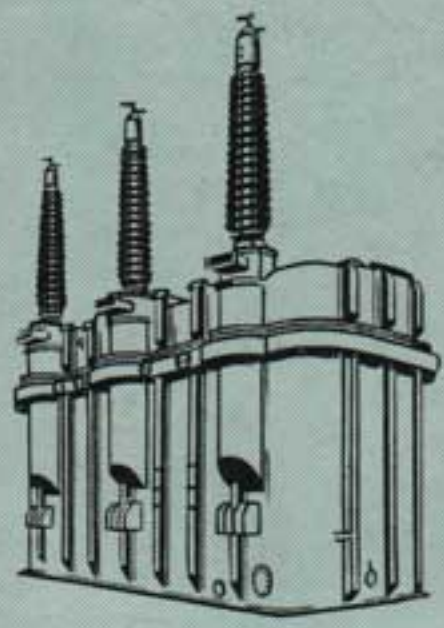
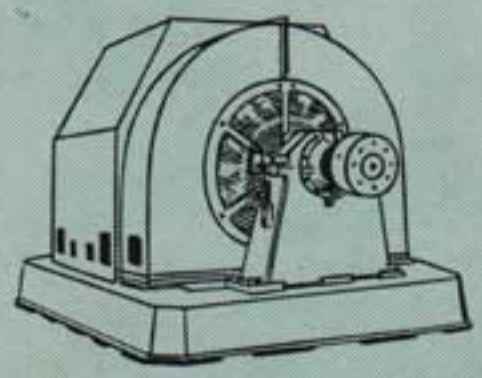
BRUCE PEEBLES

AND COMPANY LIMITED, EDINBURGH · SCOTLAND





PRODUCTS

Publication No. GP 100

ASSOCIATED COMPANIES

The following Companies are associated with Bruce Peebles in the recently-constituted Bruce Peebles Group:

THE BELMOS COMPANY LTD

Bellshill Lanarkshire

Manufacturers of industrial and flameproof switchgear and motor control gear

EVERETT EDGCUMBE & CO. LTD

Colindeep Lane London N.W.9

Manufacturers of electrical indicating, measuring, and recording instruments

WHYTE & EDWARD (METALS) LTD

Downfield Foundry Dundee

A non-ferrous foundry supplying sand castings, pressure die castings, and gravity die castings

MANUFACTURING ELECTRICAL ENGINEERS

BRUCE PEEBLES & CO., LIMITED
EDINBURGH, 5. SCOTLAND

Telephone: GRAnton 6261 Telex: 72-265

PRINCIPAL PRODUCTS

Generator Transformers
Transmission Transformers
System Transformers
Distribution Transformers
Rural Transformers
Rectifier Transformers
Mining Transformers
Flameproof Mining Transformers
Power Transductors
Current-Limiting Reactors
Shunt Reactors

Hydro-Electric Generators
Geared Turbine-driven A.C. Generators
Engine-driven A.C. Generators
Synchronous Condensers
Synchronous Frequency Changer Sets
Salient-Pole Synchronous Motors
Synchronous Induction Motors
Salient-Pole Synchronous Induction Motors

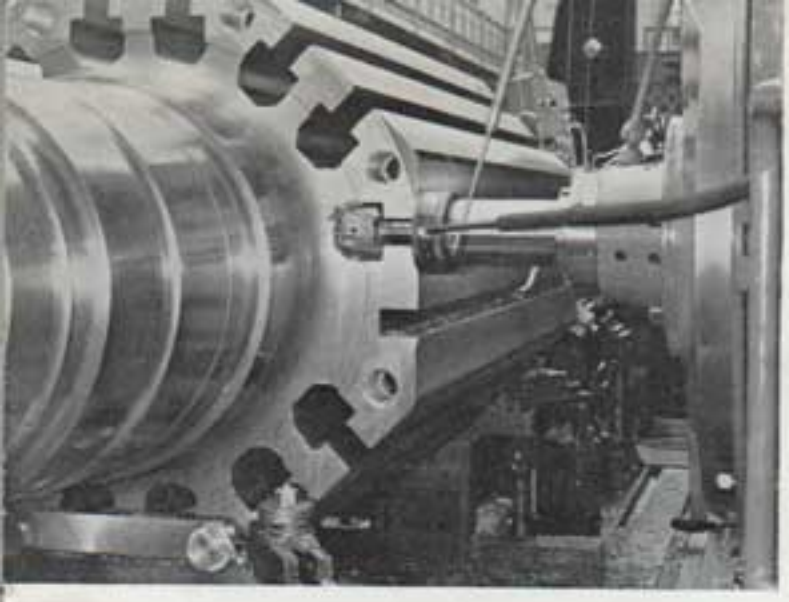
Squirrel-Cage Induction Motors
Slipring Induction Motors
Steelworks Auxiliary Motors
Flameproof Induction Motors
Induction-Type Frequency Changers

D.C. Generators
D.C. Motors
Rolling Mill Drives

Mercury-Arc Rectifiers
Semi-Conductor Rectifiers
Mining-Type Battery Chargers

Automatic Control Systems

Industrial Electronic Equipment



(Top Left) Machining a large rotor forging

(Top Right) 90 MVA transformer core and windings

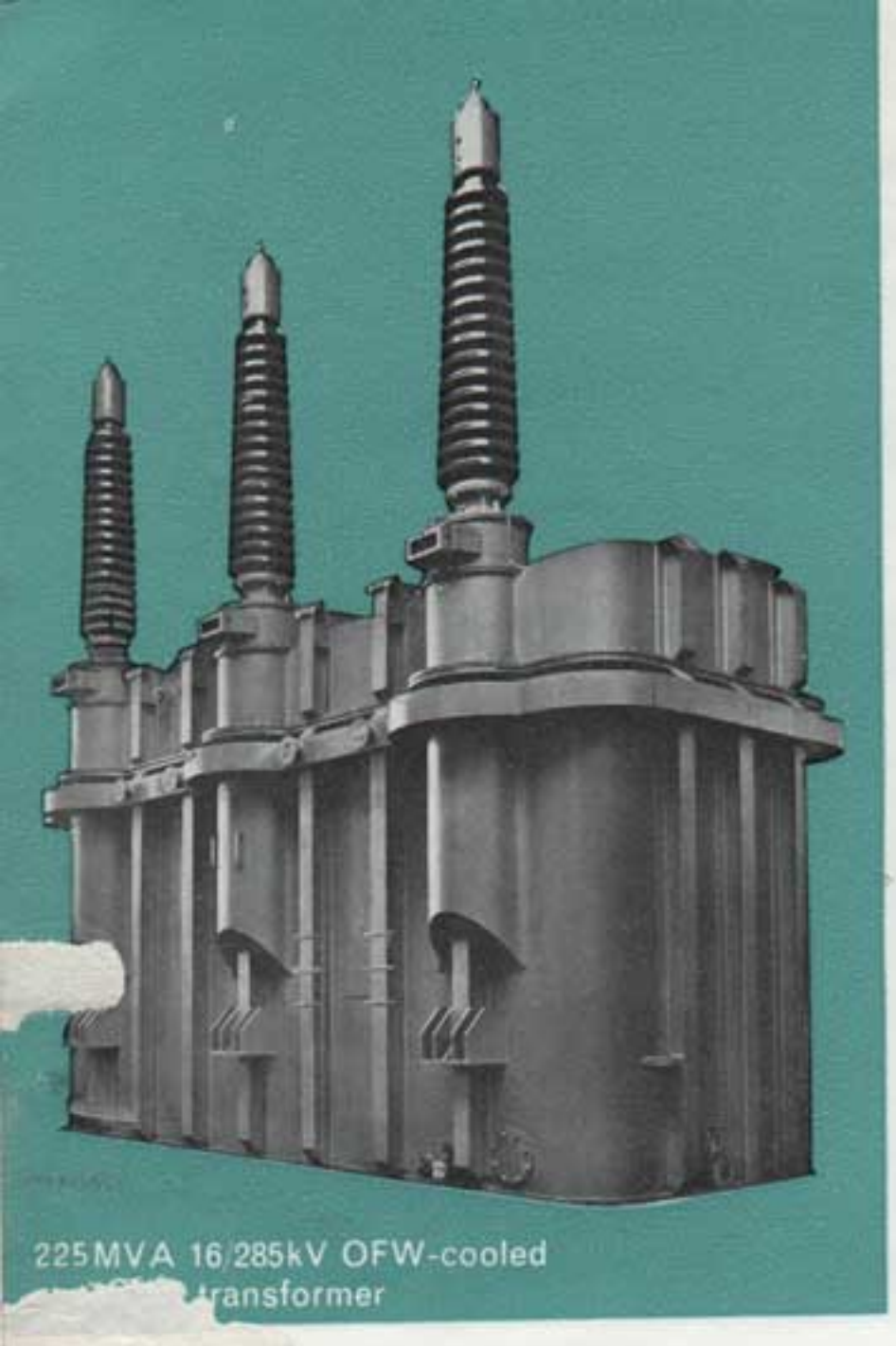
(Bottom Left) Part of our Analogue Laboratory

(Bottom Right) Our Digital Computer

INTRODUCTION

Bruce Peebles & Co., Limited, are the largest manufacturing electrical engineers in Scotland, and our principal products include transformers, generators, motors, rectifiers, and industrial electronic equipment. Over sixty years of experience lie behind the design, manufacture, and application of this extensive range of electrical machinery and apparatus, and a vigorous policy of continuous development over this period has resulted in the name Bruce Peebles becoming identified in the minds of discriminating users with a robust and reliable product of proven and guaranteed efficiency.

This Publication is intended to provide interested engineers with a brief glimpse of the nature and extent of our manufactures. A fully comprehensive account of our many products is of course impossible in a booklet of this kind, and more detailed and technical literature descriptive of specific types and ranges is available on request.



225MVA 16/285kV OFW-cooled
transformer

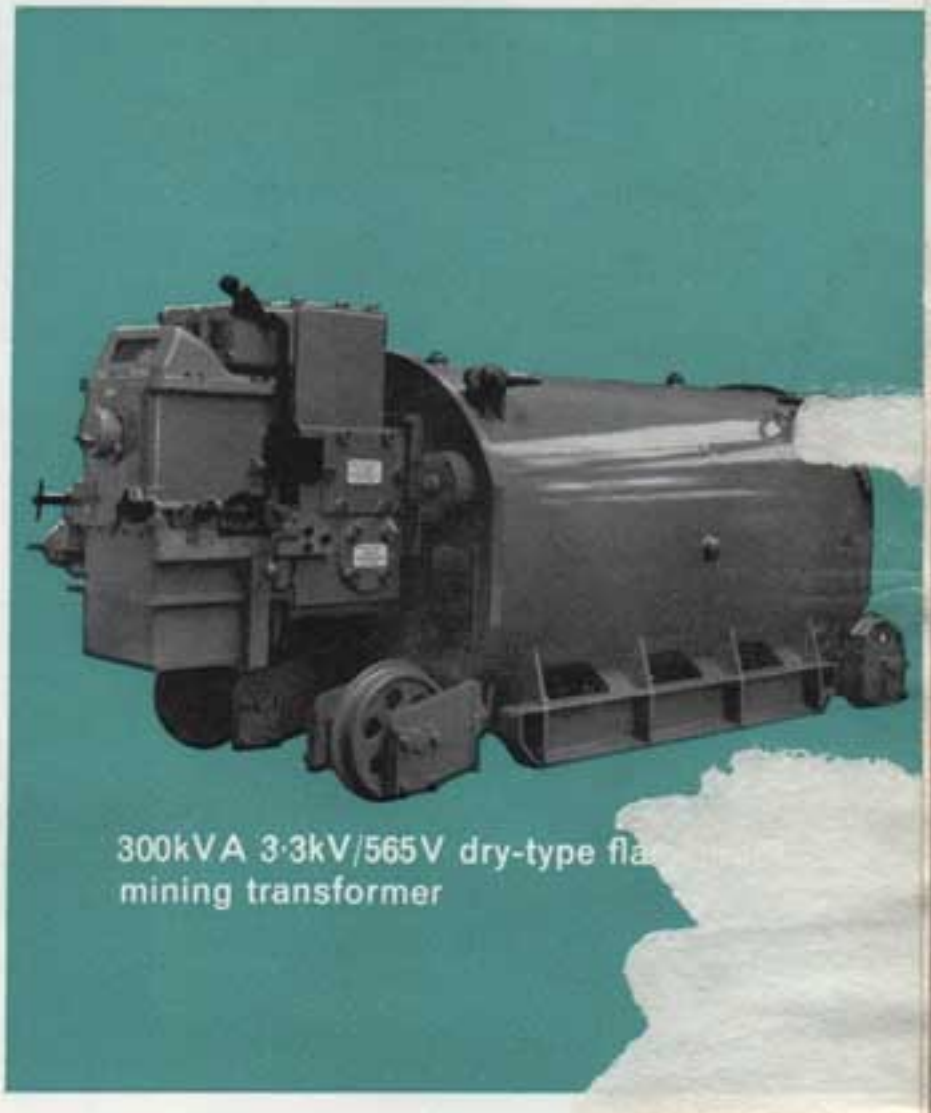
10MVA 33/11kV
ON-cooled system
transformer

TRANSFORMERS

Tap-changer control
panel for two 60MVA
132/33kV transformers

Since 1925, when we first began to build transformers at East Pilton, our production capacity has had to be increased no less than six times to meet the ever-expanding demand, and we have recently opened an entirely separate factory, at Broxburn, West Lothian, for the manufacture of our rural and distribution transformers. Our range now includes almost every imaginable type of transformer: pole-mounting rural transformers, dry-type flameproof transformers, distribution transformers, single-phase transformers for modern a.c. railway electrification projects, system transformers, and power transformers for the largest outputs and at the highest voltages in use today. A giant 40MVAr synchronous condenser has recently been commissioned to supplement our power testing facilities, and these facilities and our impulse testing equipment—all as modern as our latest manufacturing techniques—enable us to prove the performance of our products to standards well beyond

500 kV A 11 kV/433 V
distribution transformer



300kV A 3·3kV/565V dry-type fla
mining transformer

those demanded in the usual specifications. Work goes on continuously in our research and development departments both to improve our fundamental knowledge and to exploit the properties of new materials and the potentialities of new techniques, and in our use of our own digital computor and such other design tools as our electrolytic and resistance-type analogues we may fairly claim to have made a significant contribution to the art and science of transformer design in Great Britain.

25 kV A 11 kV/500/250 V
pole-mounting rural
transformer

21 MW 11 kV 600 r.p.m. closed-air-circuit water-cooled vertical-shaft synchronous generator

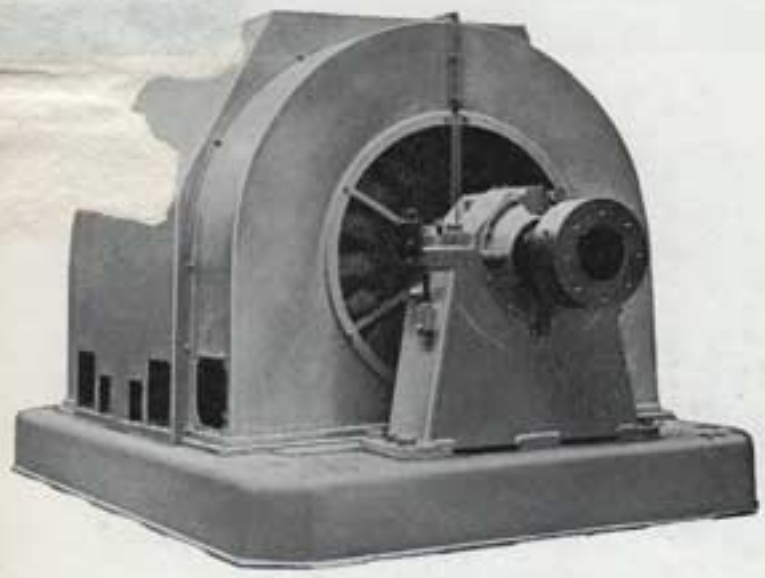
HYDRO-ELECTRIC PLANT

In 1906 Bruce Peebles were responsible for the 6MW Snowdon hydro-electric project, the first of its kind for public supply in Great Britain. The part since played by the Company in the development of hydro-electric power at home and abroad is well known. The 1500 kW Snowdon generators have of course been eclipsed long since by the giant units of the present day, but full advantage has been taken of our fifty-five years of experience in the development of the many generators —vertical and horizontal, synchronous and induction, large and small, high-speed and low-speed—recently supplied or currently under construction.

Our long record of co-operation with eminent consulting and civil engineers, and with most of the leading manufacturers of water-turbines, has given us much valuable experience of hydro-electric projects as a whole. Today we often undertake, as main generating set contractors, complete responsibility for the turbine, the generator and its excitation system (including the automatic voltage regulator), the associated transformers and switchgear, and the ancillary protection and local/remote manual or automatic control gear.

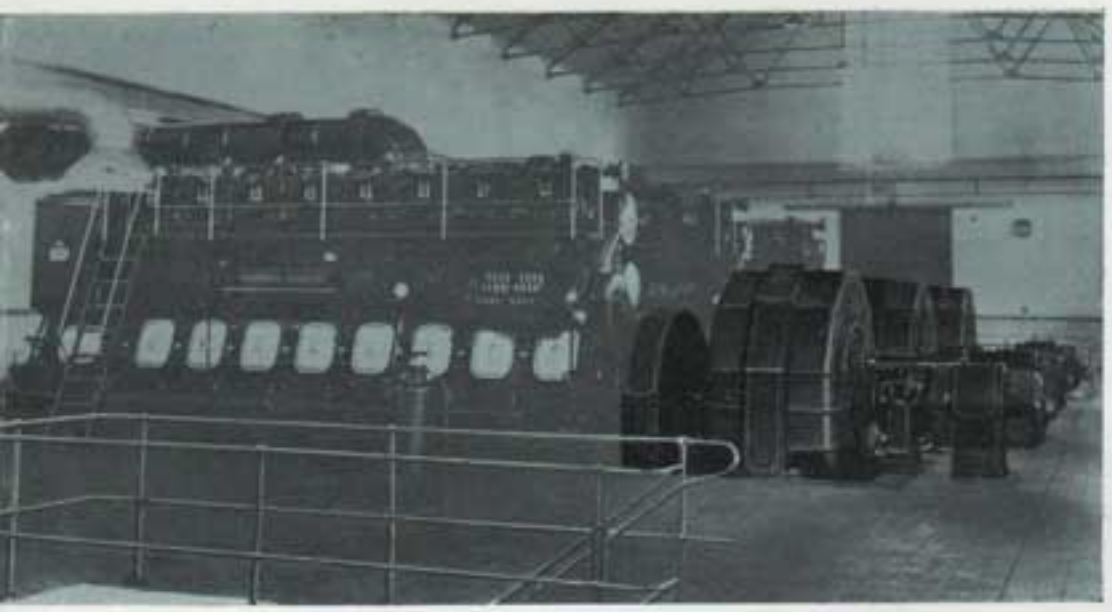
Contracts in hand or recently completed include: Four 10 MW 187 r.p.m. synchronous generators and a 2 MW 755 r.p.m. induction generator for the Strathfarrar and Kilmorack project of the North of Scotland Hydro-Electric Board; one 12 MW 333 r.p.m. and two 18 MW 600 r.p.m. synchronous generators for the Central Electricity Generating Board's Rheidol project; one 3·5 MW 167 r.p.m. and two 12 MW 375 r.p.m. synchronous generators for the N. of S. H. E. B.'s Shin scheme, and one 21 MW 600 r.p.m. synchronous generator, and induction generators totalling 11 MW, for the same authority's Breadalbane scheme.

2400 kW 3·3 kV 755 r.p.m. screen-protected horizontal-shaft induction generator



A.C. GENERATORS

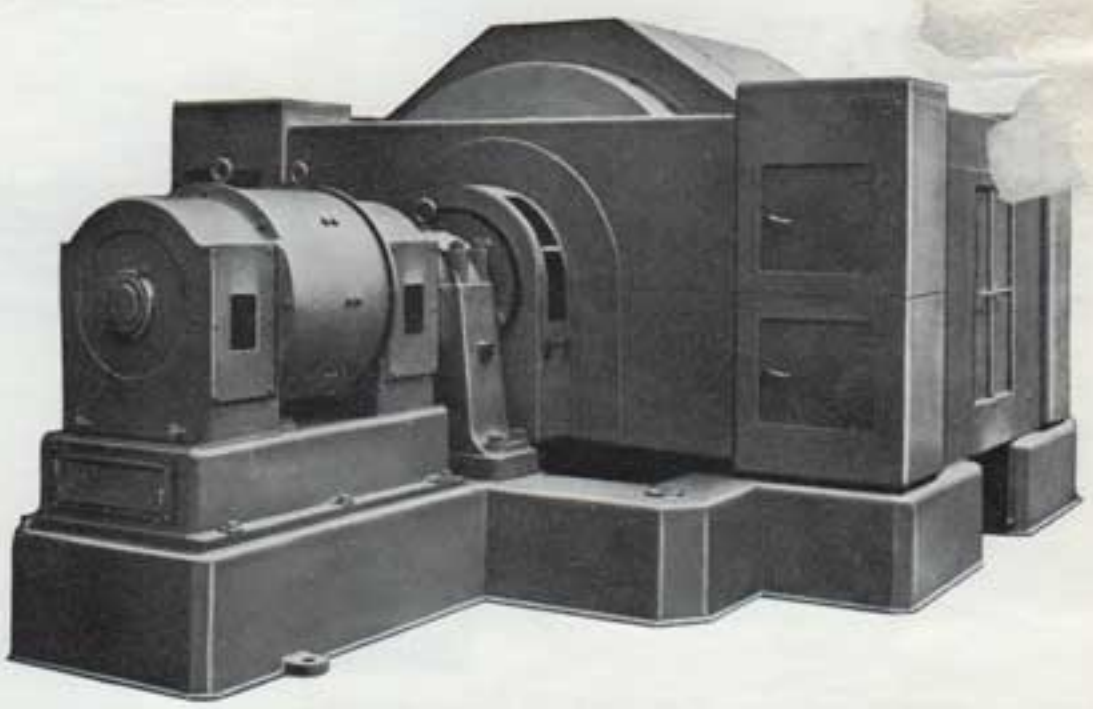
Increases in the capacities of public supply systems have of late very much restricted the circumstances in which private generation is economic. In certain industries, however—and especially in paper mills, chemical and gas works, oil refineries, textiles manufacturing and processing, beet sugar factories, and breweries—the economics of process energy recovery are such that private generation of at least part of the required power supply is justified; in such circumstances a geared turbo-alternator running at 1500 or 1800 r.p.m. (for a 50 c/s or a 60 c/s supply) is usually adopted. A complete range of four-pole alternators of this type, with outputs of up to about 6000 kW at voltages up to 11 kV, is available, and any of the usual types of enclosure (e.g. screen-protected, filter- or duct-ventilated, closed-air-circuit water-cooled) can be supplied. Slow-speed engine-driven alternators of up to about 2000 kW are also available, and these are frequently specified as stand-by plant for emergency use or for installation in isolated situations. All these alternators are of the rotating-field salient-pole type, and they are normally supplied on a bedplate with a single pedestal bearing and with a directly-coupled self-contained excite



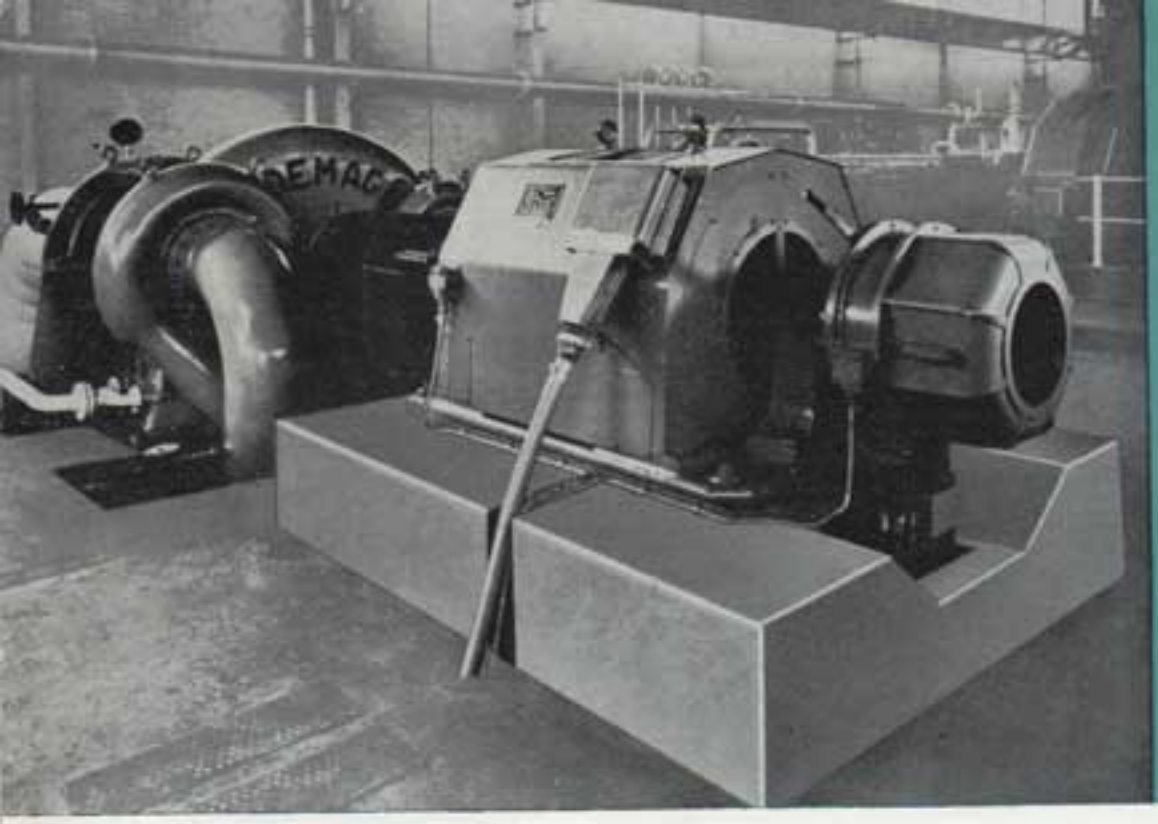
1000 kW 11 kV 300 r.p.m. screen-protected engine-driven a.c. generators

SYNCHRONOUS CONDENSERS

Synchronous condensers are normally employed to regulate system voltage or improve system stability by generating or absorbing inductive (or "magnetising") reactive power. They usually resemble the larger and higher-speed salient-pole a.c. generators both electrically and mechanically, although detail differences may be necessary because of the need to start the condenser as a salient-pole synchronous motor. Our recent activities in this field include the manufacture of three 16·4 MVAr 750 r.p.m. closed-air-circuit water-cooled machines for The Electricity Trust of South Australia, the installation of a 40 MVAr 750 r.p.m. machine for our own Transformer Testing Department, and a contract for two 60 MVAr 1000 r.p.m. outdoor-type closed-hydrogen-circuit water-cooled condensers for the C.E.G.B.



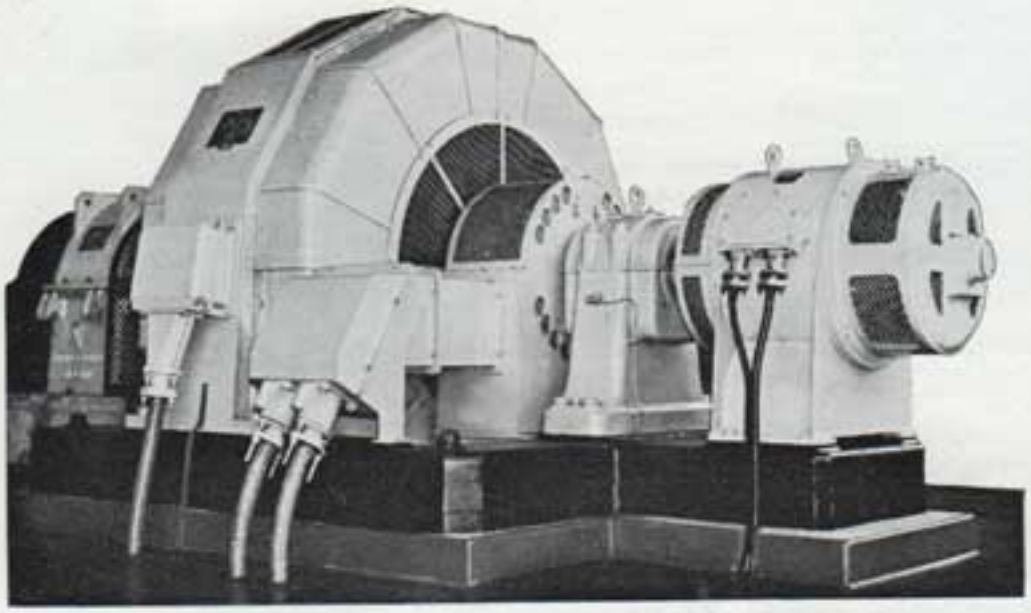
3 MW 11 kV 1500 r.p.m. closed-air-circuit water-cooled steam-turbine-driven a.c. generator



A.C. MOTORS

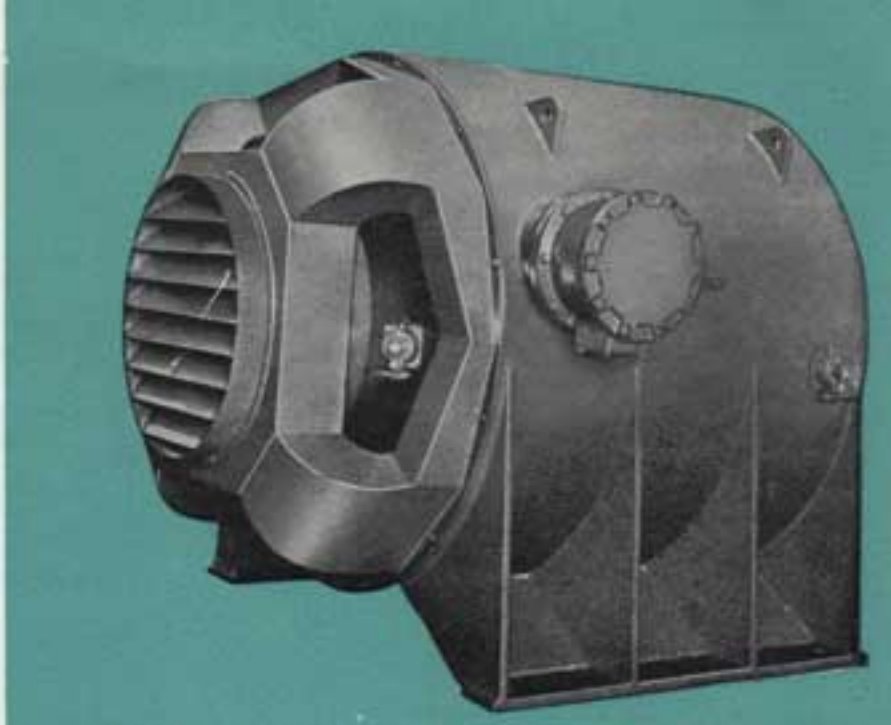
1800 h.p. 3·3 kV 1480 r.p.m. screen-protected slipring induction motor

There are very few industrial applications for which a Bruce Peebles motor cannot be supplied, and there are very few industries to whose progress and efficiency we have not contributed at some time. It is impossible here to illustrate more than a few of the many kinds of a.c. motors available, but the following list will perhaps give some idea of the nature and extent of our manufacturing range.
Squirrel-cage induction, slipring induction, salient-pole synchronous, synchronous induction, salient-pole synchronous induction, multi-speed squirrel-cage induction, variable-speed Kramer.
Screen-protected, drip-proof, pipe-ventilated, duct-ventilated, filter-ventilated, weatherproof, plain totally-enclosed, totally-enclosed fan-cooled, closed-air-circuit air-cooled, closed-air-circuit water-cooled, flameproof (both totally-enclosed fan-cooled and closed-air-circuit air-cooled).
Horizontal or vertical; self-contained or with bedplate and pedestal bearings; high speed or low speed; high-voltage or low-voltage; high-torque or low-starting-current.



900 h.p. 3·3 kV 300 r.p.m. screen-protected synchronous induction motor

450 h.p. 6·9 kV 1780 r.p.m. totally-enclosed fan-cooled squirrel-cage induction motor



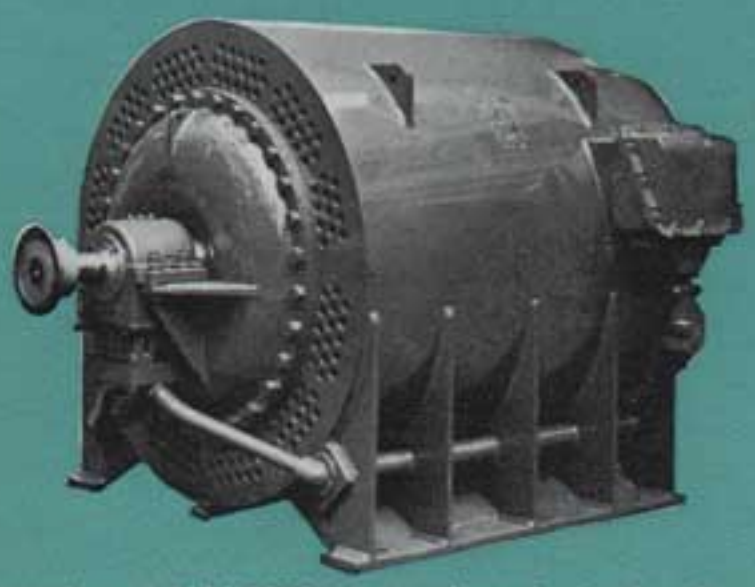
1000 h.p. 3·3 kV 985 r.p.m. closed-air-circuit air-cooled weatherproof squirrel-cage induction motor

Motors to British Standards, American Standards, Canadian Standards; standard motors and special motors; motors to drive mine fans, sinter fans, air-conditioning fans and blowers; motors for boiler feed pumps, circulating water pumps, mine pumps, dock pumps; motors for axial compressors and reciprocating compressors; motors for frequency changers and motor-generator sets; motors for steelworks auxiliary drives, for cement mills and coal crushers, for the oil and chemical industries, for coal mining machinery—all these are available in an almost infinite variety of combinations and variations, and on this and the opposite page are just a very few examples of the kind of motor whose reputation for reliability has written the name of Bruce Peebles into so many specifications. And although a wide range of standard motors is available we are always pleased to look into any special drive requirements with a view to the provision of a motor with exactly the right characteristics.

75 h.p. 415 V 980 r.p.m. totally-enclosed fan-cooled squirrel-cage induction motor

40 h.p. 440 V 720 r.p.m. short-time-rated totally-enclosed slip-ring induction motor

65 h.p. 525 V 1480 r.p.m. totally-enclosed fan-cooled flameproof squirrel-cage induction motor

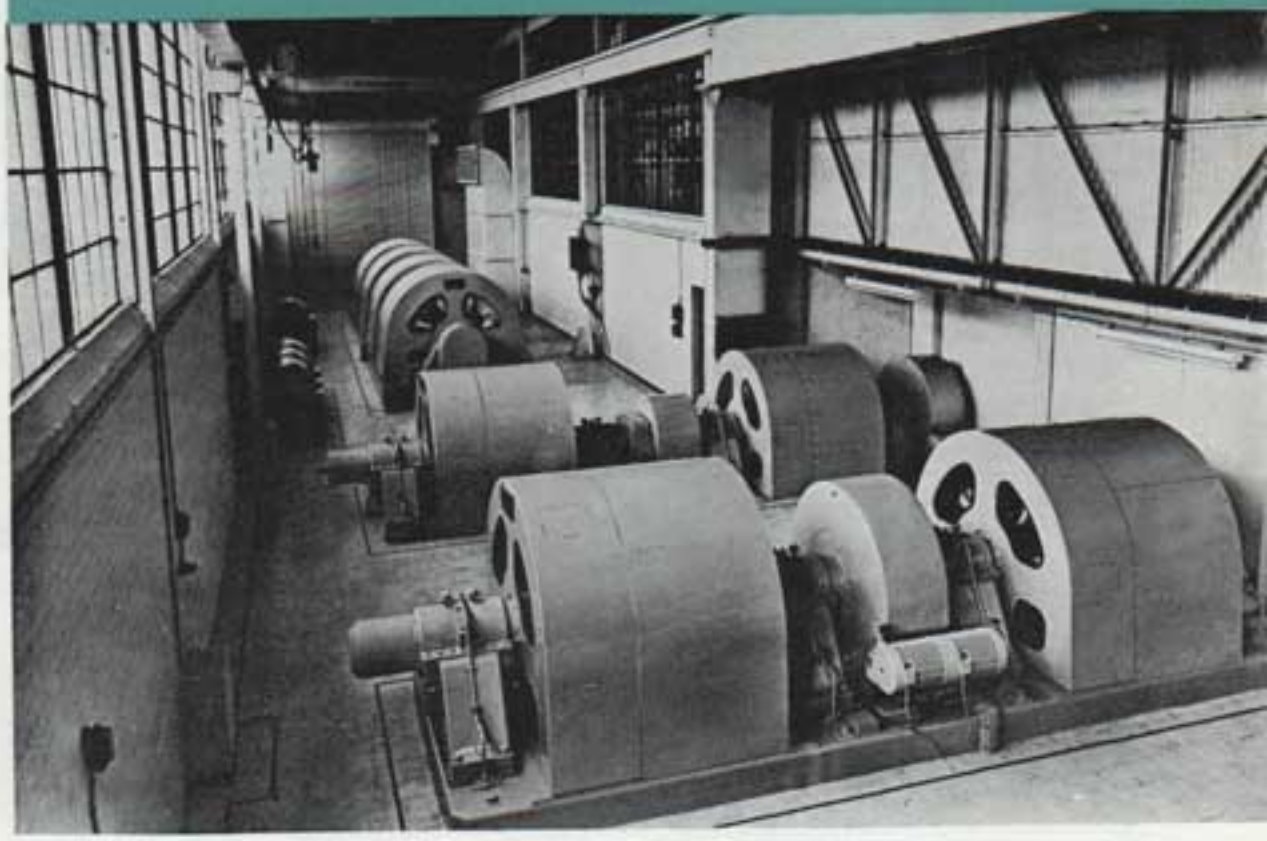


650 h.p. 3·3 kV 2970 r.p.m. closed-air-circuit air-cooled flameproof squirrel-cage induction motor

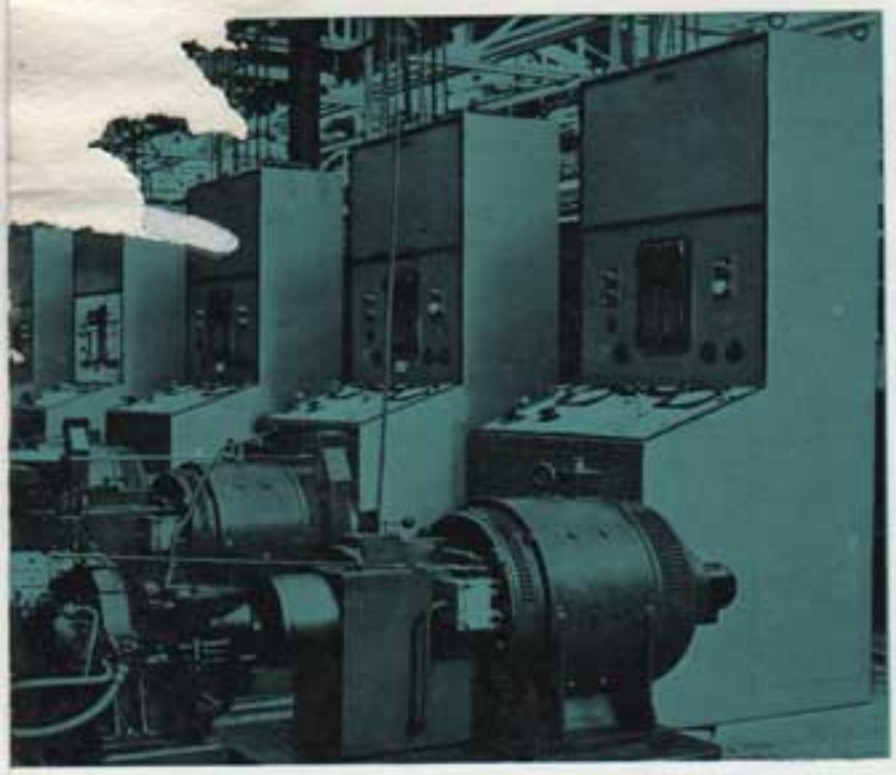
D.C. MACHINES

In modern industry alternating current reigns supreme, and in general there can be no denying its utility and economy. There are still applications, however, where the characteristics of the direct current motor make it especially suitable, and none more so than wherever variable speed is essential. For wide speed ranges, and especially at large output powers and where the drive demands a constant-torque characteristic, the speed control of a d.c. motor by armature voltage ·riation is preferred by many indus- users. In particular, and in spite need for either a motor- set or a grid-controlled d.c. motor is still the .niversal choice of the steel- engineer for his main rolling lrives.

Another equally specialised applications which d.c. machines have recently plied include dynamometers for the testing of small diesel engines and a rectifier-controlled variable-speed motor for the testing of hydraulic transmission equipment. In both these applications the flexibility of operation of the d.c. machine, and its ready response to armature voltage and field current changes, made it especially suitable for incorporation into automatic control systems designed to facilitate the work of the testing engineers.

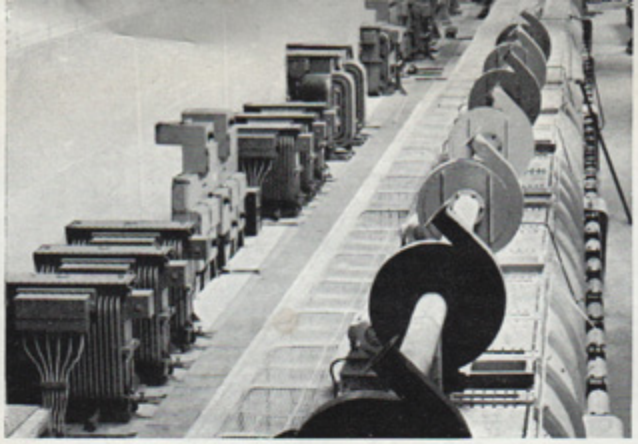


Motor room of modern steel strip mill, showing two 715 h.p. mill motors, two 625 h.p. reel motors, and (background) a 3000 h.p. synchronous motor driving three 1240 kW d.c. generators



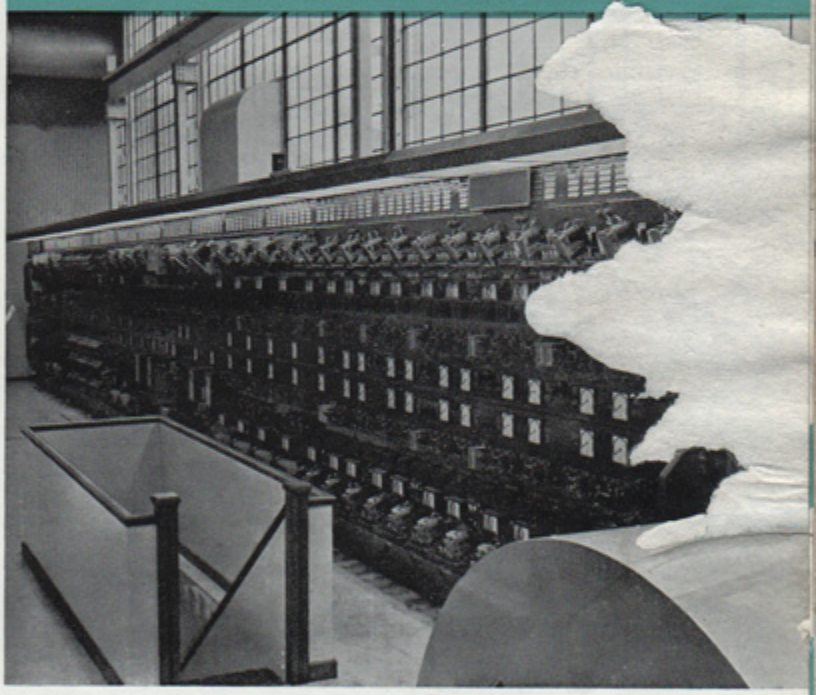
40 kW 1000-2600 r.p.m. d.c. generators used as dynamometers for testing diesel engines

1500-580 h.p. 700 V 1550-600 r.p.m. pipe-ventilated forced-draught d.c. motor



3MW electrically-heated galvanising furnace installation with series transductor control

CONTROL SYSTEMS



Part of REGA Brucker control gear for modern steel strip mill

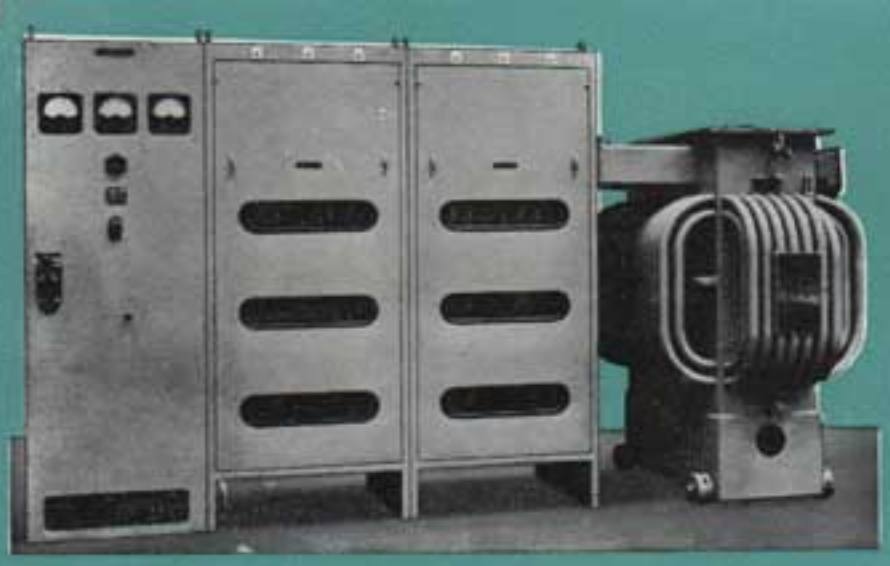
THE SYSTEMS ENGINEERING GROUP

Until recently our several control gear sections dealt more or less independently with the separate problems associated with rotating plant, rectifiers, and transformers. The activities of these separate sections have now become the responsibility of a single new engineering section known as the Systems Engineering Group. Although it continues to undertake the work formerly done by its major constituent sections, the new Group—staffed by qualified and experienced engineers and adequately supported by the appropriate Drawing Office facilities and by the Company's manufacturing resources—has as its principal responsibility the design and execution of complete systems for the control and protection of our principal and more basic products.

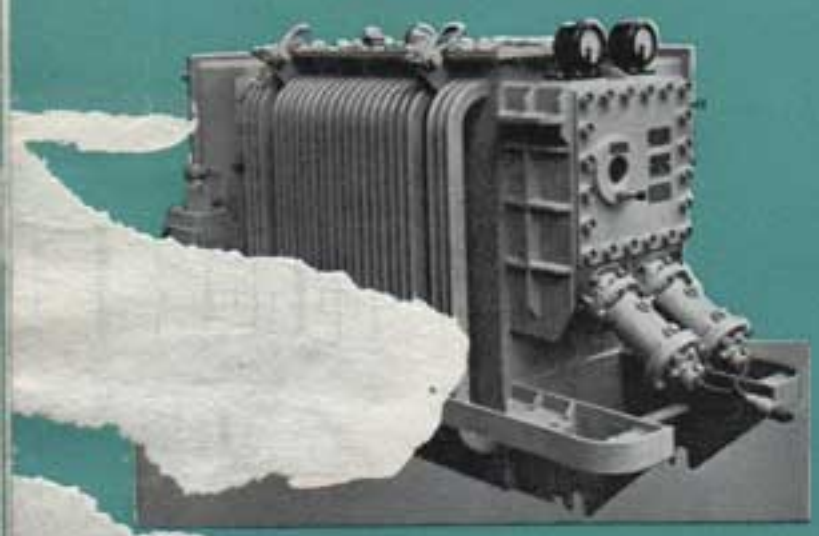
Among the control systems already commissioned by the Group or currently in hand may be mentioned the speed control of a 2000h.p. variable-speed modified-Kramer cascade set driving a sinter fan at a steelworks; rolling-mill drives with automatic speed and tension control; the speed control of the 1500h.p. rectifier-fed d.c. motor illustrated opposite; and a system for the automatic temperature control of a battery of electrically-heated furnaces by means of magnetic-amplifier-controlled series transductors.

ROLLING MILL CONTROL

Complementing the activities of the Systems Group in the specialised rolling mill field is the agreement recently concluded between Bruce Peebles and REGA Brucker of Siegburg, West Germany. Under the arrangements made in this agreement, rotating machines and rectifiers are built by Bruce Peebles, while equipment for automatic gauging and tension control, and for programming and optimisation, are designed by REGA Brucker and may be manufactured either by them or, under licence, by Bruce Peebles.



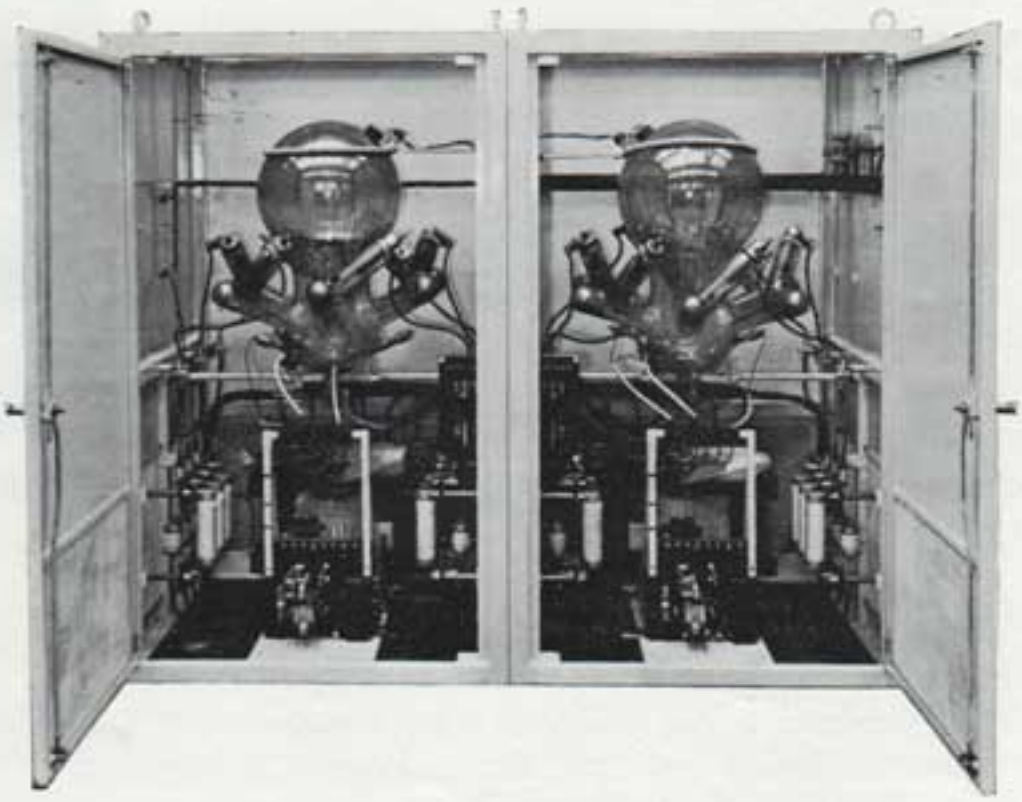
225 kW 460/230V 3-wire germanium rectifier and associated transformer



battery-charging silicon rectifier

RECTIFIERS

In spite of the overwhelming convenience and economy of present-day alternating current systems there are still many industrial applications for which direct current is more suitable or even absolutely essential. Bruce Peebles have for many years been associated with the conversion of alternating to direct current, and we are in a position to supply all the usual types of static rectifier, i.e. mercury arc (glass bulb or steel tank) and semi-conductor (germanium or silicon). Each of these types has its own special advantages in particular circumstances, and advice on their merits is available at any time from our experienced application engineers. The design and manufacture of rectifier transformers is another of our specialities, and the close co-operation between the rectifier and transformer designers so essential for the success of a rectifier application is thus assured.

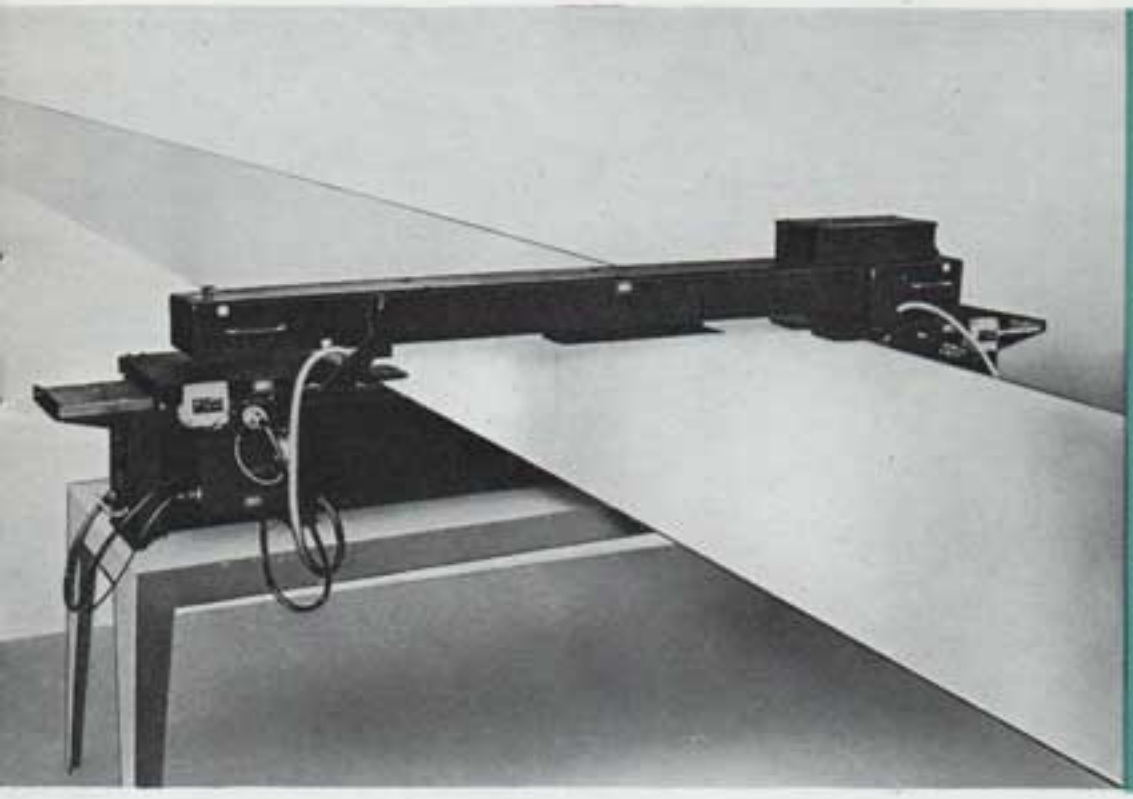


150 kW 650-300 V glass-bulb mercury arc rectifier

INDUSTRIAL ELECTRONIC EQUIPMENT

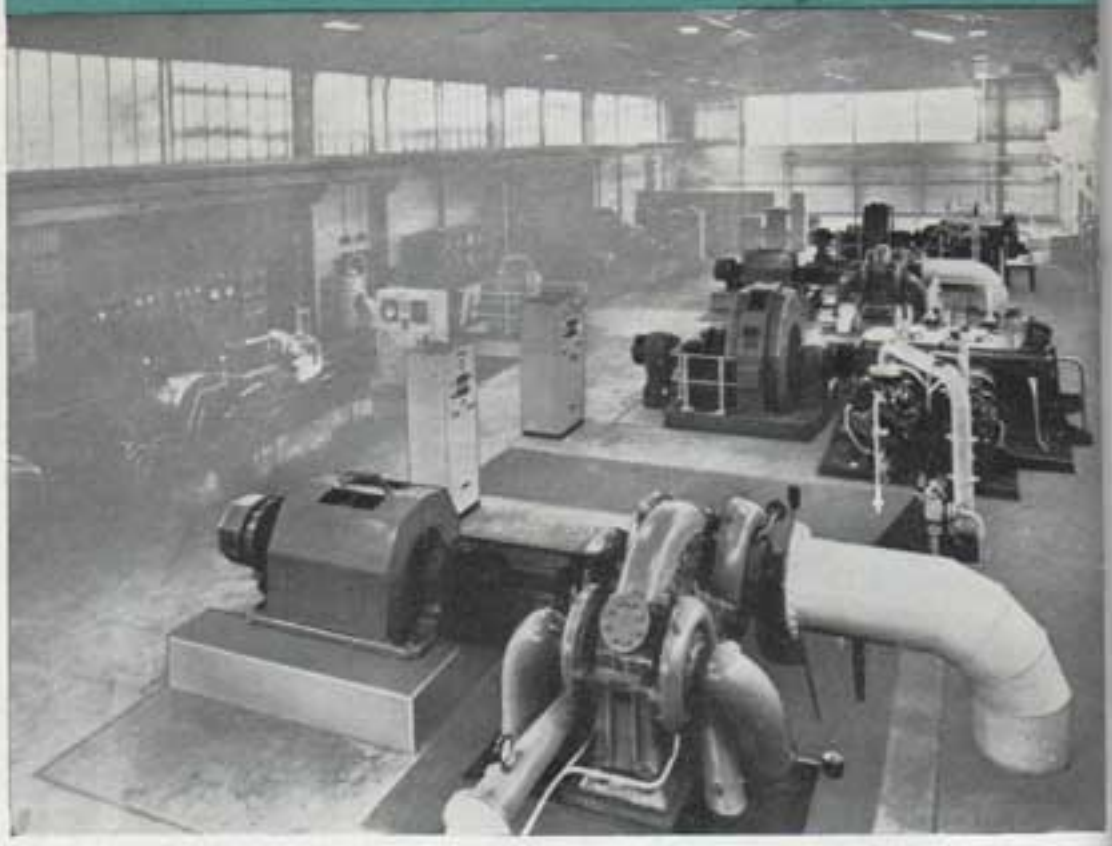
Our Electronics Division is now concentrating its extensive laboratory facilities and the experience of its engineers and scientists on the design of electronic equipment for a wide variety of industrial applications. Once again it is impossible to illustrate more than a few of its activities, but some idea of its scope may be gathered from the successful development of apparatus for the detection and location of extremely small "pinholes" in rapidly moving steel or tinplate strip, automatic mining control equipment based on contactless proximity devices and static logic switching systems, static low-frequency generation for nuclear reactor control rod drives, and high-speed gas chromatography. In addition to these directly productive activities the Division also plays an important part in the work of our Systems Engineering Group by designing and building such control system elements as transistor and magnetic amplifiers, and its contribution to our research includes the design and development of a wide variety of analogue units.

Gas Chromatoscope



Pinhole Detector

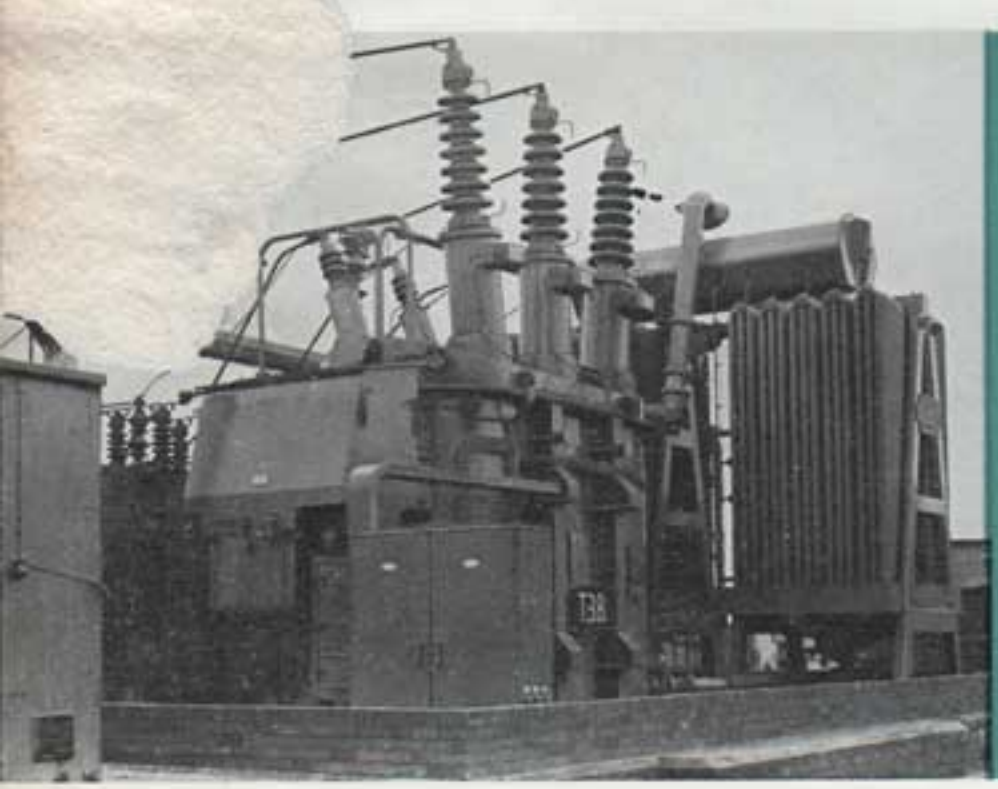
TYPICAL INSTALLATIONS

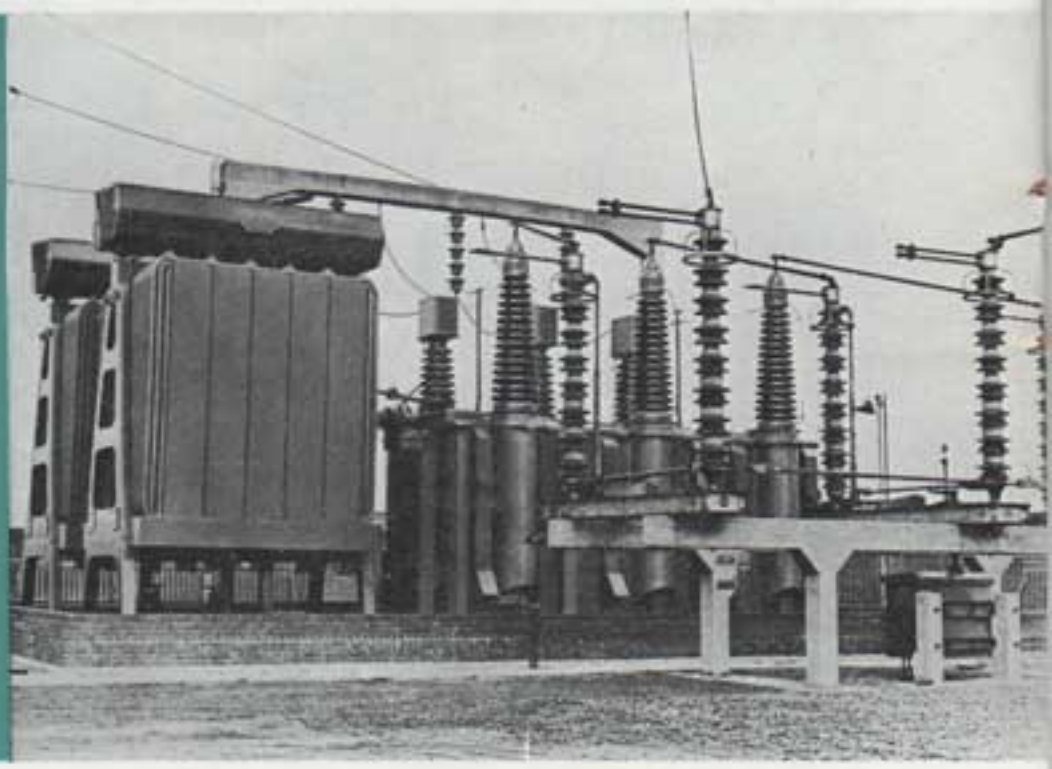


(Right)
1800 h.p. 1480 r.p.m. slipring induction motors and 1450 h.p. 375 r.p.m. salient-pole synchronous induction motors at a large gasification plant

(Bottom Left)
MVA 132/33 kV ON/OFB-cooled transformer

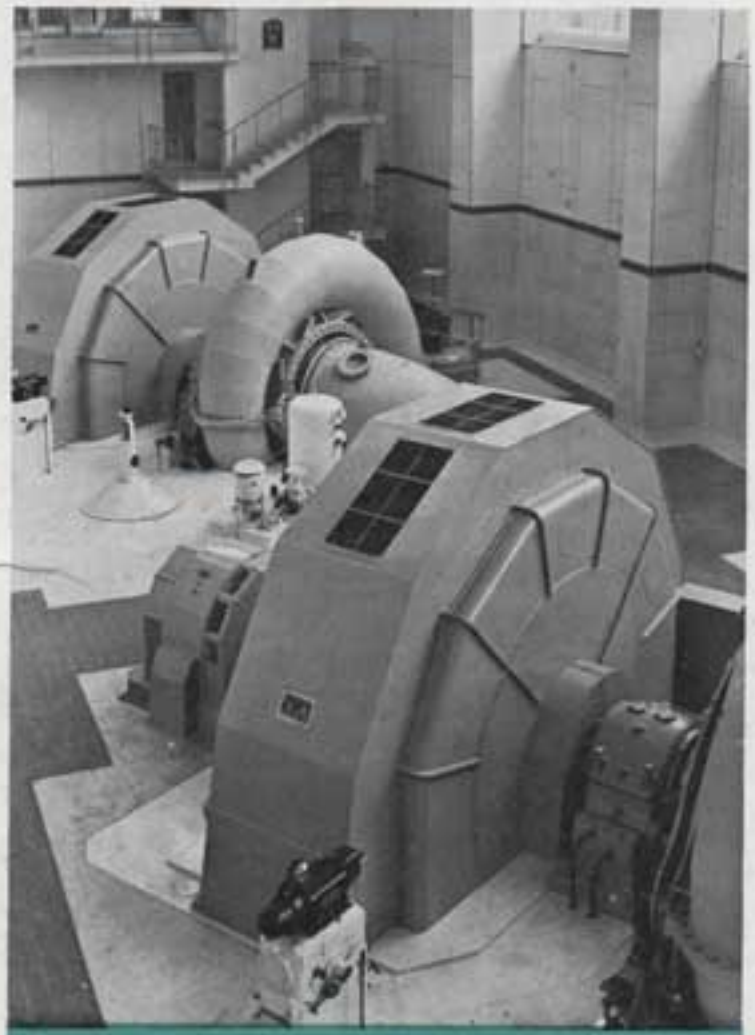
(Bottom Right)
60/120 MVA 275/132 kV ON/OFB-cooled auto-transformer





300 h.p. 2975 r.p.m. closed-air-circuit air-cooled flameproof squirrel-cage induction motors in an oil refinery

12 MW 375 r.p.m. duct-ventilated horizontal-shaft hydro-generators



900 kW 1500 r.p.m. gas turbine-driven a.c. generators at a cement works

HOME BRANCHES

LONDON, 56 Victoria Street, S.W.1.
Telephone: TATe Gallery 3551

CARDIFF, 28 Windsor Place.
Telephone: Cardiff 25682

BIRMINGHAM, 95 Cornwall Street, 3.
Telephone: CENtral 1389

LEEDS, Permanent House, The Headrow, 1.
Telephone: Leeds 35447

MANCHESTER, Peter House, St. Peter's Square, 1.
Telephone: CENtral 6690

NEWCASTLE-UPON-TYNE,
3 Windsor Crescent, Jesmond, 2.
Telephone: Newcastle 81-2869

GLASGOW, 26 Blythswood Square, C.2.
Telephone: Central 6677/8

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Avda. Belgrano 406-6° Pisco,
Buenos Aires

AUSTRALIA
H. J. M. Ward,
Engineer Representative,
Bruce Peebles & Co. Limited,
522 Little Collins Street,
Melbourne, C.1.

BELGIUM
G. de Corte S.P.R.L., 13, Vlaamse Kaai, Gand

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Westmount, Montreal 6, Quebec

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P.O. Box 14, Estnasg 7, Helsingfors

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P.O. Box 509, Calcutta 16
and branches in Bombay, Delhi, Madras

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Rezeyat Trading Co., P.O. Box 106, Kuwait

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