stations and associated transmission projects undertaken during the year.

Chapter Two. Batang Padang Hydro-Electric Project

THE Batang Padang Hydro-Electric Scheme forms the second and lower stage of the Cameron Highlands Scheme. The characteristics of the two schemes are similar although the output and installed capacity of the Batang Padang Scheme will be about 50% greater.

The Project includes the construction of two earthfill dams and 13 miles of tunnel, as well as an underground and a surface power station.

The offshore finance for the Project is obtained from the Board's second I.B.R.D. loan and therefore all the main contracts go out to International Tender. Advertisements are inserted in newspapers and in suitable technical and commercial papers and journals in the States of Malaya, the United Kingdom and America, and copies of these advertisements are forwarded to the Embassies of all countries which are members of the International Bank for Reconstruction and Development. In all cases a wide interest has been shown in the various contracts advertised to date and competitive tenders have been obtained. The following Contracts were placed during the year:-

The Waters of the Batang Padang River entering the Intake of the Diversion Tunnel at Jor Dam.

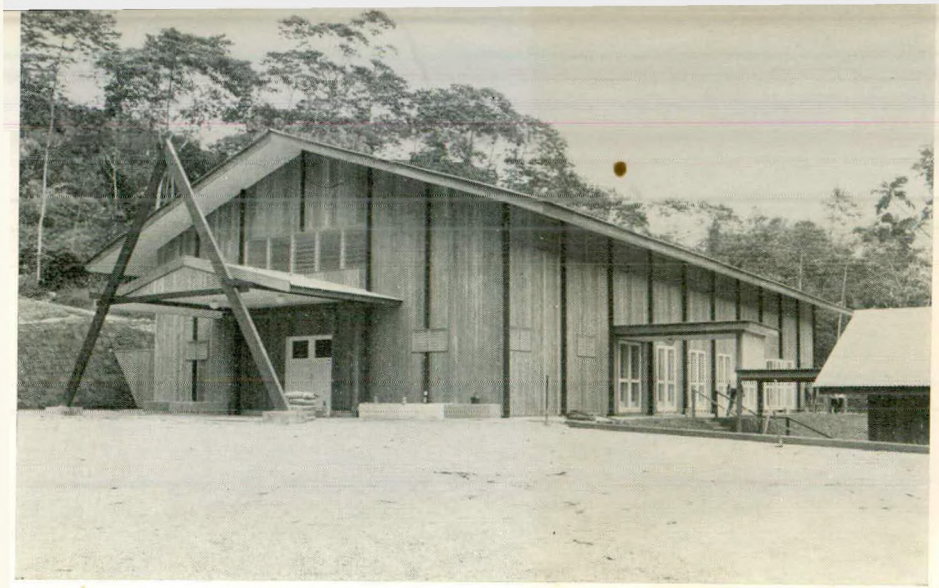
Jor Dam Spillway Tunnel.

(i) Contract No. 8 for the manufacture and delivery of intake gates, bulkhead gates, draft tube gates, reservoir outlet valves, intake screens and bulkhead doors.

(ii) Contract No. 9 — Woh Plant. This Contract is for the supply and erection of two vertical shaft Francis turbines operating at 600 rev/min with a design output of 68,500 B.H.P. under a net head of 1,165 feet, as well as two vertical shaft alternators capable of delivering 50 MW at 0.9 p.f. together with governors, high head inlet valves, isolating valves and over-velocity valves, power station crane, ventillatory equipment, etc. An order was subsequently placed for a third 50 MW set.

(iii) Contract No. 10 — Odak Plant. This Contract is for the supply and erection of the Odak Plant which includes two vertical shaft Francis turbines operating at 200 rev/min having a design output of 2,200 B.H.P., two double helical spur gearboxes giving an increase of speed from 200 to 750 rev/min and two vertical shaft induction generators operating at 750 rev/min and capable of delivering 1,400 kW.

Under Contract No. 6 for the Civil Engineering Works awarded last year, over five miles of tunnel have already been completed, the most difficult section being that of the 33′-6″ diameter Jor diversion and spillway tunnel where the rock was heavily sheared and faulted.



Community Hall for Engineers' Staff — Batang Padang Hydro-Electric Scheme.

Excavation in the main underground power station was completed down to the main floor level. Excavation for the switchyard was completed and the construction of the switchyard building is in progress.

The diversion of the main Cameron Highlands Road at the 17½ m.s. was opened to traffic on 24th November 1964, thus enabling construction of the Jor saddle dam to proceed. All exploratory drilling and boring was completed during the year, the total footage amounting to 8,364 feet. Construction of the main Jor dam and saddle dam are in progress.

The Contractor completed the construction of labour camps and offices at the various working sites as well as the housing, offices and laboratories for the staff of the Chief Resident Engineer. Tri-axial and other soils testing equipment as well as concrete testing equipment were installed in the laboratories.

Picture shows some of the 45 ECAFE delegates inside the one mile long Tailrace Tunnel of the $147 million Batang Padang Hydro Electric Scheme scheduled to be commissioned in 1968. The delegates were on a study-tour of Malaya when they visited the Hydro Scheme on 23.11.1964.

Jor Dam Cut-off Trench

Under the terms of the Contract, the Contractor constructed a hospital and engaged a Doctor and Hospital Assistants. All necessary medical facilities are being provided to look after the health of the Contractor's site staff which had risen to a total of 2,334 by the 31st August 1965. Despite precautions taken to prevent accidents, it is regretted that one tunnel helper was fatally injured as a result of a fall from the drilling platform in the underground power station.

It is also with great regret that we record the death of Dr. G.D. Gilbert, a Senior Assistant Engineer on the staff of the Chief Resident Engineer, who was killed in a car accident whilst travelling to work.

The Hydraulics Research Station at Wallingford in the United Kingdom completed model studies on sidestream intakes, the siphon bellmouth spillway and the stilling basin at Jor dam as well as an analysis of the surge shaft system.

Upper Telom Development

The three schemes comprising this development were Cognate projects to the main Cameron Highlands Scheme. It is worthy of note that the design and supervision of all civil engineering work was undertaken by Malaysian Engineers of the Board's Hydro-Electric Division.

Kuala Terla Power Station.

The Sungei Plau'ur was diverted into the Cameron Highlands catchment area on 21st January, 1964. The Kampong Raja and Kuala Terla Schemes commenced commercial operation during the year and, apart from initial teething troubles with the automatic water level control equipment, have continued to operate in a trouble free manner.

A unique feature of the Kampong Raja and Kuala Terla Schemes is the use of induction generators whose output is automatically controlled by the water level at the intakes.

H.R.H. the Sultan of Pahang touring the Kuala Terla Hydro-Electric Scheme in Cameron Highlands.

Boring Rig at work on Saddle Dam.

Bentong Hydro-Electric Development

Site surveys and investigations for the Perting and Benus Schemes of the Bentong Hydro-Electric Development were undertaken by the Board's Hydro-Electric Division. These schemes are capable of generating about 100 million units per annum. The Project Report by the Hydro-Electric Division was approved by the Board on 12th November 1964.

In order that the Bentong Development could form part of the Board's Third I.B.R.D. loan, the Board's Consultants were asked to include this development in their report on 'Generation and Transmission Developments 1966 — 1970'. This report concluded that the development of the Sungei Benus and Sungei Perting, as outlined in the Board's Project Report, was both feasible and economic and also recommended that the Bentong development should be undertaken.

Instructions have subsequently been given for the Consulting Engineers to proceed with the production of contract documents and it is now envisaged that the Perting and Benus power stations will be commissioned before the end of 1969.

Upper Perak Hydro-Electric Development

In accordance with the Memorandum of Understanding between the Central Government and the Government of Canada, the report on the feasibility of the Upper Perak Development, prepared by the Shawinigan Engineering Company of Canada, will be submitted to the Central Government early in 1966. This report will set out:-

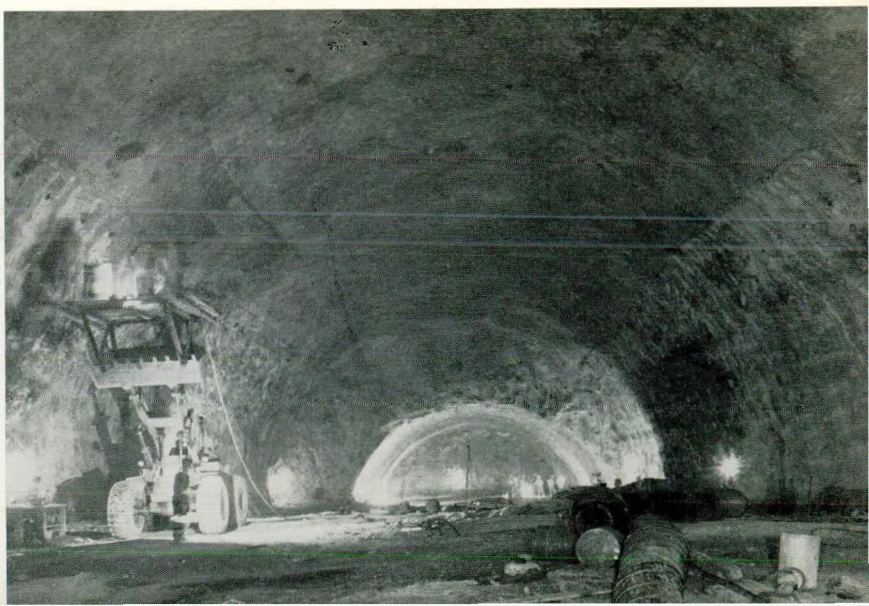
(i) Detailed estimates of power output.
(ii) Estimated construction costs.
(iii) Recommended scope of development.
(iv) Construction schedule.
(v) Description of preliminary site for dams and power houses.

Following the receipt of the report, a Working Party will be established, with representatives of the Central Government, the State of Perak and the National Electricity Board, for the purpose of considering the implications of the report.

A meeting to discuss the Upper Perak Development was held on 12th June 1965 with representatives of the Perak State Council under the Chairmanship of the Mentri Besar at which the Chairman and Senior Representatives of the Board were present.

A staff of nine Canadians from the Shawinigan Engineering Company together with some 90 Malayan technical and other personnel were engaged throughout the year on survey work and geological investigations at three dam sites. The geological investigations included 9,355 feet of diamond drilling. Soil samples were analysed in the Soils Laboratory of the Public Works Department. The Geological Survey Department also carried out tests and undertook drilling investigations.

Another important aspect of the field investigation was hydrological studies to estimate available riverflow and examine the reservoir siltation problems. The Perak River Hydro-Electric Power Company Ltd. rendered valuable assistance in this connection.



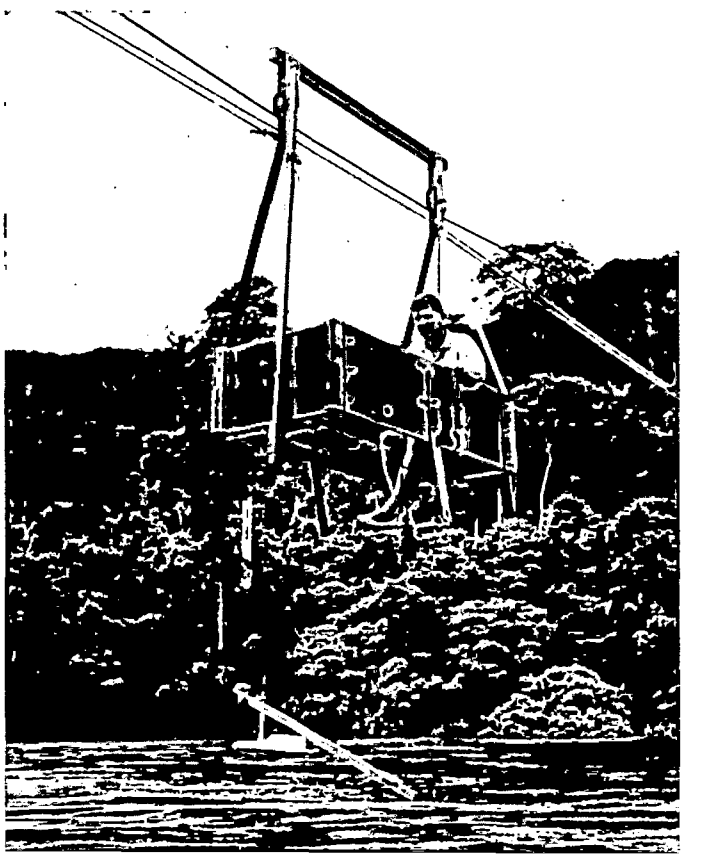
Excavation in progress at the Machine and Transformer halls at Woh Power Station.

Messrs. Hunting Aero Surveys Ltd., flew a number of sorties over the area to obtain photographs for subsequent production of maps in Canada. Poor weather conditions delayed this work.

Senior representatives of the Shawinigan Engineering Company made a number of visits to Malaysia and the Deputy Chief Engineer (Hydro) visited Montreal for discussions in their Head Office. The Board authorised a series of meetings to take place between the Shawinigan Engineering Company and the Principal Consultants to the Board, Messrs. Preece, Cardew & Rider.

General Investigations of Hydro-Electric Schemes

The Table attached to the end of this chapter of the Annual Report shows the considerableprogress made with the development of hydro-electric resources since the Emergency but does not include those schemes for which preliminary investigations and reports have already been undertaken by the Hydro-Electric Division, and which have been found to be economic. These schemes are capable of producing at least 1,500 million units per annum.



Canadian surveyor measuring water viewed from the air.

The Hydro-Electric Division prepared a report in February 1965 on the economic feasibility of a number of alternative methods of developing the hydro-electric potential of the Sia, Liang and Sempam rivers in the District of Raub. This report concluded that the hydro-electric resources of the Sia, Liang and Sempam could be developed economically and would be capable of producing about 175 million units per annum.

It was recommended that a detailed site investigation including hydrological studies should be started as soon as possible and that a Project Report should be prepared. Automatic water level recorders were accordingly installed on the three rivers and the Board resolved that Colombo Plan assistance should be sought in connection with the detailed investigation and preparation of the Project Report. The Malaysian Government subsequently received a number of offers of aid in connection with the investigation.

A draft report on the economic feasibility of incorporating a hydro-electric power station at the Pedu dam of the Muda River Irrigation Project was received by the Board. However, since the irrigation requirements of the project were altered at the time of discussions with the I.B.R.D., Sir William Halcrow & Partners have been authorized to arrange for a fresh computer programme to be carried out prior to the preparation of the final report.

The Hydro-Electric Division continued routine river gauging as well as sediment sampling and analysis. Particular attention was paid to the question of soil erosion and catchment control within the catchment area of the Cameron Highlands Hydro-Electric Scheme. The co-operation of the District Officer and other Government Departments in connection with this work is gratefully acknowledged.

Upper Perak Bersia Dam site viewed from the air.

TABLE OF HYDRO-ELECTRIC DEVELOPMENT

Station	Installed Capacity kW	Gross Head Feet	Catchment Area Sq. Miles	Output kWh	Date of Commissioning
IN OPERATION					
Robinson Falls	3 × 300	770	8.3	7×10^6	1959
Sultan Yussuf	4 × 25,000	1,880	70.7	324×10^6	1963
Habu	2 × 2,750	320	51.2	34×10^6	1964
Kampong Raja	1 × 800	277	11.9	6×10^6	1965
Kuala Terla	1 × 500	131	16.7	4×10^6	1965
UNDER CONSTRUCTION					
Woh	3 × 50,000	1,360	151.9	480×10^6	1967
Odak	3 × 1,400	40	152.1	14×10^6	1968
UNDER DESIGN					
Perting	3 × 4,000	680	34	62	1969
Benus	2 × 4,000	734	36	36	1969
*UNDER DETAILED INVESTIGATION					
Temengor	132,000	320	1,310	790×10^6	
Bersia	42,000	100	1,390	240×10^6	
Kenering	60,000	90	2,140	360×10^6	
TOTAL	515,900 kW			$2,357 \times 10^6$	

*These figures are provisional pending receipt of Project Report.

Chapter Three. Planning and Construction

Planning

Generation

Thermal Power Station

Port Dickson Power Station

This Station is planned for an ultimate capacity of 480 MW. The initial stage will consist of two 60 MW turbo-alternators and associated 550,000 lb/hr. oil-fired boilers. It is anticipated, that these units will be commissioned in 1969.

Preliminary sub-soil investigation and exploration of the site was undertaken by a firm of consulting engineers who have reported on the feasibility of the site.

The Board's Consultants are actively engaged on the preparation of the specifications for the generating and ancillary equipment.

Diesel Power Stations

Plans for meeting the increasing demands on the Board's Diesel Power Stations during the next few years are now based on a policy of utilising wherever possible, existing generating plant rendered surplus by the extension of Bulk Supplies.

With an increasing need for industrial development, there has been a marked increase in individual load demands and whilst ten years ago industrial loads of 100 kW were considered normal and 500 kW large for a diesel power station, these figures have now increased to 500 kW and 3000 kW respectively.

The maximum demand on East Coast diesel power stations is increasing more rapidly and the transfer of numerous generating sets totalling over 15,000 kW in capacity which have been rendered surplus by extending Bulk Supplies along the West Coast will commence in mid 1966 and continue until 1969.

Preliminary investigations for the transfer of the 2×3000 kW Free Piston Gasifyer generating plant from Butterworth to Lemal Power Station, Kelantan, are now being conducted.

Transmission

The maximum demand on the Central Network during the year reached 155.4 MW, which represents an increase of 17.3% over the network maximum demand of

132.5 MW reached during 1963/64. This is a significantly higher rate of growth in demand than the 11.3% achieved during the previous year. The most important factor contributing to such a trend is the considerable expansion in commercial and industrial activity around Kuala Lumpur and Petaling Jaya. Selangor State alone now accounts for about 80% of the total Central Network demand and 57% of this or 43% of the total Central Network demand is concentrated in Kuala Lumpur and Petaling Jaya with an estimated annual incremental rate of about 20% over the next 5 years. It is fortunate that demands from air conditioning in commercial and government premises and some newly established industries run mainly on a single shift basis and are not co-incidental with system peak and domestic demands. This has caused the day peak to keep up very closely with the early night system peak. The resultant annual load factor for the year is 65.8% as compared with 67.5% for last year. This shows the diminishing influence on future annual load factors by the relatively high load factor tin mining load which will progressively form a lesser proportion of the total system load.

Our consultants have submitted their report on load survey and generation and transmission requirements of the Western part of Malaya. Their market survey, comprising year by year forecasts up to 1971 and at two yearly intervals thereafter up to 1984 suggests, in comparison with the Board's previous estimates, a higher rate of growth up to the early 1970's but thereafter a slower rate of increase, with the total estimate by 1984 approximating closely to previous forecasts. It confirms a continuing high load concentration in the Kuala Lumpur/Petaling Jaya area as reported in the foregoing paragraph.

On the basis of forecasts in the recent market survey, it has been possible to draw up a preliminary programme of generating plant and transmission requirements up to 1970 but finalisation of such a programme has to await the findings of a feasibility study of the proposed Upper Perak Hydro Electric Development which is expected to be available before the end of the current year. Plans are in hand for the construction of a double circuit 275 kV line (to be operated initially at 132 kV) between the proposed Port Dickson Power Station and Kuala Lumpur. Plans are also going ahead for the construction of a 132 kV D/C line from Port Dickson to Seremban. Planning and design have virtually been completed for two small hydro stations at Perting and Benus in the Bentong district with installed capacities of 3 : 4 MW and 2 : 4 MW respectively. These will be interconnected with the Segambut Substation, Kuala Lumpur via a 132kV Transmission line. This scheme will enable Bentong and eventually Mentakab diesel power stations to be shut down. It is proposed at a later date to extend this 132kV Transmission line to another larger hydro scheme near Raub.

The Johore Bahru 22 kV system is being further developed to meet new industrial and water pumping loads. Growth rates exceeding 20% are anticipated for the next few years. By 1967/68 it will be increasingly uneconomic to supply such new loads by additional 22kV feeders from the Sultan Ismail Power Station and preliminary plans are being formulated to reinforce the 22kV system through bulk supply substations employing a higher voltage. A detail assessment is being made of the relative merits of employing 66kV or 132kV reinforcement.

The 66kV extension from Seremban to Kuala Pilah has been virtually completed and bulk supply should be made available to Kuala Pilah and Bahau in early September, 1965. Work on the 66kV extensions from Batu Pahat to Kluang and from Kuala Pilah to Gemas has been delayed due to deliveries of materials on order being later than anticipated. Revised completion dates for these lines are mid-1966 and early 1967 respectively. A load survey is being undertaken in the Labis/Chaah area and a preliminary route survey between Gemas and Kluang has been programmed. By the end of the present decade, it should be possible to complete the 66kV distribution ring from Se-

remban to Malacca via Kuala Pilah, Gemas, Labis, Kluang, Batu Pahat and Muar, thus obviating the necessity for standby diesel plants in any of the towns.

Distribution

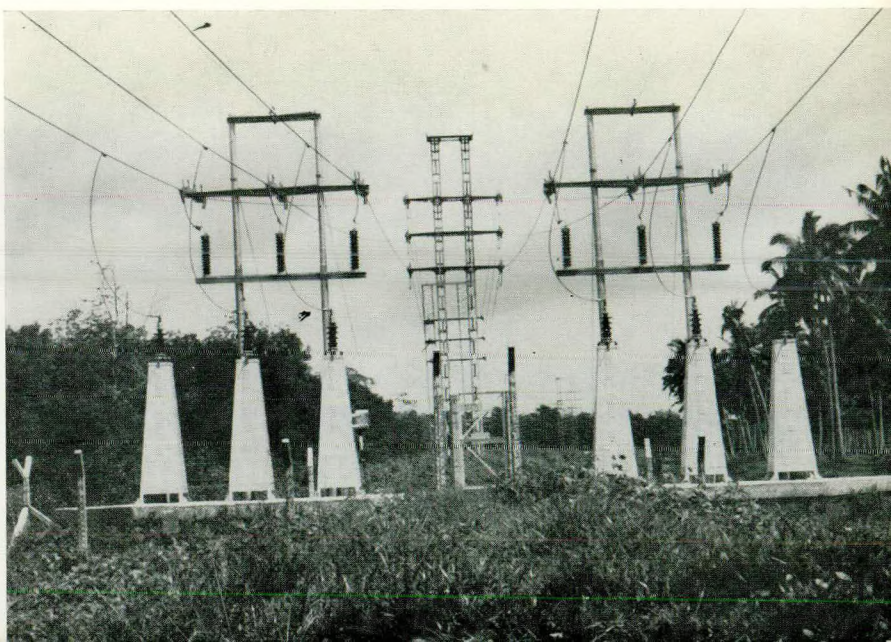
Central Area. — During the year, Stage I of the Kuala Lumpur and District 33kV underground system has been completed with the establishment of 2×15 MVA 33/11kV substations at Jalan Rodger and Jalan Sungei Besi. Stage II is scheduled for completion by August, 1966 with the commissioning of a similar type substation at Jalan Pahang. Plans have been formulated to proceed with Stage III and Stage IV of the scheme with March, 1967 and August, 1968 as target commissioning dates respectively.

In June, 1965, tenders were called for the installation of a Supervisory Control and Indication System at the Regional Control Centre at Kuala Lumpur. The Control Centre is expected to be in service towards the end of 1966.

A new industrial estate is being set up near Batu Tiga off the Federal Highway and plans for a new Selangor State Capital in the same neighbourhood are ready for implementation. Although initial loads can be supplied off the existing 11kV reticulation in the area, a 66/11kV substation to be fed from the Connaught Bridge/Bungsar interconnectors is envisaged for the future.

Northern Area — The two 30 MVA 33kV submarine cables between Penang and Prai was put on commercial load on 1st August, 1965 in conjunction with the commissioning of Sungei Dua 33/11kV substation and the changeover of Muda River D.I.D. Pumping Station to 33kV operation. On 6th August, 1965, 33kV Bulk Supply was extended to Sungei Patani. The new 33kV network has been further extended to Pinang Tunggal D.I.D. Pumping Station and work has already started on the extension to Bukit Mertajam. Owing to land acquisition difficulties the 33/11kV bulk supply substation to Bukit Mertajam town is not expected to be ready until the beginning of 1966.

Plans have been finalised to re-organise the Butterworth 11kV distribution system in anticipation of the commissioning of Prai Power Station in the latter half of 1966.



View of Transmission Line From Cable Terminal Prai

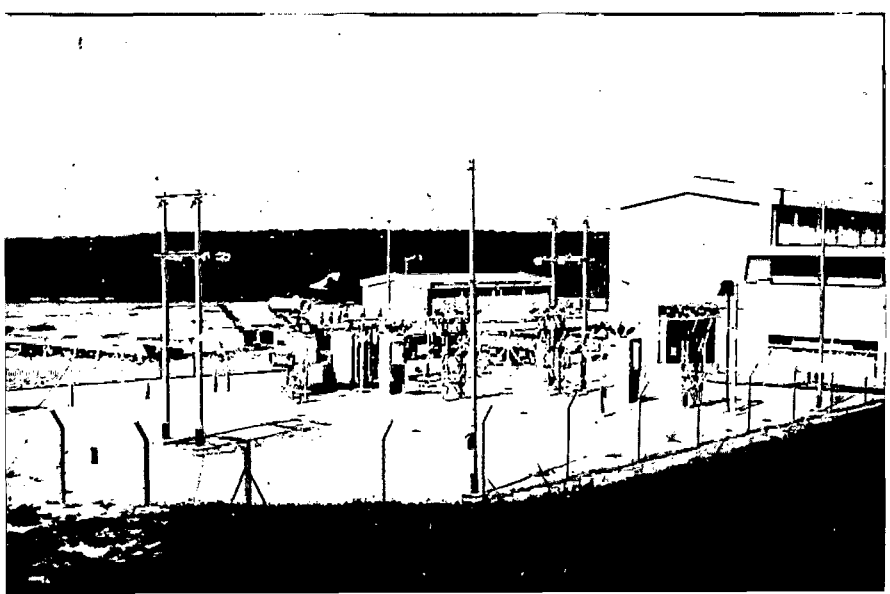
Southern Area. — The Johore Bahru system maximum demand increased from 13.9 MW to 18.2 MW. To cope with anticipated demands, a second 3 MVA 21/6.6kV transformer is to be installed at Tampoi No. 2 Substation and a third 4.5 MVA 21/6.6kV transformer at Central Substation. The 22kV network is to be reinforced by a new 0.2 sq. in. 22kV feeder from the Power Station to the Tampoi No. 2 Substation. Negotiations for supply to Johore River Waterworks are proceeding. For the initial stage of pumping development a 22kV extension to a 5 MVA 22/6.6kV substation at the Waterworks site is scheduled for completion by February, 1967. In conjunction with this project, a 6.6kV bulk supply will be extended to Kota Tinggi, thus enabling the existing diesel station there to be shut down.

In Kluang a new 11kV distribution network will be laid to accept bulk supply from the 2×10 MVA 66/11kV substation by mid-1966.

The Malacca Town evening peak load has increased to beyond the firm capacity of the 2×0.2 sq. in. 11kV feeders from the Power Station, and arrangements have been made to re-commission the Bona Vista 66/11kV substation, with the installation of a 7.5 MVA 66/11kV transformer, to meet the future load requirements. In Seremban, the system M.D. is also increasing steadily, though at a lesser rate and the existing 11kV distribution network is being re-inforced.

Eastern Area. — Lundang Power Station will gradually be utilised for peaking and standby purposes when further 3 MW sets are installed at the new Lemal Power Station to supply the large irrigation pumping loads under the Lemal and Kemubu Irrigation Schemes. A 0.15 sq. in heavy duty 33kV overhead line will be constructed from Lemal Power Station to Lundang, and transformer capacities increased at the terminal substations. Plans are in hand to reinforce the Kota Bharu 6.6kV underground system by laying new feeders from Lundang to link up with Central Substation. This 6.6kV system is eventually to be changed over to 11kV.

An 11kV distribution system has been introduced in Pekan with one 11kV feeder being taken out from the Power Station to the Istana Substation. Additional 11/0.4kV substations will be established as and when the load development warrants them.



Scudai water-works 5 MVA 22/6.6 kV sub-station with the pumping station in the back-ground.

Prai Power Station.

Construction

Generation

Thermal Power Stations

Prai Power Station — The first phase of this Station consists of two oil-fired 300,000 lb/hr. boilers and two 30 MW turbo-alternators operating with steam conditions of 900 p.s.i.g./900° F at the turbine stop valve. Construction is progressing satisfactorily although work on the foundations was delayed by about three months due to a labour dispute at the end of last year; however a major portion of the time lost has been recovered by re-arranging the construction programme.

Erection of the steelwork for Boiler and Turbine House and other main buildings is almost complete and construction of the first boiler is well underway. It is anticipated that the Station will be commissioned during the latter half of 1966.

Malacca Power Station. — The final extension of the Station consists of the fourth 10 MW turbo-alternator and associated boiler plant. Contract for the civil work was awarded in September 1964 and successfully completed in March 1965.

Erection of the boiler was underway in early June. The tempo of work has temporarily slackened pending the arrival of further shipment of materials in early September.

Erection of the turbo-alternator is scheduled to commence in September 1965 and the complete extension is expected to be commissioned in the middle of 1966.

Sultan Ismail Power Station. — The first extension of the Station consists of one 30 MW turbo-alternator and the associated 300,000 pounds per hour boiler.

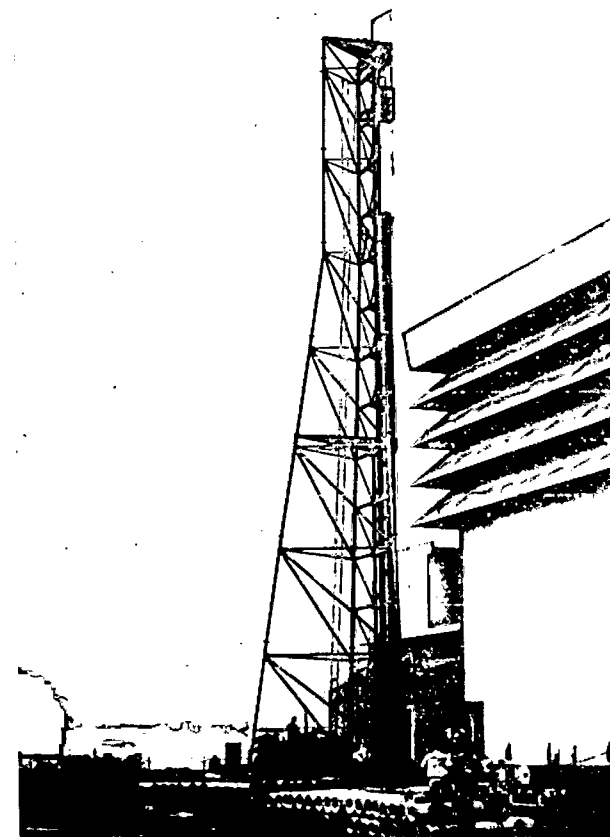
The target date for commissioning of the plant is March 1967.

The civil work connected with the first extension of the Station has begun.

Visit by the Deputy Prime Minister, Tun Abdul Razak to the Frai Power Station on 2.7.1965.

Diesel Power Stations

Lemal Power Station (*Pasir Mas, Kelantan*). — Construction of the first two phases of the Power Station Building, and installation of the first 3 MW Mirrless-National KVSS 16 Diesel Generating Set, including Switchgear, Auxiliaries, Fuel Storage Tanks and Cooling Ponds, were all completed during the year. The new Power Station was officially declared open by His Royal Highness, the Sultan of Kelantan, on 19th April 1965. Erection of the second 3 MW Diesel Generator was completed and the Set given a no-load test on 26th August 1965. Installation of the associated Switchgear and work on the Third Phase of the Power Station Building, are well advanced.



Driving of the first pile at the Sultan Ismail Power Station — First Extension Work.

Movements of diesel plant during the year were as follows:-

(i)	New Plant installed and commissioned.	1-3020 kW Set at Lemal 1-1020 kW Set at Taiping
(ii)	New Plant received or in course of erection at 31.8.65	1-3020 kW Set at Lemal
(iii)	New Plant on order at 31.8.65	1- 750 kW Set for Alor Star 1- 750 kW Set for Taiping
(iv)	Plant transferred and commissioned.	1- 100 kW Set to Dungun 1- 396 kW Set to Pekan 1- 308 kW Set to Segamat 2- 50 kW Sets to Kota Tinggi
(v)	Plant in course of transfer at 31.8.65	1- 400 kW Set to Bentong 1- 50 kW Set to Rembau 1- 200 kW Set to Arau 1- 400 kW Set to Sitiawan 1- 100 kW Set to K. Klawang 1- 975 kW Set to Alor Star
(vi)	Old or inefficient plant sold	1- 75 kW Set at Tg. Malim 1- 75 kW Set at Pekan 3- 22 kW Sets at C. Store 1- 22 kW Set at Malacca 1- 82 kW Set at P. Serai 1- 65 kW Set at P. Serai 2- 16 kW Sets at P. Serai 1- 200 kW Set at C. Highlands 2- 100 kW Sets at C. Highlands 1- 175 kW Set at Mentakab

Batu Pahat is the only Diesel Station to be given bulk supply this year.

Lemal Power Station

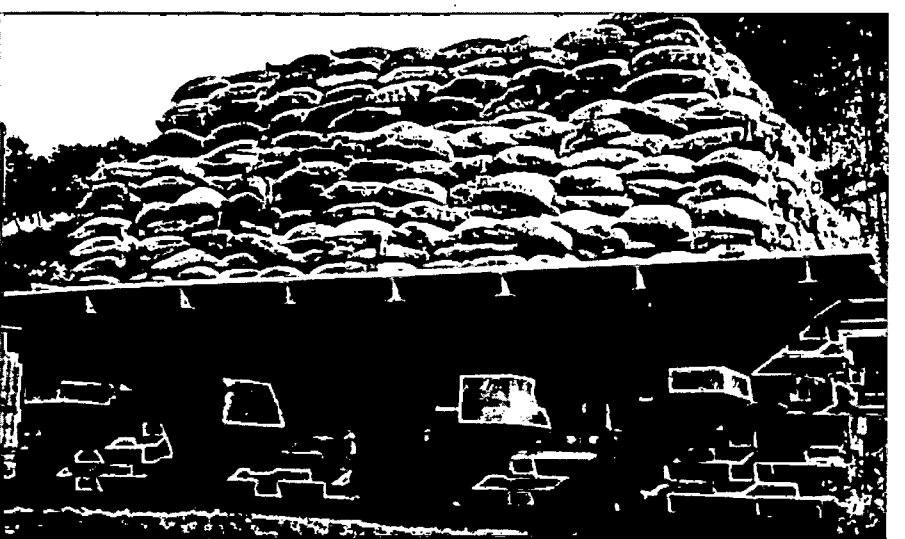
Stations which had their capacity increased during the year are as shown in the following table:-

STATION	Plant Capacity in kW as at 31st August.		% INCREASE
	1964	1965	
Taiping	4655	5675	22
Lemal (New)	NIL	3020	—
Dungun	430	530	23
Pekan	350	671	92
Segamat	935	1143	22
Kota Tinggi	310	410	32

Transmission

During the year, construction work has been hampered by a number of adverse factors. Foremost amongst these is the delay in obtaining wayleaves for transmission lines and land for substation sites.

Recent irrigation projects have promoted double cropping in many padi fields and this in turn has reduced drastically the time available during each year for construction work to be carried out on such land in order to prevent damage to plants and harvests. Late and short deliveries of essential constructional materials from oversea suppliers have also held up work and delays up to several months have occurred on this account.



Simulated load test on R.C. Pile at Tower No. 3 at Sungei Patani using sand ballast.

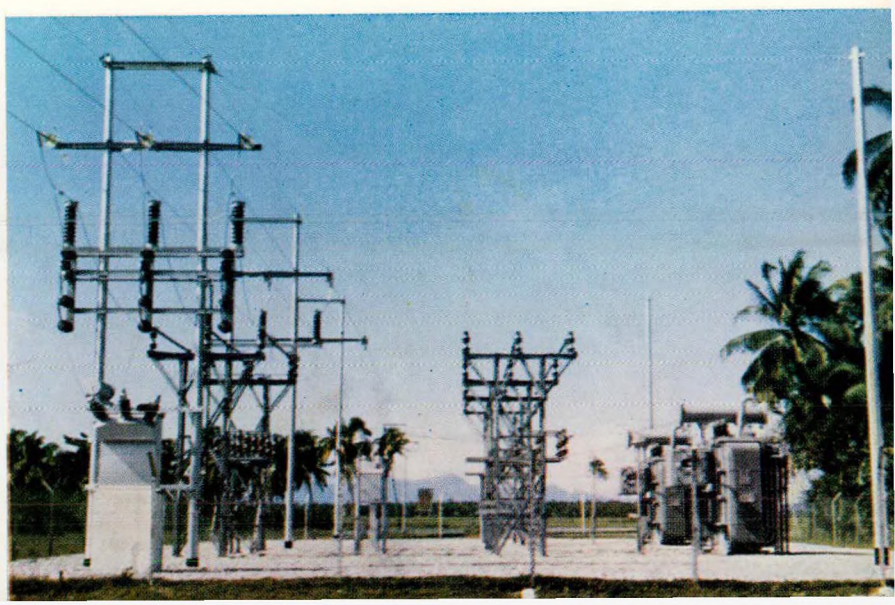
Batang Padang and Prai Power Development. — Transmission works associated with the Batang Padang and Prai Power Development are now estimated to cost about $M53 millions including interests and engineering supervision.

The 132kV breakers and ancillary equipment at Segambut Substation were commissioned. International tenders were called and awarded for transformers for 132kV and 33kV switchgear and ancillary equipment required at all other major substations. First shipment of switchgear is due to arrive in the country in the last quarter of this year, and erection is due to commence early next year. Civil works and site preparations at a number of substations have been delayed by land acquisition proceedings.

Under the contract for supply and erection of 132kV overhead lines all tower and insulator type tests have been completed. Profile and soil surveys for all the lines have also been virtually completed, except for small sections where objections from land owners have yet to be resolved. Progress in the construction of tower foundations and tower erection on the Prai/Taiping/Papan lines has not been up to expectations. Extremely poor soil encountered on a portion of the route has necessitated a four fold increase in heavy concrete piling than originally allowed for.

The Board's own staff constructed 5.6 miles of single circuit 132kV line from Muda River to Sg. Patani using narrow based lattice towers and wooden crossarms with .15 sq. in. SCA conductors. A 0.6 mile tee-off into Sungei Patani substation was erected utilizing double circuit tower construction. These lines were commissioned at 33kV in August and in conjunction with existing 33kV lines were used temporarily to bring bulk supply from Butterworth to Sungei Patani. International tenders are being called for the construction of the remainder of the Prai/Alor Star 132kV Transmission lines i.e. from Sungei Dua to Muda River and from Sungei Patani to Alor Star.

International tenders have been received and are being examined for power line carrier, communication and supervisory equipment.



Sungei Dua Substation showing
(1) 2x5 MVA Transformers
(2) 250 MVA 33 kV O.C.B.
(3) 50 kVA 33/.4 kV Auxiliary transformer
(4) Near side 'H' pole — incoming line from Prai cable sealing ends. Far side 'H' pole — outgoing line to Muda River and Sungei Patani.

Prai — Sg. Patani 132 kV Line P.U. Pole No. 26 at Sg. Patani showing
(1) Chengal Wooden crossing arms 11"x4"x 12'0" single plank type.
(2) Counterweight on bottom insulator set when adjacent to section or Angle Tower.
(3) Preform Armour Grip Suspension Clamps.

Laying of two 33kV 30 MVA solid cables, each comprising 5.3 miles of 3 core submarine section and 0.3 mile of single core land section together with a pilot cable between Penang Power Station and the Prai Mainland was completed but unfortunately one of the cables developed a fault soon after commissioning. This was subsequently traced to a localised manufacturing defect in the lead sheath and the necessary repairs were carried out using the same flexible jointing technique as was employed when the cable was first laid. The two submarine cables are now in commission and provide a bulk supply from Penang Power Station to the Butterworth distribution network. A tender was awarded for supply and installation of 6,000 yards of oil filled 33kV cables between Prai Power Station Switchyard and the Penang/Prai submarine terminations cable. These cables are due to be commissioned early next year.

Schemes Directly engineered by Board's Staff

Overhead Lines and Cables. — During the year, preliminary route surveys for the following proposed transmission lines were completed:-

(i) 132kV line from Sungei Patani to Alor Star. Route length 37 miles.

(ii) 132kV line from Port Dickson to Seremban. Route length 16 miles.

(iii) 132kV line from Segambut Substation, Kuala Lumpur, to Bentong. Route length 33 miles.

The profile survey of the proposed 66kV line from Kuala Pilah to Gemas was also completed.

The 66kV line from Muar to Batu Pahat with a route length of 29.3 miles was completed and commissioned in October, 1964.

21 miles of 66kV line were constructed from Seremban to Kuala Pilah. The line is to be commissioned in September this year.

Rentis clearing of the proposed 66kV line from Batu Pahat to Kluang commenced in August, 1965 in the Kluang district. Wayleave difficulties through a large rubber estate in the Batu Pahat district have delayed commencement of work. Materials for this line are beginning to arrive.

Substations. — The 66kV mesh at Seremban Substation was extended to allow an additional circuit to be taken out to Kuala Pilah. Substantial circuit alterations had to be undertaken together with civil works in extending the substation site so as to provide room for two future 132kV interconnectors from the proposed Port Dickson Power Station.

A standard 3 switch substation equipped with two 3 MVA 66/6.6 kV transformers and switchgear at Batu Pahat Substation was commissioned in October, 1964.

At Alor Gajah 66/11kV Substation, the 1.5 MVA 66/11kV transformer was replaced by a larger 3 MVA unit.

Distribution

Central Area — 33kV Overhead Lines and Underground Cables. — Preliminary route and profile survey for the 33kV 0.15 sq. in. conductor line from Ayer Hitam Substation to the Kuala Langat area was completed. Rentis clearing has been completed for about a quarter of the route. Extension of this line towards Banting is being surveyed.

The first and second stages of cable laying in the Kuala Lumpur 33kV underground development which were commenced last year were completed and commissioned. A total of 12.0 miles of 33kV 30MVA and 2.83 miles of 33kV 15 MVA oil filled cables together with 12.26 miles of 12 pairs and 2.88 miles of 19 pairs of supervisory cables were laid.

33kV Substations

One rural supply scheme was completed at Rasa No. 2 Substation where a 33/11kV 500kVA stepdown substation was established to give supply to Batang Kali.

Nine 33/0.4 kV substations were erected to give supply to tin mines. The total capacity was 4,350 kVA.

One 33/6.6kV 1,200 kVA substation was erected to give supply to a tin dredge.

Two 33/11kV 2×15 MVA substation at Jalan Rodger and Jalan Sungei Besi were completed and commissioned, the latter with only one transformer energised due to cable shortage. Three months after commissioning the 33kV cable box of transformer No. 1 in the former substation exploded and was repaired necessitating a new length of 33kV underground cable to be laid from the 33kV switchgear to the transformer. The switchgear in Jalan Rodger Substation comprise 5 panels of 33kV switchgear and 18 panels of 11kV switchgear whilst Jalan Sungei Besi Substation is equipped with 4

panels 33 kV O.C.B. and 17 panels 11kV O.C.B. All the switchgear have double busbars. Two banks of 11kV capacitors with a total capacity of 2 MVAR and CO_2 fire-fighting equipment are installed in each of the substations.

Work is in hand on the installation of a 7.5 MVA 33/11kV transformer at Kajang Main-Intake Substation.

11kV System. — At Kuala Lumpur and Petaling Jaya, thirty 11/0.4kV substations with a total capacity of 17,900 kVA were installed. There was a total increase of 4,100 kVA in transformer capacity as a result of installing larger transformers in eleven existing substations, and the conversion of four 33kV substations to 11kV.

Forty 150 MVA 11kV O.C.Bs. in 16 substations in the high fault level areas in Kuala Lumpur were modified and up-rated to 250 MVA.

In the Kuala Lumpur Outstations, Beranang Substation was constructed with a transformer capacity of 150 kVA; the supply was from Mandin No. 2 Substation, in Seremban District, and 4.493 miles of 0.0225 sq. in. 11kV cable were laid. The Old People's Home Substation, in Cheras, was constructed with a transformer capacity of 200 kVA; the supply was from the Cheras Pumphouse Switching Station, and 0.773 miles of 0.0225 sq. in. 11kV cable was laid. Batang Kali was given bulk supply by laying 3.027 miles of 0.04 sq. in. 11kV cable from Rasa No. 2 Substation and constructing a 100 kVA substation. Kampong Jawa, at Kerling, was given a supply by constructing a 25 kVA substation which was looped into an existing cable from the Kerling 33/11kV stepdown substation. At Kajang, the new Radio Malaysia Station was given supply by constructing a 2 1,000 kVA substation and laying 1.326 miles of 0.2 sq. in. 11kV and pilot cables from Kajang Main-Intake Substation.

Two 500 kVA transformers were installed at the Faculty of Medicine on behalf of the University. A 750 kVA transformer was also resited for the Faculty.

In Klang District, twelve substations with a combined transformer capacity of 3,925 kVA were constructed. This included the temporary outdoor substation of 500 kVA constructed at the Chemical Co. of Malaysia. A total of 32·6 miles of various sizes of cables were laid. Fung Keong Substation was increased in capacity by the installation of an additional 500 kVA transformer. The R.A.F. Substation of 300 kVA capacity on the former Port Swettenham airstrip, was dismantled.

Northern Are

Butterworth District. — The long delayed bulk supply from Penang was given to Sungei Patani via the submarine cables and the 33kV overhead lines on 6th August, 1965. The transformers installed at Sungei Patani were one, 1,000 kVA 33/3.3kV and one 5,000 kVA 33/11kV. The 33/3.3kV transformer will be removed when Sungei Patani 3.3kV distribution system is completely changed to 11kV.

The Sungei Dua Substation of 2 3 MVA 33/11kV transformers was commissioned on 1st August, 1965. On the same day, the existing line, between Sungei Dua and Muda River, which was insulated for 33kV but operated hitherto at 11kV, was converted to 33kV operation. The 500 kVA 11/0.4 kV transformer was changed to a 500 kVA 33/0.4kV transformer at Muda River on conversion to 33kV operation.

The 33kV line from Muda River to Pinang Tunggal D.I.D. pumphouse was completed. The 750 kVA 33/0.4kV substation was commissioned and energised in August, 1965. The final route length of the line completed was 5.05 miles.

The route survey for the 33kV line to Bukit Mertajam was completed. Erection of this has begun although access to the Bukit Mertajam Substation site, and a short section of the 33kV rentis just before the substation, has still not been obtained.

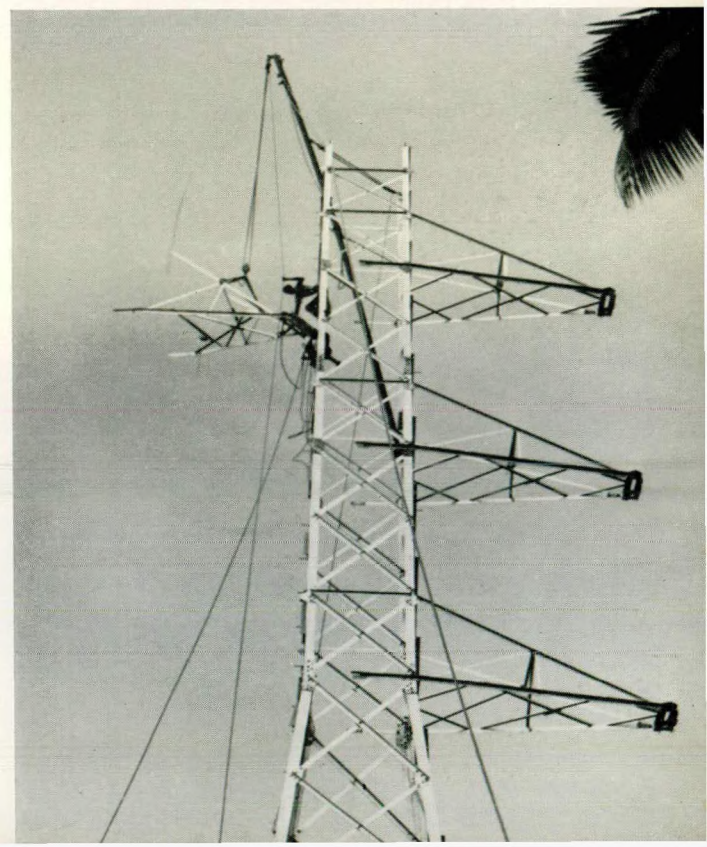
A preliminary route survey for a 33kV overhead line one mile long to supply the Mak Mandin Industrial Estate, Province Wellesley, was completed.

Taiping District. — Supply to Simpang Ampat, Selinsing, was given by laying 2.036 miles of 0.06 sq. in. 11kV cable from Krian Water Works Substation, and constructing a 25 kVA outdoor substation. Simpang Tiga also got a supply by laying 1.422 miles of 0.0225 sq. in. 11kV cable from Simpang Ampat Substation.

Changkat Jering was given a supply by laying 2.529 miles of 0.0225 sq. in. 11kV cable from Simpang Village Substation, and constructing a 50 kVA substation.

Ipoh District. — Work on the extension of the 22/11kV Main-Intake Substation at Telok Anson was well in hand and nearing completion. Three 11kV O.C.B. panels and a 2 MVA 22/11kV transformer were installed. The laying of approximately 1.628 miles 0.1 sq. in. 11kV cable was completed but not jointed. Two 11kV Isolators were installed at Batak Rabit Road Substation.

An additional 11kV O.C.B. panel was installed at Bintang Substation, and 0.504 mile of 0.0225 sq. in. 11kV cable laid to give supply to the Federal Bungalow, Cameron Highlands. The Federal Bungalow Substation was erected by District staff.



132 kV Tower Erection — Hoisting cross-arm at Type 'DAT' Tower No. 4 Sungei Patani.

The installation of the 600 kVA 0.4/11kV and 900 kVA 0.4/11kV generator transformers at Kuala Terla and Kampong Raja Hydro-stations, respectively, at the Cameron Highlands together with the associated switchgear, cabling, local supply, and 11kV overhead interconnection with the existing H.V. reticulation was completed. The new Hydro Power Stations were commissioned.

In Ipoh, 2.634 miles of 0.2 sq. in. 11kV cable were laid and commissioned from Silibin Substation to Cowan Street Substation in order to reinforce the town distribution network.

Southern Area

Batu Pahat District. — In the Yap Tau Sah area, Kluang, a 200 kVA 6.6/0.4 kV substation was erected and 0.797 mile of 0.04 sq. in. 11kV cable laid from Kampong Majid Substation to give supply to 500 consumers. An additional H.V. switch fuse unit was installed at Kampong Majid Substation to accommodate the outgoing cable.

Johore Bahru District. — At the P.W.D. Waterworks Substation, Johore Bharu, the obsolete H.V. switchgear was replaced and a new L.V. board installed.

At Kota Tinggi, the 200 kVA 0.4/3.3kV step-up transformer in the Power Station was replaced by one of 400 kVA. The 100 kVA 3.3/0.4kV transformers in Substations Nos. 1 and 2 were replaced by transformers of 200 kVA in each substation.

The route survey for a 22kV overhead line from F.E.T.C. to Kota Tinggi was completed. The route length of the line is 10 miles.

Malacca District. — Work on the project to give supply to Kemendore Estate at Jasin was well advanced. From Jasin Town Substation to a new switching station 1.637 miles of 0.1 sq. in. 11kV cable were laid. From the switching station to the 200 kVA Kemendore Estate Substation, 1.068 miles of 0.0225 sq. in. 11kV cable were laid. The commissioning is to take place during the first week of September, 1965.

Seremban District. — In anticipation of bulk supply at Kuala Pilah, 15.162 miles of 0.06 sq. in. 11kV cable were laid from Kuala Pilah Main Substation to Bahau where a 500 kVA Substation was erected in the Power Station. This cable and Bahau Substation are to be commissioned in September, 1965.

In conjunction with the project of giving bulk supply to Kuala Pilah, 0.68 miles of 0.06 sq. in. cable was laid and additional 11kV switch fuse units installed in Bahau Road Substation.

Eastern Area

Kota Bharu District. — The preliminary route survey from Lemal to Lundang Power Stations, a distance of 14 miles, was completed. This survey is for a new additional 33kV overhead line interconnector between the Power Stations.

The 33kV 0.025 sq. in. copper conductor line from Melor to Bachok was completed. The route length is 13.25 miles.

At Lemal Power Station, work was completed on the installation of a 3.75 MVA 11/33kV transformer and associated 33 and 11kV switchgear.

Kuantan District. — The new Survey Office, Kuantan, was given supply by the construction of a new 200 kVA 6.6/0.4 kV substation.

The 350 kVA 0.4/6.6kV step-up transformer at the Kuantan Power Station was replaced by a 1,000 kVA 0.4/6.6kV transformer.

Supply was given to Kuantan Gardens Housing Estate by the construction of a 200 kVA 6.6/0.4kV substation.

In order to supply electricity to the New Istana, Pekan, a 300 kVA 11/0.4 kV sub-station was erected at the Istana and 2.04 miles of 0.0225 sq. in. 11kV cable laid from the Power Station where a 650 kVA 0.4/11kV step-up transformer was also installed.

Chapter Four. Operation: The Central Network

Generation

General

The number of units generated during 1964/65 by the thermal and hydro-electric power stations connected to the Central Network totalled 894,763,496 which represents an increase of 14.0% over the units generated for the preceding year. The maximum demand recorded was 155.4 MW which represents an increase of 17.3% over the previous year. The network load factor for the year was 65.8%. The overall thermal efficiency (sent out) was 23.4%.

The comprehensive programme of steam plant maintenance which was commenced in November 1963 continued throughout the year. All the four turbo-alternators were overhauled at Connaught Bridge Power Station.

The Cameron Highlands Hydro-Electric Scheme was completed with the final commissioning of the Kampong Raja and Kuala Terla power stations in the Upper Telom in November 1964 and January 1965 respectively. The former station has an installed capacity of 800 kW and the latter 500 kW.

Monthly inspection and routine maintenance was carried out on all the intake civil works, the Sultan Abu Bakar Dam and the Pinglet reservoir. A minor land slip on the right bank of the reservoir opposite the Habu PWD quarters was reported in April and this later developed into a land slide of about 70 feet across. Another land slide was observed to the right of the valve chamber adit but this did not constitute any danger.

A detailed inspection of the Telom tunnel was carried out in August. In view of the heavy sedimentation and 'rock-fall' at one section of the tunnel, a major outage has been planned for the removal of the sediment and repair of the tunnel in the coming October.

Connaught Bridge Power Station

A total of 381,988,090 units was generated during the year at an overall thermal efficiency of 25.0%. There was a decrease in station thermal efficiency caused by low load conditions prevailing during the rainy season when Sultan Yussuf Power Station carried the major portion of the system load.

Boilers

The routine overhaul of boilers continued throughout the year and Nos. 1, 2, 3, 4 and 6 were duly surveyed by the Inspector of Machinery and their certificates of fitness renewed.

A recurrent leak at the expansion of the middle feed inlet tube in the boiler drum of No. 7 boiler was finally cured by cropping off the end of the affected tube at the drum and welding on a short length of new tube which was then expanded in.

Internal inspections were made of Nos. 1 and 2 stacks. The lining of No. 1 stack was found to have deteriorated to a point where sections of the metal were exposed in the region of the top sixteen feet of the stack. Steps are being taken to paint the exposed metal till such time as the stack can be taken out of service for relining.

The lining of No. 2 stack was in a satisfactory condition throughout. A few peripheral and longitudinal cracks were cleaned out and filled in with a sand/Ciment Fondu mix. There was no evidence of corrosion of the metal at the bottom of the cracks.

Turbo-Alternators

The major overhaul of No. 1 Turbo-Alternator was completed in October 1964 but the set proved to be subject to vibration troubles which were not satisfactorily remedied until March 1965 when the turbine spindle and alternator rotor were rebalanced by a balancing Engineer from the manufacturers. This work delayed the replacement of the 11kV main generator cables of Nos. 2 and 3 sets but load conditions at Sultan Yussuf Power Station remained favourable and renewal of the cables was completed during April and May 1965.

The opportunity was taken during the outage in May to change the lubricating oil in No. 3 set. The change was necessary due to a deterioration of the oil in service.

The major overhaul of No. 4 Turbo-Alternator started on 21st May 1965 was completed on 10th July 1965. The blading and shrouding were found to be in good condition except for one L.P. blade (37th row) which had broken off at the root and split into two pieces. One piece was found in the bottom chamber of the 38th row of moving blades and the other piece was wedged in the stationary blading immediately after the 37th row. Fortunately, damage to the blading was very slight consisting of dents which were easily knocked out.

The whole lubricating oil charge in this set was also renewed due to deterioration of the oil in service.

The phospher bronze wearing pads of the turbine/alternator claw couplings of both Nos. 1 and 4 sets were renewed and both air coolers retubed during their respective overhauls.

Heavy sparking of the brushes on the pilot exciter commutator of No. 2 set was finally eliminated by attention to the spline drive shaft, which was running slightly out of true, and raising the centre of the exciter shaft journals to a position .005″ higher than that of the alternator rotor. These measures eliminated the vibration of the exciter shaft which was the cause of the sparking.

General

One of the major jobs undertaken and now about 80% completed has been the remaking of the gland seals of all pyrotenax cables in the station and renewal of the insulation end sleeving.

The overhaul of No. 3 circulating water pump disclosed that the lands in the pump casing for the upper efficiency ring had disappeared due to corrosion and scouring. New lands were built up by welding on to studs threaded into the casing and grinding

Malacca Power Station—Final Extension Lifting of No. 4 Boiler Steam Drum.

the weld metal to required shape and fit.

Nos. 2 and 3 oil fuel storage tanks at the Camp Road installation were completely desludged after being in continuous service since 1953. Desludging of the remaining storage tanks will be carried out as the tanks become available during the present year.

A start was made on the renewal of the flat roof weather-proofing of the station building, as there was evidence of considerable deterioration of the existing weather-proofing with multiple leaks as a result. The weather-proofing of the boiler house roof was completed in March 1965.

Malacca Power Station

During the year under review the total units generated were 144,840,760 which show an increase of about 30% over last year's total. The average overall thermal efficiency was 24.3%.

Water Supply

With the commissioning of Durian Tunggal Pumping Station in August 1965, water supply to the Station improved appreciably. Quality of water supply is now back to the former standard and rationing is no longer enforced. A new high capacity water softener plant has also been commissioned to cope with any abnormally high hardness in raw water in the future.

Turbo-Alternators

No major maintenance was undertaken on the turbo-alternators during the year under consideration.

The heat exchanger tubes of the Oil Purifier experienced considerable corrosion attack and some tubes were replaced.

An ultrasonic test was carried out for Condenser No. 2 to determine the degree of wastage of metal on condenser water boxes and to serve as a check on the effectiveness of cathodic protection.

Boilers

Annual inspection and overhauls were carried out on Boilers Nos. 1, 2 and 3. In each case it was found necessary to renew about 100 air-heater tubes at the cold end of the heater due to excessive corrosion.

Chimneys Nos. 1 and 2 were inspected during the year. The gunite surfaces were found to be in good condition.

Final Extension

The installation of one 10 MW Turbo-Alternator and the associated boiler is in progress in the station.

The boiler is in an advanced state of erection. The erection of the turbine will be commencing soon. It is hoped that the additional plant will be commissioned by the middle of next year.

General

In conjunction with the final extension of the Station, modifications to the Station bearing cooling water system will be carried out. This modification will put the bearing cooling water on an independent system from town water supply to the evaporators.

Modification work for the Station cooling water culvert intake civil work has been planned to commence in late October this year. The work will be undertaken to improve the access to the culvert for cleaning and removal of silt and marine growth and to minimise outage time for such operation.

Both the north and south culverts have been inspected during the year. The effective control through chlorination during the past year has greatly reduced the extent of marine growth in the culverts.

Routine mooring maintenance was carried out in March.

The Station 240V. battery was examined following the irregular variation of the specific gravity. This led to the discovery of discolouration and distortion of the negative group bars. Further test observations were instituted and the matter pursued with the Consultants and manufacturers in an effort to establish the cause of the deterioration.

Bungsar Power Station

The Bungsar Power Station which steamed for the last time in January 1964 ceased to exist as a station. Following the decision to utilise the Station for additional storage space for the main store, tender was called for the sale of the generating plants and ancillary equipments mainly as scrap. The process of dismantling began in October and was completed in about six months.

Sultan Yussuf Power Station (Cameron Highlands)

The Station generated 310,778,130 units during the year. Despite the very dry conditions experienced in January which had the lowest rainfall for the past 15 years, the total combined output from the various stations in the scheme exceeded average expectation.

The Station was run to the best advantage and no loss of water by spill over the dam gate occurred. It is only through the hard work and efficiency of the maintenance staff that the machine outages have been kept to a minimum especially during the wet seasons.

The Pelton wheel of No. 2 machine was inspected on 22nd October 1964 after approximately 7000 hours of running and found to be in excellent condition. The subsequent inspection on 22nd March also indicated similar condition.

The No. 3 machine was taken out of commission from the 25th to 31st January for general inspection of the Pelton wheel, spears and deflectors. Some maintenance work was carried out.

As a result of a number of failures of Hydrofit "U" rings fitted in the various water stuffing boxes and servo motor gland housings the manufacturer has subsequently supplied new sets of rings which have proved satisfactory.

The Argus and Versa Control valves used for the opening and closing circuit of the machine inlet valve show evidence of micro biological corrosion as a result of iron bacteria activities. The valves fitted to Nos. 1 and 2 machines were most affected in the early days of commissioning. Tests are being carried out to decide the necessity of installing sodium hypochlorite injection equipment. Apart from the effect of iron bacteria, the valve design was found unsatisfactory. The manufacturer has agreed to modify all Argus valves. The Versa valves have been modified on site.

On 12th July, the load on No. 2 machine suddenly dropped from 12 MW to zero and the governor failed to respond to speeder motor control. The fault was traced to the break-up of the ball spacer cage in the Pendulum bearing which in turn caused damage to a set of gear wheels in the governor head. The break-up was caused by the bearing stop plate rubbing on the cage. The spare governor head was installed. Inspections and modification of the stop plates were carried out on other machines to prevent similar occurrence.

No. 4 machine tripped out on the 27th August while carrying a load of 16 MW. Failure was traced to the governor no-load running device adjustment screw being forced out of its split housing. The housings on other machines were modified accordingly.

The pressure reducing valves which supply low pressure water (at 180 psi) to the transformer fire fighting emulsifier unit are far from satisfactory despite the fitting of new type pilot valves supplied by the makers. Arrangements are now underway to replace the pressure reducing valves and to provide a small independent draw-off for the air conditioner cooler.

The decision to de-water the Telom Tunnel in October 1965 for the removal of sediments and the guniting of part of the tunnel rock structure will result in the shutdown of Habu Power Station and reduction in the output of Sultan Yussuf Power Station.

Habu Power Station (5.5 MW Capacity)

This Station gave fairly trouble free service throughout the year and generated a total of 36,574,100 units.

A complete inspection and overhaul was carried out on No. 2 machine in February 1965, when it was found necessary to completely realign the machine. This realign-

ment has resulted in the necessity to re-dowel the alternator drive end bearing stool, the exciter end bearing, the stator frame and the exciter stool and for this purpose suitable tapered reamers have had to be ordered. The inspection and wear measurements taken have given a good indication of spares requirements for the future.

In order to reduce the rather high stator temperatures experienced, modifications to the design of the alternator ventilation system will be carried out during the planned shutdown of this Station in October/November 1965 when the Telom Tunnel maintenance is carried out. The required branch pieces and ductings have been manufactured in our Workshop at Jor in readiness for the modification.

Robinson Falls Power Station (0.9 MW Capacity)

The total units generated by this Station for the year were 7,738,190 which represents a station load factor of 98.15%. There were short periods when the Station had to be shutdown due to complete blockage of the intake by debris and sand particularly during heavy rains immediately following a long dry spell.

The No. 3 machine was inspected and overhauled in December 1964.

Kampong Raja Power Station (0.8 MW Capacity)

This Station was first commissioned on 29th November 1964 on a manned 16-hour basis until 29th April 1965 whence it was put on unmanned automatic function after the successful commissioning of the automatic float control gear.

A total of 3,019,380 units was generated by this Station.

Kuala Terla Power Station (0.5 MW Capacity)

This Station was first commissioned on a manned basis on 4th January and was finally commissioned as a fully automatic station on 7th May 1965 when the automatic float control gear was successfully commissioned.

A total of 1,481,430 units was generated here.

Ulu Langat Power Station

Due to another dry year at the catchments the stations at Ulu Langat generated only 8,259,292 units throughout the year, which was well below average.

Routine maintenance was carried out on the plant and equipment of both stations at regular intervals throughout the year. The Lower Station machine sliprings were replaced with a new assembly, the bearings changed for spare units and during the same outage, the generator internals were cleaned of fouling debris. The Upper Station 19″ Lolo Auto-Sluice Valve was fitted with a replacement liner and overhauled. Both stations overhead cranes were dismantled, overhauled and the chains annealed and tested. Both the units were deadweight tested after re-assembly to an appropriate excess of the full working load.

Both 3.3/33kV step-up transformers were dismantled, overhauled and recharged with fresh oil during the year. A sunken trestle on the Lolo pipeline was repaired and the Kolam cleaned of fouling debris which remained from the 1963 landslip.

During the year under review a new office for the Officer-in-Charge and staff was constructed into which was incorporated a modern dispensary section to serve the needs of Board's employees and their families. A well equipped workshop housed in a new building providing also for oil storage was put into use.

Transmission

Overhead Lines

Regular patrolling of the 132kV and 66kV transmission line rentises was carried out throughout the year. Each line was patrolled on the average of once every four to six weeks. Rentis clearing was carried out on contract except through some of the large rubber estates where the estate owners maintain the rentises on behalf of the Board.

Trees considered to be a danger to the Transmission lines were felled. Trouble is being experienced with bamboo shoots. Several types of chemicals to eradicate them are being tried out at the moment.

Soil erosion around the base of the towers was experienced on the 132kV Rawang—Jor line, and the 66kV Bangi — Seremban and Seremban — Rantau lines. Bakau piling and back filling was carried out to prevent further erosion.

Wind stays were erected on many of the H pole structures on the Bachang — Muar 66kV line.

An unusual fault occurred on the 66kV C.E.P.S./Bungsar line No. 1. The outlet from a small lake had been dammed and this caused the water level to rise rapidly during the rainy season. Plants growing on floating debris came in contact with the line causing a breakdown. Immediate action was taken to lower the water level to normal.

Several faults occurring on the 66kV Rantau/Alor Gajah line were found to be caused by snakes climbing the towers and getting into contact with conductors.

Bulk supply was given to Batu Pahat by extending the 66kV transmission line from Muar in October 1964.

Substations

Routine maintenance and overhaul of all equipment in the 132kV and 66kV Substations was carried out throughout the year. Details are as follows:-

Equipment	No. of Routine Maintenance Operations	No. of Overhaul Operations
132 kV O.C.B's	13	—
66 ,, ,,	40	17
33 ,, ,,	18	36
11 ,, ,,	2	17
132 kV Transformer	15	—
66 ,, ,,	42	—
33 ,, ,,	13	—

At Segambut Substation one of the 132/33kV transformer developed a serious fault in the tap change selector switch and was repaired by the manufacturer's staff. Four new 132kV O.C.B's and two 132kV P.T.'s have been installed and commissioned in this Substation.

The 132/66 kV interbus transformer at Connaught Bridge Power Station developed oil leaks between the disconnecting chambers and the cable boxes. This was repaired by Board's staff.

The Synchronous Condensers at Rawang and Bungsar are now being maintained by the maintenance staff of C.B.P.S. The electronic circuitry of the Rawang machine is now maintained by the Senior Meters Protection and Test Engineer.

Control

Grid Control

During the year there were 7 trippings on the 132kV system. Only 2 of these were due to probable faults on the transmission lines; 4 of the trippings were caused by spurious signals being received on the carrier system whilst the other one was due to maloperation of protective gear.

The auto-reclose feature on the 132 kV line Oil Circuit Breakers has been removed since 23.11.64 as a result of malsynchronism caused by incorrect operation of this equipment.

The performance of the 132kV lines shows great reliability compared with the 66 kV lines where we had 118 operations of the arc suppression coil and 36 trippings.

The rate of tripping per hundred miles of 66 kV lines was 15 and that for the 132 kV lines was 2.

The 66kV arc suppression coil efficiency was 69.5%. The supply to a large part of Kuala Lumpur was interrupted on 4 occasions, twice due to the trippings on the 132 kV system caused by spurious signals and twice due to the total loss of all three Connaught Bridge-Bungsar feeders during thunder storms. The longest interruption lasted 15 minutes.

Regional Control (Central Area)

On the Kuala Lumpur & District 33 kV Overhead system there were a total of 325 Arc Suppression Coil operations where the fault current exceeded 20% of the coil setting and of these 227 were successfully suppressed. This gave a total of 98 outages representing a coil efficiency of 70%. The total number of 33kV OCB trippings due to permanent and transient faults were 316. Of this figure 55 were due to permanent faults which required the calling out of breakdown gangs.

Communications

The VHF and Power Line Carrier communications systems operated satisfactorily throughout the year.

Sultan Ismail Power Station

Generation

This Station gave a continuous supply to Johore Bahru District, for which it is the sole public source of electricity. It is the only Board steam station not connected to the Central Network.

The total number of 99,007,898 units generated at an average gross thermal efficiency of 24.7% represents an increase of 20.2% over the figure for the previous year. During the period under review, the demand as measured in terms of maximum peak load attained during the calendar month rose by 23.6% from 13.9 MW to 18.2 MW. Work on the first extension of the Power Station has now started.

Boilers

All major parts of the Station were operational by September 1964, but some commissioning work remained to be done. Automatic combustion control could not be established due to the occurrence of excessive fluctuation in boiler draught. After extensive research, the boiler contractors decided that the solution of the problem lay in the provision of hydraulic couplings in the induced draught fan drives. One such coupling was recently installed on Boiler 3 and has enabled the automatic combustion control gear to be commissioned on this unit. The change to smaller size burner tips improved flame stability.

To combat the excessive rate of corrosion at the 'cold' end of the air heater tubes, the boiler contractors carried out a number of modifications aimed at raising the gas leaving temperature. These measures were successful.

The insulation of the boiler roofs and casings was found to be unsatisfactory in the hottest region of the gas path. Surface temperatures were excessive and increasingly frequent; holing of the metal casing was occurring. Following recent investigations, the boiler contractors improved the design of the insulation.

The original pressure reducing valves which provide low pressure steam for auxiliary purposes were too slow in response and those subsequently provided were found to wear out rapidly. The manufacturers have agreed that these valves are incapable of satisfactory performance over the exceptionally wide throughout range. The Board's Consultants are working on the solution of the problem.

Turbo-Alternator

The loss of normal insulation resistance of the main exciter belonging to Turbo-Generator No. 3 was traced to the soldered connexions between the commutator segments and the armature bars. The affected areas were sprayed with trichloroe-thylene under pressure from a specially constructed ejector gun. After restoring the insulation Cesistance reading, the soldered joints were sprayed with Shellac varnish.

The turbine contractors have not yet completed the calibration of the alternator stator temperature indicating equipment. There are also a few other contract commitments which have yet to be completed.

Deaerator

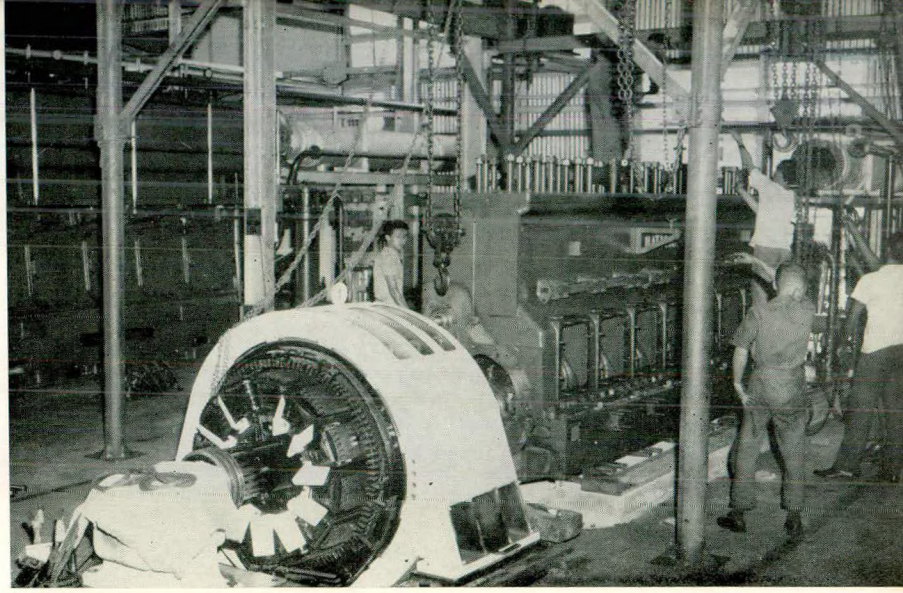
The extensive circuit modification of the shunt deaerator has brought the performance of this plant up to specification. Due to lack of space, the storage vessel is in two parts which are now connected in series, instead of in parallel as previously.

Water Treatment Plant

On the demineralit water treatment plant the nylon tubes containing control air have been found prone to bend failure almost since commissioning. It is hoped that the contractors will soon agree to replace these parts with tubes made of a more reliable material, such as traditional copper. The same contractors are also considering what steps to take about the repeated failure of the aluminium dosing meter. Two new meters wore out after only a few months in service.

Cathodic Protection

The Cathodic Protection equipment continued to effectively arrest the corrosion of iron and steel parts in contact with sea water. The satisfactory results obtained so far appear to justify the design decision to adopt this method of protection in conjunction with the employment of mild steel condenser water boxes. The performance of the equipment is under continual critical surveillance as its use has not yet found universal



Set No. 1 Taiping—National F 4408 under major overhaul.

acceptance in the industry. Overprotection of the circulating water pump casings appears to have resulted in heavy pitting of the stainless steel pump shafts. The protection currents have now been reduced and this action, together with the provision of shaft earthing brushes, is expected to eliminate this nuisance. There are indications that the platinum plating of the titanium anodes will not last for 10 years as had been hoped. With the equipment currently available, this method of protection is unlikely to succeed without the daily attention of a technician and regular supervision by a suitably experienced engineer.

General

The switchgear contractors have tentatively agreed to substitute more reliable cartridge type fuses for the under-voltage protection circuits, following inadvertent tripping traced to fuses of an inferior design.

Among the considerable work carried out by Station Staff in re-arranging DC circuits for the turbine and boiler control panels, to eliminate possible sources of malfunction, was the provision of a separate ring main supply to the solenoid operated fuel oil shut-off valves. One of these valves is provided for each boiler as a precaution against explosion.

The air compressors which provide a continuous supply to the automatic combustion control gear have required more maintenance than expected, mainly as a result of a new design employing dry-lubricated cylinders.

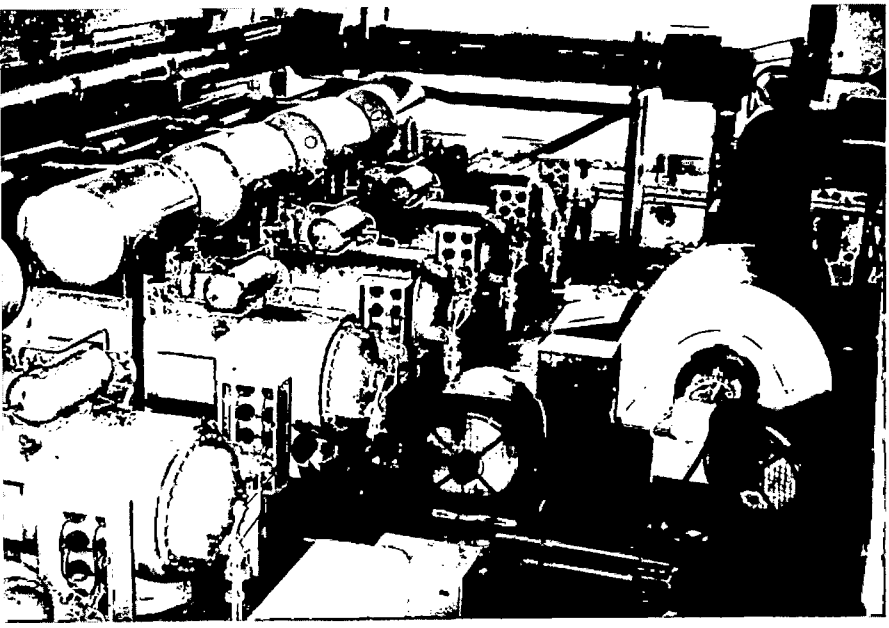
The bituminous paint originally applied to the inner soft water and surge tank surfaces failed after a comparatively short time. The tanks have now been internally shot-blasted and treated with Acalor compound.

Chlorination of the circulating water successfully discouraged the colonization of the culverts by mussels and other species of marine life.

Diesel Power Stations

Generation

At the beginning of the year under review, the total installed operative diesel plant, excluding 1530 kW of standby plant, was 43,210 kW. This was increased during the year to 45,792 kW, an increase of 6.0%.



3000 kW Free Piston Gasifyer Turbo Alternator Set (No. 1) Butterworth Power Station.

During the year 152,478,076 units were generated by Diesel stations. This represents 12.3% of the total units generated and purchased by the Board, and an increase of 11.7% over the previous year.

Taiping, Alor Star & Butterworth Power Stations.

The burning of residual fuel in engines at Taiping and Alor Star and the Free Piston Gasifyers at Butterworth continues to be economical, although the ignition delay of the fuel, which is blended from Middle East crude oil, has given trouble by burning-out exhaust valves, particularly in Alor Star. This problem is being largely overcome by deep Stelliting exhaust valves. The two 1000 kW diesel sets operating on residual fuel at Taiping continue to give excellent results, with an overall thermal efficiency of 40.5 per cent and a generation cost of 3.05 cents per unit.

At Butterworth Power Station, the Free Piston Gasifyers suffered numerous stoppages throughout the year due to fuel pump seizures, broken piston rings, overstroking, burnt prechamber injectors, leaks, and unknown causes. Extensive trials with various makes of piston rings produced no sensible results and it is now suspected that the trouble has been largely caused by unevenly worn cylinder liners, which will be replaced at the beginning of next year. Combustion problems associated with the Middle East fuel oil necessitated more trials with the fuel centrifuging plant, increased fuel pressures and temperatures, and injectors. Some progress has been made, but it is obvious that the efficient combustion of a blended fuel having a considerable ignition delay, requires constant technical supervision.

In September 1964, the two 3000 kW gas expansion turbines at Butterworth underwent major inspection. Both machines were in good condition and there was only a slight carbon build-up on all blading, after 15,000 hours operation, mostly on Sumatran fuel oil. The gear-boxes and alternators were also inspected and found to be in excellent condition.

The only serious breakdown during the year, was the fatigue failure of the crankshaft of a 1040 B.H.P. engine in Taiping Power Station. This necessitated the purchase of a new crankshaft (which was luckily obtained ex-stock in Europe), Metalock repairs to the fractured bedplate, and a new set of main bearings. The engine was out of commission for five months.

Chapter Five. Area Reports

Central Area

General

The Area continued to expand in all fields during the year under review and sales to domestic, commercial and industrial consumers showed increases of 13·1%, 18·9% and 14·0% respectively while the overall increase recorded was 14·9%. A notable feature was the boost in the sales to tin mining consumers mainly due to the prevailing high price of tin.

The major technical event in Central Area during the year was the commissioning in Kuala Lumpur of the first part of an underground oil-filled cable system operating at 33 kV. It had been realised for some time that the Kuala Lumpur load was rapidly reaching the limitations imposed by 11 kV distribution and the work of superimposing a higher voltage system to bolster the existing network, was started by Planning and Construction Department.

The demand for new supplies in the Federal Capital continued unabated throughout the year and several multi-storey buildings, notably banks, were connected to the Board's mains.

The distribution system in Kuala Lumpur underwent a radical change consequent upon the commissioning of the 33 kV oil-filled cables and the setting up of the first two 30 MVA. 33/11 kV substations at Rodger Street and Sungei Besi Road. Planning of further similar substations in other parts of the town as well as in Petaling Jaya has now reached an advanced stage.

The Consumers Section dealt with a total of 5,318 new consumers bringing the net number of consumers in Kuala Lumpur and district (excluding Petaling Jaya) to 56,080 representing an increase of 5·0% as compared to an increase of 7.4% during 1963/64. The Hiring sub-section continued to render satisfactory service tc consumers although the demand for hired apparatus, particularly ceiling fans, showed an appreciable decline. This is attributed largely to the greater affluency of consumers who prefer to purchase, rather than hire, electrical apparatus.

Kuala Lumpur District (North)

Extensive improvement schemes to roadways by the Municipality required a considerable amount of resiting work involving both the overhead and underground mains. A notable example was the complete removal of the 11 kV overhead line from Central Substation to Sentul Substation in order to facilitate the construction of a new through road from the Ipoh Road area to the town centre. Three substations previously connected to this line were also dismantled and were replaced by new substations connected to the underground system.

Improvements to the low voltage system were extensively undertaken necessitating the rehabilitation of approximately 35.7 miles of L.V. overhead mains. In addition 2,273 yards of perished services were renewed.

Consistent with normal Board policy of providing power in bulk at high voltage whenever possible, the Faculty of Medicine of the University of Malaya and the new Telecoms. Training Centre at Gurney Road were given supply at 11 kV.

The year under review witnessed a total of 12 sub-stations commissioned and the capacities of 8 substations increased while 3 substations were converted from outdoor to indoor type. Altogether an overall increase of 9,250 kVA in transformer capacity has been recorded; 3.5 miles of 11 kV cables were laid, 6.4 miles of L.V. overhead mains erected and 4.14 miles of L.V. cables laid.

Approximately 1,600 new consumers were connected.

Kuala Lumpur District (South)

The commissioning of the first part of the 33 kV oil-filled cable system enabled power taken from Segambut to be fed to two new substations in District South at Rodger Street and Sungei Besi Road. Two 15 MVA. 33/11 kV transformers were commissioned at Rodger Street and the first of two more similar units at Sungei Besi Road.

A slight slackening of the rate of building of housing estates was detected during the year but towards the end of the period under review the pace again quickened and several housing schemes were about to be completed. Electrical supplies to all new housing development were made available without any serious delays by careful forward planning and energetic execution of the construction work.

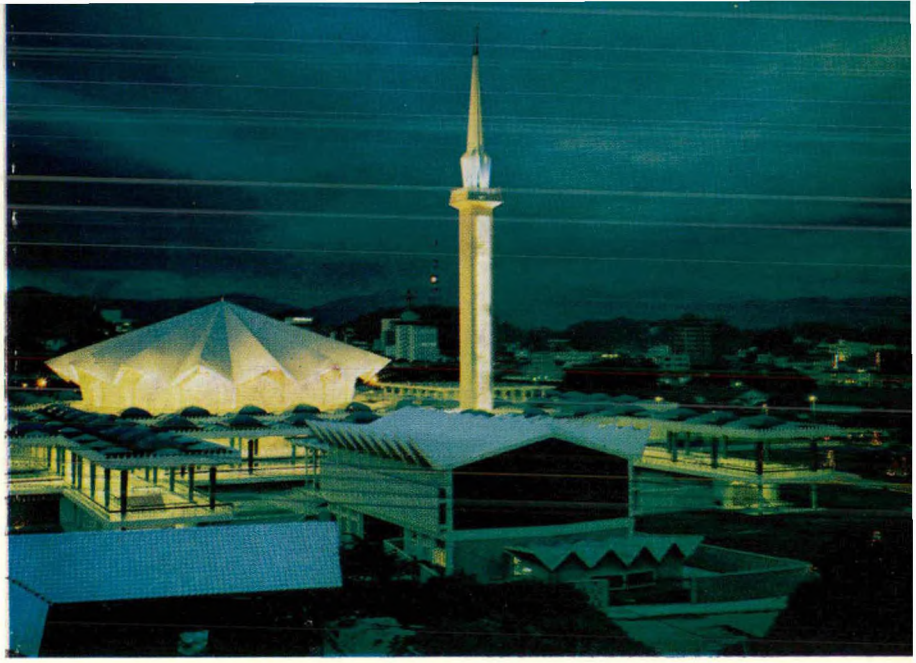
Supply to several multi-storey air-conditioned buildings occupied a fair amount of engineering time. Owing to the size of these buildings and their air-conditioning load the transformer capacity in the substations of each building had to be quite substantial, particular examples being the A.I.A. building (2 × 750 kVA), the Chartered Bank (2 × 750 kVA), the Bangkok Bank (2 × 500 kVA), the Kwong Yik Bank (1 × 1000 kVA) and the United Commercial Bank (1 × 750 kVA). The Rubber Secretariat (1 × 500 kVA) also received a supply during the year.

Altogether 22 substations with a total installed capacity of 12,900 kVA were commissioned, while the capacities of 4 substations were increased by 1,200 kVA. Approximately 5.7 miles of 11 kV cables and 7.1 miles of L.V. cables were laid and 7.4 miles of L.V. overhead mains erected during the course of the year. In addition 2,500 perished services were renewed and 750 services increased in capacity. Approximately 1,300 new consumers were connected.

Petaling Jaya

The fast rate of development of Petaling Jaya continued to be maintained with particular emphasis on housing development while a few additional factories were built. This trend is likely to continue as nearly all the land scheduled for industrial use has been taken up, while more land for housing development became available particularly in Sections 16, 14, 17, Diana Estate, Petaling Garden Phase IV, Paramount Estate and S.E.A. Housing Scheme.

In all 8 new substations with a total installed capacity of 7,500 kVA (inclusive of International Airport installations) were commissioned while the capacities of 3 sub-



Supply given to the National Mosque.

stations were increased by 700 kVA. Approximately 3.5 miles of 11kV cables and 3.0 miles of L.V. cables were laid while 5.4 miles of L.V. overhead mains were erected.

A notable feature has been the commissioning of the 11 kV bulk supply to the new International Airport.

The total number of consumers rose from 8,430 to 10,120 representing an increase of 20%. Sales increased by 10.888 million units or 19·3% over last year's figure.

The development of Petaling Jaya has reached the stage where consideration may soon have to be given to its creation as a separate district within the Area.

H.V. Distribution

The favourable price of tin accounted for an extraordinary increase in mining activities resulting in a jump in the sales of electricity with particular reference to open cast mines which showed a rise of 40.7% over the previous year while an increase of 10.4% was recorded by dredges.

Altogether fifteen new 33kV outdoor substations totalling 10,650 kVA were erected to cater for new mining supplies while the capacities of eight substations were increased by 3,550 kVA. During the same period nine mining substations totalling 7,000 kVA were dismantled owing to the cessation of mining operations. One mining consumer in the Kajang area was supplied from the 11kV system by a 750 kVA substation. The total net increase in transformer capacity was thus 7,950 kVA.

Consistent with the policy of converting non-mining 33kV outdoor substations to the 11kV underground system wherever possible, seven 33/0·4 kV and one 33/11 kV substations were dismantled and supply given from the 11kV underground network instead. Furthermore, mining operations necessitated the resiting of 5 substations.

Maintenance work on substations and the 33kV overhead mains continued effectively and the level of maintenance was improved wherever necessary. Altogether 7.2 route miles of 33kV mains and 4.5 miles of 11kV mains were rehabilitated.

Although there were no major extensions to the 33kV overhead system, supplies to new mines involved service extensions totalling 3.68 miles. Work had just commenced at the end of the year on a major extension of approximately 14 miles of 33kV lines to supply two dredges in the Kuala Langat area.

Several requests from miners for sections of the 33 kV mains to be re-sited in order to facilitate or permit mining operations were dealt with satisfactorily. Work of this nature occupied a great deal of engineering time.

Street Lighting

In Kuala Lumpur and Petaling Jaya good progress was maintained with the relighting of main roads and major road junctions. Several high intensity lighting fittings mounted on steel columns were installed. Altogether 5·5 miles of street lighting cable were laid, 1,496 new lanterns installed and 496 old lanterns dismantled. Sales of electricity for public lighting purposes were increased by 12.4% and judging from the extensive programme envisaged for the following year further improvement in sales can be expected. Use of the new hydraulic platforms coupled with some re-organisation of street lighting maintenance will provide further improvements in efficiency.

Breakdown Service

The Breakdown Section in Kuala Lumpur continued to maintain its high degree of efficient service. The replacement of all the older type of V.H.F. radio equipment with modern transistorised sets during the year improved the communication facilities. These sets were being designed for 3-channel operation to enable contact to be maintained easily between the mobile sets and the respective fixed stations located at Gombak Lane, Regional Control Bungsar as well as Klang District.

During the year the number of service calls totalled 17,964 showing a drop of 297 calls over the previous year. There were several unusually severe storms occurring during the year resulting in trees and branches falling across the mains and causing widespread disruption of electricity supplies. Repair gangs worked continuously to restore supplies and where possible temporary repairs were quickly effected to enable early resumption of supply to homes, factories and offices.

Klang District

This district achieved steady progress all round during the year. The number of consumers increased by 1086 to 11,818 while sales rose by 19·0% over the previous year. The system maximum demand increased from 6.0 MW to 7.305 MW.

Twelve new substations comprising a total capacity of 6,725 kVA were commissioned. The major development was the installation of 3 : 2.28 miles of 11kV cable from Connaught Bridge Power Station to supply the Chemical Company of Malaysia. About one mile of 11 kV cable was laid from Midlands Estate substation to provide a temporary supply to the site for constructional purposes. In addition, supply to the new Damansara Water Supply Scheme was connected by laying approximately 5.4 miles of 11kV cable and a further 6.18 miles were laid in order to connect up the new International

Airport at Subang and provide the Airport with an alternative feed to the normal intake from Petaling Jaya Bulk Substation.

Supply to Highlands Estate was given by laying approximately 1.82 miles of H.V. cable along the Langat Road. It is anticipated that this cable will be extended eventually to link up with Banting.

Erection of overhead L.V. mains totalled 4.19 miles while 1,287 overhead and 54 underground services were installed, 1,104 services renewed and 121 dismantled.

Steady progress was maintained in the street lighting section where 116 mercury-vapour and 19 filament lights were installed. Maintenance work on street lights continued satisfactorily.

Kuala Selangor

Bulk supply to Pasir Penambang and Tanjong Karang, which was inaugurated last year, was satisfactorily maintained. However bulk supply to Kuala Selangor was interrupted once during the year for several hours because of a fault on the submarine cable laid across the Sungei Selangor, brought about by the dragging anchor of a boat. The standby diesel station was run up and supply was re-established causing the minimum inconvenience to consumers. It is proposed to lay a second submarine cable across the river early next year so that faults from this cause will not have such a serious effect on the continuity of supply to the town after the dismantling of the existing diesel power station.

Two new substations of 300 kVA each were added during the year. The system maximum demand rose from 223 kW to 433 kW. The number of consumers increased by 44·0% to 926 while sales showed a substantial rise of 109·9% when compared to the previous year.

Outstations District

In general there was steady progress in outstations where a great deal of effort is concentrated on rural electrification projects. The only major development occurred in Kajang where a 2,000 kVA substation was commissioned to serve the new Radio Malaysia Overseas Transmitting Station in April 1965. To cater for this additional load installation of a 7.5 MVA. 33/11 kV transformer and ancilliary works at Kajang Main Intake Substation was in progress. Besides this notable development, a 200 kVA substation was commissioned to supply the Old Peoples Home and Rehabilitation Centre at the 11½ mile Cheras Road. Sales in Kajang increased by 24.5% but the increase in the number of consumers was only 3.3%.

Elsewhere in stations north of Kuala Lumpur, progress has likewise been fairly steady. In Rawang , L.V. mains were extended to supply fifty-four Malay low cost houses built under the auspices of the State Government.

A water supply scheme is being planned by the Government in the Ulu Selangor area and it is proposed to supply the pumps by tapping the 11kV cable feeding Batang Kali and Ulu Yam Bahru. Together with another treatment plant to be located at Kalumpang, the additional load is expected to improve considerably the sales of electricity in Kuala Kubu Bahru and Tanjong Malim where the demand is presently mainly domestic.

Northern Area

General

The year under review has been one of continued good progress, with a steady rise in sales and extension of supplies to new consumers. Growth has been most marked in Butterworth District where rural development and steady industrialisation are both going ahead at a rapid pace.

The new District of Alor Star has been fully occupied on rehabilitation work of both the distribution network and the generating plant. This work is likely to continue for some years. The generating station has been seriously affected by frequent breakdowns of the generating plant. Considerable progress has been made in overhauling the plant, but the problem is aggravated by the need to keep all the plant running during the peak load period. At the end of the year work had commenced on the installation of additional generating plant, and when this is operational, it is hoped to embark on a major overhaul programme.

There has been very little system growth in either Taiping or Ipoh. Both these stations have shown only the normal annual increases in sales and the number of consumers, but they have not been affected by any major industrial development. At Teluk Anson, a major rural extension to Utan Melintang was completed. Work has also been carried out on rehabilitation of the Teluk Anson distribution network following take-over.

Sales for the Area increased by 24.5% over the previous year. As the previous year was not a full trading year for Alor Star, Sungei Patani and Teluk Anson, the corrected percentage increase is 13.4%.

Ipoh District

The units sold in Ipoh increased by 6·6% from 48,080,251 to 51,262,809. The number of consumers rose from 22,151 to 23,375, an increase of 5·5% compared with 4.5% for the previous year. The maximum demand in Ipoh Town rose from 9,830 kW to 10,690 kW, an increase of 860 kW.

The P.P.H.E.P. Co's bulk supply to Ipoh was satisfactorily maintained throughout the year with only 8 momentary interruptions lasting about 22 minutes. At Batu Gajah there were 3 interruptions of supply lasting a total of 86 minutes.

Five new substations with a total capacity of 1500 kVA were erected and commissioned during the year. These projects involved the laying of 1334 yds. of 11 kV underground cables. Work is in progress at 2 more new substations.

Over 9.51 miles of L.V. overhead mains were erected and approximately 0·53 mile of L.V. underground mains were laid during the year. During the same period 0·84 mile of 11kV underground cable was laid.

At Sitiawan the units sold rose from 2,028,267 to 2,208,291, an increase of 8.8%. The number of consumers rose from 3,111 to 3,197, an increase of 2·8% compared with 3.3% the previous year. The power station operated efficiently throughout the year with no major breakdowns and no interruptions of supply. The maximum demand rose from 702 kW to 717 kW.

Units sold in Cameron Highlands came down by 5·9% from 3,523,402 to 3,317,412. This was largely due to the running down of military installations. However, the number of consumers in the station showed an increase of 7·9% from 1,185 to 1,279. One new substation with a capacity of 100 kVA was erected and commissioned.

At Teluk Anson (including Langkap) the units sold for the year totalled 5,956,731 compared with 2,826,426 sold for the period 1.3.64 to 31.8.64. The number of consumers rose from 5,854 to 6,228, an increase of 6·4%. The station maximum demand is 1700 kW.

There were altogether 27 interruptions of supply affecting the whole of Teluk Anson and Langkap, the longest being for 9 hours and 29 minutes on 31.12.64 New Year's eve. The remaining interruptions ranged from 1 minute to 5 hours and 33 minutes.

Altogether 4 new substations were erected during the year with a total capacity of 330 kVA. Two substations had their capacity increased by 259 kVA. A transformer of 2000 kVA capacity is being installed in the main 22/11 kV intake substation.

Butterworth District

Twenty-four new substations with a total capacity of 19,805 kVA were commissioned. Eight of these substations were constructed under rural electrification projects. The remaining substations commissioned are (a) Eastern Powder Factory — Mak Mandin Industrial Estate, (b) Malaysia Weaving Factory, (c) Paper Mill, (d) Coir Industries, (e) R.A.A.F Radar Station, (f) Southern Iron Works, (g) Bukit Panchor Government Quarters, (h) Sungei Juru Dam & Gates, (i) Jalan Sekerat, (j) Jalan Kuala Ketil, (k) Jalan Petri Intake Substation, (l) Pinang Tunggal Pumping Station, (m) Sungei Puyu (3),(n) Sungei Patani (2), (o) Bumbong Lima, and (p) Penang Glugor Power Station (2).

The 2×15 MVA transformer at Penang Power Station were energised for some months before finally the 2×33 kV submarine cables (5.79 miles and 5.77 miles respectively) and the Prai/Sungei Dua 33 kV overhead line were commissioned.

On 1st August, 1965 the 33/11 kV (2×5 MVA) stepdown substation at Sungei Dua was commissioned and put on commercial load, feeding into the Butterworth H.V. network with supplies switched off from the three 11 kV submarine cables coming from the Penang City Council Glugor substation. At the same time, the 11kV Muda River Line was converted to 33kV operation.

Following the commissioning of Sungei Dua substation, the 5 MVA 33/11kV Sungei Patani substation was energised on 6.8.65. With bulk supply being made available at Sungei Patani, the power station there has since been closed down and the diesel generators have ceased running.

The conversion of Sungei Patani 3.3kV distribution system to 11kV operation is now in hand and progressing rapidly.

The 11kV overhead mains from Maklom Tower to Muda River of 6.99 miles were converted by the Senior Construction Engineer's staff for 33 kV operation and they also carried out the construction of 6.15 miles of the overhead line from Kuala Muda to Sungei Patani.

All 11kV substation work was carried out by District staff which also arranged and supervised the laying of about 12 miles of 11kV underground cable in connection with these projects.

Almost 50 miles of L.V. overhead mains were constructed, about 40 miles being in the rural areas and the remainder for new housing estates. More than 2,650 yds. of L.V. mains were rehabilitated.

There were 34 reported outages due to faults on the Province Wellesley H.V. system. The outages were due to varying causes, such as falling trees (1), overhead faults (7), cable faults (3), vehicles (4), vermin (3) and 16 other outages due to lightning and earth faults or unknown causes, all of short duration. There were still considerable number of outages mainly on the Parit Buntar H.V. feeder due to shedding at times of trouble with Free Piston Gasifyers at Butterworth Power Station.

The combined maximum demand reached 11,644 kW in August with Sungei Patani converted to bulk supply.

The units sold in Province Wellesley for the year throughout Butterworth District increased by 42·1% from 33,950,688 units to 48,256,228.

The number of consumers increased by 10.71% from 31,990 to 35,417.

Throughout Butterworth District, 4,069 new services were erected and 1,494 services were renewed.

The respective District Councils maintained keen interest in street lighting; 102 new mercury vapour fittings and 67 filament fittings being installed, and 9 filament fittings being converted to mercury vapour.

Enquiries continue to be received from prospective firms proposing to erect factories in Province Wellesley and in most cases terms and conditions of supply, tariff rates etc. were made available to these firms.

There was no substantial progress in connecting very large industrial consumers except the Sugar Refinery at Prai, and to a smaller extent the North Malaya Paper Mill at Tasek. It is expected, however, that in the next financial year, there will be substantial increases.

The additional D.I.D. pumphouses at Bumbong Lima, Pinang Tunggal, Sungei Kreh and Pekula are expected to be in operation within the next few months.

The Penanti Quarry installation and the P.W.D. second stage pumping at Bukit Toh Allang are now in operation.

A substantial increase in load is also expected from the R.A.A.F. base in Butterworth.

A weaving factory at Bukit Mertajam is in its final stages of construction and the construction of the proposed steel mill at Prai will commence shortly.

Taiping District

The units sold in Taiping increased by 12.7% from 20,027,518 to 22,579,657. The number of consumers rose by 8·3% from 10,208 to 11,059. The maximum demand rose from 4,440 kW to 5,180 kW. These are considered to be normal growth.

An extra 1,000 kW Mirrlees KSS 6 dual fuel generating set was installed in October 1964 thus increasing the station capacity to 5.2 MW. This set has operated satisfactorily to date. There was, however, a major breakdown to the Mirrlees HFS7 set which suffered a broken crankshaft and a damaged bedplate, the set was out of commission for 5 months. Repairs to the bedplate were effected by Watt & Akkermans and a new crankshaft complete with main bearings was fitted. On completion of this set, the National F4AU8 set was stripped down for re-levelling of the foundation and

fitting of new bearings. As a result of these major jobs, the power station staff had a very tiring time and had to work constantly at nights to maintain minimum interruption of supply.

Three substations with a capacity of 125 kVA were constructed and commissioned under the Board's Rural Electrification Scheme during the year. This involved the laying of a total of 10,349 yds. of 11kV cables and construction of a total of 17,924 yds. of L.V. overhead mains. These projects will provide electricity supply to about 365 rural consumers.

The rehabilitation work of laying 623 yds. of 0.1 sq. in. 11kV cable from Taiping Consolidated Tin Substation to Stephens Road Substation and the associate switchgear installation work were completed.

At Klian Intan the units sold rose by 3·7% from 66,279 to 68,708 whilst the number of consumers rose by 0·9% from 225 to 227. Bulk supply from Messrs. Rahman Hydraulic Tin Ltd. was satisfactorily maintained throughout the year.

Alor Star District

The number of units generated in Alor Star was 16,146,761 while the maximum demand recorded was 3,611 kW. The number of units sold was 13,907,637.

The number of consumers in Alor Star increased from 12,813 to 13,800. Due to improvements to the L.V. distribution system the percentage units unaccounted for have dropped from 11·8% for the previous year to 10.3% . Due to the substantial increase in load, together with the problems associated with the present grade of fuel oil, engine trouble was experienced during the year resulting in a number of shutdowns while urgent repairs were carried out. The co-operation of consumers was requested and with this, the maximum demand on the station has been reduced and the number of failures diminished considerably.

One 50 kVA substation was commissioned, the capacity of two other substations increased by 150 kVA. Construction of four other substations is also in progress and when these are completed a further increase of 800 kVA will be expected.

At Arau/Kangar the units generated increased from 1,927,244 to 2,400,136 while the units sold increased from 1,673,943 to 2,060,695. The number of consumers increased by 3·0% from 2,025 to 2,086. The power station operated satisfactorily throughout the year and work on the foundation and installation of an additional 220kW set was in progress and 95% completed.

Work on the foundation for the 1,000 kW English Electric set to be transferred from Butterworth Power Station was completed. Work on the building and the actual physical transfer of the set commenced and completion is expected early during the coming year 1965/66. Considerable trouble was still being experienced with the fuel oil being received from the Middle East and this problem has yet to be solved.

Alor Star is due to receive bulk supply from the 132 kV grid in 1967. The reorganisation of the 11kV system has been planned and work will be carried out during the forthcoming years to enable the system to cope with the anticipated increase in load and in order that work can be carried out on sections with the minimum interruption of supply to consumers.

One new 50 kVA substation was constructed and two substations were uprated increasing the existing capacity by 150 kVA.

Southern Area

General

On 28th October, 1964, Batu Pahat town received bulk supply from the Central Network with the commissioning of the 66 kV Muar/Batu Pahat Transmission Line. The Diesel Power Station was closed down but three sets are being retained for standby purposes.

Work on the erection of the 66 kV Transmission Line from Seremban to Kuala Pilah is nearing completion and it is hoped to connect both Kuala Pilah and Bahau to the Central Network sometime in September, 1965.

During the year the rate of development of electricity supplies has increased over the previous year. Units sold increased by 17·9%, rising from 188,310,566 units to 222,680,870 units, while the number of consumers increased from 75,520 to 84,262 or an increase of 11·6% over 1963/64. The consumption of electricity for industrial consumers increased by 25.9% and for the domestic consumers by 20.6%. With the implementation of the First Malaysia Plan in 1966 and the large number of Housing Estates and factories being developed in the area, it is felt that the rate of increase will be maintained next year.

Malacca District

The general progress and development in Malacca District has been encouraging and electricity supplies were extended to a number of rural areas and housing estates including one large rubber estate (Regent Estate). About 95% of the Rural Projects under the Federal Government's Second Five Year Plan, were completed at a cost of $1.1 million.

Seventeen additional substations were erected with a total capacity of 2,055 kVA. A total of 27.5 miles of 11 kV underground cables of various sizes were laid making an increase of 20·0%. The increase of L.V. overhead mains was 40.24 miles (16·3%) and L.V. underground cables 1.97 miles (11·2%).

The total number of consumers in the district is now 35,823 as compared to 32,072 in 1963/64, an increase of 11.7%. The total units sold has also increased from 58.57 million units to 66.15 million units, giving an increase of 12·9%.

In Malacca, the total installed transformer capacity is now 16,940 kVA with a recorded maximum demand of 10.487 MW and a total sale of 46,961,130 units. Our largest consumer is still the British Commonwealth Camp at Terendak which consumed over 17.3 million units. The number of consumers has increased from 15,709 to 17,368 which gives an increase of 10·6%. About 19.02 miles of 11 kV underground cable and about 25.2 miles of overhead lines were erected to supply housing and rural projects.

At Muar, the number of consumers increased from 8,753 to 10,401 an increase of 18.8% over the previous year. The corresponding increase in sales of electricity was

Erection of L.V. mains at Sentosa Gardens a Housing Estate of Stately Bungalows at Bukit Baru, Malacca.

from 6,479,952 units to 7,380,657 units or an increase of 13.9%. A maximum demand of 2,400 kW was achieved, an increase of 350 kW over the previous year. Five new substations were commissioned during the year bringing the total substation capacity to 5,430 kVA for 31 substations. A 30 kVA Tail End Booster was installed at Kampong Tengah Jeram to regulate the poor voltage conditions there. A total of 14.4 miles of L.V. overhead mains were erected, 4 miles of overhead lines were rehabilitated and about half a mile of L.V. underground cable was laid.

At Segamat, the three 50 kW sets installed last year have been removed and sent to other stations. In their place a 310 kW set ex-Batu Pahat was installed, bringing the total generating capacity to 1,090 kW . The station's maximum demand has increased from 670 kW to 765 kW, an increase of 14·2%. In order to cater for the growing load in the town, a 150 kVA 0.4/11 kV Step-up Transformer was installed at the Power Station and connected in parallel with the existing 500 kVA 0.4/11 kV Step-up Transformer. The number of consumers increased by 195 to 2,577 or an increase of 8.2%. The total sales has also increased by 9·6%.

There is hardly any development in Gemas except for minor extensions. Hence, the increase in the number of consumers and units sold has been very small. The operation of generating sets was satisfactory and no breakdown was experienced. The maximum demand is now 320 kW.

As at Gemas, only minor extensions and maintenance work were carried out in Tangkak and Jasin during the year. The number of consumers has increased by 100 or 5.6% making a total of 1,877 consumers. The maximum demand recorded was 428 kW. The bulk supply to these two towns has been satisfactory and there have been no breakdowns.

As from the beginning of this financial year Alor Gajah has been amalgamated with Tampin. The total number of consumers now stands at 2,448 and the total substation capacity is 3,000 kVA. The total sales figure for Alor Gajah and Tampin now stands at 6.613 million units.

Supply given to the new multi storey Templer Flats, Seremban.

There were 15 Government New Villages, 3 Board's New Villages and 3 Rural Stations in Malacca District. Ten of the Government New Villages have now been rehabilitated and bulk supply given to Bukit Pasir New Village in Muar. Work on giving bulk supply to Ayer Keroh in Malacca is now in progress. The number of consumers in the Rural Stations and Board's New Villages is 1,476 and that for the Government New Villages is 1,506.

Seremban District

The rate of development in Seremban District has been well maintained throughout the year and the total number of consumers increased to 19,902, an increase of 2,368 consumers or 13.5%. The total units sold has correspondingly increased by 10.5%, bringing the present total to 45,063,622 units.

The total number of substations in commission was 131 with a total capacity of 26,362 kVA. Over 5.96 miles of 11 kV underground cables were laid during the year as well as the erection of about 17.25 miles of L.V. overhead mains.

At Seremban, the number of consumers increased from 11,685 to 13,320 and the sales of electricity increased by 12.6% to 28,645,462 units. The maximum demand increased slightly from 5.72 MW to 6.4 MW. Four new substations were erected bringing the present total number of substations to 63.

At Port Dickson, the number of consumers increased by 12.8% bringing the present total to 2,900 consumers. Sales for the year increased by 42,649 units to 13,544,420 units. Seven new substations were installed bringing the present total to 56. Work in respect of the Rural Electrification Project to supply Kampong Linggi and Pekan Linggi will be commenced shortly.

Since the takeover of Kuala Pilah from Messrs. Huttenbachs last year there has been an increase of 9.8% in the number of consumers and the present total at the end of the financial year now stands at 1,591. The annual consumption for the year was 1,358,248 units with a maximum demand of 458 kW. A fair portion of rehabilitation work in respect of the L.V. mains and five-foot way mains in this town has been carried out. The 66/11 kV Main Intake Substation at Kuala Pilah and the 66 kV Transmission Line from Seremban to Kuala Pilah is nearing completion and bulk supply is expected some time in September, 1965.

At Bahau, the number of consumers increased by 25.2% while the consumption increased by 8.8%. The 11 kV cable extension from Kuala Pilah to Bahau has been completed and bulk supply to this town will be available very soon.

There has not been much development in Kuala Klawang with the total number of consumers standing at 617. An increase of 6.8% in units sold to 345,951 units had also been recorded. At present a proposal is in hand to extend bulk supply from Kuala Klawang to Titi Village via Jelebu Estate New Village, where another 500 consumers will be connected.

The rate of progress in Rembau has continued to be very substantial and the number of consumers has increased by 31% and the annual sales by 50.5%.

Batu Pahat District

At Batu Pahat the major event of the year was the connection of this station to the Central Network on 28th October, 1964. The 66 kV bulk supply has been satisfactory, there being only 3 outages of very short duration and 3 planned shut-downs to carry out essential maintenance. The number of consumers has increased by 9.6% to 5,853 and the annual units sold has increased by 13.1% while the maximum demand has increased from 1.69 MW to 2 MW . A number of projects have been carried out in this town including laying of a new 0.1 sq. in. 11 kV cable measuring about 1.1 miles in place of the existing 0.06 sq. in. 6.6 kV cable due to road widening for the new Federal Highway and the laying of a third feeder of about 1.54 miles in length from the Main Intake Substation to Jalan Kluang No. 1 Substation. The L.V. overhead mains in the town were extended by 1.762 miles and 11 spans were rehabilitated. The street lighting has also been improved by the installation of an additional 57 HPMV lamps.

Demand for electricity at Kluang continued unabated. The number of consumers increased by 7% to 5,132 and the annual sales increased by 22.3%. The maximum demand has also increased from 3.15 MW to 3.69 MW. Two 300 kVA substations were erected and two other substations had their capacities increased. Several L.V. overhead mains extensions and rehabilitation work were also carried out during the year. At Pontian the maximum demand increased by 13.2% to 600 kW and the annual sales increased by 34%; these increases were mainly due to factory extension and the increased rate of production at the Coir Factory at Pontian Besar. The number of consumers increased by 8.2% to 2,020. One new substation was erected and about one mile of 11 kV cable was laid. The operation of the generating sets was satisfactory and there was no breakdown.

At Mersing, there were only minor extensions and normal maintenance work being carried out during the year. The number of consumers increased by 7% to 1,358 and the annual sales by 8.4%. The maximum demand now stands at 296 kW.

Johore Bahru District

Throughout the year, a satisfactory 22 kV Bulk Supply from the Sultan Ismail Power Station was maintained. Only one major failure of supply which affected the whole of Johore Bahru town for approximately 25 minutes was experienced. This failure was due to a technical fault in the power station.

The operation and maintenance of H.V. and L.V. Systems were efficiently and satisfactorily maintained and there were no major breakdowns although several outages, due to lightning, were experienced on the 22 kV Overhead Transmission Line Supply to Ulu Tiram Estate and Far East Training Centre. To reduce outages to this lightning-prone section of the Overhead System arrangements are being made to instal relays which will enable auto-reclosing of the Oil Circuit Breaker at the Tebrau Tie-In Substation.

Progress at Johore Bahru was most encouraging. The major event of the year was the opening of the Singapore Public Utilities Board Sultan Ismail Waterworks at Scudai on 3rd April, 1965. This waterworks is one of the Board's largest consumers and consumes over one million units per month. Numerous housing estates have also mushroomed all over Johore Bahru to cater for the growing town population.

The Johore Government two 15-storey low cost flats in the heart of the Town were also recently given supply.

H.R.H. the Sultan of Kelantan inaugurating the Lemal Power Station.

In the Tampoi Industrial Area seven new factories were connected to the system thus maintaining the good progress being carried out in the industrialisation of the town. The total number of consumers reached is 13,125, an increase of 12% over the previous year. The units sold showed an increase of 26.4% rising from 66,284,106 units to 83,798,685 units giving a corresponding increase in revenue of nearly 21.8%. The system maximum demand of 17.6 MW was recorded in May, 1965, an increase of 4.3 MW over the previous year.

On the distribution side, five new 6.6/0.4 kV substations having a total capacity of 1,100 kVA were erected and commissioned. One 22 kV substation and six 6.6 kV substations had their transformer capacities increased. The second 1.83 MVA, 22/6.6 kV transformer at Tebrau Tie-In Substation developed an internal fault in April 1965, and after having been repaired at Bungsar Workshop was re-commissioned in August 1965. A section of the 22 kV transmission line between Johore Bahru and Tebrau Waterworks was undergrounded by laying 1,500 yards of 0.15 sq. in. 22kV cable, the project being carried out by the Construction Department. A total of approximately 4.16 miles of 6.6 kV cable of various sizes were laid for supplying the new substations mentioned above and also for the replacement of undersized cables in the system.

Extensive L.V. overhead mains and underground cable extensions were carried out to cater for new Housing Development.

In order to improve the street lights in the town, 173 Mercury Vapour Lamps were installed, some of them in place of existing filament street lamps.

There was hardly any development in Kota Tinggi during the year, the total number of consumers increasing by 89 to 1,049 and the units sold rising by 11%. The capacity of the Power Station was increased to 410 kW by the installation of two additional 50 kW National Sets. The maximum demand of the Station recorded was 292 kW. The operation and maintenance of the generating sets were carried out satisfactorily and only one breakdown was experienced, resulting in a total failure of approximately 40 minutes. The H.V. system was rehabilitated and the supply voltage was uprated from 3.3 kV to 6.6 kV, the work being carried out by the Construction Department with the assistance of the District staff. Rehabilitation of L.V. mains was also carried out in order to improve low voltage conditions in some areas outside the town. With the rehabilitation of both the H.V. and L.V. distribution systems it is expected that the high percentage of units unaccounted for at this station would improve considerably.

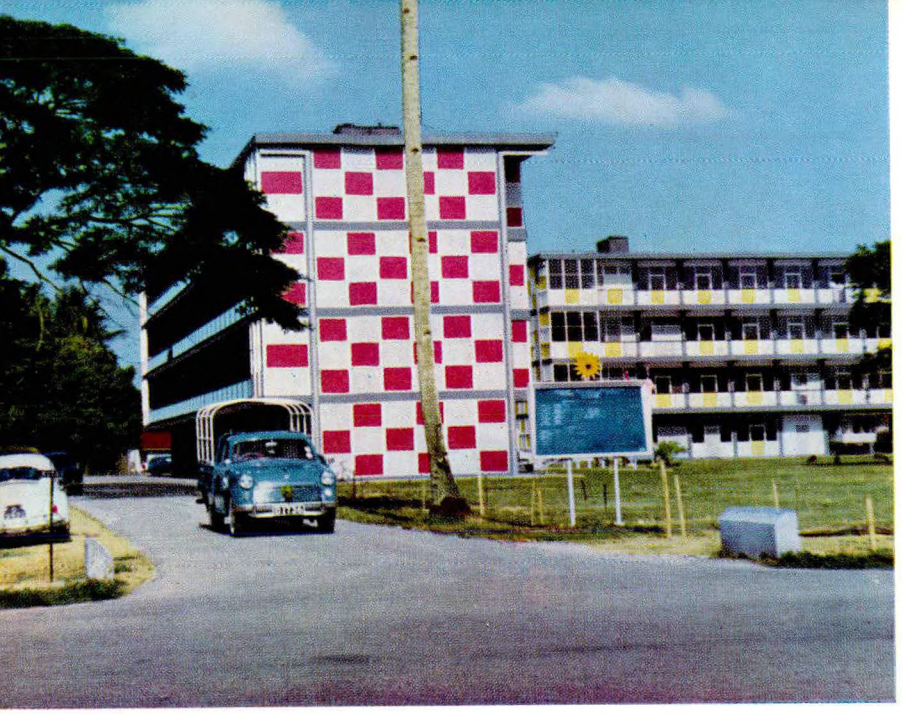
The operation and maintenance of the nine New Villages and three Rural Stations in the District has been satisfactorily carried out. The work of rehabilitating the New Village Stations had been completed with the exception of two villages where completion is expected next year.

Eastern Area

General

The most notable feature was the formal opening of Lemal Power Station by His Royal Highness the Sultan of Kelantan on 19th April, 1965.

During the year under review the results achieved in Eastern Area were satisfactory with sales of electricity continuing to increase at approximately the same rate as last year. The units sold increased by 13.7% to 41,404,964 units whilst the number of consumers rose by 10% to 41,782.



Supply given to the Federal Office Building in Kota Bahru.

The consumption of electricity for domestic purpose increased by 9.3% compared with 15.2% used by all other types of consumers.

There was steady progress in supplies to rural areas, particularly in Kota Bharu District where much of the effort was concentrated.

The high standard of diesel stations maintenance resulted in fairly good operating conditions throughout the year.

Kota Bharu District

Progress in Kota Bharu again was most encouraging and the Maximum Demand increased from 4251 kW to 4760 kW, an increase of about 12%. The units sold rose by 21.1% to 18,197,520 with an increase in the number of consumers by 14.4% to 18,613.

The station load factor for the year was 52.6%, this being mainly due to the increase in consumption by the D.I.D. Pumping Stations. Their recorded consumption was 2,151,526 units during 1964/65 representing an increase of 39.8% over the previous year's figure of 1,538,936. Steady progress was being made towards improving the reliability of supply to the H.V. overhead lines which have a total route length of over 97 miles.

The main causes of outages were due to lightning, flying foxes, falling tree branches and wires being thrown over the lines.

Following the extension of 13.6 miles of 33 kV line, supply was given to Jelewat and Bachok. Two substations had been planned for connection to this line for supplying Pauh Lima and Gunong.

In Kota Bharu Town two new substations were erected and commissioned with a total capacity of 500 kVA. These projects involved the laying of 2.247 miles of H.V. underground cable. In addition, the transformer capacities in two substations were changed resulting in a net increase of 550 kVA.

At Lemal Power Station a 3 MW set with 3750 kVA 11/33 kV transformer and associated switchgear were commissioned and the diesel station at Kota Bharu continued to supply the town only over peak.

Several street lighting projects were carried out, of these the most prominent being the lighting of the new Sungei Kelantan Bridge and its two approach roads, which comprised some 172 lamps.

At Kuala Trengganu the sales rose from 4,614,682 to 5,480,245, an increase of 18.8% and the number of consumers from 5,312, to 6,016, the latter representing a rise of 13.3%.

The Maximum Demand was 1700 kW compared with 1490 kW in the previous year.

The transformer capacity in one substation was increased by 50 kVA and the distribution system extended by approximately 6.7 miles of L.V. overhead mains.

Development at Dungun was slow but steady, the units increasing by 3.1% from 1,076,307 to 1,109,261. There was a modest increase in the number of consumers from 1,822 to 1,900 by 4.3%.

Street Lighting at the New Sungei Kelantan Bridge — The Sultan Yahya Bridge.

The Maximum Demand rose from 409 to 434 kW. A 100 kW generating set was commissioned to cope with the increased demand. Additions and reinforcement of L.V. overhead mains was continued.

Kuantan District

Unit sales in Kuantan increased from 4,937,618 to 5,720,908 an increase of 16%, and the number of consumers rose from 3,973 to 4,287 by 7.9%. The increase in sales was mainly due to the consumption at the new Survey Office and increased production of metal in the P.W.D. Quarry.

The H.V. distribution network was extended by 2,125 yards and the L.V. by 6,460 yards.

Over 2,050 yards of L.V. mains were rehabilitated.

Two new substations of 200 kVA capacity each were commissioned and one substation had its capacity increased from 25 to 100 kVA. The step-up transformer capacity of the station also was increased from 1,700 to 2,350 kVA.

The generating sets operated satisfactorily apart from one major breakdown on one of the generating sets. No load shedding was necessary.

At Pekan the number of consumers increased by 10.1% from 796 to 875 and sales by 17.4%.

The generating capacity of this station was increased from 350 to 675 kW in order to cater for the new Istana Sultan Abu Bakar. It was also necessary to provide a 11 kV distribution system to supply the Istana which involved the installation of a 650 kVA step-up transformer at the power station, a 300 kVA indoor substation at the Istana and laying of approximately 3,250 yards of 11 kV underground cable.

The introduction of this H.V. system will enable the supply in Pekan to be improved by erecting substations in main load centres which are now fed by L.V. mains direct from the power station.

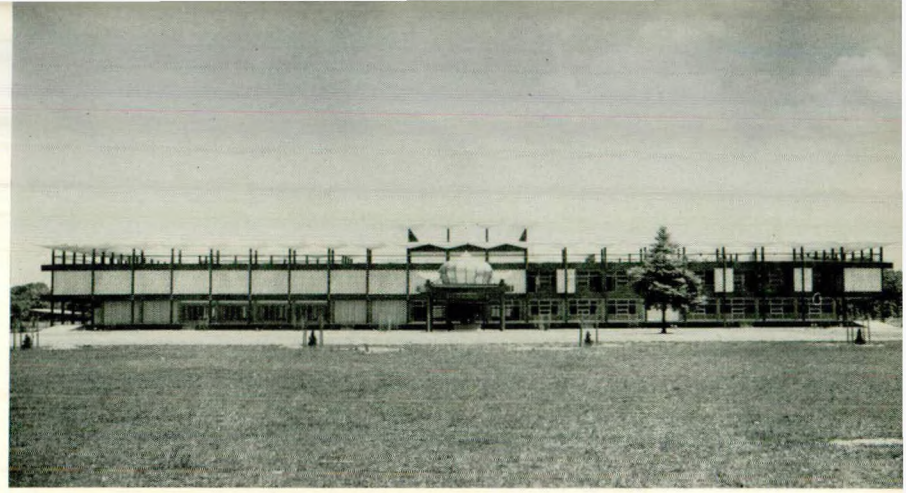
At Kemaman the number of consumers increased by 4.4% from 1,283 to 1,340 and sales by 5.5% from 647,212, to 682,724.

There was a slight increase in the station Maximum Demand from 264 during 1963/64 to 270 kW.

A 30 kVA L.V. booster was installed and the L.V. mains reinforced by some 1,400 yards in order to improve the voltage.

Raub–District——

There was little development in Raub during the year with a disappointing figure for the increase in units sold of 5.4% compared with 17.4% last year. The number of consumers also showed a corresponding decrease from 3.8% to 2.1%. The Hydro electric plant at Sempam continued to operate satisfactorily throughout the year and the diesel sets in Raub Power Station were run up only when maintenance work was carried out on the H.V. overhead line between Sempam and Raub or the electrical plant at Sempam.



Supply given to the Istana Sultan Abu Bakar, Pekan.

Rehabilitation of L.V. overhead mains in Bukit Koman and Sg. Lui was still in progress. No major installation or construction work was carried out. A total of 367 services were renewed.

At Bentong an extension was made to the power station to accomodate an additional 500 kVA set. The sales increased by 5% from 2,172,274 to 2,280,302 and the number of consumers by 3.1%, the figure at 31.8.65 being 2,601.

Development at Mentakab/Temerloh was fairly steady. Unit sales increased by 12.6% and the number of consumers 4%.

A new 40 kVA pole mounted substation was erected to supply a low cost housing estate whilst the capacity at Batu Lima Camp was increased from 200 to 300 kVA.

At Kuala Lipis the sales increased by 12.5% from 5.4% during the previous year and the consumers went up by 4% against 3.4% in 1963/64.

At Fraser's Hill the number of consumers decreased by 2.2% to 180 but the sales of electricity showed an increase of 5.5% compared with 24.6% last year.

Chapter Six. Rural Electrification

THIS financial year marks the last phase of the Board's Five-Year Rural Electrification Programme under the Federal Government Second Five Year Development Plan 1961/65. The Board has made considerable progress during this period in connecting more villages and rural townships to the Board's Networks; of particular interest was the bulk supply to Pasir Puteh, a fairly sizeable township in Kelantan, which was officially inaugurated by the Hon'ble Deputy Prime Minister, Tun Abdul Razak, in November 1964.

During the year 75 villages have been given supply, whilst 65 more villages are expected to be connected in the early part of 1965/66 which will mean that altogether 422 villages will have received supply under the Second Five Year Development Plan at a total cost of approximately $16 million of which the Government has contributed approximately $12 million, the National Electricity Board $3.5 million and Kinta Electrical Distribution $0.5 million.

The Deputy Prime Minister, Tun Abdul Razak inaugurating electricity supply to Pasir Puteh, Kelantan.

A Rural Scheme — 50 kVA Pole Mounted sub-station at Pantai Kundor with a typical Kampong house in the back-ground.

Early in the year, the Board prepared and submitted to Government its proposals for the First Malaysia Plan 1966/70 which included a large number of rural electrification schemes costing approximately $16 million and covering 343 villages in the States of Malaya.

The rehabilitation of Government New Village supplies continued as planned and 36 Government New Village installations were converted to standard type rural stations, leaving only 14 to be completed in 1965/66.

By the end of the financial year there were altogether 25 Board's rural stations, 36 Government rural stations and 7 other Government New Village installations which are still running on the old water-cooled generating sets but are not included in the Rehabilitation of Government New Village Supplies programme. The Board proposes to take over these 7 Government New Village installations and convert them to rural stations or extend bulk supply. Five sets of the old water-cooled generating plants from 4 Government New Village installations which have been converted to rural stations or given bulk supply were disposed of by public tender.

The maintenance and repairs of semi-automatic air-cooled generating sets in the Board's and Government rural stations has again been carried out on contract by a local firm.

The following list gives details of rural electrification schemes which have been completed this year and those which are still under construction:-

PERLIS — Completed — Nil
Under Construction — Nil

KEDAH	Completed — Padang Temesu, Ayer Merah, Kampong Pelau, Sungei Limau & Kampong Langgar.
PROVINCE WELLESLEY	Completed — Kampong Setol, Kg. Bukit To' Panjang, Kg. Masjid Timah, Kg. Telok, Ara Rendang, Permatang Kerai Besar, Permatang Kerai Kechil, Pokok Sena, Permatang Haji Hassan & Pokok Machang. Under Construction — Sungei Duri, Sungei Bong, Kg. Datoh, Kg. Lahar, Lahar Ikan Mati, Permatang Tiga Pinggit, Permatang Tinggi, Paya Keladi, Lahar Kapah, Kg. Setol, Permatang Panjang, Kg. Siam/ Kebun Sireh, Bukit Kebun Changkat & Permatang Rambai.
PERAK (NEB)	Completed — Simpang Empat, Selinsing, Simpang Tiga, Kg. Selinsing, Hutan Melintang, Sungei Tukang Sidin, Changkat Jering & Kg. Banggol Pasir. Under Construction — Lower Semanggol, Bukit Semanggol, Simpang Lima, Jelutong, Kg. Paya, Kg. Hujong Matang & Kg. Bengali.
PERAK (KED)	Completed — Pangkalan Pagoh B, Kg. Pisang, Kg. Kledang, Kg. Kota Lama Kanan, Kg. Sayong, Kg. Sayong Tengah, Kg. Bendang Kering, Kg. Kubang Chandong, Kg. Tanjong Glugor, Kg. Pulau Ayer Mati, Kg. Padang Changkat & Tengah, Kg. Telok Bekong, A, Kg. Telok Bekong B, Kg. Tanjong, Kg. Kota & Paloh, Kg. Jalan Kachu, Kg. Dusun Muda, Kg. Batu Melintang, Kg. Batu 1, Jalan Pahang, Kg. Batu 3, Jalan Pahang, Kg. Titi Besi, Kg. Sembilan, Kg. Batu 7 & 8, Kg. Pulau Piasang & Aji, Dusun Hulu & Hilir & Kg. Selat. Under Construction — Kg. Tanjong Aur, Kg. Paloh & Telok Manis & Lambor Kanan.
SELANGOR	Completed — Kg. Jawa, Batang Kali New Village, Kg. Mak Kota Kg. Batu Tiga (Jalan Kapar sampai Rantau Panjang), Beranang & Behrang Station. Under Construction — Kg. Bukit Changgang, Kg. Olak Limpit, Rantau Panjang, Ulu Yam Baru, Ulu Yam Lama, Batu Caves & Kg. Kuang Batu 18.
NEGERI SEMBILAN	Completed — Nill Under Construction — Batang Melaka, Pekan Linggi, Kg. Linggi, Gemencheh & Gedok.
MELAKA	Completed — Pantai Kundor/Tanah Merah, Bukit Katil, Bukit Tempayan, Paya Lubok, Gangsa Area, Paya Pumput & Kg. Cheng. Under Construction — Pernu & Umbai, Kandang, Telok Mas, Semabok, Serkam, Kg. Tanjong Pimau (dan daripada batu 21 sampai batu 21¾), Bukit Eringin/Londang, Bukit Tembakau, Berangan Enam, Tedong, Solok Pengkalan Batu, Padang Temu, Bukit Piatu Solok & Pengkalan Lanjut Lareh.
JOHOR	Completed — Simpang Jeram, Jalan Bakri, Kg. Parit Lanjut & Bukit Pasir New Village. Under Construction — Nill.
PAHANG	Completed — Nil Under Construction — Nil

TRENGGANU	Completed — Seberang Marang. Under Construction — Pulau Rusa, Kg. Alor Lintah & Jerteh.
KELANTAN	Completed — Bachok & Jelawat. Under Construction — Kg. Gunong, Pauh Lima, Kg. Perupok, Kg. Sungei/Beris Kubor Besar, Pasir Tumboh, Kusial Bahru, Kg. Pangkal Meleret & Kg. Kijang/Kedai Buloh.

List of Government New Village Installations in the Rehabilitation Programme

KEDAH	Kejai
PROVINCE WELLESLEY	Wellesley Estate.*
PERAK	Tasek, Pelawan, Batu Duabelas, Behrang Ulu, Kg. Batu Dua, Redang Panjang, Lasah, Lintang, Padang Gajah, Sungei Rotan & Sg. Kroh.
SELANGOR	Subang*
NEGERI SEMBILAN	Durian Tipus, Jelebu Estate*, Broga, Pantai.
MALACCA	Taboh Naning, Lendu, Machap Bharu, Machap Umbor, Pondok Batang, Parit Keliling & Ayer Kroh*.
JOHORE	Kg. Tengah, Bukit Siput, Kebun Bahru, Sagil, Chemek, Lam Lee, Kangkar Bharu, Bukit Batu, Sedenak, Ayer Bemban, Sengkang, Telok Sengat, Ban Foo, Saleng, Kangkar Pulai & Ulu Choh.
PAHANG	Penjom, Sungei Chetang, Kerdau, Lanchang, Sungei Dua, Bukit Tinggi, Telemong, Mengkarak, Kerayong, Manchis, Mengkuang & Kemayan.
KELANTAN	Gua Musang.

*Bulk Supply

List of Government New Village Installations to be taken over by the Board

PROVINCE WELLESLEY	Sungei Lembu
PERAK	Simpang Lima
MALACCA	Paya Mengkuang
JOHORE	Batu Anam & Jementah
PAHANG	Karak & Triang.

Chapter Seven. Headquarters Departments

Meters, Protection and Test Department

SINCE moving into new premises at Petaling Jaya last year, this Department made a great leap forward in achievements during the year under review. Amongst the substantial increases were the number of meters tested and the number of protection testing and commissioning jobs carried out. The rate of expansion in activities of this Department may be further indicated by the fact that five years ago the rate of increase of meter requirements was in the order of 15,000 single phase meters annually whereas last year the rate of increase was in the order of 40,000 meters. Shortage of Division I staff is still hampering the activities of the Department and four Division I vacancies were left unfilled for the whole year under review.

The Measurements Section is now in top gear, and with the introduction of revised methods and procedures for meter repairing and testing and with a greater amount of supervision, it can now produce an average of over 300 tested meters daily, compared to an average of 100 — 120 tested meters in previous years. The output should still be capable of increment with an addition of test personnel, however the need for this is not yet obvious. The rate of expansion in meter requirements is indicated by the fact that last year the increase of meters owned by the Board (excluding those taken over from Huttenbachs' stations) was 36,848 single phase and 1,839 three phase. This year the increases were 40,375 single phase and 854 three phase. Much of the increases have been taken up by Kuala Lumpur, Butterworth, Malacca and Ipoh Districts in that order. The Board now owns 370,831 single phase and 14,055 three phase meters. After a survey conducted about three years ago, it was decided that because of climatic conditions, transportation disturbances and consumers' load characteristics, all house service meters should be routine changed once every five years. This policy is being actively pursued and for the year under review, all Districts were served with a total of 3518 routine change notices which involved the changing of 34,385 meters. Comparative figures of meters repaired and tested for the past five years are shown in the following table:-

Year	Meters		Instruments		Meter Delivery Services Miles
	Repaired	Tested	Repaired	Tested	
1960/61	37,123	46,034	1,233	1,266	35,726
1961/62	32,605	36,133	981	1,424	35,429
1962/63	41,816	57,528	952	1,368	61,352
1963/64	36,074	55,572	1,042	1,096	56,321
1964/65	37,130	78,375	916	1,072	63,085

The Ipoh section of the Department continues to play its role effectively and was kept very busy during the year. It assisted in a number of major commissioning jobs in the Northern Area, some of which were the commissioning of the Upper Telom Hydro-Stations (Kampong Raja and Kuala Terla) the new 1020 kW. No. 5 Set at Taiping, the Penang/Butterworth 33 kV. submarine interconnection and Sungei Dua and Sungei Patani Main Intake Substations. It was also kept busy with relay maintenance and testing work at Cameron Highlands, Taiping, Butterworth and Alor Star. Monthly checking of all Large Power Consumers' installations were also regularly carried out including the maintenance of printometers at Cameron Highlands Hydro-Stations.

The Power Line Carrier Section still suffers from a lack of experienced senior staff and several Division I vacancies have not yet been filled. As a result of this some difficult problems that need extensive co-ordinated investigations could not be carried out. One such problem is noise interference in the PLC speech channels between Connaught Bridge and Sultan Yussuf Power Station.

Comparative figures of faults attended to are as follows:-

Year	H.F. Equipt.	V.F.T. Equipt.	Remote Supervisory	Tele-metering
1963/64	50	21	19	29
1964/65	29	18	14	22

The Large Power Consumers' metering section continued to be busy and carried out a programme of irregular checking of meter installations throughout the year. A step is being taken, now that staff are more experienced, to extend assistance to Districts where industrialisation is being carried out. One of these is Johore Bahru. The assistance is given so as to ensure a uniformly high standard of meter installation for the various types of industrial tariffs. Some precision metering installations have also been undertaken in Kuala Lumpur and Johore Bahru. Results for the year are 1,167 items of equipment installed as compared to last year's figure of 1,061. Some 604 items of equipment were removed against some 659 removed last year. 14 requests for installation of recording instruments were received and 12 tests made for power factor.

The Protection and Test Section besides being kept busy with commissioning work and breakdowns, is being more and more involved in testing industrial consumers' equipment where high voltage and other specialised testing are required. It is also being kept busy with type-testing of new pieces of electrical apparatus or articles according to the relevant standard specifications, so that approval may be given for their use in this country. This aspect of work is becoming more and more important as manufacturers from Europe, Australia, America, India and Japan are looking for markets here.

During the year under review, this Section was able to attend to some 45 cable faults, most of which were successfully located in less than one hour after arrival at site. Maintenance work has again lagged this year, but has not been completely neglected. Some 943 (1016) relays were tested, over 278 (293) miles of H.V. cable, 404 (302) O.C.Bs. and 490 ((393) oil samples were pressure tested, 105 (111) substations involving 108,733 (48,612) kVA of transformer capacity commissioned, 357 (280) H.V. Liquid Fuses re-

paired and 45 (58) cable faults located. (Last year's figures in brackets).

The number of consumers' L.V. O.C.Bs. tested and protection set for contractors continued to increase at 92 tested this year against last year's figure of 71. The number of specimens of new electrical equipment sent in for approval tests was 26 for the year under review. These included switches, contactors, domestic appliances, cables, fuses, etc.

Commercial Department

There was again a substantial increase in the overall sales of electricity and approximately 1,073 million units were sold representing an increase of 16.3% as compared with an increase of 14.3% for the previous year.

Statistics giving commercial details of the Board's operations are grouped together in Appendix VI.

Table	I	—	Units generated or purchased, sent out and sold.
Table	II	—	Sources of supply
Table	III	—	Daily units generated or purchased during the month of August.
Table	IV	—	Classification of sales
Table	V	—	Number of Consumers
Table	VI	—	Hire of Apparatus
Table	VII	—	Monthly output from the Board's stations and the monthly bulk purchases in 1964/65.

On the Central Network the maximum off-take from the system was 155.4 MW as compared with 132.5 MW in the previous year and occurred at 7.45 p.m. on 26th August. Typical daily load curves are shown at Appendix X and due to the absence of seasonal variations in Malaya the load curve was fairly consistent throughout the year. The annual load factor fell from 67.5% to 65.8% although the rapid increase in the maximum demand caused this figure to be lower than the daily load factor which varied between 64% and 78% during the year. In diesel stations, the annual load factor ranged from 31% to 57% whilst 40% was about the average for the majority of stations.

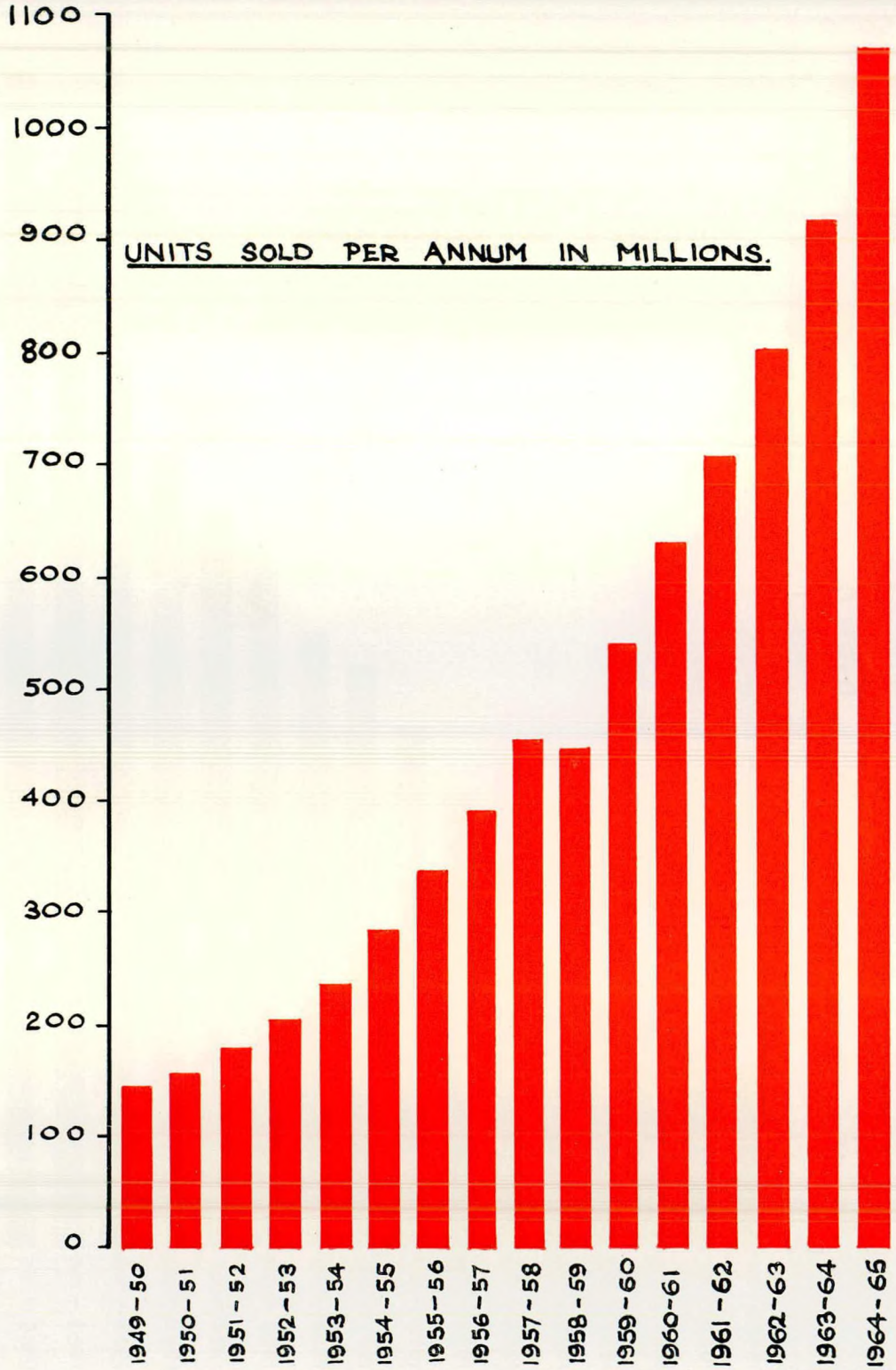
Tariffs for Central Network have now been extended further South when another diesel station, Batu Pahat, was connected to the Grid on 28.10.64.

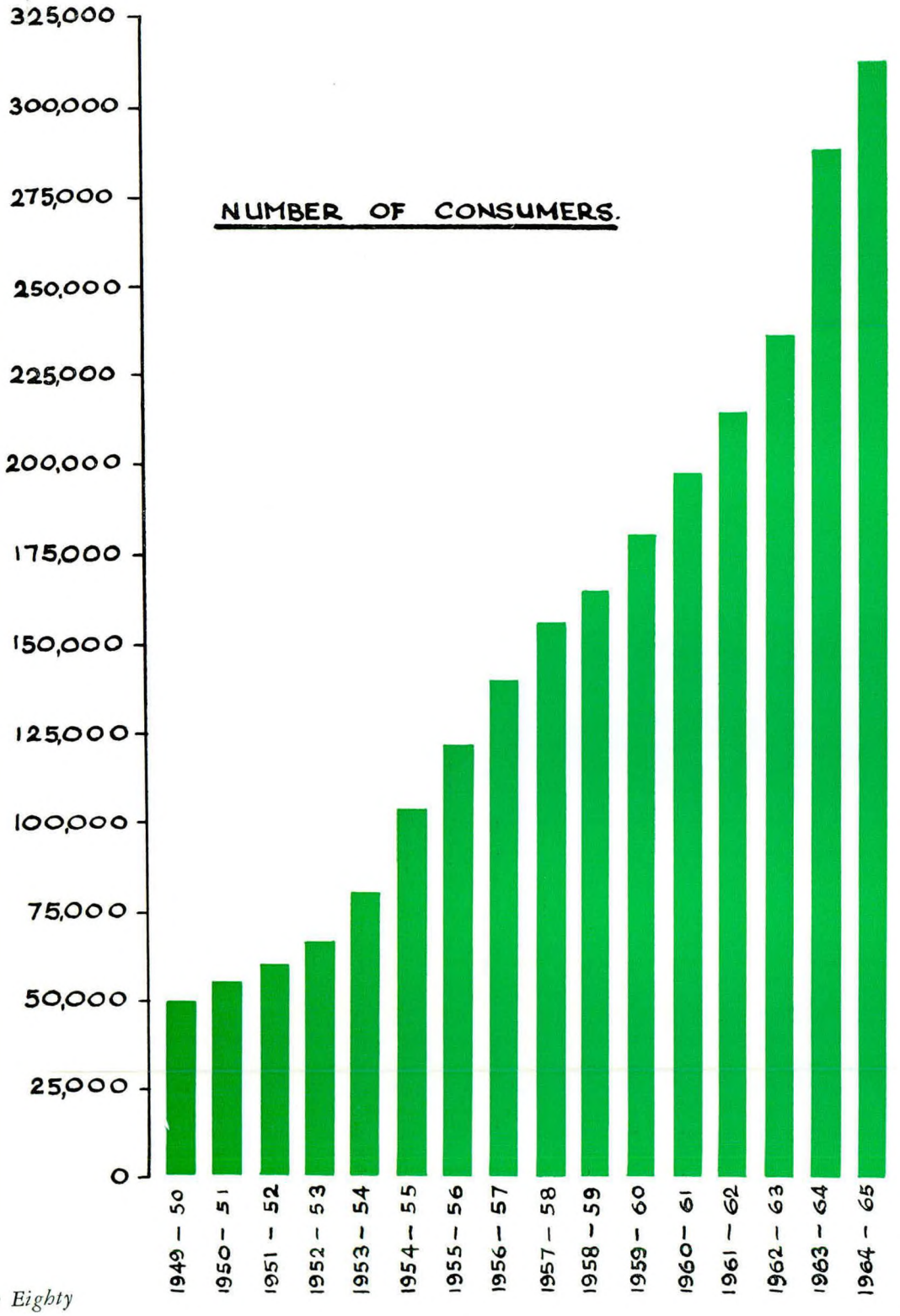
Contracts Department

The year 1964/65 was another busy year for the Contracts Department. New maintenance teams were established in Arau, Klang, Kuala Kubu Bharu, Sitiawan and Telok Anson.—However, due to staffing difficulties it was still not possible to take over Government maintenance work in all districts, particularly those in Eastern Area.

The New Works Section was extremely busy during the year. The total value of work completed during the year was $1.9 million. At the end of the year works to the value of $8.7 million were in hand.

The amount of work in the hands of the Consultants at the end of the year amounted


UNITS SOLD PER ANNUM IN MILLIONS.
1100
1000
900
800
700
600
500
400
300
200
100
0
1949-50
1950-51
1951-52
1952-53
1953-54
1954-55
1955-56
1956-57
1957-58
1958-59
1959-60
1960-61
1961-62
1962-63
1963-64
1964-65


NUMBER OF CONSUMERS.
325,000
300,000
275,000
250,000
225,000
200,000
175,000
150,000
125,000
100,000
75,000
50,000
25,000
0
1949 – 50
1950 – 51
1951 – 52
1952 – 53
1953 – 54
1954 – 55
1955 – 56
1956 – 57
1957 – 58
1958 – 59
1959 – 60
1960 – 61
1961 – 62
1962 – 63
1963 – 64
1964 – 65

The Chairman of the National Electricity Board, Dato Kurnia Jasa Osman bin Talib is seen placing a one cent coin just before laying the foundation stone of the $5 million new N.E.B. 13-storey Head Office Building in Jalan Bangsar, Kuala Lumpur on 31.7.1965. *Looking on are*: Y. M. Raja Zainal b'n Raja Sulaiman, N.E.B., Gen. Manager (standing behind the Chairman), Mr. G.R. Wheeler, N.E.B. Secretary (extreme left) and Mr. Chan Keong Hon, Board Member (extreme right).

to $11.3 million which included projects such as the Teaching Hospital and three Technical Schools in Kuantan. The National Mosque, the New International Airport and the Flying Training School at Alor Star were three of the many projects completed by Consultants during the year.

Purchasing and Contracts Department

The Purchasing and Contracts Department continued to undertake directly all purchasing and letting of contracts within the States of Malaya.

The details of the values of contracts placed locally as well as through the Crown Agents are as follows:-

(a)	Total value of orders placed with Suppliers in Malaya	27.8 million
(b)	Total value of orders placed with the Crown Agents.	19.8 million

The Board is following the policy of the Malaysian Government in purchasing locally made goods in preference to imported goods provided the tenders submitted are reasonable and the materials offered are of the required standard.

Wherever possible the Crown Agents invite tenders on an international basis for all materials ordered through them by the Board.

Architect's Department

The New Head Office Building at Bungsar is nearing completion and is scheduled to open on 26th March 1966.

Fifty one quarters for both junior and senior staff were constructed during the year under review excluding the fifth block of flats at San Peng Road for the Industrial & Manual which contains twenty four units.

A number of substation buildings has been constructed and several offices modified to provide improved working facilities for the staff.

Bungsar Workshop

During the year, a total of 4285 jobs passed through the Workshop and the amount of work handled increased by 5.5% over the previous year. The demand for transformers from Districts continued to increase; during the year 283 passed through the Transformer Shop.

As in previous years, the Fitting, machine, and Structural Sections were fully occupied, most of the work originating from Central Stores, Construction Department and Central Area. The Paintshop was kept extremely busy working overtime right through the year on the renovating of Board Motor Vehicles, domestic apparatus, furniture etc. The services of the Electrical Section were fully extended to meet the Board's demands and that of various Government Departments. Pressure of work in the Motor Vehicle Repair Section also continued unabated.

The Apprentices Training Centre was further expanded during the year. A new section for training apprentices in basic Electrical Trade was organised and put in charge of a newly appointed Electrical Instructor. A total of 25 Junior Technical Assistant Cadets and 28 Central Apprenticeship Board apprentices received training during the year.

Chapter Eight. General Administration

Change In The Name Of The Board

By an Act of Parliament which has received the Royal Assent the Central Electricity Board of the Federation of Malaya is with effect from 22nd June, 1965, now known as "LEMBAGA LETRIK NEGARA, TANAH MELAYU" or in English "THE NATIONAL ELECTRICITY BOARD OF THE STATES OF MALAYA".

Inauguration of the Setesen Janaletrik, Lemal, Pasir Mas

On 19th April, 1965, the Board was greatly honoured when His Highness the Sultan of Kelantan officially inaugurated the Board's new Power Station at Lemal before a gathering of distinguished visitors.

Assets Transferred from the Former Electricity Department

By virtue of Sections 28 and 29 of the Electricity Ordinance 1949 by which the Board was established, the undertakings of the former Electricity Department were vested in the Board. The Johore State Government has agreed to issue grants free of premium at a nominal rental with the condition that the land alienated be used for the public undertaking of the Board and purposes connected therewith and that the land shall not be alienated, charged, leased or otherwise disposed of. The Board has, as yet not been able to obtain from the State Governments other than the State Government of Johore, certificates of title to its assets in these States in an acceptable form.

The Board has made a fresh approach to the Ministry of Commerce & Industry on the whole question of transferred lands but a decision has not been reached.

The Board has, nevertheless, issued to the Central Government Ordinary Stock Certificates to the value of $30 million as compensation for transferred undertakings under Section 32 of the Electricity Ordinance.

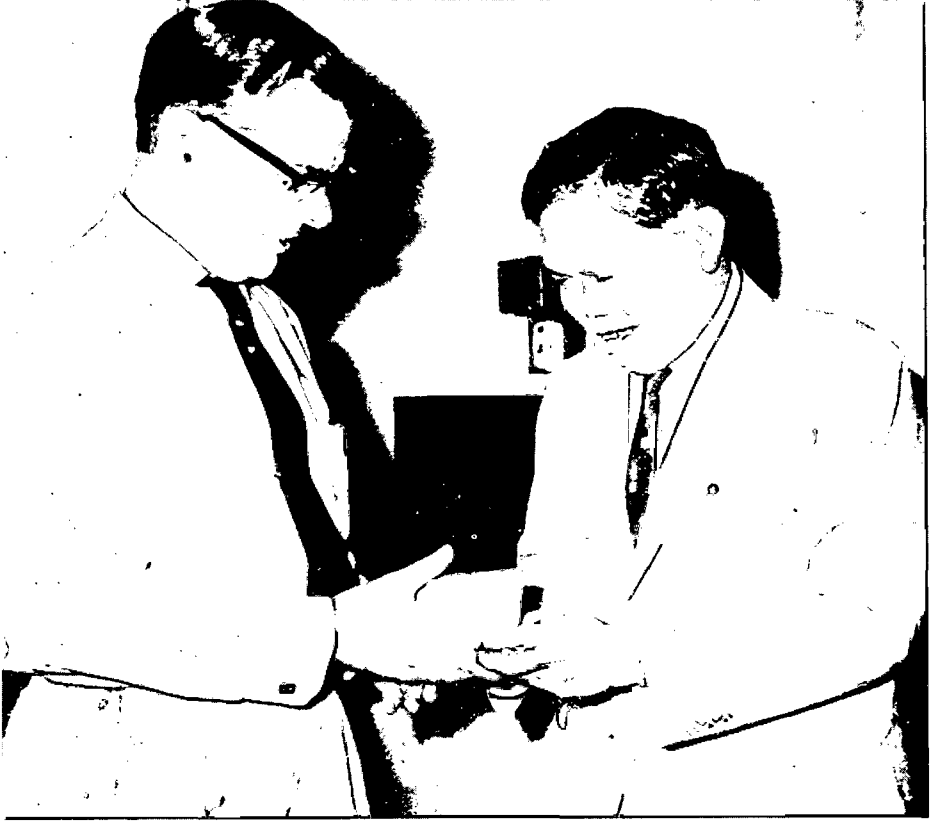
World Power Conference

The Board continued to be the Secretaries & Treasurers to the Malayan Regional Committee of the World Power Conference. The Senior Generation Engineer (Steam) attended the 14th Sectional Meeting of the World Power Conference held at Lausanne, Switzerland from 13th to 17th September, 1964. The designation of the Malayan Regional Committee was changed to the Malaysian National Committee in February, 1965.

Honours

During the year Honours were bestowed on Members of the Board as follows:-

His Majesty the Yang di-Pertuan Agong in the Malaysian Honours List, 1965,



The Chairman presenting a memento to Mr. J. H. Sumner, P.J.K. in recognition of his services in the Hydro Electric Division.

bestowed:

(a) Kesatria Mangku Negara on Mr. Chong Hon Nyan, A.M.N., a member of the Board.

(b) Kesatria Mangku Negara on Mr. Chellaturai Somasekanthan, Principal Assistant Secretary, Headquarters Office.

(c) Pingat Pangkuan Negara on Mr. Manickam Pillai Anthonisamy, Foreman of Diesel Station, Taiping.

(d) Pingat Pangkuan Negara on Encho Mohamed Salleh bin Haji Siraj, Technical Assistant, Spl. Grade (Architectural Draughtsman).

Her Majesty Queen Elizabeth II in the Queen's Birthday Honours 1965 awarded to Mr. Geoffrey Gould, M.C. a Member of the Board, the Order of the British Empire.

His Highness the Sultan of Selangor in the State Honours List, 1965:

(a) Appointed Y.M. Raja Zainal bin Raja Sulaiman, J.M.N., Deputy Chairman & General Manager of the Board to be Justice of Peace.

(b) Bestowed Setia Mahkota Selangor on Inche Chan Keong Hon, A.M.N., P.J.K., a member of the Board.

(c) Awarded the Selangor Meritorious Service Medal to Enche Lall Singh, Playing Field Supervisor, Central Area, Kuala Lumpur.

Public Relations

During the period under review the Information Officer issued over 100 Press Statements on various activities of the Board.

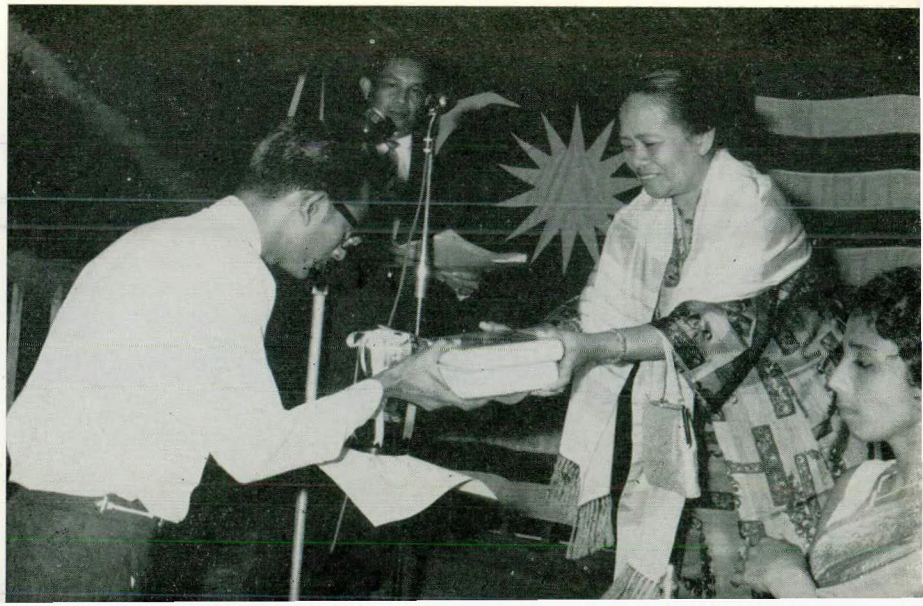
The Board has continued to receive much assistance from the Government Information Services, Radio Malaysia, Talivishen Malaysia, Filem Negara and Talivishen Singapura.

Many visitors from overseas have again visited the Board's installations particularly those associated with the Cameron Highlands and Batang Padang Hydro-electric Schemes including more than 40 ECAFE Delegates from 12 countries, a group of 14 journalists from Sabah and Sarawak and foreign journalists from several Afro-Asian countries such as the United Arab Republic and Nigeria.

National Language

The Board as part of its contribution towards the success of the National Language Month erected at its principal offices Neon signs bearing the words "Gunakan-lah Bahasa Kebangsaan". It also organised Oratory and Translation Contests in the National Language throughout the States of Malaya, the finals of which were held in Kuala Lumpur. Prizes of National Language textbooks were distributed by the Chairman of the Board to the successful contestants.

The Information Officer acted as Secretary of the National Language Month Committee and is also the Secretary to the Committee for the implementation of the National Language in the Board.



Datin Hajjah Rafeah, wife of the Chairman N.E.B. presenting away prizes for the Board's National Language Month Competition.

The Board is also organising National Language Classes throughout the States of Malaya three times a week using half an hour of the office time for such classes. Instructors for these classes work on a part-time basis and are paid a standard rate of allowance. It is estimated that the Board will incur a sum of $6,000 per month for these classes.

Festival of Books and Publications

The Board participated in the 1965 Festival of Books and Publications in the National Language held at the Dewan Bahasa dan Pustaka. Specimen forms such as bills, contract agreements, envelopes and files, commendation certificates and brochures on the Cameron Highlands Hydro-electric Scheme, the Sultan Ismail Power Station and Lemal Power Station were exhibited. The Information Officer of the Board was on the sub-committee which organised the festival.

Land Requirements

Notices under the Electricity Ordinance in respect of the Board's entry into State and alienated lands required for the 132 kV Transmission Line from Sungei Patani to Alor Star and for the 66 kV Transmission Line from Kuala Pilah to Gemas were issued during the year in addition to a number of notices for other 11 kV and 33 kV Transmission Lines. The total distance covered by these lines amounts to 114 miles. 100 sites were either leased or acquired for new Offices, Quarters, Substations and for other purposes.

Delays have been experienced in obtaining the necessary statutory consents for the Board's land requirements. As a result it has not been possible to attain the target dates for some of the Board's projects.

A comparatively small number of appeals have been lodged by land owners against the amount of compensation awarded to them by the Collectors of Land Revenue in respect of the Board's entry on their land for the purpose of constructing the transmission lines associated with the Batang Padang Hydro-Electric Scheme and the Prai Power Station. These appeals are being considered by the Statutory Authority.

The Board wishes to express its appreciation of the co-operation and assistance given by the District Officers and Collectors of Land Revenue in obtaining approval for entry on to State land and in resolving amicably a number of objections by owners to the Board's entry upon alienated lands.

Prosecutions

A number of prosecutions for offences against the Electricity Ordinance, 1949, and the Electricity Regulations, 1951, by consumers were conducted by the Police. Most common offences were theft of electricity and unauthorised wiring extensions. All of the fair prosecutions involved were successful and fines ranging from $25 to $50 were imposed.

Staff Position

The total number of personnel employed by the Board on 31st August, 1965 was 7899, an increase of 401 over the number in service on the same date in the preceding year. This represents an increase of 5.1% as compared with an increase of 9% in the number of consumers for the same period. The overall staff position is shown in the following table:

Analysis of Staff at 31st August, 1965

	Malays	Chinese	Indians	Eurasians & Others	Europeans	Total
Senior Officers Division I	36	85	66	19	45	251
Monthly Paid Technical	496	518	426	39	—	1479
Monthly Paid Non-Technical	520	437	543	59	—	1559
Industrial and Manual Group	2430	536	1589	55	—	4610
	3482	1576	2624	172	45	7899

Malayanisation

As part of its Malayanisation programme, the Board in the past few years has sent a number of students and officers overseas on academic and practical training courses. The Board has drawn up a programme for the complete Malayanisation of its undertaking by 31st December, 1967 and expatriate officers' contracts are being terminated in accordance with this programme.

Staff Training

In order to meet its future development programme the Board spent over $2,500,000 during the year to cover the cost of training of students and trainees of various grades.

Training for Senior Posts

During the course of the year, 2 Engineering and 2 Accountancy students completed their academic studies. Another 27 Engineering students were sponsored by the Board — 23 overseas and 4 at the University of Malaya, and at the end of the year the number of Board Students stood at 62.

During the period being reviewed, 24 Pupil Engineers, 1 Pupil Accountant and 1 Pupil Chemist completed their Post Graduate Training; of these, 18 were promoted to Division I Timescale 'B' posts while 1 Pupil Mechanical Maintenance Engineer was promoted to a Division I Timescale 'A' post in accordance with his Scheme of Service. Action was in hand to promote the 7 other Pupils to Timescale 'B' posts.

At the close of the year, there were 22 Pupil Engineers, 12 in the United Kingdom and 10 in Malaya, 2 Pupil Accountants, and 2 Cadets Administrative Officers, all of whom were undergoing Post Graduate Training preparatory to taking over duty posts with the Board as Fully Qualified Division I Officers. Preparations were being made to send 3 Pupil Engineers to the United Kingdom and another 2 to Sweden for further training in these countries. In addition to these Pupils and Cadets there was 1 Board Officer undergoing practical training as a Mechanical Maintenance Engineer Trainee.

3 N.E.B. pupil engineers left Kuala Lumpur Airport on 25.8.1965 for one year practical training course with various firms in United Kingdom. They are (from left) S. Dharamaraj, Mokkam Singh and Wong Hon Thang.

Administrative Staff Training

The Board sent 2 Administrative Officers to the United Kingdom for short training courses during the year under review.

Training at Technical College, Kuala Lumpur

Of the Board students at the Technical College, 10 graduated this year and were appointed as Technical Cadets for 2 years Post Graduate Training. There were 7 other Technical Cadets already in training.

Another 12 students were awarded scholarships to the College, and this brought the total number of Board sponsored students at the College to 31—12 in the first year, 7 second year, 4 third year and 8 final year.

Junior Technical Assistants Training

Candidates for training under this scheme are selected from students who have passed out from Technical Institutes and are in possession of Certificates in the Electrical or Mechanical Trades. They are trained within the Board as J.T.A. Cadets for a period of 3 years with a view to eventual promotion to supervisory posts as Junior Technical Assistants.

A total of 24 Cadets completed their training during the year and 22 new Cadets were recruited. There were 68 Cadets in training at the end of the year.

Training for Shift Engineers Posts

There were 7 Shift Engineer Trainees in training at the Board's Power Stations during the year. They will on completion of their training fill the complement for Shift Engineers at the Power Stations.

Central Apprenticeship Board Scheme

Apprentices under this scheme are trained on jobs for a period of 5 years. During the first 4 years they are allowed 2 months release each year to attend a course of training conducted by the Central Apprenticeship Board at the Industrial Training Institute. The Apprentices have to pass the prescribed examinations of the Institute before being offered employment as Tradesmen. Every opportunity is afforded to these Tradesmen for further advancement.

A total of 25 apprentices completed their apprenticeships during the year, and 28 new apprentices were recruited. There were 87 apprentices in training at the end of the year.

Other Training Schemes

The Board has various other schemes for training its Junior Staff. There were more tham 200 trainees in training under these other schemes during the year. The training periods range from 3 to 5 years.

Training for Non-National Electricity Board Personnel

The Board also provided during the year, various training facilities to personnel other than Board employees as given below:

(a) Post graduate training for private Engineering students for varying periods up to 2 years.

(b) Industrial training for 7 third year Engineering students for a period of about 5 months.

(c) Vacation training for 13 private students from the Technical College, Kuala Lumpur.

(d) Personnel from other authorities including the Sabah Electricity Board were also accepted for training for varying periods.

Long Service Award

The Board presents Long Service Awards to members of its staff who have completed 25 years meritorious service. During the year 74 members of the staff qualified for Long Service Awards which were presented to them on the occasions of the 8th and 9th, National Electricity Board Federation Sports held on 5th September, 1964 and 10th July, 1965.

Pension Scheme

On 31st August, 1965 there were 1710 members of the staff on the Pensionable Establishment, an increase of 153 during the year.

Widows' & Orphans' Provident Fund Scheme

The total number of members in this new scheme on the 31st August, 1965 was 1593, an increase of 268 members.

Staff Relations

The National Electricity Board Joint Industrial Council continued with the regular meetings in an atmosphere of cordiality and mutual helpfulness. Matters discussed and

settled included such items as Allocation of Terrace Houses for Board Staff in Petaling Jaya, increase in funds for Hire Purchase Scheme, Insurance Cover for Staff outside the scope of the Workmen's Compensation Ordinance, Leave when an officer dies in service, Amenities in Board's Holiday Bungalows, Amendments to the Rules of the Widows & Orphans Provident Fund Scheme and New Working Hours for Kuala Lumpur offices.

Meetings of the Sectional Panels of the Joint Industrial Council also continued at regular intervals throughout the year at which matters affecting the grades of staff they represent were discussed with the National Electricity Board Senior Officers Association, Junior Officers Union, Technical Services Union and the Employees Union. Matters discussed and settled included such items as Overseas Allowances, Transfer Expenses, Exemption of certain members of the staff from the Board Clerical Examination, Promotion of Telephone Operators, Allowance for Telephone Operators performing special duties, Clarification of Personnel Circular No. 305 (Out of Pocket Expenses), Allowance for Junior Machine Operators, Deferment of Increment due to failure to pass an Examination, Installation of Fans in Type V Quarters, and Payment of Overtime to Shift Staff for work on their Off Days falling on Public Holidays.

Assisted Home Ownership Scheme

The Board operates in collaboration with the Malaya Borneo Building Society an Assisted Home Ownership Scheme for its staff. Loans amounting to $532,439 were granted during the year. Since the introduction of the scheme in 1958, a total of 135 members of the staff have been granted assistance to purchase houses and loans granted so far amount to $2,266,035. The Board is greatly appreciative of the assistance given to members of the staff by the Malaya Borneo Building Society.

Medical Facilities

Whenever possible the Board seeks the assistance of private medical practitioners to provide medical treatment for its staff. The number of doctors appointed by the Board to serve the various districts rose from 29 to 30 at the end of the year. Arrangements are in hand for the appointment of Board doctors for staff at Pasir Mas and Pontian.

Social and Recreational

The Board's 5 Holiday Bungalows — 2 at Port Dickson 1 at Batu Ferringghi, Penang, and 2 at Cameron Highlands, continued to be very popular with the staff and arrangements are in hand to convert 2 more bungalows at Cameron Highlands which are now available for this purpose.

To provide recreational and social facilities for staff, 21 Kilat Clubs have been established throughout the Federation.

The Best Kept House Award introduced in 1959, continued to have a beneficial effect on the standard of upkeep of Board Quarters. In addition to the award of $50 for the best kept house, an award of $30 is made for the second best kept house. A total of 24 officers, 6 from each Area received these awards together with certificates at the 9th National Electricity Board, Federation Annual Sports Meeting.

The 8th and 9th National Electricity Board, Federation Annual Sports Meetings were held on 4th and 5th September, 1964 and 9th and 10th July, 1965, respectively. Performances showed considerable improvement and Northern Area emerged as Area Champions at both meets.

The Punch Room Supervisor, Mrs. Wee Guan Hee (standing) and her key punch operators at work.

The 4 Areas of the Board held Sports Meets at Kuala Lumpur, Ipoh, Malacca and Kota Bharu. All the districts in Northern Area and Southern Area also staged Athletic Meets.

The Ipoh Kilat Club had a very successful season in the field of sport. They established a new Perak State record for the 4 × 100 Relay with a time of 43.9 seconds at the Perak Medical Services Sports Meet, and won the same event at two other Sports Meets. The Club also became Champions with an unbeaten record in the Ipoh District Division One Football League.

Two members of the Board's staff, Inche Tan Yee Khan and Inche Ng Boon Bee of the Ipoh Kilat Club had the distinction of winning the Men's Doubles Title at the All England Badminton Championships, at the World Badminton Championships held in Glasgow and at the 2nd Malaysian Badminton Championships for the second time running.

The Kilat Club, Kuala Lumpur, retained the Stoner Shield which is the premier Cricket Award in the State of Selangor.

The Board's teams participated in the various competitions of the Government Services Welfare and Recreation Council and the teams performed creditably. At the time of writing the competitions have not yet been completed.

A number of the Board's staff were again during the year selected to represent Malaysia in Football, Hockey, Cricket, Badminton and Athletics.

Power Magazine

The Staff Magazine "Power" continued to enjoy the support of the staff and has maintained its high standard. The circulation reached 7250 copies.

Co-operative Society

The Society continued to progress during the year, the membership as at 31st August, 1965 being 2384 and the total subscription credit being $1,637,743. A number of members were allowed to withdraw 80% of their subscription credit to enable them to build their own houses.

The Society has invested a sum of $430,000 in Government loans and this includes an investment of $50,000 in the Purchase of National Defence Bonds. A sum of $202,000 has been placed as fixed deposits in various banks for the period of one year

Death Levy Fund

This Fund, established by the staff themselves, provides immediate cash relie to the widow (or nominated beneficiary) of any employee member who dies in service. During the year under review, 9 employees died and a total of $31,767 was distributed to their widows or beneficiaries. Membership of the Fund continued to increase and at 31st August, 1965 it stood at 3732 an increase of 251 over the membership on the same date in the preceding year.

Chapter Nine
Administration of the Electricity Ordinance

General

During the year under review the Electrical Inspectorate continued to operate with no increase in complement as follows:-

Chief Electrical Inspector
Senior Electrical Inspector (North)
Electrical Inspector (Central)
Electrical Inspector (South)
Electrical Inspector (East)
Assistant Electrical Inspector

As in previous years, due to the general shortage of senior staff in the Board, it was not possible to fill the above complement in full and throughout the year the Inspectorate had to function with one Inspector short.

In addition, as a result of various promotions and transfer brought about by the Board's Malayanisation Policy, a series of changes in the holders of practically all the above posts took place during the year. The only exception is the Electrical Inspector (South) who in consequence has been able to consolidate his newly established office in Johore Bahru.

The changes mentioned above, unavoidable though they may be, did to a certain extent affect the smooth functioning of the Inspectorate and this is reflected in the marked decrease in the number of inspections carried out as compared with past years.

Inspection of Installations

The number of installations inspected during the year was 156, compared to 268 during the previous year. The details are as follows:-

Registered Installations	92
Unregistered Installations	16
Public Licences	38
Private Licences	10
TOTAL:	156

Registered Installations

The total number of installations with generating plant over 10 kW in capacity registered at the end of the financial year was 648. Of this 91 were registered during the financial year while over the same period 50 installations had their registration cancelled on ceasing operation. In addition, there were 49 installations falling within the same category which, being Government installations, were exempted from registration.

As a result of inspections carried out on a number of these installations 29 Certificates of Registration were issued to replace provisional ones which were issued initially.

Private Licensed Installations

Five new Licences were issued during the year and seven were cancelled bringing the total number of Private Licences in operation at the end of the financial year to 117. Of this 35 were renewed during the period under review.

Public Licensed Installations

During the financial year applications to supply electricity to five villages were received. In addition there were five applications received during the previous year which were still under consideration. Of these ten applications, four were approved during the year and licences issued accordingly, one withdrew and the remaining five are still under investigation.

Six licences were cancelled during the year, two of which were taken over by the Board i.e. Kampong Langgar near Alor Star, Kedah and Behrang in Selangor. Of the other four, three were cancelled due to the inability of the operators to carry on while the other one was converted to a registered installation.

As a result of the above additions and deletions, there were altogether 137 public icences in operation as at 31.8.1965.

Registered Wiring Contractors

44 new wiring contractors were registered during the year while 27 existing ones were deleted from the register bringing the total number of wiring contractors registered at the end of the year to 429, i.e. a net increase of 17 over the previous year.

The Certificates of Registration of three wiring contractors were suspended during the year for not having suitably qualified staff to conduct the business.

Examination For Certificates Of Competency

In addition to the four centres in Kuala Lumpur, Ipoh, Johore Bahru and Kota Bharu where examinations for certificates of competency as chargemen and wiremen have in the past been conducted, two new centres at Butterworth and Kuantan were set up during the year.

Chargeman's and Wireman's examinations were conducted at the above centres throughout the year as and when sufficient applications were received, while only one examination was held in Ipoh for Certificate of Competency as an Electrical Engineer.

The details of the examinations held are given in the table below:

Examination	Total No. of Applications Received	Passed	Failed	Absent	Certificate issued without examination
Electrical Engineer 1st Grade	11	3	2	2	4
Electrical Engineer 2nd Grade	18	8	4	6	—
Chargeman	195	91	100	4	—
Removal of Restriction (Chargeman)	39	32	7	—	—
Wireman	445	201	209	35	—
Removal of Restriction (Wireman)	71	40	27	4	—
TOTAL	779	375	349	51	4

Investigation Of Accidents

A total of 67 accidents were investigated during the year, 16 of which caused the death of 16 persons and a cow. One of the accidents investigated was found to be non-electrically caused.

As in previous years, the majority of these accidents were found to be due to carelessness and faulty apparatus while the remainder were caused by unauthorised extensions and ignorance.

The Chief Electrical Inspector held further investigations on nine of the accidents in accordance with Section 80 (3) of the Electricity Ordinance 1949. In the case of two of these accidents it was found that criminal proceedings could be brought against the persons concerned and reports on the further investigations were accordingly forwarded to the Public Prosecutor for his further action.

A total of 46 fires were reported to the Electrical Inspectorate during the year out of which 15 were not investigated as it was obvious that they were not caused by electrical faults. Of the 31 fires investigated 12 were found to have been caused by electricity but fortunately none of them resulted in any serious damage.

Infringement Of The Electricity Ordinance

Details of prosecutions instituted by the Inspectorate for infringement of the Electricity Ordinance during the year are as follows:-

Prosecutions instituted during the year	—	7
Cases brought forward from previous year	—	1
Cases tried	—	3
Cases acquitted	—	1
Cases convicted	—	2
Cases carried forward to next year	—	5

Statistics

The Inspectorate kept statistics of monthly units generated in the Malayan States by supply authorities and private installations, as well as the units used for various purposes. This information was submitted monthly to the Chief Statistician (Malaysia), Department of Statistics, Kuala Lumpur.

Similar information together with other statistics required was also supplied to the Chief of the Electrical Power Section, Industry & Trade Division, Economic Commission for Asia and the Far East, Bangkok for compilation of the United Nations Year Book.

Chapter Ten. Finance And Accounts

THE accounts and associated information for the sixteenth year of the Board's operation are given in Appendix I, which contains the following statements:

Statement	1	—	Revenue Account
	2	—	Balance Sheet
	3	—	Notes on the Accounts
	4	—	Report of the Auditors
	5	—	Sales of Electricity
	6	—	Other Income
	7	—	Rechargeable Work Account
	8	—	Hire of Apparatus Account
	9	—	Operating Expenses
	10	—	Fixed Assets
	11	—	Provision for Depreciation
	12	—	Contributions from Consumers to Capital Works
	13	—	Capital Employed — Movement during the year
	14	—	Financing of Capital Requirements

Revenue Account

Total income for the year amounted to $100,418,806 and operating expenses to $70,208,274 (including depreciation of $17,296,192) leaving an operating surplus of $30,210,532. From this operating surplus of $30,210,532 there falls to be deducted interest payable amounting to $18,657,805 leaving net revenue of $11,552,727. To this net revenue of $11,552,727 should be added an amount of $460,000 set aside in 1963/64 for turnover tax and no longer required, giving an amount of $12,012,727 available for appropriation. Of this amount of $12,012,727, $10,612,727 was transferred to Capital Development Account and $1,400,000 was contributed to General Reserve.

As explained in the Annual Report for the year ended 31st August 1963, the balances as at 31st August 1963 on the Board's former capital reserves — the reserve for increased cost of replacement of fixed assets, insurance reserve and amortisation reserve—together with the balance on net revenue account as at 31st August 1963 and amounting in total to $30,346,759 were transferred on 31st August 1963 to the newly-opened Capital Development Account and these former capital reserves were then closed down. The amounts contributed to reserves during the past five years are shown in Table 1 below:

TABLE I

Contributions to Reserves (in thousands of dollars)

Reserve	Year ended 31st August				
	1961	1962	1963	1964	1965
Capital development account	—	—	8,055	5,033	10,613
Reserve for increased cost of replacement of fixed assets	2,800	4,100	—	—	—
Insurance reserve	100	100	—	—	—
Amortisation reserve	1,500	1,900	—	—	—
General reserve	1,400	1,800	800	900	1,400
TOTAL	5,800	7,900	8,855	5,933	12,013

Interest on Ordinary Stock

The Board has declared a rate of interest of 5 per cent per annum for the year ended 31st August 1965 on its ordinary stock of $87,319,000; interest amounting to $3,955,402 will be paid on 28th February 1966. This is the third year in which interest at the rate of 5 per cent per annum has been paid on ordinary stock. During each of the first thirteen years of the Board's existence it paid interest at the rate of 4 per cent per annum on its ordinary stock. Out of the ordinary stock of $87,319,000 an amount of $84,319,000 is held by the Government of Malaysia and the remaining $3,000,000 by the Government of the State of Pahang.

Financial Policy

In its 14th Annual Report for 1962/63 the Board reviewed and restated its general financial policy; this restatement is repeated here for convenient reference:

(1) The Board will fix its tariffs so that its total revenues will be sufficient to earn a return of not less than 8 per cent per annum on the average value of its net fixed assets in operation during any financial year after meeting all operating expenses, including depreciation based on historical cost.

(2) The amount so earned will be used to meet interest charges, including interest on ordinary stock, and to make contributions to Capital Development Account and to General Reserve so that the amounts contributed to reserves, together with sums set aside for depreciation provision and other internal resources, will finance a reasonable proportion of capital expenditure, a reasonable proportion to be generally regarded as not less than 40 per cent or not more than 50 per cent of capital expenditure, taking one year with another.

(3) In allocating net revenue as between the Capital Development Account and General Reserve, the Board's aim will be to maintain the General Reserve at an amount approximately equal to 10 per cent of annual income from sales, the balance of net revenue to be placed to Capital Development Account.

Sales of Electricity

Income from sales increased during the year by $13,405,560 or 15.9% to $97,829,831. The annual growth of income from sales of electricity during the past five years is indicated in Table 2 below:

TABLE 2

Income from Sales of Electricity

Year ended 31st August	Income	Increase over preceding year
	$ million	%
1961	59.610	14.3
1962	66.893	12.2
1963	75.094	12.3
1964	84.424	12.4
1965	97.830	15.9

While income increased by 15.9% over the previous year, sales of units increased by 16.8% (see Table 3 below). This resulted in a fall in income per unit sold from 9.19 cents to 9.12 cents.

TABLE 3

Units Sold and Income from Sales — Increases over Previous Year

Class of Consumer	Units sold		Income	
	Units	Increase	Amount	Increase
	million	%	$milllon	%
Domestic Light and Power	220.934	15.1	29.194	15.2
Commercial and Industrial:				
Lighting	85.823	13.0	18.321	12.3
Power	485.838	21.2	35.983	20.3
Dredges and Mines	280.480	12.2	14.332	11.4
TOTAL	1,073.075	16.8	97.830	15.9

Operating Expenses

Total operating expenses increased by $6,907,703 to $70,208,274 representing an increase of 10.9%. Operating expenses per unit sold decreased from 6.89 cents to 6.54 cents.

Generation costs rose by $1,960,318 to $30,404,378 but there was a fall in generation costs per unit sold from 3.33 cents to 3.07 cents, arising mainly from an increase in units sold from the Board's power stations from 854,756,469 units to 990,243,381 units. Fuel costs per unit sold fell by 0.15 cents from 1.57 cents to 1.42 cents. This fall was due partly to an increase in the number of units generated and sold from hydro-electric sources, namely from 283 million units to 329 million units, following the commissioning of the Cameron Highlands Hydro-Electric Scheme on 21st March 1963 (against which there are no fuel costs); it was also due in part to the favourable new fuel oil prices which came into effect from 1st December 1963 in respect of boiler fuel and from 1st September 1964 in respect of diesel fuel. The average fuel cost per unit sold from thermal stations was 1.94 cents per unit for stations using boiler fuel and 2.92 cents per unit for stations using diesel fuel. Fuel duty remained unchanged during the year at $15 per ton on boiler fuel oil and 8 cents per gallon on diesel fuel oil.

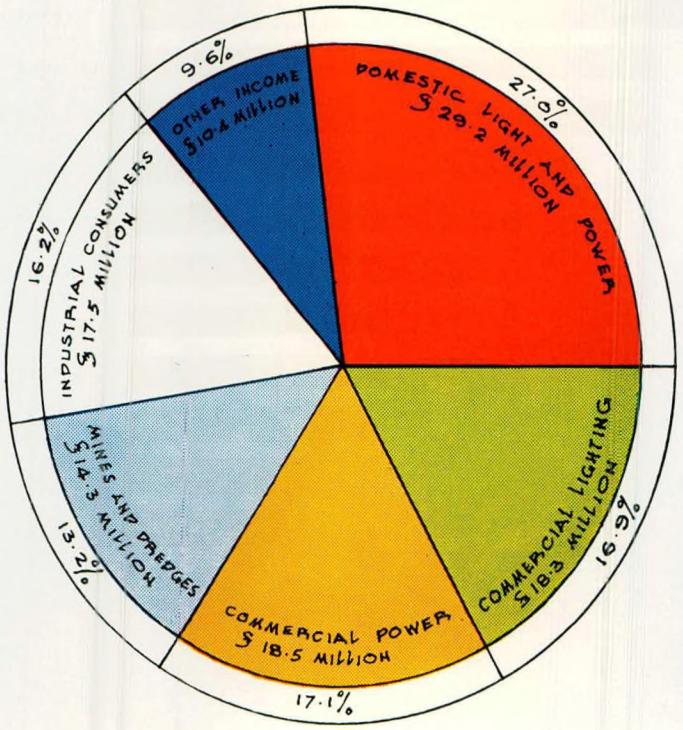
Bulk purchases of electricity rose by $870,364 to $4,277,254 following an increase in the sale of units purchased in bulk by 18,859,782 units to 82,831,616 units. As a result the cost of electricity purchased in bulk fell from 5.33 cents to 5.16 cents per unit sold.

Transmission expenses increased by $339,350 to $3,362,071 due mainly to the expansion of the transmission system to Batu Pahat and Kuala Selangor. Transmission costs per unit sold fell from 0.33 cents to 0.31 cents.

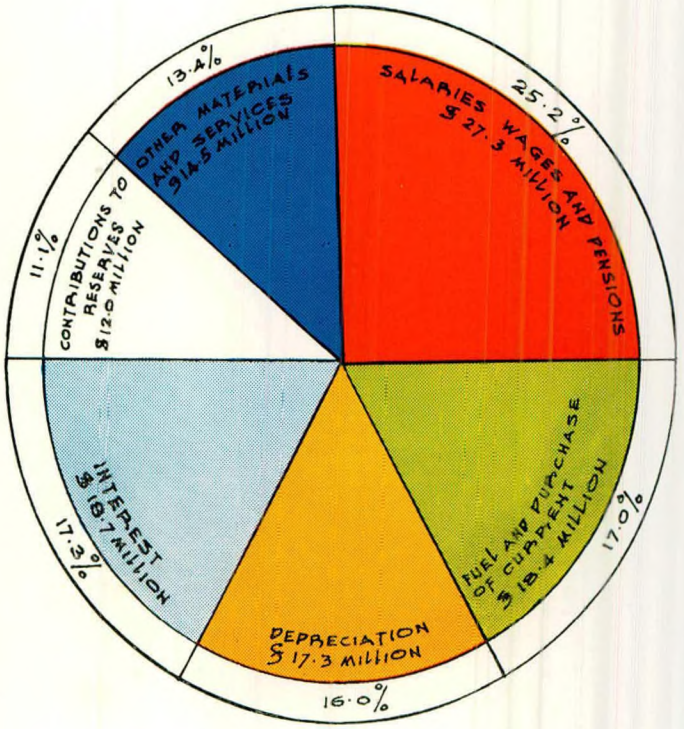
INCOME AND EXPENDITURE DIAGRAMS

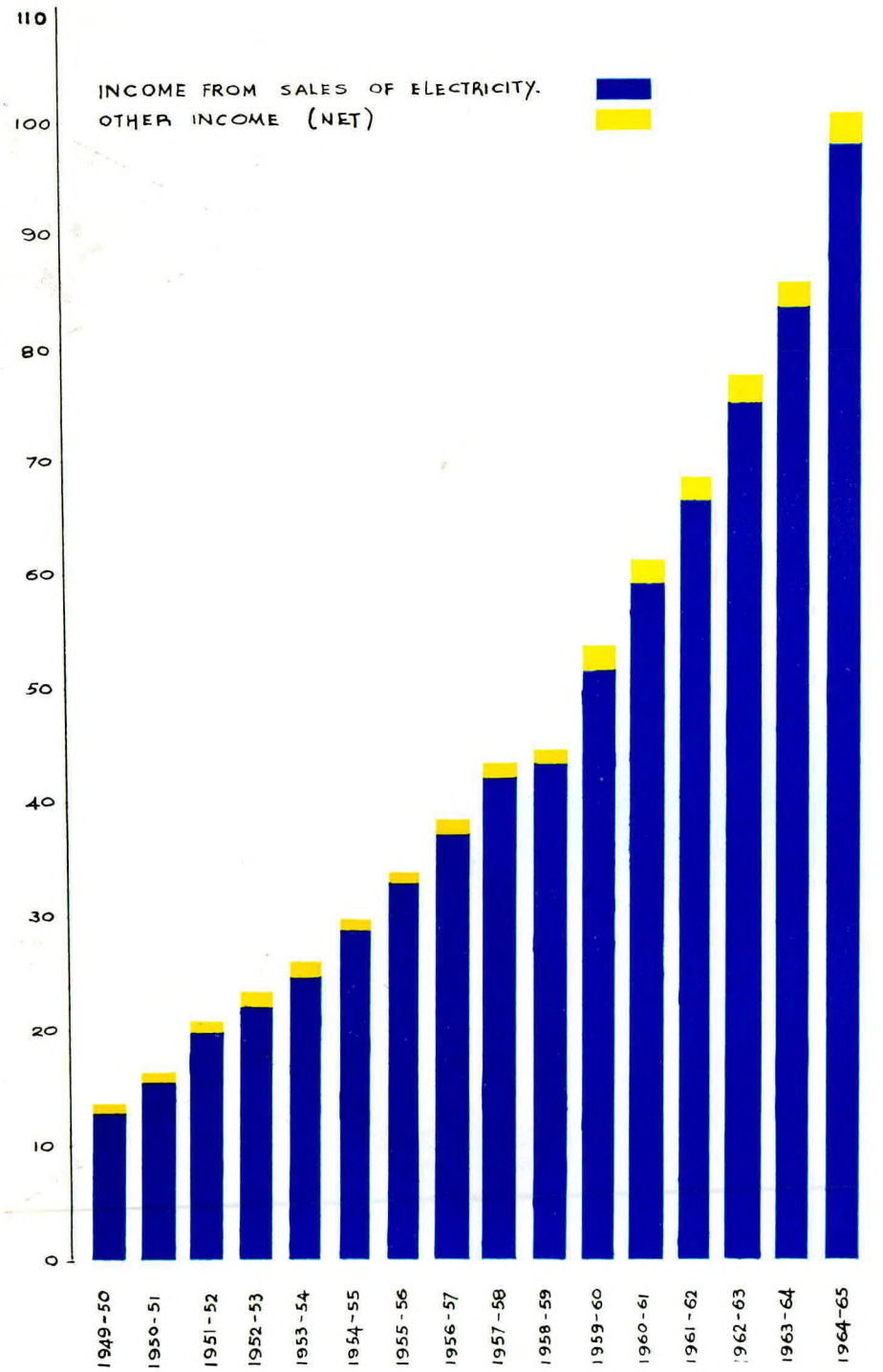
SHOWING THE RELATIVE PROPORTIONS OF THE MAIN CLASSES OF GROSS INCOME AND EXPENDITURE FOR THE YEAR 1964/65

INCOME



EXPENDITURE




INCOME FROM SALES OF ELECTRICITY.
OTHER INCOME (NET)
110
100
90
80
70
60
50
40
30
20
10
0
1949-50
1950-51
1951-52
1952-53
1953-54
1954-55
1955-56
1956-57
1957-58
1958-59
1959-60
1960-61
1961-62
1962-63
1963-64
1964-65

Distribution expenses increased by $1,307,225 to $15,371,507 due mainly to the continued extension of the distribution system. Distribution costs per unit sold fell from 1.53 cents to 1.43 cents.

The cost of consumers' service increased by $273,431 to $2,040,163 . Consumers' service costs per unit sold remained at 0.19 cents.

The expenses of meter reading, billing and collection of accounts increased by $460,834 to $3,900,386. In cost per unit sold they fell from 0.38 cents to 0.36 cents.

Training and welfare expenses increased by $649,200 to $3,150,202. Training and welfare costs per unit sold rose from 0.27 cents to 0.30 cents.

Administration expenses increased by $53,337 to $2,870,083 but expressed in cents per unit sold fell from 0.30 cents to 0.27 cents.

General expenses after apportionment to rechargeable work increased by $993,644 to $4,832,230 representing an increase in cost per unit sold from 0.42 cents to 0.45 cents.

Fixed Assets

Capital expenditure for the year, less disposals of fixed assets, amounted to $76,831,025 bringing the amount of the Board's fixed assets at cost less disposals, to $572,694,782. Of this capital expenditure of $76,831,025, an amount of $7,695,009 was incurred in respect of the first stage of the Cameron Highlands Hydro-Electric Scheme and projects cognate to the Scheme, bringing total capital expenditure to 31st August 1965 on these projects up to $150,544,080.

Expenditure of $45,011,630 was incurred in respect of the Batang Padang and Prai Power Development, which consists of the Batang Padang Hydro-Electric Scheme (the second stage of the Cameron Highlands Hydro-Electric Scheme), Prai Thermal Power Station, and associated transmission lines. Total capital expenditure up to 31st August 1965 on the Batang Padang and Prai Power Development was $74,894,156.

Depreciation for the year, less depreciation of $5,786,314 written back on assets scrapped or sold, amounted to $11,509,878 bringing the total provision for depreciation to $107,617,092 and giving the Board's fixed assets a written-down value of $465,077,690 before deduction of the balance on consumers' contribution account.

Return on Capital

As indicated in (1) of the Board's statement of financial policy quoted on page 98, the Board expects to earn a minimum annual net revenue return of 8% on its net fixed assets in operation after meeting all operating expenses including depreciation but before meeting interest payments. The net revenue return for 1964/65 was 8.9%, calculated as follows:

	As at 31st August 1964	As at 31st August 1965
	(in $ million)	(in $ million)
Fixed assets in operation	442.6	468.0
Less: Depreciation	96.1	107.6
Consumers' contributions	13.7	16.7
Net fixed assets in operation	332.8	343.7

A.	Average net fixed assets in operation during 1964/65	$338.3 million
B.	Net revenue for 1964/65 (before meeting interest payments)	$ 30.2 million
	Percentage of B to A	8.9%

Loan Arrangements

The Board is empowered to borrow money and raise capital in accordance with the provisions of Sections 17(1) and 18 of the Electricity Ordinance, 1949. The loans negotiated by the Board are set out in Table 4 below:

TABLE 4

Loans Negotiated

Lender	Amount
	Malayan $
Government of Malaysia — 5 % loan	40,000,000
6 % loan	38,000,000
5¾% loan	13,000,000
	91,000,000
International Bank for Reconstruction and Development:	
Loan 210 MA (US $28,600,000)	85,800,000
Loan 350 MA (US $51,900,000)	155,700,000
Commonwealth Development Corporation (£7,077,590)	60,668,143
Employees Provident Fund Board	10,000,000
Commonwealth Development Finance Company Limited (£500,000)	4,285,714
Overdraft facilities with Chartered Bank, Kuala Lumpur:	
Secured by Government guarantee	9,000,000
Temporary additional unsecured facilities	2,000,000
Overdraft facilities with Chase Manhattan Bank, Kuala Lumpur:	
Secured by Government guarantee	6,000,000
	424,453,857

Of the above amount of $424,453,857 the sum of $123,708,134 was undrawn as at 31st August 1965. Details of individual loans are given in Note 3 of Statement 3 Appendix I.

Ordinary Stock

The amount of ordinary stock issued increased by $15,000,000 from $72,319,000 to $87,319,000. Further details of ordinary stock are given in Note 2 of Statement 3 of Appendix I.

Financing of Cameron Highlands Hydro-Electric Scheme

The first stage of the Cameron Highlands Hydro-Electric Scheme is now estimated to cost $126 million and certain projects which are cognate to the Scheme are estimated to cost $32 million, making a total of $158 million, including $12.4 million interest capitalised during the period of construction of the Cameron Highlands Scheme (all monetary figures in this Report refer to Malayan dollars unless otherwise stated). Of this total amount of $158 million, foreign (i.e. offshore) expenditure is estimated at $86 million, including $8.3 million capitalised interest, while local expenditure is estimated at $72 million, including $4.1 million capitalised interest. To assist in the financing of the Scheme the International Bank for Reconstruction and Development is lending the Board US$28.6 million (approximately $86 million) in respect of the offshore expenditure on the Scheme and on the other capital projects cognate to the Scheme. These other capital projects include a fourth 25 MW generator at the Sultan Yussuf Power Station at Jor and extensions to the transmission and distribution systems which will enable or have already enabled the Board to close down ten diesel generating stations and also to bring supplies to areas without electricity. The loan originally arranged with the International Bank was for a sum of US$35. 6 million but by mutual agreement this amount has been reduced by US$7 million, which is not now required, to US$28.6 million.

To assist in financing local expenditure on the Scheme the Commonwealth Development Finance Company Limited lent the Board £500,000 (approximately $4.3 million) and the Government lent the Board $38 million. The Government also agreed that interest accruing on its loan up to 31st December 1963 and amounting to $4.5 million would be added to the principal amount of the loan. The balance of local expenditure on the Cameron Highlands Scheme will be financed from the Board's internal resources.

At the end of the year $83,885,651 (including $8,571,427 interest capitalised) had been drawn on the loan from the International Bank while the Commonwealth Development Finance Company loan of £500,000 and the Government loan of $38 million had both been fully drawn.

Financing of Batang Padang and Prai Power Development

The capital cost of the Batang Padang and Prai Power Development, which comprises the second stage of the Cameron Highlands Hydro-Electric Scheme, a thermal power station at Prai, and the expansion of transmission facilities designed to interconnect all the major generating stations on the west coast of Malaya, is being met out of funds provided by the International Bank and by Government. The total cost of these three projects originally estimated at $224.7 million ($155.7 offshore and $69.0 local) has now been revised to $243.7 million, of which $158.5 million is offshore expenditure and $85.2 million is local expenditure.

The International Bank is providing a loan of US$51.9 million ($155.7 million) to finance the foreign exchange element of the cost of these projects, including approximately US$4 million ($12 million) in respect of interest capitalised during the period of construction. Government is guaranteeing the International Bank loan and has agreed to subscribe to ordinary stock to the extent of $66.4 million for the purpose of meeting

he local currency element of the cost. At the end of the year $37,123,987 (including $2,181,642 interest capitalised) had been drawn on the International Bank loan.

Financing of Capital Expenditure during 1964/65

As indicated in Statement 14, capital expenditure during the year amounted to $83,961,149. Allowing for a decrease of $2,406,293 in working capital, the total capital requirements for the year amounted to $81,554,856. An amount of $28,678,809 or 35·2 per cent was financed from internal resources and $52,876,047 or 64.8 per cent from loans or from subscriptions to ordinary stock.

It may be useful to point out that the Board has, since its formation, reinvested all its contributions to reserves in the business, thereby reducing the amounts which it has had to borrow from external sources. One of the reasons for forming the Capital Development Account was to make it perfectly clear that the sums transferred to this Account are (together with the contribution to general reserve, depreciation provision and other internal resources) used to finance the Board's capital programme, i.e. they do not represent sums of money over and above that required by the Board but represent instead additional revenue which has been deliberately secured as a contribution to capital development and is available only for investment in plant and other assets.

Pensions Scheme

The Chartered Bank (Malaya) Trustee Limited is the managing trustee of the National Electricity Board Pensions Scheme, 1957. The accounts of the Pensions Scheme and associated information are given in Appendix II.

Widows and Orphans Provident Fund Scheme

The National Electricity Board Widows and Orphans Provident Fund Scheme, 1964 came into force on 1st July 1964 following the termination of the previous arrangements made with the Manufacturers Life Insurance Company of Canada. The Chartered Bank (Malaya) Trustee Limited was appointed as the managing trustee of the new Scheme. The accounts of the Scheme and associated information are given in Appendix III.

Audit

Messrs. Price Waterhouse and Company, Kuala Lumpur, were re-appointed auditors to the Board for the year ended 31st August 1965 and have conducted a continuous audit of the accounts. They have also audited the accounts of the Pensions Scheme and the Widows and Orphans Provident Fund Scheme. The Auditors' Report on the accounts of the Board is at Appendix I, Statement 4 and their reports on the accounts of the Pensions Scheme and the Widows and Orphans Provident Fund Scheme are at Appendix II, Statement 3 and Appendix III Statement 3 respectively.

Electronic Computer

The Board placed an order for an IBM 1440 electronic data processing system in April 1964 and during the year under review has been preparing for a number of accounting processes to be performed on the computer, the first applications being stores ledger, the payroll and certain other jobs connected with the payroll. The computer has already arrived at IBM's office in Kuala Lumpur but delivery is not being taken by the Board until 31st December 1965. The computer will be installed in the Board's new Head Office at Pantai, Kuala Lumpur, when these offices are opened early in 1966.

Appendices

APPENDICES

APPENDIX I

STATEMENT 1

REVENUE ACCOUNT FOR THE YEAR ENDED 31st AUGUST, 1965

Year ended 31st August, 1964		Particulars			Cents per unit sold	Notes on the accounts	Supporting statements
Cents per unit sold	$		$	$			
9.19	84,424,271	Income from sales of electricity	97,829,831		9.12	8	5
0.23	2,147,597	Other income	2,588,975		0.24		6
9.42	86,571,868			100,418,806	9.36		
		Deduct—Operating expenses:					
3.33	28,444,060	Generation	30,404,378		3.07		9
5.33	3,406,890	Electricity purchased in bulk	4,277,254		5.16		9
3.47	31,850,950		34,681,632		3.23		
0.33	3,022,721	Transmission	3,362,071		0.31		9
1.53	14,064,282	Distribution	15,371,507		1.43		9
0.19	1,766,732	Consumers' service ..	2,040,163		0.19		9
0.38	3,439,552	Meter reading, billing and collection of accounts ..	3,900,386		0.36		9
0.27	2,501,002	Training and welfare ..	3,150,202		0.30		9
0.30	2,816,746	Administration	2,870,083		0.27		9
0.42	3,838,586	General expenses	4,832,230		0.45		9
6.89	63,300,571			70,208,274	6.54		
2.53	23,271,297			30,210,532	2.82		
		Deduct—Interest payable on:					
1.47	13,544,342	Loan capital	14,062,578		1.31	3	
0.33	3,008,142	Ordinary stock	3,955,402		0.37	2	
0.03	325,917	Bank overdraft	639,825		0.06	6	
1.83	16,878,401			18,657,805	1.74		
0.70	6,392,896			11,552,727	1.08		
(0.05)	(460,000)	*Add*—Amount set aside for turnover tax no longer required		460,000	0.04	5	
0.65	5,932,896	Net revenue—used to finance capital requirements ..		12,012,727	1.12		
		Deduct—Contributions to reserves:					
0.55	5,032,896	Capital development account	10,612,727		0.99		
0.10	900,000	General reserve	1,400,000		0.13		
0.65	5,932,896			12,012,727	1.12	4	

NATIONAL ELECTRICITY BOARD
BALANCE SHEET AS

31st August, 1964 $		$	$	Notes on the accounts	Supporting Statements
	ISSUED CAPITAL—				
72,319,000	Ordinary Stock		87,319,000	2	
	LOAN CAPITAL—				
	Loans:				
39,046,842	Government of Malaysia — 5 per cent ..	38,886,057			
13,000,000	— 5¾ per cent ..	12,849,361			
42,089,491	— 6 per cent ..	41,302,306			
10,000,000	Employees Provident Fund Board - 6 per cent	10,000,000			
4,285,714	Commonwealth Development Finance Company Limited - 6¾ per cent ..	4,285,714			
75,477,960	International Bank for Reconstruction and Development — Loan 210 MA - 5¾ per cent	78,834,632			
10,482,182	— Loan 350 MA - 5½ per cent	37,877,029			
55,981,134	Commonwealth Development Corporation — 6½ per cent	54,620,816			
250,363,373			273,656,415	3	
	RESERVES INVESTED IN THE BOARD'S UNDERTAKING—				
43,934,164	Capital development account	54,546,891			
8,400,000	General reserve	9,800,000			
52,334,164			64,346,891	4	
375,016,537			430,322,306		13
460,000	AMOUNT SET ASIDE FOR TURNOVER TAX ..		—	5	
	CURRENT LIABILITIES, DEPOSITS AND PROVISIONS—				
16,085,284	Trade creditors	16,953,300			
2,501,122	Other creditors and accrued liabilities ..	2,948,055			
7,406,003	Accrued interest	8,022,590			
9,696,705	Consumers deposits	10,834,351			
895,341	Provision for leave pay and passages ..	529,725			
8,469,963	Bank overdraft	13,029,136		6	
45,054,418			52,317,707		
420,530,955			482,640,013		

Future capital expenditure authorised by the Board at 31st August, 1965 totalled approximately $206 million, of which $150 million was under contract at that date.

The explanatory notes on the accounts in Statement 3 form an integral part of this Balance Sheet and attached Revenue Account.

The report of the Auditors appears as Statement 4.

31st August, 1964 $		$	$	Notes on the accounts	Supporting Statements
	FIXED ASSETS—				
495,863,757	At cost less disposals	572,694,782		7	10
96,107,214	*Deduct:* Provision for depreciation	107,617,092			11
399,756,543		465,077,690			
13,690,574	*Deduct:* Balance of consumers' contribution account	16,740,436			12
386,065,969			448,337,254		
	CURRENT ASSETS—				
2,025,268	Fuel at cost	1,564,082			
19,994,591	Stores at cost	18,140,097			
1,123,117	Rechargeable work in progress at cost	1,442,198			
1,639,879	Staff advances	2,023,316			
—		—			
	Debtors:				
6,284,813	Consumers	7,553,635			
1,076,111	Rechargeable work	1,652,248			
1,278,444	Miscellaneous	1,185,203			
8,639,368		10,391,086			
	Deduct:				
407,027	Provision for doubtful debts	470,989			
8,232,341		9,920,097			
—		—			
33,015,196		33,089,790			
842,170	Payments in advance	439,150			
	Cash in hand and at banks:				
35,947	In hand	39,666			
571,673	At banks	734,153			
34,464,986			34,302,759		
420,530,955			482,640,013		

DATO OSMAN — *Chairman*

RAJA ZAINAL BIN RAJA SULAIMAN — *General Manager*

A.R. SINCLAIR — *Deputy General Manager (Finance)*

APPENDIX I

STATEMENT 3

ACCOUNTS FOR THE YEAR ENDED 31st AUGUST, 1965

NOTES ON THE ACCOUNTS

Introduction

THESE notes supplement the figures in the Revenue Account and Balance Sheet and form an integral part of this Account and Balance Sheet. The Report of the Auditors appears as Statement 4.

Note 1 — CONVERSION OF OTHER CURRENCIES INTO DOLLARS

Conversion of US dollars into sterling has been made at the rate of US $2.80 to £1 and conversion of sterling into dollars at the rate of 2s 4d to $1.

At 31st August 1965 there was a contingent liability of approximately $1,320,000 representing the excess of the Board's liability for repayment of loans in foreign currencies, calculated at rates of exchange ruling at 31st August 1965, over the Malayan dollar equivalent of the loans included in the Board's accounts.

Note 2 — ORDINARY STOCK

Of the amount of $87,319,000 of issued ordinary stock, $84,319,000 is held by the Government of Malaysia and $3,000,000 by the State Government of Pahang. The following ordinary stock certificates were issued to the Government of Malaysia during the year under review:-

	$
Stock issued for capital subscribed on 15th January 1965	6,000,000
Stock issued for capital subscribed on 25th March 1965	6,000,000
Stock issued for capital subscribed on 15th July 1965	3,000,000
	15,000,000

Interest on the above stock is limited by Section 23 of the Electricity Ordinance, 1949, to a maximum average rate of 6 per cent per annum taking one year with another. The Board paid 4 per cent interest on its ordinary stock each year up to 31st August 1962 but in consideration of Government's agreement in November 1962 to take up a further $60 million of ordinary stock the Board gave an undertaking that it would endeavour as from 1st September 1962 to pay an average rate of interest of 5 per cent per annum, taking one year with another. Accordingly interest at the rate of 5 per cent per annum has been paid for each year since 1st September 1962.

Note 3 — LOAN CAPITAL

Loans from the Government of Malaysia — The Government of Malaysia has made three separate loans to the Board. The first loan was for an amount of $40,000,000 at a rate of interest of 5 per cent per annum, repayable by equal annual instalments (principal and interest) over a period of 60 years from the date of each individual drawing. At 31st August 1965 repayments of principal amounted to $1,113,943.

A loan of $13,000,000 at the rate of interest of $5\frac{3}{4}$ per cent per annum was given to finance certain specified projects within the Board's general development programme. Interest is payable half-yearly on 1st May and 1st November. Repayment of the loan is by equal half-yearly instalments (principal and interest) over a fifteen year period. With regard to the first drawing of $7,000,000 made on 1st January 1960 the first instalment was paid on 1st May 1965 and the final instalment is due on 1st November 1979; at 31st August 1965 repayment of principal amounted to $150,139. With regard to the second and final drawing of $6,000,000 made on 15th March 1961 the first instalment is due on 1st May 1966 and the final instalment on 1st November 1980.

A loan of $38,000,000 was given to assist in the financing of the Cameron Highlands Hydro-Electric Scheme. Interest at the rate of 6 per cent per annum is payable half-yearly on 1st June and 1st December, but interest up to 31st December 1963 amounting to $4,465,973 was not paid in cash by the Board but added to the principal amount of the loan and treated as part thereof. Repayment of the loan (including interest capitalised) is being made by fifty equal half-yearly instalments (principal and interest) which commenced on 1st June 1964, the final instalment falling due on 1st December 1988. At 31st August 1965 repayments amounted to $1,163,667.

Loans from the Employees Provident Fund Board — The Employees Provident Fund Board lent the Board $5,000,000 on 18th March 1960 and a further $5,000,000 on 1st December 1962 at a rate of interest of 6 per cent per annum. Interest is payable half-yearly on 1st March and 1st September with respect to both of these loans. Repayment of the loans will be made by twenty equal half-yearly instalments over a ten year period, namely 1st March 1971 to 1st September 1980 in the case of the first loan and 1st March 1973 to 1st September 1982 in the case of the second loan. Both of these loans are guaranteed by the Government of Malaysia.

Loan from the Commonwealth Development Finance Company, Limited — The Commonwealth Development Finance Company, Limited lent the Board a sum of £500,000 ($4,285,714) towards the cost of the Cameron Highlands Hydro-Electric Scheme. Interest at the rate of $6\frac{3}{4}$ per cent per annum is payable half-yearly on 30th June and 31st December. Repayment of the loan will be made by ten annual instalments of £50,000 each, commencing on 30th June 1970, the final instalment falling due on 30th June 1979. This loan is guaranteed by the Government of Malaysia.

Loans from the International Bank for Reconstruction and Development — The International Bank for Reconstruction and Development has made two separate loans to the Board. The first loan No. 210 MA is for an amount in various currencies equivalent to US $35,600,000 ($106,800,000) towards the cost of the Cameron Highlands Hydro-Electric Scheme, being the amount of expenditure then estimated to be incurred outside Malaysia. Following on re-estimates of the cost of the Scheme the amount of the loan was reduced by mutual agreement first to US $30,600,000 ($91,800,000) and later to US $28,600,000 ($85,800,000); it was also agreed that expenditure incurred outside Malaysia on certain capital projects cognate to the Scheme could also be financed from the loan. Interest at $5\frac{3}{4}$ per cent per annum is payable half-yearly on 15th

January and 15th July together with a commitment charge of $\frac{3}{8}$ per cent per annum (reduced from $\frac{3}{4}$ per cent per annum from 1st July 1964) on the principal amount of the loan not withdrawn. A sum of US $2,800,000 ($8,571,427) representing interest and commitment charges during the period of construction of the Scheme has been capitalised and treated as drawings against the principal amount of the loan. A total amount of US $27,402,650 ($83,885,651) had been drawn against the principal amount of the loan up to 31st August 1965 including the sum of US $2,800,000 ($8,571,427) charged to the Board in respect of capitalised interest and commitment charges.

Payments are made by the Bank in various currencies and the Board is required to pay interest on the amounts drawn and later make loan repayments in the currencies in which payments have been made by the Bank. The amounts drawn to 31st August 1965 were as follows:

Currency	Amount	US Dollar Equivalent	Malayan Dollar Equivalent
United States dollars	US $ 8,105,363.42	8,105,363	24,812,333
Pounds sterling	£457,806.13s.7d.	1,281,859	3,924,057
Deutschemark	DM. 38,485,570.94	9,527,390	29,165,475
Japanese yen	Y 244,611,418.00	679,476	2,080,029
Netherlands guilders	FI. 1,503,542.02	404,890	1,239,453
Indian rupees	Rs. 6,853,340.63	1,439,203	4,405,723
South African rands	R 208,733.82	292,227	894,573
Austrian schillings	AS. 5,031,235.56	195,432	598,261
Australian pounds	A£795,440.1s.2d.	1,781,786	5,454,445
French francs	FrF. 8,002,329.82	1,620,869	4,961,844
Swiss francs	SwF. 8,913,863.59	2,074,155	6,349,453
		US $27,402,650	M $83,885,651

While the rate of interest on the loan is shown as $5\frac{3}{4}$ per cent per annum, the International Bank has sold participations in early maturities amounting to the equivalent of US $2,061,000 and has reduced the annual rate of interest on the appropriate part of the loan to $5\frac{1}{4}$ per cent in respect of US $1,280,000, to $5\frac{1}{2}$ % in respect of US $500,000 and to 5 per cent in respect of US $281,000. The loan is repayable over a period of twenty years by half-yearly payments on 15th January and 15th July; repayments commenced on 15th January 1964. This loan is guaranteed by the Government of Malaysia. Repayments of the principal amount of the loan made as at 31st August 1965 were as follows:-

Currency	Amount	US Dollar Equivalent	Malayan Dollar Equivalent
United States dollars	US $1,426,000	1,426,000	4,365,305
Pounds sterling	£80,000	224,000	685,714
		US $1,650,000	M $5,051,019

The second loan No. 350 MA is for an amount in various currencies equivalent to US $51,900,000 ($155,700,000) to finance the foreign exchange element of the cost of the Batang Padang and Prai Power Development. The Loan Agreement with the In-

ternational Bank for Reconstruction and Development was signed on 7th August 1963 and the loan became effective on 25th October 1963. As with the first loan, the Board is required to pay interest on the amounts drawn and later make loan repayments in the currencies in which payments have been made by the Bank. The amounts drawn to 31st August 1965 were as follows:-

Currency	Amount	US Dollar Equivalent	Malayan Dollar Equivalent
United States dollars	US $4,155,087.81	4,155,088	12,719,654
Deutschemark	DM. 24,929,003.11	6,232,251	19,078,316
Indian rupees	Rs. 3,092,591.74	649,445	1,988,096
Pounds sterling	£ 219,024. 12s. 10d.	613,269	1,877,354
Belgian francs	BF. 1,375,574.00	27,511	84,219
Australian pounds	A£126,441.11s.5d.	283,229	867,028
Japanese yen	Y.59,896,051.00	166,378	509,320
		US $12,127,171	M $37,123,987

The loan is to be repaid over a period of twenty years by half-yearly payments on 1st May and 1st November commencing on 1st May 1968. Interest at $5\frac{1}{2}$ per cent per annum is payable half-yearly on 1st May and 1st November each year, together with a commitment charge of $\frac{3}{8}$ per cent per annum (reduced from $\frac{3}{4}$ per cent per annum from 1st July 1964) on the principal amount of the loan not drawn. A sum of US $4,000,000 ($12,000,000) was included in the loan to cover capitalisation of interest and commitment charges during the period of construction of the projects, namely up to 1st November 1967. Up to 31st August 1965 a sum of US $712,670 ($2,181,642) had been charged to the Board's loan account by the Bank in respect of interest and commitment charges up to 1st May 1965. Interest and commitment charges accruing from 1st May 1965 to 31st August 1965 amounting to US $245,994 ($753,042) have been capitalised and treated as a drawing in the Board's accounts, making the total amount of the loan drawn as at 31st August 1965 US $12,373,165 ($37,877,029) i.e. US $12,127,171 drawn plus accrued interest and commitment charges of US $245,994. The Bank has sold participations in early maturities amounting to US $2,830,000 and has reduced the annual rate of interest on this part of the loan from $5\frac{1}{2}$ per cent to $5\frac{1}{4}$ per cent. This loan is also guaranteed by the Government of Malaysia.

Loan from the Commonwealth Development Corporation — The three Commonwealth Development Corporation debentures amounting to £7,077,950 ($60,668,143) were redeemed on 19th January 1960 and replaced on the same date by a new loan of the same amount bearing interest at $6\frac{1}{4}$ per cent per annum. The loan is repayable by equal annual instalments (principal and interest) over 25 years commencing on 25th March 1961, the final instalment falling due on 25th March 1985. At 31st August 1965 the amount repaid was £705,521.7s.8d. ($6,047,327). This loan is guaranteed by the Government of Malaysia.

Note 4 — RESERVES

The Board has only two reserves, namely a capital reserve, i.e. the Capital Development Account, and a revenue reserve, i.e. the General Reserve. The Board's policy is to make such annual contributions to General Reserve as will maintain the General Reserve at an amount approximately equal to 10% of annual income from sales.

The balance of net revenue available after the contribution has been made to General Reserve is then placed to Capital Development Account. The whole of the Board's net revenue is thus reinvested in the industry by being used, together with the annual depreciation provision and other internal resources, to finance a substantial part of the Board's capital expenditure.

Note 5 — Amount Set Aside For Turnover Tax

The amount of $460,000 set aside in 1963/64 for turnover tax for the year ended 31st August 1964 is no longer required as the Board has been exempted from this tax by the Turnover Tax Act, 1965. The provision has therefore been brought back into revenue.

Note 6 — Bank Overdraft

The Board has two overdraft accounts, both subject to annual review, one with the Chartered Bank, Kuala Lumpur and the other with the Chase Manhattan Bank, Kuala Lumpur. The overdraft facilities with the Chartered Bank are for a maximum of $9 million secured by a Government guarantee plus temporary additional facilities of $2 million not subject to Government guarantee; these facilities are in force until 31st July 1966. The overdraft facilities with the Chase Manhattan Bank, which were opened on 24th May 1965, are for a maximum of $6 million secured by a Government guarantee and are in force until 23rd May 1966. The rate of interest charged in respect of these overdraft facilities is the Malayan Exchange Banks Association's agreed minimum rate for clean advances, which at the end of the year under review was 7 percent per annum.

Note 7 — Land

Included in the fixed assets is the sum of $14,780,656 for land. This amount is made up as follows:-

Freehold land	$10,215,577
Leasehold Land	$ 4,565,079

Included in the cost of freehold land is the sum of $1,034,345 in respect of land taken over from Government under the provision of Section 29 of the Electricity Ordinance, for which it has still not been possible to obtain satisfactory titles. As mentioned in previous reports, the Government has undertaken to assist the Board to obtain titles to this land from the State Governments concerned.

Note 8 — Income From Sales Of Electricity

As in previous years, the amount credited to revenue account represents charges for electricity calculated on the meter readings taken during the year to 31st August, and revenue from unread consumption of electricity to 31st August 1965 has not therefore been included in the accounts.

Note 9 — Cost-of-Living Allowances on Pensions

Cost-of-living allowances paid on pensions are charged against the Board's revenues and not against the Pension Fund. The Board has a present and continuing liability for cost-of-living allowances payable on pensions which is estimated as being of the order of $1,700,000.

A provision for cost-of-living allowances payable on pensions was set up in 1962/63 and a sum of $200,000 was placed to this provision with the intention that similar annual amounts would be provided in future years. Another sum of $200,000 was placed to this provision in 1963/64 and a further sum of $200,000 was placed to this provision in respect of the current year bringing the amount up to $600,000. Until the total provision is of an adequate size, cost-of-living allowances paid each year will be charged to the Board's revenue and not to the provision.

Note 10 — Contingent Liability In Respect Of Malaya Borneo Building Society Limited

In accordance with an Agreement dated 28th October 1960 between the Board and the Malaya Borneo Building Society Limited, the Board has guaranteed overdraft facilities which the Chartered Bank, Kuala Lumpur, is prepared to give to the Society up to a sum not exceeding $1 million so that the Society may grant loans to Board employees to enable such employees to build or purchase dwelling houses for their own occupation. The overdraft facilities had not been used at 31st August 1965.

The Board has also given guarantees to the Malaya Borneo Building Society Limited in respect of the excess amount of any loan granted by the Society to Board employees over the maximum amount which the Society would normally advance to a borrower for the building or purchase of a dwelling house. The total amounts guaranteed on individual loans to Board employees at 31st August 1965 were $497,169.

Note 11 — Contributions In Aid Of Rates — Johore Bahru Town Council

Agreement has been reached with Johore Bahru Town Council in regard to the amount of the contribution in aid of rates on Sultan Ismail Power Station at Johore Bahru, namely $101,110 per annum. Actual contributions paid to Johore Bahru Town Council during the year ended 31st August 1965 were $252,775, of which $219,070 was charged in the accounts. The amount of $252,775 is made up as follows:-

Contribution for 1963 (second half of year)	$ 50,555
Contribution for 1964	101,110
Contribution for 1965	101,110
	$252,775

Note 12 — Widows And Orphans Provident Fund

A valuation of the Widows and Orphans Provident Fund was made by the Government Actuary as at 30th June 1965 in accordance with Section 10 of the National Electricity Board's Widows and Orphans Provident Fund Scheme, 1964. The Actuary's report disclosed a surplus of $42,000 as shown in Appendix III Statement 4.

Note 13 — Trade Creditors

The balance sheet figures for Trade Creditors and Fixed Assets do not include expenditure of $6,840,000 incurred on capital projects before 31st August 1965 but not certified by the Board's consulting engineers in London until after the accounts were closed.

APPENDIX I

STATEMENT 4

ACCOUNTS FOR THE YEAR ENDED 31st AUGUST, 1965

REPORT OF THE AUDITORS APPOINTED UNDER SECTION 25(2) OF THE ELECTRICITY ORDINANCE, 1949, TO AUDIT THE ACCOUNTS OF THE NATIONAL ELECTRICITY BOARD OF THE STATES OF MALAYA

We have obtained all the information and explanations which to the best of our knowledge and belief were necessary for the purposes of our audit. In our opinion proper books of account have been kept by the Board so far as appears from our examination of those books and proper returns adequate for the purposes of our audit have been received from district offices not visited by us.

We have examined the annexed Balance Sheet and Revenue Account which are in agreement with the books of account and returns. In our opinion and to the best of our information and according to the explanations given to us, the Balance Sheet, together with the Notes annexed thereto, gives a true and fair view of the state of the affairs of the Board as at 31st August 1965 and the Revenue Account gives a true and fair view of the results of its operations for the year ended on that date.

PRICE WATERHOUSE & CO.,
Chartered Accountants,
Certified Public Accountants (Malaysia)

Kuala Lumpur.
31st January, 1966.

APPENDIX I

STATEMENT 5

SALES OF ELECTRICITY — YEAR ENDED 31st AUGUST, 1965

Year ended 31st August, 1964			Class of Consumer			
Income $	Units 000's	Cents per unit sold		Income $	Units 000's	Cents per unit sold
			DOMESTIC CONSUMERS —			
7,261,969	26,574	27.33	Lighting	8,140,596	29,793	27.32
13,087,111	113,401	11.54	Block tariff	15,576,404	133,416	11.67
20,349,080	139,975	14.54	TOTAL	23,717,000	163,209	14.53
			COMMERCIAL CONSUMERS—			
13,801,115	58,745	23.49	Lighting	15,407,062	65,852	23.40
15,377,637	185,833	8.27	Power	18,499,133	222,738	8.30
29,178,752	244,578	11.93	TOTAL	33,906,195	288,590	11.75
			INDUSTRIAL CONSUMERS—			
8,337,252	157,342	5.30	Dredges	8,911,206	170,480	5.23
4,528,678	92,568	4.89	Open cast mines ..	5,420,605	110,001	4.93
14,535,252	215,143	6.76	Others	17,484,293	263,099	6.64
27,401,182	465,053	5.89	TOTAL	31,816,104	543,580	5.85
4,985,209	51,892	9.61	FORCES CONSUMERS ..	5,476,620	57,725	9.49
2,510,048	17,230	14.57	PUBLIC LIGHTING CONSUMERS	2,913,912	19,971	14.59
84,424,271	918,728	9.19	TOTAL SALES OF ELECTRICITY	97,829,831	1,073,075	9.12

STATEMENT 6

OTHER INCOME — YEAR ENDED 31st AUGUST, 1965

Year ended 31st August, 1964 $	Particulars	$	$
	TRADING PROFITS:		
51,960	Rechargeable work		
89,141	Hire of apparatus	234,310	
		29,206	
141,101			263,516
	MISCELLANEOUS INCOME:		
1,104,992	Transfer from consumers' contribution account		
860,699	Sundry receipts	1,366,466	
		950,277	
1,965,691			2,316,743
40,805	INTEREST RECEIVABLE		8,716
2,147,597	OTHER INCOME CARRIED TO REVENUE ACCOUNT		2,588,975

APPENDIX I

STATEMENT 7

RECHARGEABLE WORK ACCOUNT FOR THE YEAR ENDED 31st AUGUST, 1965

Year ended 31st August, 1964 $	Particulars	$	$	$
6,050,731	Charges for work done or supervised by the Board			7,244,966
	Deduct:			
	Direct Costs:			
1,988,314	Salaries and wages	2,317,393		
1,204,395	Materials	1,721,964		
579,495	Transport and travelling expenses	668,820		
1,466,941	Sub-contractors' charges	1,913,248		
5,239,145			6,621,425	
	Indirect Costs:			
699,521	Salaries and wages	536,843		
11,342	Repairs and maintenance	17,375		
850	Sundry expenses	2,434		
24,986	Depreciation of equipment	22,065		
176,205	Apportionment of general expenses	129,595		
912,904			708,312	
6,152,049			7,329,737	
	Add:			
969,839	Work in progress at 31st August, 1964		1,123,117	
7,121,888			8,452,854	
	Deduct:			
1,123,117	Work in progress at 31st August, 1965		1,442,198	
5,998,771				7,010,656
51,960	Profit transferred to Other Income			234,310

STATEMENT 8

HIRE OF APPARATUS ACCOUNT FOR THE YEAR ENDED 31st AUGUST, 1965

Year ended 31st August, 1964 $	Particulars	$	$	$
796,577	Revenue from hire of apparatus			776,308
	Deduct:			
	Direct Costs:			
116,283	Salaries and wages	120,721		
252,002	Repairs and maintenance	267,206		
39,397	Transport and travelling expenses	51,878		
67,068	Installation expenses	77,179		
474,750			516,984	
	Indirect Costs:			
232,686	Depreciation of apparatus		230,118	
707,436				747,102
89,141	Profit transferred to Other Income			29,206

APPENDIX I

STATEMENT 9

OPERATING EXPENSES FOR THE YEAR ENDED 31st AUGUST, 1965

Year ended 31st August, 1964		Particulars	$	$	Cents per unit sold
Cents per unit sold	$				
		GENERATION —			
0.50	4,253,911	Salaries and wages - operation	4,433,739		0.45
1.57	13,382,195	Fuel	14,126,589		1.42
0.07	610,130	Oil, water and engine room stores ..	773,105		0.08
0.04	334,779	Transport and travelling expenses ..	404,574		0.04
0.41	3,517,798	Repairs and maintenance	3,829,765		0.39
0.74	6,345,247	Depreciation	6,836,606		0.69
3.33	28,444,060			30,404,378	3.07
5.33	3,406,890	ELECTRICITY PURCHASED IN BULK		4,277,254	5.16
3.47	31,850,950			34,681,632	3.23
		TRANSMISSION —			
0.08	756,957	Salaries and wages - operation	786,034		0.07
0.02	217,810	Transport and travelling expenses ..	240,422		0.02
0.05	424,065	Repairs and maintenance	514,364		0.05
0.18	1,623,889	Depreciation	1,821,251		0.17
0.33	3,022,721			3,362,071	0.31
		DISTRIBUTION —			
0.27	2,535,831	Salaries and wages - operation	2,746,975		0.26
0.39	3,572,727	Repairs and maintenance	3,909,100		0.36
0.15	1,371,287	Transport and travelling expensss ..	1,540,886		0.14
0.04	359,399	Public lighting -repairs and renewals	408,703		0.04
0.68	6,225,038	Depreciation	6,765,843		0.63
1.53	14,064,282			15,371,507	1.43
		CONSUMERS' SERVICE —			
0.10	967,557	Salaries and wages..	1,011,353		0.09
0.06	514,623	Connection and testing expenses.. ..	649,546		0.06
0.03	273,991	Transport and travelling expenses ..	373,921		0.04
—	10,561	Publicity, exhibitions, etc.	5,343		—
0.19	1,766,732			2,040,163	0.19
		METER READING, BILLING AND COLLECTION OF ACCOUNTS — ..			
0.32	2,884,426	Salaries and wages..	3,263,467		0.30
0.02	200,674	Commission for collecting electricity accounts	230,152		0.02
0.04	354,452	Transport and travelling expenses ..	406,767		0.04
0.38	3,439,552			3,900,386	0.36
		TRAINING AND WELFARE —			
0.01	119,981	Salaries and wages..	162,350		0.02
0.03	237,991	Welfare expenses	292,946		0.03
—	45,093	Transport and travelling expenses ..	56,724		0.01
0.23	2,097,937	Training expenses	2,638,182		0.24
0.27	2,501,002			3,150,202	0.30
6.17	56,645,239	Balance carried forward		62,505,961	5.82

STATEMENT 9 (*Continued*)

OPERATING EXPENSES FOR THE YEAR ENDED 31st AUGUST, 1965

Year ended 31st August, 1964		Particulars	$	$	Cents per unit sold
Cents per unit sold	$				
6.17	56,645,239	Balance brought forward		62,505,961	5.82
		ADMINISTRATION —			
		Salaries, wages and allowances:			
0.06	581,967	Management	582,932		0.05
0.15	1,356,165	Accounting	1,480,359		0.14
0.07	631,419	Secretarial and general	559,357		0.05
0.02	247,195	Transport and travelling expenses ..	246,434		0.03
0.30	2,816,746			2,870,083	0.27
		GENERAL EXPENSES —			
—	15,737	Consultants' fees and allowances.. ..	—		—
0.04	351,193	Stationery and printing	361,664		0.03
0.05	430,555	Postages, telephones and telegrams ..	488,224		0·05
0.10	965,880	Repairs and maintenance	1,059,103		0.10
0.01	36,159	Audit fees	35,000		—
0.02	206,549	Rent, rates, local taxes, etc.	217,775		0.02
0.03	307,300	Insurances	565,959		0.05
0.02	202,267	Advertising and legal expenses	111,009		0.01
—	5,835	Subscriptions and donations	8,494		—
0.02	208,604	Outfit allowances, uniforms, etc. ..	242,140		0.02
—	14,147	Overseas conferences	8,064		—
0.01	66,804	Miscellaneous expenses	81,048		0.01
0.06	545,447	Depreciation	591,832		0.06
0.01	110,771	Loss on exchange	90,726		0.01
0.01	138,994	Investigation of potential hydro-electric schemes	168,927		0.02
—	—	Compensation payable under Board's Malayanisation Scheme	579,963		0.05
0.04	362,550	Loss (profit) on assets dismantled ..	(124,012)		(0.01)
0.01	86,882	Arrears of wages to industrial and manual staff for period 1.1.63 to 31.8.64 ..	425,909		0.04
—	1,199	Pre-commissioning expenses	—		—
0.01	56,913	Physical survey of Huttenbachs Ltd. assets	—		—
0.44	4,014,791		4,961,825		0.46
		Deduct:			
0.02	176,205	Amount apportioned to rechargeable work	129,595		0.01
0.42	3,838,586			4,832,230	0.45
6.89	63,300,571	TOTAL OPERATING EXPENSES		70,208,274	6.54

APPENDIX I

STATEMENT 10

FIXED ASSETS

A. MOVEMENTS DURING YEAR ON FIXED ASSETS (EXCLUDING CAPITAL PROJECTS IN PROGRESS)

Particulars	At 1st September 1964 $	Less Dismantled or sold during the year $	Projects completed or reclassified during the year $	At 31st August, 1965 $
GENERATION —				
Land, buildings and civil works ..	104,653,802	—	5,455,551	110,109,353
Plant and machinery	111,615,623	3,306,209	−5,302,414	103,007,000
TRANSMISSION —				
Land, buildings and civil works ..	1,197,910	—	821,807	2,019,717
Plant and machinery	12,898,589	216,591	7,518,646	20,200,644
Lines	36,605,223	1,670	−4,309,918	32,293,635
DISTRIBUTION —				
Land, buildings and civil works ..	2,906,250	3,750	661,368	3,563,868
Plant and machinery	28,280,103	899,375	7,324,732	34,705,460
Mains and lines	68,081,412	308,141	10,992,113	78,765,384
Services	17,480,975	1,872,666	3,452,503	19,060,812
Meters	10,196,725	155,719	1,146,911	11,187,917
Public lighting	3,863,322	16,983	499,800	4,346,139
GENERAL ASSETS —				
Land, buildings and civil works ..	32,554,760	121,290	2,452,628	34,886,098
Plant and machinery	955,111	—	−171,198	783,913
Furniture, fittings and office equipment	3,945,366	110,445	746,103	4,581,024
TRANSPORT —				
Motor vehicles	2,549,421	45,137	1,279,777	3,784,061
WORKSHOP —				
Land, buildings and civil works ..	340,631	4,300	5,960	342,291
Plant and machinery	398,128	2,000	3,728	399,856
APPARATUS FOR HIRE	4,110,731	65,848	−46,643	3,998,240
FIXED ASSETS EMPLOYED IN EARNING REVENUE	442,634,082	7,130,124	32,531,454	468,035,412

B. MOVEMENTS DURING YEAR ON CAPITAL PROJECTS IN PROGRESS

Particulars	At 1st September 1964 $	Capital expenditure during the Year $	Less Capital projects completed during the Year $	At 31st August 1965 $
Sultan Ismail Power Station, Johore Bahru	—	252,468	252,468	—
Batang Padang Hydro-Electric Scheme	22,528,463	30,105,272	—	52,633,735
Prai Power Station	4,587,132	7,553,137	—	12,140,269
Transmission lines associated with Batang Padang and Prai Schemes ..	2,766,931	7,353,221	—	10,120,152
Cameron Highlands Cognate Projects	8,282,978	7,661,942	10,824,105	5,120,815
Transmission lines	649,534	482,088	493,163	638,459
Distribution system	9,030,098	18,579,818	17,082,235	10,527,681
Other works .. .	5,384 539	11,973,203	3,879,483	13,478,259
	53,229,675	83,961,149	32,531,454	104,659,370
TOTAL FIXED ASSETS AT COST LESS DISPOSALS (A + B) ..	495,863,757	76,831,025	—	572,694,782

APPENDIX I

STATEMENT 11

PROVISION FOR DEPRECIATION

Year ended 31st August, 1964 $	Particulars	$	$
82,632,251	Balance as at 1st September, 1964		96,107,214
	Deduct:		
2,505,436	Depreciation provision in respect of assets dismantled or sold during the year ended 31st August, 1965		5,786,314
80,126,815			90,320,900
	Add:		
	Provision for depreciation for the year ended 31st August, 1965 charged to Revenue as follows:		
6,345,247	Generation	6,836,606	
1,623,889	Transmission	1,821,251	
6,225,038	Distribution	6,765,843	
545,447	Office and stores buildings	591,832	
714,372	Staff houses	707,419	
24,986	Workshops	22,065	
268,734	Transport	321,058	
232,686	Hired apparatus	230,118	
15,980,399			17,296,192
96,107,214	Balance as at 31st August, 1965		107,617,092

STATEMENT 12

CONTRIBUTIONS FROM CONSUMERS TO CAPITAL WORKS

Year ended 31st August, 1964 $	Particulars	$
11,234,708	Balance of contributions as at 1st September, 1964	13,690,574
	Add:	
3,560,858	Contributions receivable during the year ended 31st August, 1965	4,416,328
14,795,566		18,106,902
	Deduct:	
1,104,992	Amount transferred to Other Income based on the estimated average lives of the assets for which the contributions were received	1,366,466
13,690,574	Balance of contributions as at 31st August, 1965	16,740,436

APPENDIX I

STATEMENT 13

CAPITAL EMPLOYED — MOVEMENT DURING THE YEAR ENDED 31st AUGUST, 1965

Particulars	At 31st August 1964 $	Additions during the year $	Repayments during the year $	At 31st August 1965 $
ISSUED CAPITAL —				
Ordinary stock	72,319,000	15,000,000	—	87,319,000
LOAN CAPITAL —				
Loans:				
Government of Malaysia — 5 per cent	39,046,842	—	160,785	38,886,057
— 5¾ per cent	13,000,000	—	150,139	12,849,861
— 6 per cent	42,089,491	—	787,185	41,302,306
Employees Provident Fund Board at 6 per cent	10,000,000	—	—	10,000,000
Commonwealth Development Finance Company Limited at 6¾ per cent ..	4,285,714	—	—	4,285,714
International Bank for Reconstruction and Development — Loan 210MA at 5¾ per cent	75,477,960	5,921,977	2,565,305	78,834,632
— Loan 350 MA at 5½ per cent	10,482,182	27,394,847	—	37,877,029
Commonwealth Development Corporation at 6¼ per cent	55,981,184	—	1,360,368	54,620,816
	250,363,373	33,316,824	5,023,782	278,656,415
RESERVES INVESTED IN THE BOARD'S UNDERTAKING—				
Capital development account	43,934,164	10,612,727	—	54,546,891
General reserve	8,400,000	1,400,000	—	9,800,000
	52,334,164	12,012,727	—	64,346,891
Total Issued and Loan Capital and Reserves invested in the Board's Undertaking as shown in the Balance Sheet	375,016,537	60,329,551	5,023,782	430,322,306

APPENDIX I

STATEMENT 14

FINANCING OF CAPITAL REQUIREMENTS FOR THE YEAR ENDED 31st AUGUST, 1965

Year ended 31st August, 1964		Particulars	$	$	%
$	%				
		CAPITAL REQUIREMENTS —			
73,856,243	107.5	Capital expenditure during the year	83,961,149		103.0
5,166,087	7.5	Decrease in working capital	2,406,293		3.0
68,690,156	100.0	TOTAL CAPITAL REQUIREMENTS		81,554,856	100.0
		SOURCES OF FINANCE —			
		Internal Resources:			
15,980,399	23.3	Depreciation provision	17,296,192		21.2
5,932,896	8.6	Contributions to reserves	12,012,727		14.7
21,913,295	31.9	Retained revenue income	29,308,919		35.9
2,455,366	3.6	Consumers' contributions	3,049,862		3.7
1,928,499	2.8	Disposals of fixed assets	1,243,810		1.7
26,297,660	38.3		33,702,591		41.3
4,295,672	6.3	*Deduct* — Loan repayments	5,023,782		6.1
22,001,988	32.0	Total Internal Resources		28,678,809	35.2
		External Resources:			
		Borrowings:			
		International Bank for Reconstruction			
8,918,656	13.0	and Development — Loan 210 MA	5,921,977		7.2
10,482,182	15.3	— Loan 350 MA	27,394,347		33.6
755,308	1.1	Government of Malaysia	—		—
5,531,522	8.0	Increase in Bank Overdraft	4,559,223		5.6
		Issue of ordinary stock:			
21,000,000	30.6	Government of Malaysia	15,000,000		18.4
46,688,168	68.0	Total External Resources		52,876,047	64.8
68,690,156	100.0	TOTAL SOURCES OF FINANCE		81,554,856	100.0

APPENDIX II

STATEMENT 1

NATIONAL ELECTRICITY BOARD PENSIONS SCHEME, 1957
STATEMENT OF ACCOUNT FOR THE YEAR ENDED 31st AUGUST, 1965

Year ended 31st August 1964 $	Particulars	$	$
10,221,419	Balance of Pension Fund as at 1st September, 1964 ..		12,561,477
	Add — Contributions by the Board:		
1,771,050	Contributions based on pensionable emoluments	2,072,900	
805	Provision for pension written back	1,305	
67,158	Profit on disposal of investments	60,261	
	Investment Income:		
353,884	Interest on Government and Municipal securities	429,502	
284,792	Dividends	406,075	
27,500	Interest on fixed deposit	27,500	
—	Bank interest	5,290	
2,505,189			3,002,833
12,726,608			15,564,310
106,705	*Deduct*— Pensions and retiring allowances paid	112,363	
58,426	Gratuities paid	81,107	
165,131			193,470
12,561,477	Balance of Pension Fund as at 31st August, 1965		15,370,840

Notes:

1. In accordance with Section 7(1) of the National Electricity Board Pensions Scheme, 1957, the National Electricity Board appointed The Chartered Bank (Malaya) Trustee Limited as trustees to administer the Pension Fund as from 1st September 1957.

2. A valuation of the Fund as at 31st August 1963 disclosed a surplus of $22,000 as at that date.

For The Chartered Bank (Malaya) Trustee Limited

R. A. VOKES.
Manager.

APPENDIX II

STATEMENT 2

NATIONAL ELECTRICITY BOARD PENSIONS SCHEME, 1957
THE BALANCE OF THE PENSION FUND AT 31st AUGUST, 1965 IS REPRESENTED BY:

Year ended 31st August 1964 $	Particulars	$	$
	Investments at cost:		
1,237,104	Malaysian Government, Singapore Government and Penang Muncipal securities	1,828,574	
1,220,072	Malaysian Government securities issued in London ..	1,220,073	
2,899,732	British Government securities	4,434,076	
2,272,738	Other Commonwealth Government securities	1,929,177	
3,396,061	Malaysian and Singapore stocks and shares	4,477,987	
616,144	United Kingdom stocks and shares	452,755	
11,691,851	(Market value — $14,212,155)		14,342,642
	Debtors:		
193,755	National Electricity Board	202,975	
116,379	Sundry	155,359	
310,134			359,334
124,176	Balance with The Chartered Bank on current account ..		190,775
500,000	Deposit with Malaya Borneo Building Society Limited ..		500,000
12,626,161			15,392,751
	Deduct —		
	Creditors:		
61,893	For securities purchased	15,649	
2,791	Sundry	6,262	
64,684			21,911
12,561,477			15,370,840

APPENDIX II

STATEMENT 3

NATIONAL ELECTRICITY BOARD PENSIONS SCHEME, 1957 ACCOUNTS FOR THE YEAR ENDED 31st AUGUST, 1965

REPORT OF THE AUDITORS APPOINTED UNDER SECTION 25(2) OF THE ELECTRICITY ORDINANCE, 1949, TO AUDIT THE ACCOUNTS OF THE NATIONAL ELECTRICITY BOARD PENSIONS SCHEME, 1957

We have examined the annexed statements of account with the books and vouchers maintained by the trustees in respect of the Scheme and have obtained all the information and explanations we have required. In our opinion such statements of account are properly drawn up so as to exhibit a true and correct view of the state of the affairs of the Scheme at 31st August 1965, according to the best of our information and the explanations given to us and as shown by the books of the Scheme.

PRICE WATERHOUSE & CO.,
Chartered Accountants,
Certified Public Accountants (Malaysia)

Singapore
20th December 1965.

APPENDIX III

STATEMENT 1

NATIONAL ELECTRICITY BOARD

WIDOWS AND ORPHANS PROVIDENT FUND SCHEME, 1964

STATEMENT OF ACCOUNT FOR THE YEAR ENDED 30th JUNE, 1965

Particulars	$	$
Cash surrender value of group policies Nos. GE1440 and GE2510 received from The Manufacturers Life Insurance Company on dissolution of old Scheme		1,132,304
Add — Contributions receivable during the year		587,450
Investment Income:		
Interest —		
Malaysian Government and Municipal Securities	2,561	
Other Commonwealth Government securities	32,954	
Dividends —		
Malaysian and Singapore industrial stocks and shares	37,722	
		73,237
		1,792,991
Less — Retirement benefits paid	25,989	
Death benefits paid	15,368	
		41,357
Balance of the Fund at 30th June, 1965		1,751,634

Note:

In accordance with Section 7(1) of the Scheme the National Electricity Board appointed The Chartered Bank (Malaya) Trustee Limited as trustees to administer the Fund as from 1st July 1964.

For The Chartered Bank (Malaya) Trustee Limited

R. A. VOKES
Manager

APPENDIX III

STATEMENT 2

NATIONAL ELECTRICITY BOARD

WIDOWS AND ORPHANS PROVIDENT FUND SCHEME, 1964

THE BALANCE OF THE FUND AT 30th JUNE 1965 IS REPRESENTED BY:

Particulars	$	$
Investments at cost:		
Malaysian Government and Municipal securities	95,277	
Other Commonwealth Government securities	840,268	
Malaysian and Singapore industrial stocks and shares	737,080	
(Market value — $1,422,718)		1,672,625
Debtors:		
National Electricity Board	54,991	
Comptroller of Income Tax	12,390	
		67,381
Cash at bank:		
The Chartered Bank, Singapore	69,674	
The Chartered Bank, Kuala Lumpur	1,890	
		71,564
		1,811,570
Deduct —		
Creditors:		
For securities purchased		59,936
		1,751,634

APPENDIX III

STATEMENT 3

NATIONAL ELECTRICITY BOARD
WIDOWS AND ORPHANS PROVIDENT FUND SCHEME, 1964
ACCOUNTS FOR THE YEAR ENDED 30th JUNE, 1965

REPORT OF THE AUDITORS APPOINTED UNDER SECTION 25(2) OF THE ELECTRICITY ORDINANCE, 1949, TO AUDIT THE ACCOUNTS OF THE SCHEME

We have examined the annexed statements of account with the books and vouchers maintained by the trustees in respect of the Scheme and have obtained all the information and explanations we have required. In our opinion such statements of account are properly drawn up so as to exhibit a true and correct view of the state of the affairs of the Scheme at 30th June 1965, according to the best of our information and the explanations given to us and as shown by the books of the Scheme.

PRICE WATERHOUSE & Co.,
Chartered Accountants,
Certified Public Accountants (Malaysia)

Singapore
17th November 1965

STATEMENT 4

NATIONAL ELECTRICITY BOARD
WIDOWS AND ORPHANS PROVIDENT FUND SCHEME, 1964

REPORT ON ACTUARIAL VALUATION OF NATIONAL ELECTRICITY BOARD WIDOWS AND ORPHANS PROVIDENT FUND SCHEME, 1964

Introduction:

THE Fund was set up with effect from 1 July 1964 replacing a Scheme granting death and retirement benefits insured with the Manufacturers' Life Insurance Company under Group Life Insurance Policies. On winding up the former Scheme the cash surrender values of the Policies were paid into the newly-established Fund.

The benefits payable by the Fund are basically one month's pensionable emoluments at the date of death or retirement for each year of membership with the previous Scheme and the Fund, with the following modifications:

Death: years of membership are augmented by the number of years the member would have served to age 60.

Retirement: years of membership of the previous Scheme only count as to three-quarters.

Resignation: the employee has certain options but in general his own contributions are retained in the Fund and returned to him at age 50 together with simple interest at 5%.

The joint contributions paid into the Fund are approximately 8% of the pensionable emoluments of each member, shared equally between the Board and the member.

The valuation has been made as at the end of the first year of operation.

Progress of the Fund:

The numbers and movements of members during the valuation period (1 July 1964 to 30 June 1965) were:

Members transferring from previous Scheme	1,238
New members joining 1 July 1964	53
Initial membership	1,291
New members joining in year	240
Members leaving in year	17
Membership at 30 June 1965	1,514

The size of the Fund and the Income and Expenditure were:

	$		$
Cash surrender value of Group Life Policies	1,132,304	Retirement Benefits	25,989
		Death Benefits	15,368
Contributions	587,450	Amount of Fund at 30 June 1965	1,751,634
Interest on Investments	73,237		
	1,792,991		1,792,991

At market prices, the amount of the Fund at 30 June 1965 was $1,501,727.

Valuation Basis:

The basis adopted is derived from the experience of the Fund during the year.

Mortality: A 1924/29 ult.

Retirement: 20% of members reaching age 55 retire and the remainder continue to compulsory retirement at age 60. Some allowance was made for early retirement on grounds of poor health.

Salary Scale: For Division I members, a comparative rise from 100 at age 25 to 200 at age 60; for other Divisions a comparative rise from 100 at age 25 to 260 at age 60.

Rate of interest: 4½%.

Value of investments: in the case of fixed interest investments already purchased, the actual rate in excess of 4½% which will be earned has been taken into account in the value placed on the assets of the Fund. Equities have been taken at book values.

Valuation Result:

The joint contribution of 8% includes an allowance for future general increases in salary levels —this allowance was deliberately incorporated when the Fund was established. The valuation therefore also makes provision for general salary increases, otherwise a large and meaningless surplus would be thrown up. The allowance made is for general increases equivalent to a rise of 2 per cent a year.

The valuation is carried out by discounting back to 30 June 1965 all future benefit payments and contributions at the valuation rate of interest of 4½% and comparing the resulting discounted values with the value placed on the assets of the Fund.

The valuation of the assets and liabilities of the Fund brought the following result:

	$ (000's)		$ (000's)
Present value of:		Present value of:	
Death benefit	2,267	Future contributions	11,296
Retirement benefit	10,883	Excess interest earnings	144
Surplus	42	Fund at 30 June 1965	1,752
	13,192		13,192

The present value of the contributions is based on a joint contribution slightly greater than 8% of salary as contributions are 8% of the top salary of each salary band.

APPENDIX V

LIST OF NATIONAL ELECTRICITY BOARD PUBLIC SUPPLIES

GENERATING STATIONS

Name of Town or Village	State	Generating Plant Capacity kW	Motive Power
NORTHERN AREA			
Arau	Perlis	500	O.E.
Alor Star	Kedah	4,175	O.E.
Sungei Patani	Kedah	1,935	O.E.
Butterworth (See also Bulk Supplies)	Province Wellesley	8,045	O.E.
Taiping	Perak	5,675	O.E.
Sitiawan	Perak	820	O.E.
Jor (Sultan Yussuf Power Station)	Perak	100,000	H.E.
Habu	Pahang	5,500	H.E.
Robinson Falls	Pahang	900	H.E.
Kampong Raja	Pahang	800	H.E.
Kuala Terla	Pahang	500	H.E.
SOUTHERN AREA			
Kluang	Johore	3,864	O.E.
Batu Pahat (Standby) (See also Bulk Supplies)	Johore	908	O.E.
Muar (Standby) (See also Bulk Supplies)	Johore	390	O.E.
Segamat	Johore	1,143	O.E.
Kota Tinggi	Johore	410	O.E.
Pontian	Johore	884	O.E.
Mersing	Johore	440	O.E.
Johore Bahru (Sultan Ismail Power Station)	Johore	30,000	S.T.
Gemas	Negeri Sembilan	450	O.E.
Kuala Klawang	Negeri Sembilan	249	O.E.
Bahau	Negeri Sembilan	400	O.E.
Rembau	Negeri Sembilan	125	O.E.
Kuala Pilah	Negeri Sembilan	551	O E.
Malacca	Malacca	30,000	S.T.
RURAL STATIONS.			
Layang-Layang	Johore	56	O.E.
Sri Lallang	Johore	28	O.E.
Lima Kedai	Johore	28	O.E.
Gelang Patah	Johore	28	O.E.
Pekan Nanas	Johore	56	O.E.
Cha'ah	Johore	84	O.E.
Labis	Johore	112	O.E.
Bekok	Johore	56	O.E.
EASTERN AREA			
Raub Operating)	Pahang	1,235)	H.E.
Standby)		898)	O.E.
Kuantan	Pahang	1,943	O.E.
Mentakab	Pahang	1,236	O.E.
Pekan	Pahang	671	O.E.
Kuala Lipis	Pahang	652	O.E.
Fraser's Hill	Pahang	300	O.E.

APPENDIX V (*Cont.*)

LIST OF NATIONAL ELECTRICITY BOARD PUBLIC SUPPLIES

GENERATING STATIONS (*Cont.*)

Name of Town or Village	State	Generating Plant Capacity kW	Motive Power
Bentong	Pahang	947	O.E.
Lemal	Kelantan	3,020	O.E.
Kota Bharu (Lundang)	Kelantan	4,230	O.E.
Kuala Krai (Standby)	Kelantan	242	O.E.
Kuala Trengganu	Trengganu	2,227	O.E.
Kemaman	Trengganu	370	O.E.
Dungun	Trengganu	530	O.E.
RURAL STATIONS.			
Kuala Brang	Trengganu	28	O.E.
Sebrang Takir	Trengganu	28	O.E.
Kuala Paka	Trengganu	28	O.E.
Jerteh	Trengganu	56	O.E.
Kampong Rajah	Trengganu	56	O.E.
Kuala Kemaman	Trengganu	28	O.E.
Kijal	Trengganu	28	O.E.
Pantau Panjang	Kelantan	56	O.E.
Besut Barat	Kelantan	28	O.E.
Besut Kastam	Kelantan	28	O.E.
Gambang	Pahang	56	O.E.
Jerantut	Pahang	84	O.E.
Cheroh	Pahang	28	O.E.
Sungei Ruan	Pahang	56	O.E.
Benta	Pahang	56	O.E.
CENTRAL AREA			
Connaught Bridge	Selangor	80,000	S.T.
Ulu Langat	Selangor	2,288	H.E.
Kuala Selangor (Standby) (See also Bulk Supplies)	Selangor	169	O.E.
RURAL STATIONS.			
Jenjarom	Selangor	56	O.E.
Behrang Station	Perak	28	O.E.

TRANSMISSION, IMPORT AND DISTRIBUTION SUBSTATIONS

HV Distribution shown in capital letters thus 'ALOR STAR'
LV Distribution shown in small type thus 'Kulim'

Locality	State	No. of sub-stations	Transformer Capacity kVA	Supply From
NORTHERN AREA				
ALOR STAR	Kedah	1	925	Alor Star O.E.
Alor Star Town	,,	17	3,550	Alor Star
Anak Bukit	,,	1	100	,,
Bukit Pinang	,,	1	750	,,
Hutan Kampong	,,	1	25	,,
Jitra	,,	1	200	,,
Kampong Langgar	,,	1	50	,,
Kepala Batas	,,	2	350	,,
Kuala Kedah	,,	1	100	,,
Kulim	,,	6	650	Butterworth
Lunas	,,	2	125	,,
Padang Serai	,,	2	200	,,
Tanah Merah	,,	1	100	Alor Star
Tanjong Pauh	,,	1	100	,,
Telok Chengai	,,	1	100	,,
Telok Jelai	,,	1	200	,,
Pantai Johore	,,	1	100	,,
Bertam Valley	Pahang	1	25	Central Network
Boh Tea Estate	,,	1	200	,,
Cameron Highlands	,,	5	1,500	,,
Federal Bungalow	,,	1	100	,,
Gunong Brinchang (Wireless Station)	,,	1	50	,,
Habu	,,	1	100	,,
Jor Station	,,	1	100	,,
Jor Workshop	,,	2	300	,,
Kampong Raja	,,	1	50	,,
Kea Farm	,,	1	25	,,
Kuala Terlah	,,	1	50	,,
44th Mile	,,	1	25	,,
Ringlet	,,	1	50	,,
Robinson Falls	,,	1	25	,,
Rose Hill	,,	1	25	,,
Sg. Ular Road	,,	1	200	,,
Tringkap	,,	1	25	,,
15th Mile	Perak	1	50	,,
Talam Mines	,,	1	3,000	,,
LANGKAP	,,	1	112	PRHEP Co.
TELOK ANSON	,,	1	2,500	,,
Telok Anson Town	,,	16	2,819	,,
Hutan Melintang	,,	1	50	,,
Sg. Tukang Sidin	,,	1	30	,,

APPENDIX V (*Cont.*)

TRANSMISSION, IMPORT AND DISTRIBUTION SUBSTATIONS (Cont.)

Locality	State	No. of sub-stations	Transformer Capacity kVA	Supply From
BATU GAJAH	Perak	4	750(a)	,,
IPOH	,,	5	32,475(b)	PRHEP Co.
Ipoh Town	,,	70	22,075	,,
SITIAWAN	,,	1	800	Sitiawan O.E.
Sitiawan Town	,,	1	200	Sitiawan
Kampong China	,,	1	25	,,
Kampong Koh	,,	1	200	,,
Kampong Koh Road	,,	1	100	,,
Lumut	,,	2	150	,,
Pasir Panjang Laut	,,	1	25	,,
Pundut Estate	,,	1	25	,,
Simpang Dua	,,	1	50	,,
Simpang Tiga	,,	1	100	,,
Suffolk Estate	,,	1	50	,,
Sungei Wangi Estate	,,	1	100	,,
TAIPING	,,	1	7,155	Taiping O.E.
Taiping Town	,,	26	5,850	Taiping
Batu Matang	,,	1	25	,,
Choong Sam Mines	,,	2	1,300	,,
Changkat Jering	,,	1	50	,,
Gunong Semanggol Quarry ..	,,	1	50	,,
Gunong Semanggol Waterworks	,,	1	500	,,
Kamunting Village	,,	1	100	,,
Klian Intan	,,	1	50	Rahman Hydraulic Tin
Matang	,,	1	50	Taiping
Military Substations	,,	8	1,450(c)	,,
Port Weld	,,	1	100	,,
Simpang Ampat	,,	1	25	,,
Simpang Tiga	,,	1	50	,,
Simpang Village	,,	1	200	,,
Taiping Consolidated Tin ..	,,	1	950(d)	,,
Tropical Produce	,,	1	500	,,
TANJONG RAMBUTAN ..	,,	1	250(e)	PRHEP Co.
ARAU	Perlis	1	500	Arau O.E.
Arau Pumping Station	,,	1	200	Arau
Jejawi Village	,,	1	25	,,
Jelampok	,,	1	25	,,
Kangar	,,	2	500	,,
Kodiang	Kedah	1	100	,,

(a) Includes 1 P.R.H.E.P. 6.6 kV step-down substation of 100 kVA capacity feeding into the Batu Gajah System.

(b) Includes 4 P.R.H.E.P. 6.6 kV step-down substation of 575 kVA total capacity feeding direct into the Ipoh System.

(c) The substations are military property.

(d) The transformer belongs to the Taiping Consolidated Tin Ltd.

(e) Property of P.R.H.E.P. Company.

APPENDIX V (*Cont.*)

TRANSMISSION, IMPORT AND DISTRIBUTION SUBSTATIONS (Cont.)

Locality	State	No. of sub-stations	Transformer Capacity kVA	Supply From
BUTTERWORTH	Province Wellesley	1	(3,750kW (4,000kVA	Penang S.T. Butterworth O.E. & Gasifyer
GLUGOR	,,	1	30,000 kVA	Penang S.T.
Butterworth Town	,,	21	5,450	Butterworth
Ara Rendang	,,	1	50	,,
Bukit Mertajam	,,	11	2,340	,,
Bukit Panchor	,,	1	50	,,
Bukit Panchor Govt. Qrs.	,,	1	25	,,
Bukit Tengah Gate	,,	1	100	Butterworth
Bukit Tengah Tower	,,	1	25	,,
Bukit To' Allang	,,	1	1,500	,,
Coir Industries	,,	1	50	,,
Jalan Petri Intake	,,	1	300	,,
Jalan Kuala Ketil	,,	1	100	,,
Kampong Guar Parahu	,,	1	50	,,
Kampong Relau	,,	1	25	,,
Kampong Setol	,,	1	50	,,
Kampong Telok	,,	1	50	,,
Kepala Batas	,,	6	1,000	,,
Lahar Ikan Mati	,,	1	50	,,
Lahar Yoi	,,	3	275	,,
Mak Mandin	,,	1	500	,,
Malaysia Weaving Factory	,,	1	200	,,
Mangkuang Sungei Lembu	,,	1	25	,,
Merbau Kudong	,,	1	50	,,
Nibong Tebal	,,	5	400	,,
Oriental Estate	,,	1	100	,,
Paper Mill	,,	1	500	,,
Paya Keladi	,,	1	50	,,
Pekan Darat	,,	1	100	,,
Penaga	,,	7	375	,,
Permatang Pasir	,,	1	50	,,
Permatang Tinggi	,,	1	50	,,
Permatang To' Kandu	,,	1	50	,,
Pinang Tunggal	,,	1	750	,,
Prai	,,	8	4,370	,,
RAAF Radar Station	,,	1	100	,,
Simpang Ampat	,,	3	2,125	,,
Southern Iron Works	,,	1	200	,,
Sungei Bakap	,,	3	220	,,
Sungei Dua	,,	2	100	,,
Sungei Duri	,,	1	25	,,
Sg. Juru Dam & Gates	,,	1	5	,,
Sungei Kechil	,,	3	90	,,
Sungei Limau	,,	1	25	,,
Sungei Puyu	,,	1	10,050	,,
Tai San	,,	1	50	,,
Tasek	,,	1	50	,,
Tasek Glugor	,,	1	100	,,
Val D'or	,,	3	85	,,
Jalan Sekarat	Kedah	1	200	,,
Jujong	,,	1	50	,,
Kampong Permatang Pasir	,,	1	25	,,
Parit Buntar	Perak	7	650	,,
SUNGEI PATANI	Kedah	1	1,825	Sungei Patani O.E.
Sungei Patani Town	,,	9	7,100	Sungei Patani

TRANSMISSION, IMPORT AND DISTRIBUTION SUBSTATIONS (Cont.)

Locality	State	No. of sub-stations	Transformer Capacity kVA	Supply From
	CENTRAL AREA			
KUALA LUMPUR & DISTRICT	Selangor	8	320,000	Central Network
Kuala Lumpur Commerce & Industry	,,	176	118,435(a)	K.L. District
Kuala Lumpur Domestic ..	,,	150	41,725	,,
Kuala Lumpur Dredges & Mines	,,	37	89,235(b)	,,
Kuala Lumpur Quarries ..	,,	8	4,850	,,
Petaling Jaya Commerce & Industry	,,	55	38,400(c)	,,
Petaling Jaya Domestic	,,	17	7,250	,,
Ampang	,,	3	400	,,
Batu Arang Village	,,	1	200	,,
Batang Berjuntai Village ..	,,	1	100	,,
Jinjang	,,	4	1,350	,,
Kalumpang Village	,,	1	100	,,
Kampong Sungei Ramal ..	,,	1	50	,,
Kepong	,,	3	700	,,
Kundang Village	,,	1	50	,,
Puchong	,,	2	250	,,
Rawang	,,	4	600	,,
Serdang	,,	2	400	,,
Serendah	,,	2	150	,,
Sungei Besi	,,	2	300	,,
Sungei Buloh	,,	1	100	,,
BANGI	,,	1	1,500	Central Network
Bangi District	,,	9	900	Bangi
Banting	,,	3	300	,,
Bukit Changgang	,,	1	50	,,
Kampong Olak Lempit	,,	1	25	,,
Labohan Dagang	,,	1	50	,,
KAJANG	,,	2	4,000	Central Network
Kajang Town	,,	7	4,100	Kajang
Cheras	,,	5	1,300	,,
Semenyih	,,	1	200	,,
KERLING	,,	1	500	Central Network
Kerling Estate	,,	1	100	Kerling
Kerling Village ..	,,	2	225	,,

(a) Includes 3,500kVA transformer capacity belonging to consumer

(b) ,, 11,160 ,, ,, ,, ,, ,, ,,

(c) ,, 9,600 ,, ,, ,, ,, ,, ,,

APPENDIX V (*Cont.*)

TRANSMISSION, IMPORT AND DISTRIBUTION SUBSTATIONS (Cont.)

Locality	State	No. of sub-stations	Transformer Capacity kVA	Supply From
KLANG	Selangor	1	20,000	Connaught Bridge S.T.
Klang & District	,,	52	19,810(d)	Klang
Port Swettenham	,,	17	4,265	,,
KUALA KUBU BAHRU ..	,,	1	1,000	Central Network
Kuala Kubu Bahru Town	,,	4	450	Kuala Kubu Bahru
RASA	,,	1	500	Central Network
Rasa Village	,,	2	200	Rasa
Batang Kali	,,	1	100	,,
KUANG	,,	1	500	Central Network
Kuang Village	,,	1	100	Kuang
SUNGEI CHOH	,,	1	500	Central Network
Sungei Choh Estate	,,	1	100	Sungei Choh
Sungei Choh Village	,,	1	50	,,
TANJONG KARANG ..	,,	1	1,000	Central Network
Tanjong Karang Town	,,	2	700	Kuala Selangor
Kuala Selangor & District ..	,,	3	600	,,
ULU LANGAT	,,	1	500	Central Network
Ulu Langat District	,,	5	250	Ulu Langat
TANJONG MALIM ..	Perak	1	750	Central Network
Tanjong Malim Town	,,	4	600	Tanjong Malim
SOUTHERN AREA				
BATU PAHAT	Johore	1	6,000	Central Network
Batu Pahat Town	,,	14	4,110	Batu Pahat
JOHORE BAHRU	,,	1	9,000	Sultan Ismail S.T.
F.E.T.C.	,,	3	1,200	,,
MOUNT AUSTIN	,,	1	200	,,
SCUDAI	,,	1	5,000	,,
TAMPOI No. 1	,,	1	3,600	,,
TAMPOI No. 2	,,	1	3,000	,,
TEBRAU TIE-IN	,,	1	3,660	,,
TEBRAU WATERWORKS	,,	1	7,000	,,
ULU TIRAM	,,	1	1,000	,,
Johore Bahru Town	,,	42	12,470	Johore Bahru

(d) Includes 3,600 kVA transfomer capacity belonging to comsumer

APPENDIX V (*Cont.*)

TRANSMISSION, IMPORT AND DISTRIBUTION SUBSTATIONS (Cont.)

Locality	State	No. of sub-stations	Transformer Capacity kVA	Supply From
Scudai	Johore	1	50	Scudai Waterworks
Tampoi	,,	25	6,850	Tampoi No. 1
Tampoi	,,	16	5,640	Tampoi No. 2
Tebrau	,,	9	2,875	Tebrau Tie-In
KLUANG	,,	1	2,740	Kluang O.E.
Kluang Town	,,	21	7,025	Kluang
KOTA TINGGI	,,	1	410	Kota Tinggi O.E.
Kota Tinggi Town	,,	2	400	Kota Tinggi
MERSING	,,	1	200	Mersing O.E.
Mersing Town	,,	1	100	Mersing
MUAR	,,	1	6,000	Central Network
Muar Town	,,	14	3,700	Muar
Bakri New Village	,,	1	100	,,
Bukit Pasir	,,	1	100	,,
Jalan Sekolah Ismail	,,	1	100	,,
Kampong Parit Lanjut	,,	1	25	,,
Kampong Tengah Jeram ..	,,	1	30	,,
Parit Ahmad	,,	1	50	,,
Parit Bakar ..	,,	1	50	,,
Parit Beting	,,	1	200	,,
Parit Jawa	,,	1	200	,,
Parit Keroma	,,	1	50	,,
Parit Limbong	,,	1	50	,,
Parit Pulai	,,	1	50	,,
Parit Raja	,,	1	100	,,
Parit Sakai	,,	1	25	,,
Simpang Jeram	,,	1	100	,,
Tangkak	,,	2	400	,,
Tok Raja	,,	1	100	,,
PONTIAN	,,	1	900	Pontian O.E.
Pontian Town	,,	4	600	Pontian
Pontian Besar	,,	1	500	,,
SEGAMAT	,,	1	650	Segamat O.E.
Segamat Town	,,	4	700	Segamat
Pekan Jabi	,,	1	25	,,
ALOR GAJAH	Malacca	1	3,000	Central Network
Alor Gajah Town	,,	2	250	Alor Gajah
Gadek	,,	2	225	,,
Ganun	,,	1	25	,,
Padang Sebang	,,	2	225	,,
Pegoh	,,	1	50	,,
Tebong	,,	5	975	,,
Malacca Town	,,	31	10,965	Malacca S.T.
Batang Tiga	,,	2	400	,,
Batu Berendam	,,	8	1,150	,,
Bertam Malim	,,	1	25	,,
Bertam Ulu	,,	1	25	,,
Bukit Bahru	,,	3	600	,,
Bukit Bruang	,,	1	25	,,
Bukit Katil	,,	1	25	,,

APPENDIX V (*Cont.*)

TRANSMISSION, IMPORT AND DISTRIBUTION SUBSTATIONS (Cont.)

Locality	State	No. of sub-stations	Transformer Capacity kVA	Supply From
Bukit Prenggi	Malacca	1	100	,,
Bukit Rambai	,,	1	50	,,
Bukit Sebukor	,,	1	50	,,
Durian Tunggal Pumphouse ..	,,	1	1,000	,,
Kampong Cheng..	,,	1	25	,,
Klebang	,,	3	600	,,
Masjid Tanah	,,	2	225	,,
Paya Rumput Village	,,	1	25	,,
Semabok Village	,,	2	150	,,
Solok Paya Rumput	,,	1	25	,,
Sungei Udang	,,	5	475	,,
Tanggar Batu Village	,,	2	225	,,
Tanjong Kling	,,	3	350	,,
Terendak Camp	,,	22	7,250(a)	,,
MERLIMAU	,,	1	1,830	Central Network
Merlimau Town	,,	4	425	Merlimau
Chinchin	,,	1	25	,,
Jasin	,,	1	300	,,
GEMAS	Negeri Sembilan	1	200	Gemas O.E.
Gemas Town	,,	3	400	Gemas
Tampin	,,	6	1,250	Alor Gajah
RANTAU	,,	1	4,830	Central Network
Bradwell Estate	,,	1	50	Rantau
Bukit Palong Estate	,,	1	25	,,
Kampong Siliau	,,	1	25	,,
Kuala Klawang	,,	1	30	Kuala Klawang O.E.
Linsum	,,	1	50	Rantau
Lukut	,,	2	75	,,
Port Dickson	,,	25	3,790	,,
Rantau	,,	1	1,250	,,
Rantau Village	,,	1	100	,,
REMBAU	,,	1	100	Rembau O.E.
Rembau Town	,,	3	125	Rembau
Sagga Estate	,,	1	25	Rantau
Sendayan Mines	,,	4	1,550	,,
Siliau Town	,,	4	1,750	,,
Tampin Linggi Estate ..	,,	1	200	,,
Tanah Merah Estate	,,	5	600	,,
Federal Tile Factory, Sungei Pelek	Selangor	1	300	,,
Sepang	,,	3	300	,,
Sungei Pelek	,,	1	100	,,
SEREMBAN	Negeri Sembilan	1	20,000	Central Network
Seremban Town	,,	37	11,302	Seremban
Batang Benar	,,	1	50	Bangi
Beranang Village	,,	1	150	Seremban
Bukit Bemban	,,	1	15	,,
Bukit Sepang	,,	1	50	,,
Kampong Gebok	,,	1	25	,,
Kampong Solok	,,	1	25	,,
Kombok	,,	1	50	,,

(a) Owned by Military.

APPENDIX V (*Cont.*)

TRANSMISSION, IMPORT AND DISTRIBUTION SUBSTATIONS (Cont.)

Locality	State	No. of sub-stations	Transformer Capacity kVA	Supply From
KUALA PILAH	Negeri Sembilan	1	600	Kuala Pilah O.E.
Kuala Pilah Town	,,	6	700	Kuala Pilah
Kuala Sawah	,,	1	25	Seremban
Linggi Waterworks	,,	3	250	,,
Mambau	,,	1	100	,,
Mantin	,,	2	400	,,
New Labu Estate	,,	1	200	,,
Nilai	,,	1	100	Bangi
Pajam	,,	1	100	,,
Paroi Village	,,	2	225	Seremban
Rahang New Village	,,	3	500	,,
Seremban Garden Estate ..	,,	1	300	,,
Sikamat Village	,,	1	50	,,
Sin Moh Quarry	,,	1	100	,,
Sungei Kaya	,,	1	100	,,
Sungei Mahang Estate	,,	1	50	Bangi
Ulu Temiang	,,	1	50	Seremban
United Plywood Factory ..	,,	1	400	,,
EASTERN AREA				
KOTA BHARU	Kelantan	4	6,800	Kota Bharu O.E.
Kota Bharu Town	,,	19	3,950	Kota Bharu
Bachok	,,	1	100	,,
Batu Tiga Puloh	,,	1	50	,,
Bukit Abal	,,	1	50	,,
Bukit Tanah	,,	1	50	,,
Chabang Tiga Pendek	,,	1	50	,,
Chop Seng Hin	,,	1	200	,,
Jelawat	,,	1	50	,,
Kampong Banggol	,,	1	50	,,
Kampong Beranggan	,,	1	25	,,
Kampong Bharu	,,	1	100	,,
Kampong Chelah Gu	,,	1	25	,,
Kampong Guan Pendek ..	,,	1	25	,,
Kampong Guchil	,,	1	50	,,
Kampong Kadok	,,	1	50	,,
Kampong Kemuning	,,	1	50	,,
Kampong Kota	,,	1	50	,,
Kampong Labok	,,	1	50	,,
Kampong Machang	,,	1	100	,,
Kampong Melor	,,	1	50	,,
Kampong Morak	,,	1	25	,,
Kampong Sakar	,,	1	25	,,
Kampong Tendong	,,	1	25	,,
Kampong Terbok	,,	1	25	,,
Kedai Mulong	,,	1	50	,,
Kedai Salor	,,	1	50	,,
Ketereh	,,	1	50	,,
Kok Lanas	,,	1	50	,,
Kubang Krian	,,	1	200	,,

APPENDIX V (*Cont.*)

TRANSMISSION, IMPORT AND DISTRIBUTION SUBSTATIONS (Cont.)

Locality	State	No. of sub-stations	Transformer Capacity kVA	Supply From
Lemal	Kelantan	2	3,950	Lemal O.E.
Lundang	,,	1	4,100	Kota Bharu
Palekbang..	,,	1	100	,,
Parit China	,,	1	50	,,
Pasir Gajah Estate	,,	1	250	,,
Pasir Mas	,,	4	1,150	,,
Pasir Pekan	,,	1	25	,,
Pasir Puteh	,,	1	250	,,
Pengkalan Chepa	,,	4	550	,,
Pulai Chondong	,,	2	600	,,
Radio Malaysia	,,	1	200	,,
Salor	,,	1	400	,,
Selising	,,	1	50	,,
Sungei Durian	,,	1	50	,,
Tanah Merah	,,	1	200	,,
Tanjong Mas	,,	1	50	,,
Tepi Sungei	,,	1	50	,,
Tumpat	,,	3	400	,,
Wakaf Bahru	,,	1	25	,,
Wakaf Che Yeh	,,	1	100	,,
BENTONG	Pahang	1	500	Bentong O.E.
Bentong Town	,,	5	600	Bentong
FRASER'S HILL	,,	1	200	Fraser's Hill O.E.
Fraser's Hill Town	,,	10	437	Fraser's Hill
KUALA KRAI	,,	1	300	Kota Bharu
KUALA LIPIS	,,	1	820	Kuala Lipis O.E.
Kuala Lipis Town	,,	11	570	Kuala Lipis
KUANTAN	,,	1	2,350	Kuantan O.E.
Kuantan Town	,,	12	2,450	Kuantan
Beserah	,,	1	100	,,
Kampong Kobat	,,	1	200	,,
Lee Rubber Works	,,	1	200	,,
PWD Quarry	,,	1	500	,,
PWD Workshop	,,	1	200	,,
Sungei Talam Estate ..	,,	1	25	,,
V.H.F.	,,	1	25	,,
Water Purification Plant ..	,,	1	50	,,
MENTAKAB	,,	1	1,050	Mentakab O.E.
Mentakab Town	,,	10	1,015	Mentakab
Roundabout	,,	1	100	,,
Temerloh	,,	2	500	,,
PEKAN	,,	1	650	Pekan O.E.
Istana Abu Bakar	,,	1	300	Pekan
RAUB	,,	1	400	Raub O.E.
Raub Town	,,	5	650	Raub
SEMPAM HYDRO	,,	1	1,975	Sempam Hydro
DUNGUN	Trengganu	1	500	Dungun O.E.
Dungun Town	,,	4	450	Dungun

APPENDIX (*Cont.*)

TRANSMISSION, IMPORT AND DISTRIBUTION SUBSTATIONS (Cont.)

Locality	State	No. of sub-stations	Transformer Capacity kVA	Supply From
KUALA TRENGGANU	Trengganu	2	2,000	Kuala Trengganu O.E.
Kuala Trengganu Town ..	,,	15	2,350	Kuala Trengganu
Bukit Payong Village	,,	1	50	,,
Chenering	,,	1	50	,,
Losong	,,	2	250	,,
Marang	,,	2	125	,,
Pulau Musang	,,	1	200	,,

APPENDIX VI

LIST OF LICENSED PUBLIC SUPPLIES

The system of supply (unless otherwise stated) is AC 400/230 Volts 50 cycles.

No.	Name of Town or Village	Capacity of Generating or receiving Station Plant	Motive Power	Fuel	Receives bulk supply from	Owner & Operating Authority
		SOUTHERN AREA				
		JOHORE				
*1.	Senggarang	110 kW	O.E.	Oil	—	Lee Leong Piow
2.	Bukit Gambir	76 kW	,,	,,	—	Bukit Gambir Co.
*3.	Parit Raja	50 kW	,,	,,	—	Parit Raja Elect. Co.
4.	Kulai	381.2 kW	,,	,,	—	Eng Ann & Co.
*5.	Semerah	40 kW	,,	,,	—	Lian Kong Elect. Co.
6.	Yong Peng	440 kW	,,	,,	—	Yong Peng Elect. Co.
7.	Paloh	70 kW	,,	,,	—	Paloh Elec. Co.
8.	Senai	95 kW	,,	,,	—	Eng Ann & Co.
*9.	Bukit Kepong	3 kW	,,	,,	—	Bukit Kepong Producers Ltd.
*10.	Grisek	25 kW	,,	,,	—	Grisek Elec. Supply Co-operative Society
*11.	Benut	110.4 kW	,,	,,	—	Benut Elec. Co.
*12.	Buloh Kasap	77 kW	,,	,,	—	Buloh Kasap Elec. Co.
13.	Sungei Rengit	70 kW	,,	,,	—	Kwong Hua & Co.
*14.	Ulu Tiram	107 kW	,,	,,	—	Sharikat Hua Seng Letrik Per Kongsi.
*15.	Parit Sulong	62.8 kW	,,	,,	—	Lim Ah Chu
*16.	Simpang Rengam	90 kW	,,	,,	—	Kueh Boon Ho
*17.	Ayer Itam	106 kW	,,	,,	—	Goh Suan Lock
*18.	Pagoh	102.6 kW	,,	,,	—	Kueh Boon Ho
*19.	Serom	56 kW	,,	,,	—	Kelang Kuasa Api
20.	Rengit	147 kW	,,	,,	—	President, Chinese Association.
*21.	Lenga Village	44 kW	,,	,,	—	Tan Cheng Swee
*22.	Sri Gading	44 kW	,,	,,	—	Sri Gading Elect. Co.
23.	Sedili Besar	105.2 kW	,,	,,	—	Sedili Besar Elec. Co
*24	Permas	19 kW	,,	,,	—	Loh Pak Yeo
*25.	Ayer Baloi	34 kW	,,	,,	—	Ayer Baloi Electric Co.
*26.	Panchor Village	62.45 kW	,,	,,	—	Kueh Boon Ho
*27.	Bukit Kangkar	22 kW	,,	,,	—	Sheikh Abdullah Elec. Co.
28	Endau Town	130.4 kW	,,	,,	—	Endau Electricity Supply Co.
*29.	Kayu Ara Pasong (supply ceased w.e.f. 16.11.64)	25 kW	,,	,,	—	Loh Pak Yeo

NOTE: *Indicates Part time supplies restricted to 12 hours or less per day.

LIST OF LICENSED PUBLIC SUPPLIES

The system of supply (unless otherwise stated) is AC 400/230 Volts 50 cycles.

No.	Name of Town or Village	Capacity of Generating or Receiving Station Plant	Motive Power	Fuel	Receives bulk supply from	Owner & Operating Authority
30.	Kahang New Village	75 kW	O.E.	Oil	—	Low Tim Chui
*31.	Jamaluang New Village	66 kW	,,	,,	—	Eng Ann & Co.
*32.	Kelapa Sawit New Village	50 kW	,,	,,	—	Si Cho Cheng
*33.	See Long New Village	42.5 kW	,,	,,	—	Yap Chin San
*34.	Sri Medan	25 kW	,,	,,	—	Low Tim Chui
		NEGERI SEMBILAN				
*35.	Batu Kikir	10 kW	O.E.	Oil	—	Chop Sin Huat Hin
*36.	Titi	44 kW	,,	,,	—	Titi Elec. Supply Co.
*37.	Batang Melaka	22 kW	,,	,,	—	Oh Ah Hay
*38.	Johol	22 kW	,,	,,	—	Siamley Elec. Co.
*39.	Pertang	16 kW	,,	,,	—	Pertang Elec. Co.
*40.	Pasir Panjang P.D.	54 kW	,,	,,	—	Khong Khoon Chye
*41.	Tanjong Ipoh & Simpang Sri Menanti	20 kW	,,	,,	—	Eng Hong Co.
		EASTERN AREA				
		PAHANG				
*1.	Kuala Krau	30 kW	O.E.	Oil	—	Pengerusi Majlis Tempatan
		TRENGGANU.				
*1.	Pekan Ayer Jernih	12 kW	O.E.	Oil	—	Phang Yak Suan
		KELANTAN				
*1.	To'Uban, Pasir Mas	40 kW	O.E.	Oil	—	Pengerusi Majlis Tempatan.
		CENTRAL AREA				
		SELANGOR				
*1.	Sungei Ayer Tawar, Sabak Bernam	40kW(D.C.)	O.E.	Oil	—	Haji Jamhuri bin Haji Saad.
*2.	(a) 39th Mile Village, Sabak Bernam	4.5 kW	,,	,,	—	Tan Kai Seng
*3.	Pulau Ketam Village	79 kW	,,	,,	—	Pulau Ketam Elect. Co.
4.	Sabak Bernam	430 kW	,,	,,	—	Tan Bros. Elec. Co.
*5.	Tanjong Sepat	105 kW	,,	,,	—	Goh Eng Boy

NOTE: *Indicates Part time supplies restricted to 12 hours or less per day.

LIST OF LICENSED PUBLIC SUPPLIES

The system of supply (unless otherwise stated) is AC 400/230 Volts 50 cycles.

No.	Name of Town or Village	Capacity of Generating or Receiving Station Plant	Motive Power	Fuel	Receives bulk supply from	Owner & Operating Authority
6.	Sekinchan New Village	178 kW	O.E.	Oil	—	Sekinchan Elec. Supply Co.
7.	Sg. Besar Town and Bagan Fishing Village.	136 kW	,,	,,	—	Min Chong Elec. Co. Ltd.
8.	Sungei Pelek	—	—	—	NEB	Sungei Pelek Elec. Co.
	NORTHERN AREA					
	KEDAH					
*1.	Bedong	113 kW	O.E.	Oil	—	Beloon Elec. Co.
*2.	Merbau Pulas	12 kW	,,	,,	—	Lim Yew Jin
3.	Baling	166 kW	,,	,,	—	Sharikat Persahabatan Berhad.
*4.	Pekan Pulai, Baling	10 kW	,,	,,	—	Haji Ahmad bin Ismail
*5.	Alor Janggos, Alor Star	25 kW	,,	,,	—	Haji Sulaiman bin Haji Hassan.
*6.	Kota Sarang Semut	20 kW	,,	,,	—	Ooi Beng Hock
7.	Selama	64 kW	,,	,,	—	Pengerusi, Majlis. Tempatan.
*8.	Kampong Langgar (Taken over by the Board w.e.f. 15.6.65)	25 kW	O.E.	Oil	—	Mohd. bin Hussein
9.	Pekan Kuah	184 kW	,,	,,	—	Ho Cheow Huat
*10.	Changloon	25 kW	,,	,,	—	Ban Guan Hoe
*11.	Pekan Tunjang	40 kW	,,	,,	—	Teoh Eng Thuan
*12.	Pokok Sena	65 kW	,,	,,	—	Pokok Sena Elec. Co.
13.	Serdang (18 hours supply)	180 kW	,,	,,	—	Yew Ah Kow Engineering Works.
*14.	Pendang, Kota Star	73 kW	,,	,,	—	Quah Ah Pin
15.	Kuala Ketil (18 hours supply)	78 kW	,,	,,	—	Kuala Ketil Elec. Supply Co.
*16.	Sungei Yen Kechil	10 kW	,,	,,	—	Khor Seng Chang
17.	Gurun (20 hours supply)	153 kW	,,	,,	—	Beloon Elec. Co.
*18.	Kuala Nerang, Padang Terap	25 kW	,,	,,	—	Ahmad bin Haji Rejab.
*19.	Mahang Village	50 kW	,,	,,	—	Haji Mohd. Isa bin Haji Dahaman.
*20.	Kupang, Baling	50 kW	,,	,,	—	Haji Ahmad bin Ismail.
*21.	Yen Besar	41 kW	,,	,,	—	Dinn's Elec. Service.
*22.	Kubor Panjang Town	16 kW	,,	,,	—	S.A. Mohd. Hanif & Co.

NOTE: *Indicates Part time supplies restricted to 12 hours or less per day.

(a) Restricted Public Licensed Installation.

APPENDIX VI (*Cont.*)

LIST OF LICENSED PUBLIC SUPPLIES

The system of supply (unless otherwise stated) is AC 400/230 Volts 50 cycles.

No.	Name of Town or Village	Capacity of Generating or Receiving Station Plant	Motive Power	Fuel	Receives bulk supply from	Owner & Operating Authority
*23.	Lubok Buntar Village, Bandar Baharu	44 kW	O.E.	Oil	—	Setia Usaha, Sharikat Letrik, Lubok Buntar.
24.	Sungei Limau (Simpang Tiga)	34.5 kW	,,	,,	—	Yeoh Cheam Cheng Hup. Bee Sawmill.
*25.	Sungei Lallang, Kedah	25 kW	,,	,,	—	Lim Kup Jit
*26.	Pekan, Sik	45 kW	,,	,,	—	Dinn's Elect. Service.
*27.	Ayer Itam & Kerpang	21 kW	,,	,,	—	Lim Teng San
28.	Kuala Pegang	44 kW	,,	,,	—	Haji Ahmad bin Ismail.
29.	(a) Bukit Junun	3 kW			—	Hock Lai Hong
		PENANG				
30.	George Town & Penang	40,000 kW	Steam Turbine	Oil	—	City Council of George Town, Penang.
31.	Sg. Pinang	2,500 kW	Oil Engine	,,	—	-do-
32.	Ayer Itam	800 kW	Hydro	—	—	-do-
		PERLIS				
33.	Kuala Perlis	390 kW	O.E.	Oil	—	Perlis Ice Works Ltd.
*34.	Simpang Ampat, Kangar	44 kW	,,	,,	—	Lim Sum Sum
*35.	Kuala Sanglang	32 kW	,,	,,	—	Khoo Swee Hin.
		PERAK				
36.	Bagan Serai	377.6 kW	Diesel Engine	Oil	—	Kinta Elec. Dist.
37.	Selama	98.56 kW	,,	,,	—	,,
38.	Kuala Kurau	211.2 kW	,,	,,	—	,,
39.	Grik	184.96 kW	,,	,,	—	,,
40.	Trong	38 kW	,,	,,	—	,,
41.	Lenggong	189.92 kW	,,	,,	—	,,
42.	Bruas	109.12 kW	,,	,,	—	,,
43.	Batu Kurau	32 kW	,,	,,	—	,,
44.	Ayer Kuning	38 kW	,,	,,	—	,,
*45.	Kati	16 kW	,,	,,	—	,,
46.	Sauk	38 kW	,,	,,	—	,,
*47.	Padang Grus	16 kW	,,	,,	—	,,
*48.	Kota Tampan	16 kW	,,	,,	—	,,
*49.	Selat Pagar	8 kW	,,	,,	—	,,
*50.	Ayer Kala	16 kW	,,	,,	—	,,

NOTE: *Indicates part time supplies restricted to 12 hours or less per day.
(a) Restricted Public Licenced Installation.

LIST OF LICENSED PUBLIC SUPPLIES

The system of supply (unless otherwise stated) is AC 400/230 Volts 50 cycles.

No.	Name of Town or Village	Capacity of Generating or Receiving Station Plant	Motive Power	Fuel	Receives bulk supply from	Owner & Operating Authority
*51.	Kuak & Raban	22 kW	Diesel Engine	Oil	—	Kinta Elec. Dist.
52.	Lima Kati	24 kW	—	—	PRHEP	,,
53.	Lubok Merbau	24 kW	—	—	,,	,,
54.	Kg. Jelepang	16 kW	—	—	,,	,,
55.	Padang Assam	24 kW	—	—	,,	,,
56.	Kuala Dhal	24 kW	—	—	,,	,,
57.	Padang Rengas	48 kW	—	—	,,	,,
58.	Kuala Kangsar	1432 kW	—	—	,,	,,
59.	Sungei Siput	544 kW	—	—	,,	,,
60.	Rimba Panjang	80 kW	—	—	,,	,,
61.	Enggor and Kg. Enggor	128 kW	—	—	,,	,,
62.	Salak Bharu	20 kW	—	—	,,	,,
63.	Salak North	20 kW	—	—	,,	,,
64.	Kampong Jawang	16 kW	—	—	,,	,,
65.	Kg. Kota Lama Kanan	40 kW	—	—	,,	,,
66.	Kg. Saiong	40 kW	—	—	,,	,,
67.	Kg. Saiong Tengah	40 kW	—	—	,,	,,
68.	Kg. Bendang Kering	40 kW	—	—	,,	,,
69.	Menglembu	1920 kW	—	—	,,	,,
70.	Lahat	80 kW	—	—	,,	,,
71.	Pinji Estate	80 kW	—	—	,,	,,
72.	Pengkalan Pegoh	40 kW	—	—	,,	,,
73.	Bukit Merah	120 kW	—	—	,,	,,
74.	New Pasir Puteh	80 kW	—	—	,,	,,
75.	Kg. Pasir Puteh	20 kW	—	—	,,	,,
76.	Station Park	40 kW	—	—	,,	,,
77.	Kuan Woh Yean	80 kW	—	—	,,	,,
78.	D.I.D. Federal Reserve.	20 kW	—	—	PRHEP	Kinta Elec. Dist.
79.	Jelapang	128 kW	—	—	,,	,,
80.	Chemor	216 kW	—	—	,,	,,
81.	Kuala Kuang	40 kW	—	—	,,	,,
82.	Kanthan Bharu	80 kW	—	—	,,	,,
83.	Kanthan	80 kW	—	—	,,	,,
84.	Tanah Hitam	24 kW	—	—	,,	,,
85.	Tg. Rambutan Filteration Plant.	80 kW	—	—	,,	,,
86.	Tg. Rambutan site Office	20 kW	—	—	,,	,,
87.	Tg. Rambutan PWD. Quarry	80 kW	—	—	,,	,,
88.	Tg. Rambutan PWD. Cantonment	80 kW	—	—	,,	,,
89.	Tg. Rambutan	80 kW	—	—	,,	,,
90.	Tambun	20 kW	—	—	,,	,,
91.	Kg. Simee	120 kW	—	—	,,	,,
92.	Tasek	1688 kW	—	—	,,	,,
93.	Kg. Tawas	80 kW	—	—	,,	,,
94.	Simpang Pulai	80 kW	—	—	,,	,,

NOTE: *Indicates Part time supplies restricted to 12 hours or less per day.

APPENDIX VI (*Cont.*)

LIST OF LICENSED PUBLIC SUPPLIES

The system of supply (unless otherwise stated) is AC 400/230 Volts 50 cycles.

No.	Name of Town or Village	Capacity of Generating or Receiving Station Plant	Motive Power	Fuel	Receives bulk supply from	Owner & Operating Authority
95.	Kg. Sengat	40 kW	—	—	PPHEP	Kinta Elec. Dist.
96.	Kg. Kepayang	40 kW	—	—	,,	,,
97.	Pengkalan Lama	24 kW	—	—	,,	,,
98.	Pengkalan Bharu & Sindoo	24 kW	—	—	,,	,,
99.	Kg. Ayer Mati	24 kW	—	—	,,	,,
100.	Sg. Trap & MTD	40 kW	—	—	,,	,,
101.	Kinta Kellas Estate	80 kW	—	—	,,	,,
102.	Kg. Pisang	16 kW	—	—	,,	,,
103.	Tronoh	80 kW	—	—	,,	,,
104.	Kg. Nalla	20 kW	—	—	,,	,,
105.	Kg. Bali.	40 kW	—	—	,,	,,
106.	Bemban	40 kW	—	—	,,	,
107.	Siputeh	16 kW	—	—		
108.	Siputeh Military Camp	20 kW	—	—	,,	,,
109.	Reyland Estate	20 kW	—	—	,,	,,
110.	Glenealy Estate	20 kW	—	—	,,	,,
111.	Parit & PWD Waterworks	240 kW	—	—	,,	,,
112.	Riverine	360 kW	—	—	,,	,,
113.	Pusing	240 kW	—	—	,,	,,
114.	Papan	40 kW	—	—	,,	,,
115.	Membang Diawan	160 kW	—	—	,,	,,
116.	Tronoh Mines	20 kW	—	—	,,	,,
117.	Kampar	1284 kW	—	—	,,	,,
118.	Kuala Dipang PWD Quarry	720 kW	—	—	,,	,,
119.	Chendrong	20 kW	—	—	,,	,,
120.	Kinta Valley Estate	20 kW	—	—	,,	,,
121.	Riverview Estate	40 kW	—	—	,,	,,
122.	Sikh Temple	24 kW	—	—	,,	,,
123.	Sungei Durian	40 kW	—	—	,,	,,
124.	Tanjong Tualang	120 kW	—	—	,,	,,
125.	Ayer Papan	16 kW	—	—	,,	,,
126.	Kg. Timah	240 kW	—	—	,,	,,
127.	Malim Nawar	145.6 kW	—	—	,,	,,
128.	Kg. Malim Nawar	24 kW	—	—	,,	,,
129.	Kg. Tualang Sekah	24 kW	—	—	,,	,,
130.	Kuala Dipang	24 kW	—	—	,,	,,
131.	Jeram	24 kW	—	—	,,	,,
132.	Kg. Jeram	24 kW	—	—	,,	,,
133.	Kg. Gunong Panjang	24 kW	—	—	,,	,,
134.	Kg. Gunong Mesah	40 kW	—	—	,,	,,
135.	Kg. Pulai	20 kW	—	—	,,	,,
136.	Lawan Kuda	40 kW	—	—	,,	,,
137.	Gopeng	80 kW	—	—	,,	,,
138.	Kota Bharu	20 kW	—	—	,,	,,
139.	Tapah	380 kW	—	—	,,	,,
140.	Lubok Katak	24 kW	—	—	,,	,,
141.	Kg. Pahang	40 kW	—	—	,,	,,
142.	Batang Padang Hydro Elec. Scheme.	176 kW	—	—	,,	,,

LIST OF LICENSED PUBLIC SUPPLIES

The system of supply (unless otherwise stated) is AC 400/230 Volts 50 cycles.

No.	Name of Town or Village	Capacity of Generating or Receiving Station Plant	Motive Power	Fuel	Receives bulk supply from	Owner & Operating Authority
143.	Kg. Raya & Kuala Raya	16 kW	—	—	PRHEP	Kinta Elec. Dist.
144.	Kg. Batu Dua	16 kW	—	—	,,	,,
145.	Pekan Getah	24 kW	—	—	,,	,,
146.	Tapah Road	80 kW	—	—	,,	,,
147.	Kg. Batu Tiga	40 kW	—	—	,,	,,
148.	Banir	20 kW	—	—	,,	,,
149.	Batu Tiga, Jalan Pahang	20 kW	—	—	,,	,,
150.	Kg. Batu Melintang	24 kW	—	—	,,	,,
151.	Temoh	120 kW	—	—	,,	,,
152.	Chenderiang	40 kW	—	—	,,	,,
153.	Trolak & Sg. Chinoh Estate	80 kW	—	—	,,	,,
154.	Trolak Estate	20 kW	—	—	,,	,,
155.	Sungei Klah Estate	20 kW	—	—	,,	,,
156.	Sungkai	80 kW	—	—	,,	,,
157.	Kg. Bikam	20 kW	—	—	,,	,,
158.	Bikam Estate	80 kW	—	—	PRHEP	Kinta Elec. Dist.
159.	Pekan Pasir	40 kW	—	—	,,	,,
160.	Sungk aiEstate	20 kW	—	—	,	,,
161.	Bidor	280 kW	—	—	,,	,,
162.	Bidor Railway Station	20 kW	—	—	,,	,,
163.	Kg. Jeram Mengkuang	24 kW	—	—	,,	,,
164.	Kg. Coldstream	40 kW	—	—	,,	,,
165.	Kuala Bikam	40 kW	—	—	,,	,,
166.	Tanah Mas	20 kW	—	—	,,	,,
167.	Kg. Batu Tujoh	40 kW	—	—	,,	,,
168.	Kg. Bercham	80 kW	—	—	,,	,,
169.	Simpang Jelong	40 kW	—	—	,,	,,
170.	Jerlun New Village	40 kW	—	—	,,	,,
171.	Chenderoh	27,000 kW	H.E.	Water	—	PRHEP
172.	Malim Nawar	94,000 kW	S.T.	Oil & coal	—	,,
173.	Batu Gajah	24,450 kW	S.T.	,,	—	,,
174.	Bagan Datoh	125 kW	O.E.	Oil	—	Bagan Datoh Electricity Supply Co
175.	Pantai Remis	154 kW	,,	,,	—	Kee Cheong Co.
*176.	Selekoh	44 kW	,,	,,	—	Tan Electric Supply Co.
177.	Slim River	160 kW	,,	,,	PRHEP	Slim River Elec. Supply Co.
*178.	Beting Luas	32.5kW(DC)	,,	,,	—	Ong Thiam Kow
*179.	Pasir Hitam	21 kW	,,	,,	—	Pasir Hitam Elect. Co.
180	Ayer Tawar (Dindings)	297.6 kW	,,	,,	—	Yew Ah Kow Engineering Works.
181.	Slim Village	12 kW	,,	,,	—	Tan Boon Pin
182.	Pangkor Island	249.6 kW	,,	,,	—	Han Sam Elec. Light Co.

NOTE: *Indicates part time supplies restricted to 12 hours or less per day.

LIST OF LICENSED PUBLIC SUPPLIES

The system of supply (unless otherwise stated) is AC 400/230 Volts 50 cycles.

No.	Name of Town or Village	Capacity of Generating or Receiving Station Plant	Motive Power	Fuel	Receives bulk supply from	Owner & Operating Authority
183.	Intan Village & Hitam Mine, Intan	2000 kW	H.E.	Water	—	Rahman Hydraulic Tin Ltd.
184.	Titi Serong, Parit Buntar	32 kW	O.E.	Oil	—	Lee Chin Woh
185.	Kg. Jalan Baharu, Parit Buntar	54 kW	,,	,,	—	Lim Lean Hong
186.	Behrang Station N.V. (Taken over by the Board in Nov. 1964)	33 kW	,,	,,	—	Khong Khoon Chye
187.	Tanjong Piandang	167.6 kW	,,	,,	—	Tanjong Piandang Elect. Co. Ltd.
188.	Kroh New Village	150 kW	,,	,,	—	Syndicate Electric Perak Utara.
*189.	Chui Chak New Village	22 kW	,,	,,	—	Wong Fook Loy
*190.	Pekan Pantau Panjang Selama	21 kW	,,	,,	—	Pantau Panjang Elec. Supply Co.
*191.	Sungei Bayor	29.6 kW	,,	,,	—	,,
192.	Gunong Semanggol	—	—	—	NEB.	Al-Ehya Public Electricity Supply

NOTE: *Indicates Part time supplies restricted to 12 hours or less per day.

APPENDIX VII

COMMERCIAL STATISTICS

TABLE I

Year ended 31st August	Units Generated/Purchased, Sent Out & Sold					
	Units Generated & Purchased		Units Sent Out		Units Sold	
	Millions	% increase over previous year	Millions	% increase over previous year	Millions	% increase over previous year
1961	740.6	15.8	704.6	15.9	632.8	16.1
1962	833.9	12.6	792.4	12.5	709.1	12.1
1963	944.6	13.2	898.4	13.3	802.2	13.1
1964	1071.0	13.4	1026.6	14.3	917.3	14.3
1965	1240.0	15.8	1191.0	16.0	1071.4	16.8

TABLE II

Year ended 31st August	Units Sent Out (millions) And Percentage of Total									
	1961		1962		1963		1964		1965	
From Board Power Stations:-		%		%		%		%		%
Steam Stations	504.9	71.7	571.3	72.1	637.6	71.0	509.3	49.6	588.1	49.4
Diesel Stations*	72.6	10.3	95.0	12.0	106.4	11.8	130.6	12.7	145.9	12.2
Hydro-Electric Stations	13.8	1.9	14.0	1.8	45.5	5.1	318.7	31.1	366.6	30.8
Sub-Total	591.3	83.9	680.3	85.9	789.5	87.9	958.6	93.4	1100.6	92.4
FROM BULK SUPPLIES:- The Perak River Hydro-Electric Power Co., Ltd.	40.8	5.8	43.7	5.5	46.6	5.2	54.2	5.3	60.9	5.1
The City of Singapore	49.8	7.1	58.3	7.3	51.6	5.7	0.3	—	—	—
The City of George Town	22.4	3.2	9.3	1.2	9.6	1.1	12.6	1.2	29.4	2.5
Other Supplies	0.3	—	0.8	0.1	1.1	0.1	0.9	0.1	0.1	—
TOTAL	704.6	100.0	792.4	100.0	898.4	100.0	1026.6	100.0	1191.0	100.0

* This includes Free Piston Gasifyers.

TABLE III

Average Units Generated/Purchased Per Day during the Month of August 1965

	(Thousands of Units)				
Source	1961	1962	1963	1964	1965
Generated by Thermal Stations	1,531.9	1,740.3	1,965.8	1,538.8	2,013.6
Generated by Hydro Stations	37.6	40.4	273.1	890.7	904.3
*Generated by Board's Diesel Stations	208.1	278.1	318.4	422.6	440.6
Purchased by the Board	332.1	331.1	172.6	210.4	250.2
Total Units Generated/Purchased	2,109.7	2,389.9	2,729.9	3,062.5	3,608.7

*Includes Free Piston Gasifyers.

TABLE IV

GROWTH OF SALES (UNITS) CONSUMER GROUPS 1963/64 — 1964/65

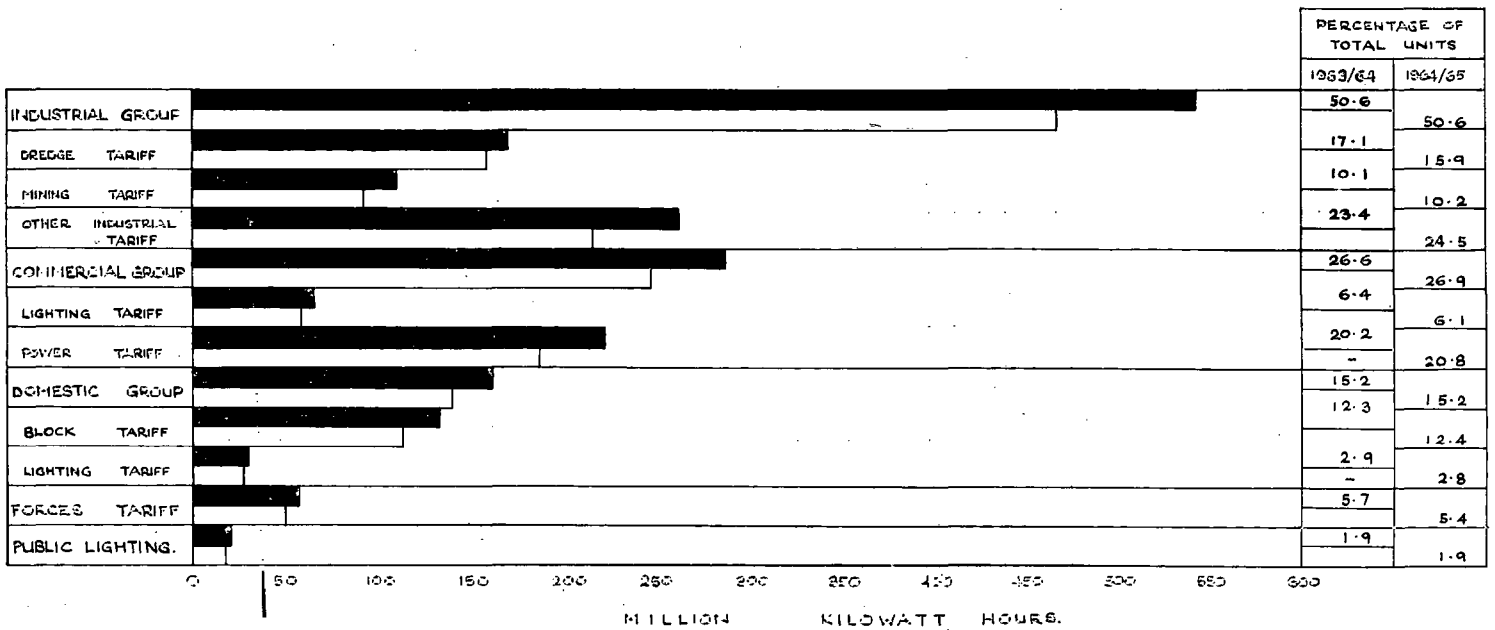


TABLE V

Increase In Number of Consumers

As At 31st August	Total Number Connected	Increase Over Previous Year	
		Number	Percentage
1961	197,559	16,962	9.4
1962	213,858	16,299	7.6
1963	238,181	24,323	11.3
1964	288,199	50,018	21.0
1965	314,050	25,851	9.0

TABLE VI

Appliances Hired To Consumers As At 31st August

Type of Appliance	1961	1962	1963	1964	1965
Ceiling Fans	27,508	27,000	26,648	26,298	25,531
Cookers	1,660	1,517	1,558	1,574	1,524
Motors	194	193	187	160	153
Refrigerators	13	10	8	9	7
Table Fans	151	119	99	67	55
Water Heaters	1,779	1,718	1,716	1,679	1,642

TABLE VII

Monthly Output of the Board's Power Stations & Bulk Purchases 1964/65
Output in Millions of Units (kWH)

Type of Station	1964				1965								Total
	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	
Bulk Purchases	7.0	7.4	7.1	7.4	7.5	6.9	8.1	7.6	8.1	8.2	8.4	7.8	91.5
Diesel*	12.6	13.1	12.1	12.0	12.6	11.5	12.8	12.5	13.4	12.9	13.3	13.7	152.5
Hydro	29.2	30.9	40.6	36.8	26.6	20.8	22.8	35.9	42.7	28.8	27.1	28.0	370.2
Steam	46.8	48.8	37.4	44.1	54.6	51.5	64.2	45.6	46.2	59.7	64.5	62.4	625.8
Total	95.6	100.2	97.2	100.3	101.3	90.7	107.9	101.6	110.4	109.6	113.3	111.9	1240.0

* This includes Free Piston Gasifyers.

Station (1)	Maximum Demand KW (2)	Units Generated and/or Purchased (3)	Load Factor % (4)	Units Used In Station (5)
CENTRAL NETWORK[1]	155,920	896,120,103	65.8	34,844,272
BULK SUPPLIES FROM CENTRAL NETWORK:				
Cameron Highlands (Robinson Falls)	920			
Jor (Talam Mines)	2,550			
Kajang	2,680			
Klang/Port Swettenham	6,900			
Kuala Kubu Baharu/Rasa	260			
Kuala Lumpur & District	90,870			
Kuala Selangor	443			
Petaling Jaya	15,120			
Tanjong Malim	260			
Malacca & District	10,487			
Tampin	1,600			
Tangkak	405			
Batu Pahat[2]	2,000			
Muar	2,400			
Port Dickson	3,600			
Seremban & District	6,400			
		896,120,103	65.8	34,844,272
STEAM STATION				
Johore Bahru	18,200	99,007,898	62.1	6,517,348
BULK SUPPLIES				
Butterworth[3]	11,644	57,521,767	56.4	2,976,339
Ipoh & District	11,145	55,435,183	56.8	982,424
Klian Intan	15	76,194	58.0	
Teluk Anson	1,700	6,582,032	44.2	110,465
		119,615,176		4,069,228
DIESEL STATIONS				
Alor Star	3,611	16,146,761	51.0	418,781
Arau/Kangar	474	2,400,136	57.8	55,744
Bahau	300	965,257	36.7	12,779
Bentong	650	2,506,720	44.0	93,188
Dungun	434	1,321,622	34.8	29,931
Fraser's Hill	287	859,884	34.2	42,739
Gemas	320	1,231,357	43.9	39,535
Kemaman	270	822,162	34.8	40,156
Kluang	3,690	18,212,310	56.3	354,515
Kota Bharu[4]	4,760	21,923,492	52.6	490,461
Kota Tinggi	292	909,796	35.6	25,537
Kuala Klawang	146	397,209	31.1	11,945
Kuala Lipis	435	1,675,444	44.0	57,626
Kuala Pilah	458	1,572,738	39.2	67,323
Kuala Trengganu	1,700	6,332,464	41.9	262,718
Kuantan	1,561	6,531,289	47.3	159,940
Mentakab/Temerloh	815	3,780,898	53.0	121,301
Mering	296	991,061	38.2	44,988
Pekan	220	803,542	33.8	25,314
Pontian Kechil	600	2,015,896	38.4	91,463
Raub[5]	600	2,255,410	42.9	49,118
Rembau	112	348,276	35.5	17,923
Segamat	765	3,305,790	49.3	77,379
Sitiawan/Lumut	717	2,610,194	41.6	87,569
Taiping	5,130	25,429,219	56.0	907,233
		125,248,927		3,585,206
		1,239,992,104		49,016,054

1. Includes 1,312,447 units generated by Batu Pahat diesel plant, 2,257 units generated by Kuala Selangor diesel plant (standby) and 5,670 units generated by Muar diesel plant (standby).
2. Connected to Central Network on 28.10.64.
3. Includes 1,440,500 units generated by Butterworth diesel plant, 21,696,660 units generated by Free Piston Gas-

Units Sent out (6)	Units Used on Works (7)	Units Unaccounted For: Units (8)	Units Unaccounted For: % of Units Generated (9)	Total Units Sold: 1964/65 (10)	Total Units Sold: 1963/64 (11)
861,275,831	11,044,803		8.58		
				3,317,412	3,523,402
				12,034,894	11,449,200
				10,253,245	8,423,527
				31,097,012	24,533,732
735,063,330	8,621,229	65,385,954		1,487,960	1,194,034
				534,269,456	470,452,634
				947,312	451,389
				66,522,199	56,011,718
				1,126,657	1,026,393
				46,961,130	45,986,181
59,335,100	981,384	3,505,488		6,613,477	1,385,140
				1,273,621	1,124,006
9,296,837	165,619	1,235,547		7,895,671	6,978,457
9,048,199	295,469	1,372,073		7,380,657	6,479,952
15,039,225	487,429	1,007,376		13,544,420	13,501,771
33,493,140	493,673	4,354,005		28,645,462	25,439,755
861,275,831	11,044,803	76,860,443	8.58	773,370,585	677,961,291
92,490,550	52,814	8,642,843	8.73	83,794,893	66,284,106
54,545,428	96,863	6,192,337	10.77	48,256,228	33,683,830
54,452,759	7,109	3,182,841	5.74	51,262,809	48,080,251
76,194		7,478	9.81	68,716	66,279
6,471,567		514,893	7.82	5,956,674	2,632,858
115,545,948	103,972	9,897,549	8.27	105,544,427	84,463,218
15,727,980	222,150	1,598,193	9.90	13,907,637	6,793,378
2,344,392	55,638	228,059	9.50	2,060,695	1,673,943
952,478	348	77,012	7.98	875,118	804,545
2,413,532	54,775	78,455	3.13	2,280,302	2,172,274
1,291,691	39,730	142,700	10.80	1,109,261	1,076,307
817,145	42,097	88,052	10.24	686,996	651,303
1,191,822	16,001	106,303	8.63	1,069,518	999,188
782,006	837	98,445	11.97	682,724	647,212
17,857,795	153,272	1,218,258	6.69	16,486,265	13,474,714
21,433,031	504,490	2,731,021	12.46	18,197,520	15,662,939
884,259	10,790	110,315	12.13	763,154	684,315
385,264	2,668	36,645	9.23	345,951	323,792
1,617,818	33,422	147,601	8.81	1,436,795	1,394,673
1,505,415	21,174	125,993	8·01	1,358,248	520,382
5,969,746	114,289	375,212	6.02	5,480,245	4,614,682
6,371,349	115,842	534,599	8.19	5,720,908	4,937,618
3,659,597	103,542	334,436	8.85	3,221,619	2,860,013
946,073	4,423	127,289	12.84	814,361	751,060
778,228	13,853	86,873	10.81	677,502	577,256
1,924,433	34,145	175,213	8.69	1,715,075	1,279,995
2,206,292	107,876	187,329	8.31	1,911,087	1,813,992
330,353	8,010	27,920	8.02	294,423	195,671
3,228,411	27,899	354,878	10.74	2,845,634	2,597,536
2,522,625	53,097	261,237	10.01	2,208,291	2,028,267
24,521,986	357,489	1,584,840	6.23	22,579,657	20,027,518
121,663,721	2,097,857	10,836,878	8.65	108,728,986	88,562,673
1,190,976,050	13,299,446	106,237,713	8.57	1,071,438,891	917,271,188

ifyers and 4,968,002 units generated by Sungei Patani diesel plant.
4. Includes 15,395 units generated by Kuala Krai and 6,640,160 units generated by Lemal.
5. Includes 2,232,720 units generated by Sempam Hydro Station.
This Appendix does not include New Villages and Rural Stations

*STATION	Population Estimated From 1958 Census	Number of Consumers	Domestic
CENTRAL AREA			
Kuala Lumpur and District	483,972	56,527	54,814,466
Kajang	15,405	7,548	1,796,692
Klang/Port Swettenham	105,188	11,218	5,349,493
Kuala Kubu Bharu/Tanjong Malim	16,571	4,369	880,209
Kuala Selangor	2,779	956	214,623
Petaling Jaya	37,142	10,120	14,587,343
	661,057	91,338	78,142,826
NORTHERN AREA			
Talam Mines	—	—	—
Ipoh and District	179,334	23,275	15,089,412
Cameron Highlands	5,682	1,279	735,081
Sitiawan/Lumut	14,078	3,197	675,008
Taiping	78,157	11,059	3,696,983
Klian Intan	2,302	227	21,381
Butterworth	131,187	35,417	6,797,227
Arau/Kangar	9,050	2,086	460,633
Alor Star/Kepala Batas	81,030	13,800	3,763,064
Teluk Anson	46,044	6,228	1,728,608
	597,064	96,668	32,967,397
SOUTHERN AREA			
Seremban	68,768	13,320	7,270,708
Port Dickson	5,347	2,900	1,765,940
Bahau	6,573	1,077	196,548
Kuala Klawang	3,639	617	116,173
Rembau	1,496	397	68,709
Malacca	92,627	17,368	8,798,713
Gemas	5,909	1,152	238,139
Muar	51,220	10,401	2,690,155
Segamat	22,343	2,577	627,189
Tangkak/Jasin	10,917	1,877	379,538
Batu Pahat	48,366	5,853	1,882,730
Kluang	39,836	5,132	2,477,706
Mersing	8,763	1,358	265,285
Pontian Kechil	10,237	2,020	459,255
Johore Bahru	94,314	13,125	12,018,377
Kota Tinggi	8,943	1,049	256,937
Kuala Pilah	15,223	1,591	392,581
Tampin	6,860	2,448	1,021,429
	501,386	84,262	40,926,112
EASTERN AREA			
Kota Bharu	75,578	18,613	3,963,898
Kuala Trengganu	36,187	6,016	1,631,220
Dungun	15,129	1,900	379,697
Kuantan	28,709	4,287	1,359,230
Kemaman	13,240	1,340	234,427
Pekan	2,504	875	295,340
Raub	10,074	2,359	545,438
Bentong	23,191	2,601	581,853
Frasers Hill	965	180	31,172
Kuala Lipis	10,609	1,405	393,336
Mentakab/Temerloh	15,872	2,206	521,335
	240,238	41,782	9,936,951
	1,999,745	314,050	161,973,286

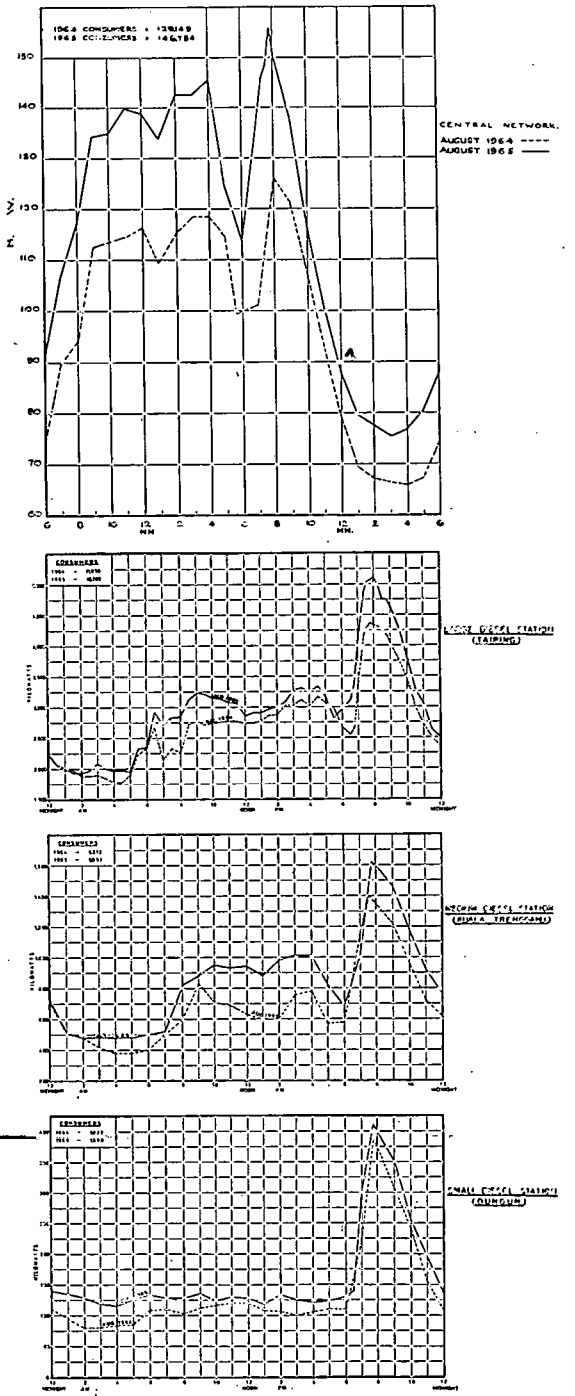
* Localities covered by the Board's stations do
Note: Units sold do not include 1,636,106

UNIT SOLD						Per Head of Population
Commercial	Mining	Other Industrial	Forces	Public Lighting	TOTAL	
125,911,786	254,006,345	83,110,894	10,957,872	5,468,093	534,269,456	1,104
5,151,747	309,300	2,742,781	24,738	227,738	10,253,245	665
8,987,128	—	15,366,886	—	893,505	31,097,012	295
1,385,288	—	148,705	26,505	173,910	2,614,617	158
597,035	—	78,010	—	57,644	947,312	341
12,934,349	—	38,150,825	—	849,682	66,522,199	1,791
154,967,333	254,315,645	139,598,101	11,009,364	7,670,572	645,703,841	977
—	12,034,894	—	—	—	12,034,894	—
27,922,994	—	5,039,384	930,940	2,280,079	51,262,809	286
1,280,284	—	461,264	789,086	51,697	3,317,412	653
1,308,748	—	77,706	—	146,829	2,208,291	157
6,434,577	7,771,463	2,318,786	1,673,539	684,309	22,579,657	289
41,165	—	—	—	6,170	68,716	30
11,494,793	—	18,966,999	9,543,496	1,453,713	48,256,228	266
1,092,650	—	387,797	—	119,615	2,060,695	227
5,414,911	—	3,981,913	333,364	414,385	13,907,637	171
3,236,390	—	709,374	—	282,302	5,956,674	127
58,226,512	19,806,357	31,943,223	13,270,425	5,439,099	161,653,013	270
9,789,850	3,705,460	4,488,507	2,688,601	702,336	28,645,462	416
5,578,379	2,652,795	2,653,302	743,240	150,764	13,544,420	2,533
492,508	—	148,326	—	37,736	875,118	133
214,697	—	—	—	15,081	345,951	95
210,746	—	—	—	14,968	294,423	196
12,434,220	—	7,527,835	17,504,655	695,707	46,961,130	507
525,531	—	245,695	—	60,153	1,069,518	181
3,200,805	—	1,074,521	—	415,176	7,380,657	144
1,435,853	—	618,963	—	163,629	2,845,634	127
780,158	—	36,009	—	77,916	1,273,621	116
2,784,683	—	2,814,058	—	414,200	7,895,671	163
2,792,611	—	4,411,265	6,361,947	442,736	16,486,265	414
457,014	—	18,437	—	73,625	814,361	93
689,684	—	497,594	—	68,542	1,715,075	167
11,950,032	—	54,709,263	4,196,645	920,576	83,794,893	888
439,969	—	—	—	66,248	763,154	85
803,407	—	97,765	—	64,495	1,358,248	89
2,027,400	—	2,461,130	1,044,948	58,570	6,613,477	964
56,607,547	6,358,255	81,802,670	32,540,036	4,442,458	222,677,078	444
7,933,158	—	5,200,580	238,249	861,635	18,197,520	240
2,505,053	—	968,517	—	375,455	5,480,245	151
652,001	—	—	—	77,563	1,109,261	73
2,668,929	—	1,481,866	—	210,883	5,720,908	199
349,891	—	40,925	—	57,481	682,724	51
275,616	—	70,781	—	35,765	677,502	270
778,252	—	466,990	—	120,407	1,911,087	101
923,061	—	607,163	—	168,220	2,280,302	98
625,990	—	28,409	—	1,425	686,996	712
662,855	—	284,709	—	95,895	1,436,795	135
1,316,967	—	605,432	667,241	110,644	3,221,619	203
18,691,773	—	9755,372	905,490	2,115,373	41,404,959	172
288,493,165	280,480,257	263,099,366	57,725,315	19,667,502	1,071,438,891	535

not necessarily conform to Town Board or Municipal Areas.
sold to Rural Stations.

APPENDIX X

TYPICAL DAILY LOAD CURVES



APPENDIX XI

SUBSTATIONS OF THE NATIONAL ELECTRICITY BOARD AS AT 31st AUGUST, 1965

Voltage of Transformer Station	Number in Commission	Total Capacity in kVA	Increase in Capacity Over Preceding Year in kVA	Under Construction or Rehabilitation	
				No.	kVA
132 kV	4	279,200	—	—	—
66 kV	12	330,500	7,200	1	3,000
33 kV	217	189,635	62,675	—	—
22 kV	14	36,362.5	542.5	1	2,000
11 kV	1066	350,971	60,871	6	1,125
6.6 kV	249	71,090	6,665	2	250
5.5 kV	—	—	—	—	—
3.3 kV	10	1,400	550 (D)	—	—
2.2 kV	25	2,083.75	—	—	—
TOTAL	1,597	1,261,242.25	137,403.5	10	6,375

Note: (i) Step up transformers in power stations etc. are included in the category of the higher voltage.
(ii) In Power Stations all transformers of similar ratio are considered as forming one substation.
(D) Decrease.

APPENDIX XII

EXTENT OF TRANSMISSION AND DISTRIBUTION SYSTEMS OF THE NATIONAL ELECTRICITY BOARD AS AT 31st AUGUST, 1965

Voltage of Transmission Lines	Length in Miles	Increase Over Preceding Year in Miles	Decrease Over Preceding Year in Miles	Length Under Construction in Miles
132 kV Overhead	236.8 (a)	—	—	—
66 kV Overhead	203.32 (b)	29.32	—	22.91
66 kV Underground	2.48	—	—	—
33 kV Overhead	413.67 (c)	1.63	—	—
33 kV Underground	39.86 (d)	39.69	—	—
22 kV Overhead	17.03	—	0.85	—
22 kV Underground	40.13	0.85	—	—
11 kV Overhead	232.94	201.44	8.13	—
11 kV Underground	1012.66	94.72	—	—
6.6 kV Overhead	18.08	—	0.37	—
6.6 kV Underground	208.95	12.57	—	—
3.3 kV Overhead	4.8	—	—	—
3.3 kV Underground	1.49	—	1.46	—
2.2 kV Overhead	3.79	—	—	—
2.2 kV Underground	3.98	—	0.03	—
Total	2,439.98	380.22	10.84	22.91

(a) Includes 97.93 miles double circuit line

(b) Includes 41.34 miles double circuit line

(c) Includes 0.58 miles of 132 k.V. D/C and 5.57 miles of 132 k.V. single circuit line operating at 33 k.V.

(d) Includes 0.58 miles of 33 k.V. single core U/G cable and 10.98 miles of 33 k.V. submarine cable.

APPENDIX XIII

ANALYSIS OF GROSS UNITS GENERATED IN THE STATES OF MALAYA

FOR PERIOD 1st SEPTEMBER, 1964 to 31st AUGUST, 1965.

Type of Prime Mover	Units Generated by Public Utilities		Units Generated by Mining Installations		Units Generated by Other Private Installations		Total Units Generated In the States	
	Millions	Percentages	Millions	Percentages	Millions	Percentages	Millions	Percentages
STEAM	1,253.943	64.49	—	—	—	—	1,253.943	58.95
DIESEL	155.560	8.00	79.570	87.04	91.074	100.00	326.204	15.34
HYDRO	534.939	27.51	11.851	12.96	—	—	546.790	25.71
TOTAL	1,944.442	100.00	91.421	100.00	91.074	100.00	2,126.937	100.00

UNITS GENERATED/SOLD/REVENUE-PRICE/UNIT SOLD

Authority	Year	Units Generated and/or Purchased	Units sold	$000
Federated Malay States ..	1926	6,321,508	5,279,954	998.8
: do - ..	1927	7,400,000	6,380,147	1,087.1
- do - ..	1928	17,550,067	14,155,371	1,531.4
- do - ..	1929	28,008,729	24,138,549	2,280.1
- do - ..	1930	31,760,297	26,367,689	2,494.4
- do - ..	1931	28,282,491	22,472,361	2,275.9
- do - ..	1932	24,671,710	18,770,116	1,960.8
- do - ..	1933	27,168,168	19,508,997	1,810.7
- do - ..	1934	41,091,933	31,150,958	2,208.2
- do - ..	1935	57,797,454	46,038,830	2,661.0
- do - ..	1936	83,080,165	68,982,094	3,233.6
- do - ..	1937	91,013,387	78,111,585	3,596.7
- do - ..	1938	71,495,668	60,010,165	3,242.7
- do - ..	1939	74,503,421	55,785,393	3,205.4
- do - ..	1940	121,503,012	97,887,501	4,326.2
	1941	—	—	—
	1945	—	—	—
Malayan Union and Federation of Malaya ..	1946	63,895,899	49,007,752	4,379.2
· do - ..	1947	102,533,237	80,011,234	7,478.9
- do - ..	1948	123,957,654	96,910,878	9,182.6
Central Electricity Board 1.9.49	31.8.50	175,401,436	141,363,811	13,639.5
- do - ..	1950-51	197,765,267	159,866,549	16,243.7
- do - ..	1951-52	230,744,326	183,230,475	20,195.7
- do - ..	1952-53	259,186,152	208,212,167	22,142.6
- do - ..	1953-54	297,055,212	241,076,210	24,284.5
- do - ..	1954-55	355,537,745	287,552,670	28,541.6
- do - ..	1955-56	415,829,412	340,239,096	33,069.3
- do - ..	1956-57	476,397,884	396,524,270	37,286.0
- do - ..	1957-58	548,335,934	458,506,752	42,264.2
- do - ..	1958-59	534,432,940	447,746,475	43,294.9
- do - ..	1959-60	639,502,028	544,904,857	52,134.1
- do - ..	1960-61	740,601,186	632,797,649	59,609.6
- do - ..	1961-62	833,931,372	709,052,595	66,597.4
- do - ..	1962-63	944,555,681	802,198,129	74,677.4
- do - ..	1963-64	1,070,995,640	917,271,188	83,907.0
National Electricity Board 22.6.65	1964-65	1,239,992,104	1,071,438,891	97,241.3

NOTE: Units sold do not include 1,636,106 units sold to Rural Stations and Board's

NUMBER OF CONSUMERS, UNITS CONSUMED

REVENUE			Number of Consumers	Units sold per Consumer	Remarks
£000	Cents per unit sold	Pence per unit sold			
116.7	18.90	5.30	5,034	1,048	
126.9	17.10	4.80	5,818	1,100	
178.7	10.80	3.15	7,503	1,888	
266.1	9.45	2.64	11,153	2,075	
291.0	9.45	2.64	13,975	1,890	
265.5	10.12	2.83	15,794	1,423	Slump years
228.8	10.45	2.93	16,576	1,133	
211.3	9.28	2.60	16,570	1,176	
257.6	7.10	1.99	17,675	1,760	
310.4	5.79	1.62	18,561	2,475	
377.3	4.69	1.31	20,237	3,440	
419.6	4.61	1.29	21,981	3,550	
378.3	5.40	1.51	23,485	2,575	
374.0	5.74	1.61	25,555	2,180	
504.7	4.43	1.24	25,836	3,780	
—	—	—	—	—	
—	—	—	—	—	Not available
510.9	8.96	2.50	41,537	1,108	9 months only
872.5	9.35	2.62	41,751	1,920	1st April to 31st
1,071.3	8.57	2.40	46,153	2,100	December 1946
1,593.0	9.65	2.70	50,006	2,827	
1,895.0	10.16	2.84	54,462	2,935	
2,356.1	11.02	3.09	59,526	3,078	
2,583.3	10.63	3.00	66,768	3,118	
2,833.2	10.07	2.82	80,355	3,000	
3,330.0	9.93	2.78	103,146	2,789	
3,858.1	9.72	2.72	120,862	2,815	
4,350.0	9.40	2.63	139,124	2,850	
4,930.8	9.22	2.58	155,691	2,945	
5,051.1	9.67	2.71	165,297	2.708	
6,082.3	9.57	2.68	180,597	3,017	
6,954.5	9.42	2.64	197,559	3,203	
7,769.7	9.39	2.63	213,858	3,316	
8,712·4	9.31	2.61	238,181	3,368	
9,789.2	9.15	2.56	288,199	3,183	
11,240.0	9.06	2.53	314,050	3,410	

New Villages. Revenue does not include $588,000 received from sales to Rural Stations and New Villages.

APPENDIX XV

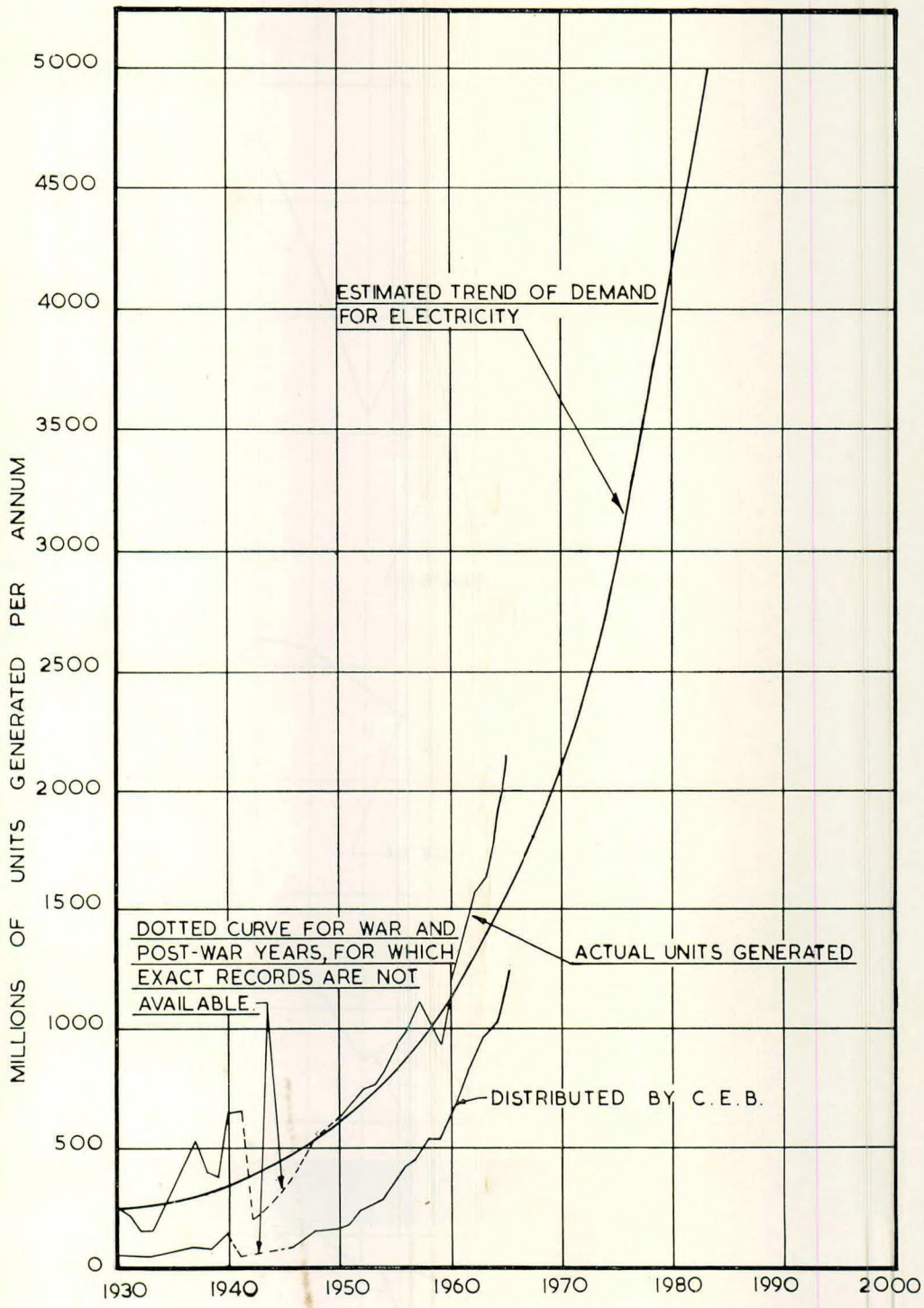
ANALYSIS OF UNITS USED FOR VARIOUS PURPOSES IN THE STATES OF MALAYA

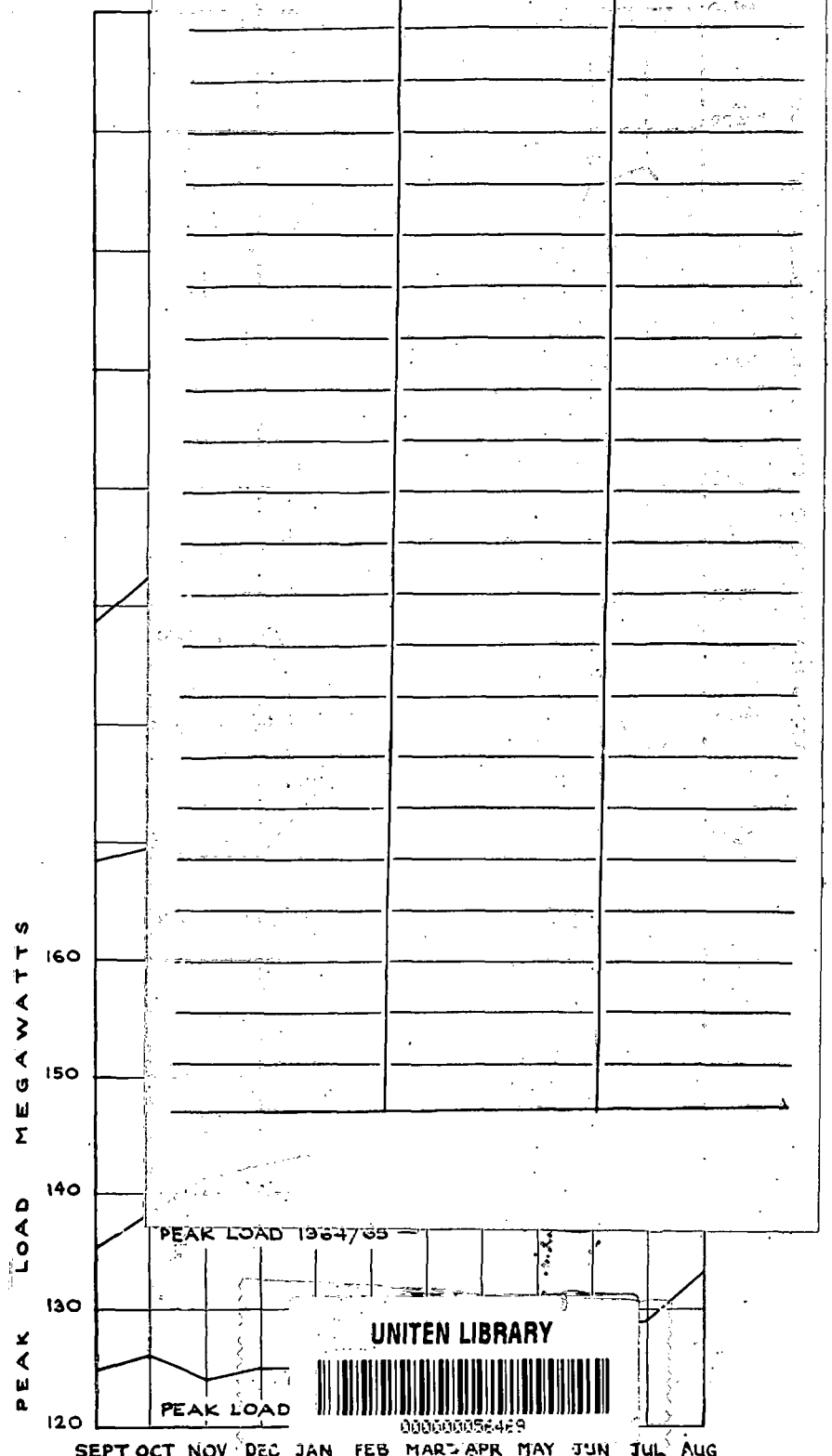
FROM 1st SEPTEMBER, 1964 to 31st AUGUST, 1965.

Purpose Units Used For	From Public Utilities		From Mining Installations		From Other Private Installations		Total Units Used In The States	
	Millions	Percentages	Millions	Percentages	Millions	Percentages	Millions	Percentages
Tin Mining:- Dredging	332.691	19.72	20.522	22.45	—	—	353.213	18.90
Open Cast	408.097	24.19	13.475	14.74	—	—	421.572	22.56
Underground	—	—	23.562	25.77	—	—	23.562	1.26
Iron Mining	.911	.06	32.427	35.47	—	—	33.338	1.79
Gold Mining	—	—	1.348	1.47	—	—	1.348	.07
Bauxite Mining	—	—	.011	.00	—	—	.011	.00
Cement	30.466	1.81	—	—	—	—	30.466	1.63
Industrial & Commercial	551.756	32.71	—	—	64.391	71.22	616.147	32.97
Lighting & Domestic	362.855	21.51	.076	.10	26.020	28.78	388.951	20.82
TOTAL	1,686.776	100.00	91.421	100.00	90.411	100.00	1,868.608	100.00

Appendix XVI

GROWTH OF GENERATION OF ELECTRICITY IN THE STATES OF MALAYA, 1930 — 1965





CENTRAL NETWORK

PRINCIPAL TRANSMISSION AND DISTRIBUTION LINES

MILES 4 3 2 1 0 4 8 12 16 20 MILES

APPROX · SCALE

REFERENCE

- 220/275 kV. Proposed.
- 132 kV. Existing.
- 132 kV. Under Construction.
- 132 kV. Proposed.
- 66 kV. Existing.
- 66 kV. Under Construction.
- 66 kV. Proposed.
- 33 kV. Existing.
- 33 kV. Proposed.
- 11 kV. Existing.
- 11 kV. Proposed.

NOTE:- TOWN 11 k.V. AND 6·6 k.V. DISTRIBUTION SYSTEMS ARE NOT SHOWN.

PERAK

TO CAMERON HIGHLANDS SCHEME

TANJONG MALIM

K. KUBU BAHRU

RASA

PAHANG

TG. KARANG

BUKIT MUNCHONG

BATANG BERJUNTAI

KUALA SELANGOR

RAWANG

BENTONG HYDRO SCHEME

MALAYAN COLLIERIES

KANCHING

KUNDANG

KEPONG

S. BULOH

ULU LANGAT P.S. (Hydro)

SENTUL

SELANGOR

SEGAMBUT

AMPANG

KAPAR

BUNGSAR P.S. (Steam)

PUDU ULU

SALAK SOUTH

P. JAYA

SUNGEI WAY

S. BESI

ULU LANGAT VILLAGE

BATU TIGA

K. L. SOUTH

KLANG

CONNAUGHT BRIDGE P.S. (Steam)

PUCHONG

9TH. MILE CHERAS

SERDANG

PORT SWETTENHAM

KAJANG

AYER HITAM

KUALA LANGAT

BANGI

BANTING

TELOK DATOK

S. MANGGIS

NILAI

PAJAM

MANTIN

SEREMBAN

NEGRI SEMBILAN

KUALA PILAH

BAHAU

RANTAU

GEMAS

PORT DICKSON P.S. (Steam) PROP.

SEGAMAT

TAMPIN

BATANG MALAKA

ALOR GAJAH

TO KLUANG

MASJID TANAH

MALACCA

JASIN

TANGKAK

MALACCA P.S. (Steam)

MALACCA

JOHORE

MERLIMAU

MUAR

BATU PAHAT

TO KLUANG

Directorate of National Mapping Malaysia No. 135 - 1965

FEDERATION OF MALAYA

PRINCIPAL GENERATING STATIONS AND TRANSMISSION LINES 1964-1965

Miles 10 5 0 10 20 30 40 50 Miles

Scale 24 Miles to an Inch

THAILAND

PERLIS

ARAU

KANGAR

ALOR STAR

KEDAH

SUNGEI PATANI

MUDA RIVER

BUTTERWORTH

SUNGEI PINANG

PENANG

KULIM

BTI MERTAJAM

PRAI

PROVINCE WELLESLEY

PARIT BUNTAR

Irrigation Reservoir

TAIPING

Chenderoh Lake

CHENDEROH

PERAK

IPOH

PAPAN

BATU GAJAH

MALIM NAWAR

SITIAWAN

LUMUT

PRAH

TELOK ANSON

SLIM RIVER

TANJONG MALIM

SELANGOR

TANJONG KARANG

KUALA SELANGOR

RAWANG

SEMPAM

RAUB

FRASER'S HILL

BENTONG

PERTING

BENUS

SEGAMBUT

ULU LANGAT

PUDU ULU

BUNGSAR

KLANG

PORT SWETTENHAM

K.L. SOUTH

CONNAUGHT BRIDGE

AYER HITAM

BANGI

SEREMBAN

PORT DICKSON

RANTAU

NEGRI SEMBILAN

BAHAU

K. PILAH

GEMAS

TAMPIN

SEGAMAT

ALOR GAJAH

MALACCA

MALACCA

MERLIMAU

MUAR

BATU PAHAT

JOHORE

KLUANG

KOTA TINGGI

SCUDAI

JOHORE BAHRU

PONTIAN

SINGAPORE

PASIR PANJANG

ST. JAMES

MERSING

P. TIOMAN

KUALA KRAI

KELANTAN

KUALA LIPIS

KUALA TRENGGANU

TRENGGANU

DUNGUN

KEMAMAN

KUANTAN

PAHANG

MENTEKAB

TEMERLOH

PEKAN

Tasek Bera

KOTA BHARU

BACHOK

PASIR PUTEH

MACHANG

TANAH MERAH

S. LEMAL

STRAITS OF MALACCA

CHINA SEA

REFERENCE

	OPERATING	PLANNED OR UNDER CONSTRUCTION
GENERATING STATIONS		
Steam	●	○
Hydro	●	○
Oil Engine	●	○
TRANSMISSION LINES		
132 kV or above	———	- - -
66 kV	———	- - -
33 kV and below	———	- - -
PRINCIPAL TOWNS RECEIVING BULK SUPPLY	+	

N.E.B. AREAS: Central, Eastern, Northern, Southern

International Boundary

State Boundaries

Directorate of National Mapping Malaysia No. 135-1965