The New POWER STATION

FOR THE

BOULDER MUNICIPAL COUNCIL

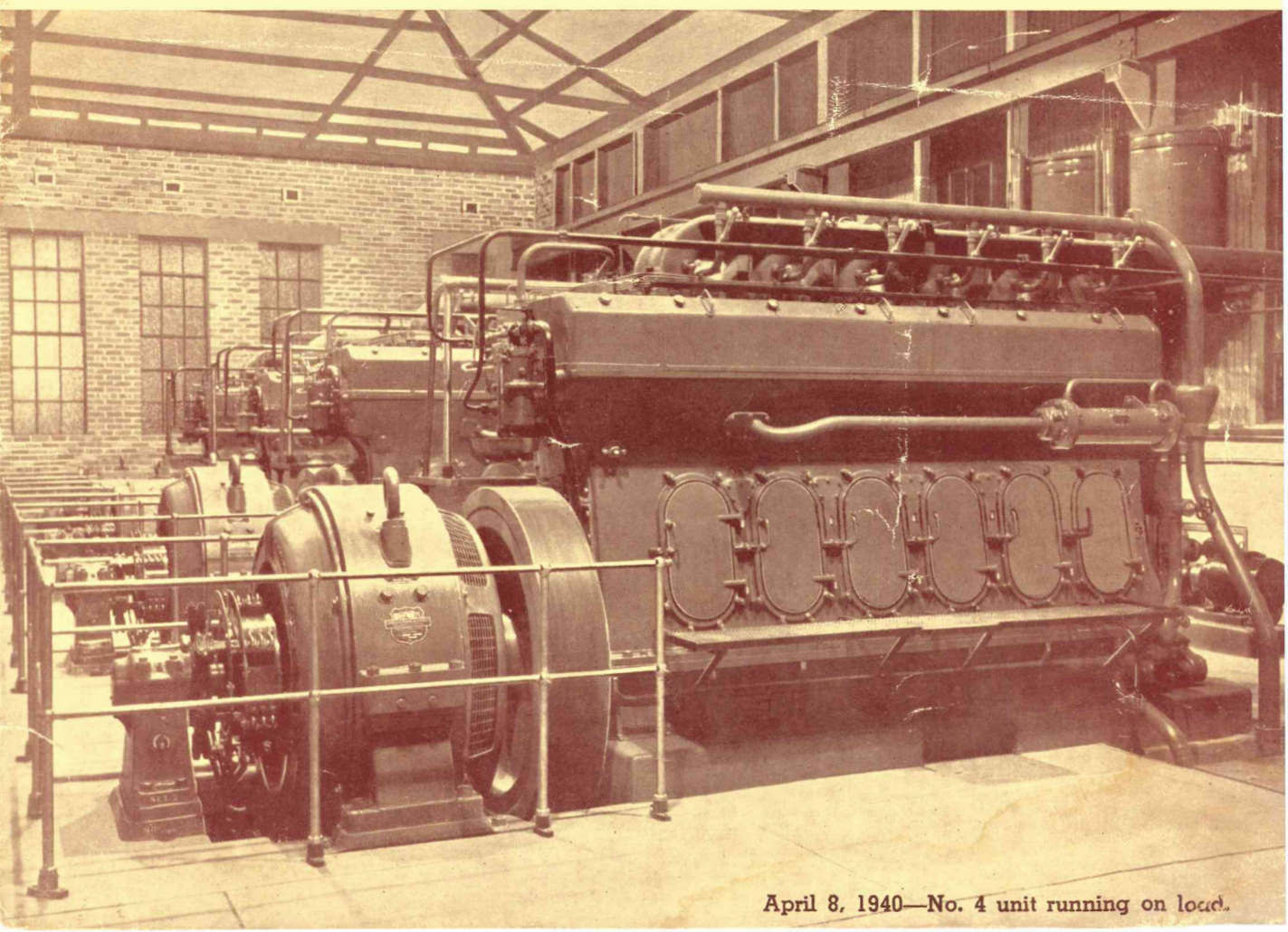
★

Designed and Constructed for

THE MUNICIPALITY OF BOULDER by

Harris, Scarfe & Sandovers Ltd.

Opened by
The Hon. Phillip Collier, M.L.A.
on 18th April, 1940

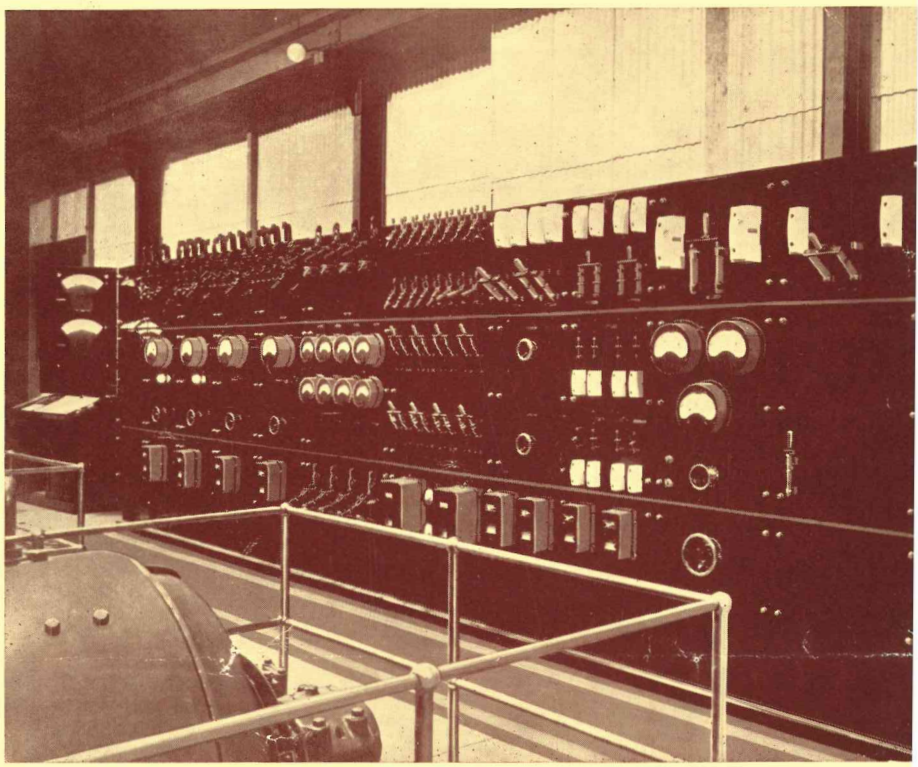


April 8, 1940—No. 4 unit running on load.

GENERAL DESCRIPTION OF BUILDING AND PLANT

Site.—The new Power Station is located in Hamilton Street, next to the Railway Reserve.

Building, Crane and Foundations.—Work under this heading was carried out by J. Flett, of Kalgoorlie, under the supervision of and for the main contractors, Harris, Scarfe & Sandovers Ltd., the latter having had the services of Messrs. Hobbs and Winning, Architects, to draw up plans and specifications for the building and crane. The main engine room is of steel frame construction, 36ft. between stanchion faces x 75ft. long, having a height of 18ft. from floor level to the stanchion caps, and 9ft. from stanchion cap to top of ridge. The roof is of ¼in. Super-Six Fibrolite and the walls of 7/32in. Standard Fibrolite. The floor is a minimum of 12 inches above ground level, and is of 6in. reinforced concrete. There is a 4ft. 6in. high reinforced concrete dado on the two longitudinal walls. Steel frame windows are provided, and for bringing in the machinery there is a roller shutter covering a sight opening 10ft. wide x 11ft. high.



April 8, 1940—The D.C. Switchboard.

The crane is of the double gantry type, hand-operated, having a capacity of 5 tons. It runs on 20lb. rails, the top of which are 14ft. 3in. from floor level.

The main foundation blocks are all 6ft. deep x 8ft. wide, the approximate lengths being 16ft. for units 1 and 2 and 20ft. for sets 3 and 4. A portion of the floor has been put down without reinforcement to facilitate excavating for the foundation of a fifth unit, if such an addition is required at a later date.

A lean-to weatherboard wing contains the following: A manager's office; a meter testing room; store and a fitting shop. The whole of the building has a brick facade.

Main Power Units.—The engines are four in number and were manufactured by Ruston and Hornsby Limited, of Lincoln, England, who are to-day the largest builders of Diesel Engines in the British Empire. All have a bore and stroke of 11 inches and 14½ inches respectively and run at 428 r.p.m.

The D.C. Generators are manufactured by the Lancashire Dynamo and Crypto Limited, of Manchester, England. They are of the single bearing type, rigidly coupled to the engine flywheels, and deliver current at 480 volts. Units 1 and 2 are of the 3-cylinder size, being 165 b.h.p./104 kw. Units 3 and 4 have six cylinders and are of 330 b.h.p./212 kw., giving a total capacity in the four units of 990 b.h.p./632 kw.

The main Contractors are an entirely Western Australian firm and are the sole W.A. agents for both engine and generator manufacturers.

The Engines are totally enclosed, forced lubricated, and are provided with "Visco" air inlet filters, integral "Streamline" oil filters with three heat elements and thermostatic heat controls, together with exhaust and water thermometers. Polished steel hand rails surround the generators.

The units are located at 12ft. 6in. centres.

Switchboards and Cables.—The switchboards were manufactured by the main contractors on their Hay Street premises. The D.C. switchboard is made up of eleven panels and additionally one swing panel. It has an overall length of 23ft. 6in. and is 7ft. 3in. high. The panels are of ducoed 1½in. slate. The D.C. board faces the four generating units, so that it can be easily viewed from any engine control platform. The A.C. board has three panels and is 5ft. 6in. long x 7ft. 3in. high. This board was also constructed by the main contractors, and is located adjacent to the two motor-alternator sets. Three-feet wide rubber mats are laid in front of the switchboards.

The back of each board is painted with white enamel, and all bus-bars and back-of-board wiring are coloured so that both voltage and polarity can readily be picked out. A refinement on the D.C. board is the embodiment of red indicator lights on the generator panels. When a unit is running and up to voltage but its circuit-breaker open, then its particular light is at 2/3rds. of full brilliancy. Putting the machine on load by closing the breaker brings up the indicator light to full brilliancy. Back-of-board isolating links are provided, by the opening of which with a special hooked stick it is possible to completely isolate from the bus-bars any one or more of the generators and their corresponding switchboard panels.

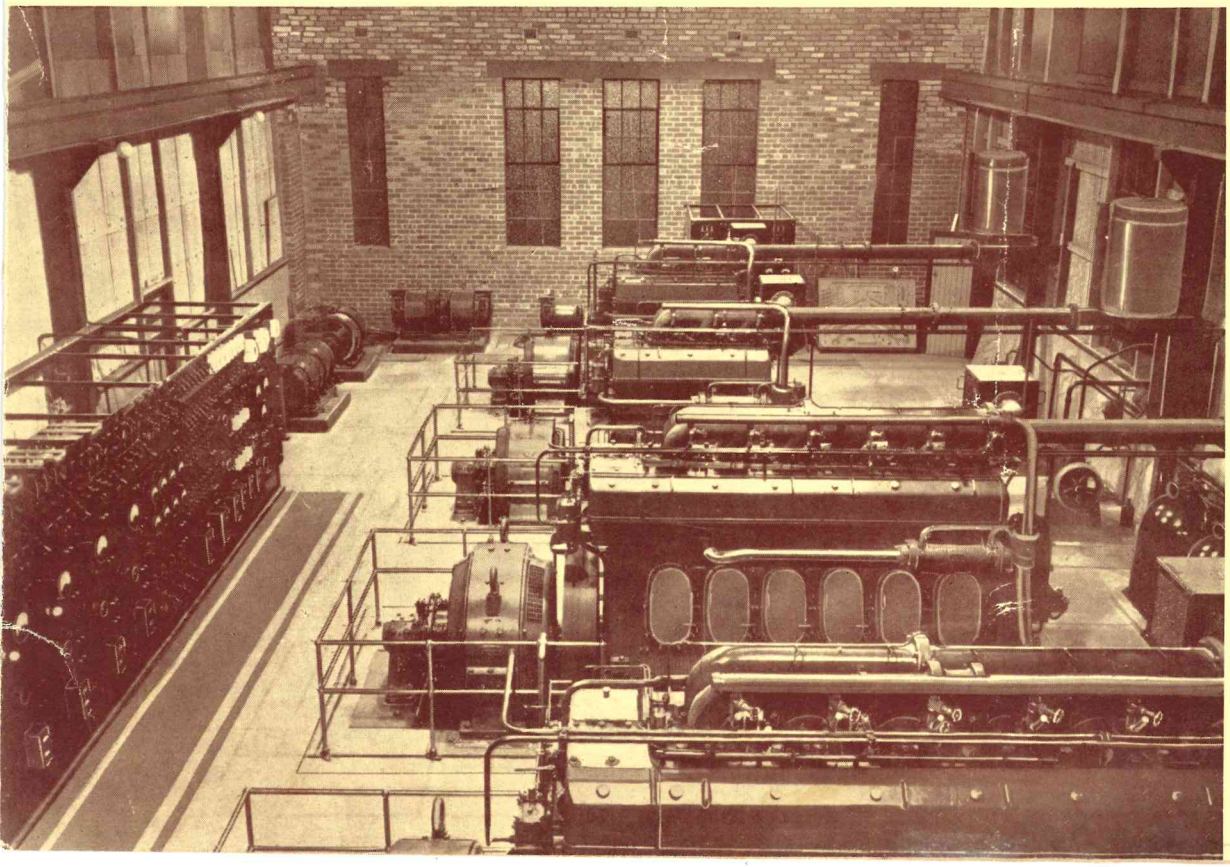
All the heavy cables from the generators to the main switchboard are run underground in 6in. fibrolite pipe ducts.

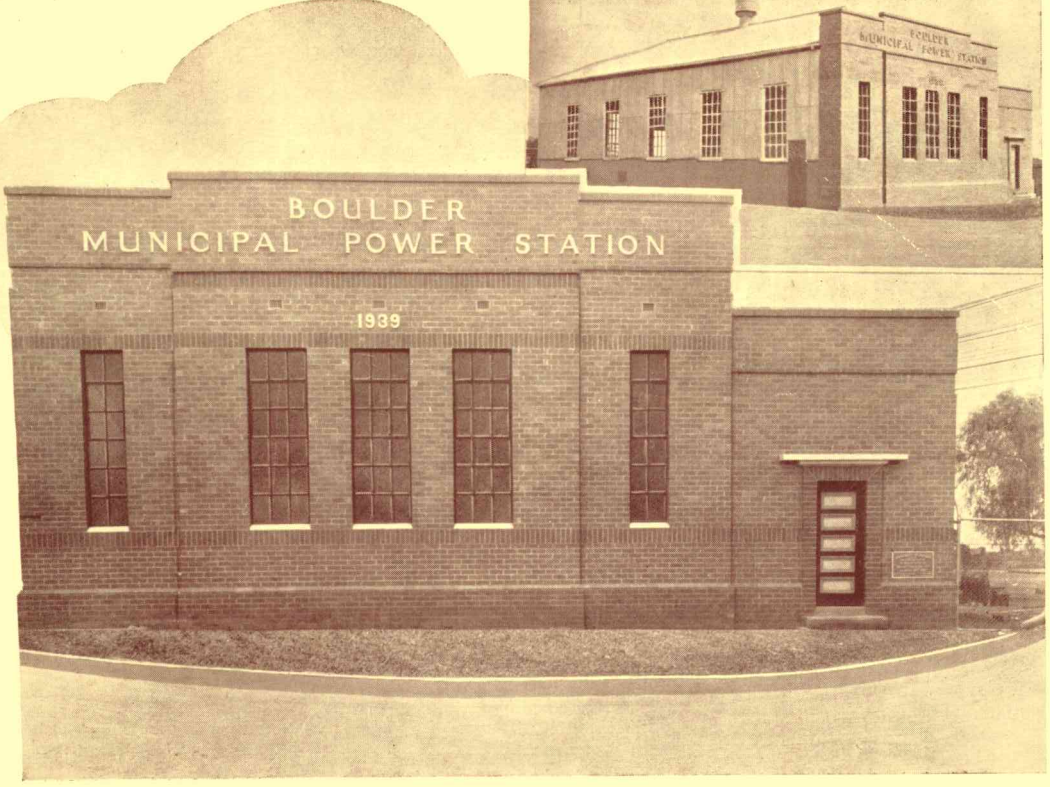
Balancers.—To provide the neutral point in the service for lighting purposes, there are two rotary balancers, one of 50 amps. capacity, being a "Westinghouse" machine from the old power station, and the other a new "Lancashire" machine of 180 amp. capacity. The latter is a rigidly coupled 3-bearing machine on a combination baseplate running at 1,200 r.p.m. The starting and controlling switchgear for the balancers is incorporated in the main D.C. switchboard.

Alternating Current Supply.—To meet the demand for alternating current, which includes the Kalgoorlie Aerodrome, two "Lancashire" machines have been installed, each running at 1,200 r.p.m., the smaller being a 28 h.p. D.C. motor direct coupled to a 22 k.v.a. alternator, and the larger a 50 h.p. motor with a 40.5 k.v.a. alternator. The output is 440/254 volts 40 cycles. Each set is mounted on a combination baseplate. An automatic voltage regulator is rendered unnecessary by having the alternators compounded with the driving motor armature current, which gives a level voltage characteristic over the full load range. Excitation of the alternators is effected from the main 480-volt circuit. Three single-phase transformers ex the old power station, each of 10 k.v.a. capacity, will step up the voltage to 3,300 to meet high tension requirements.

Lighting.—The main engine room lighting is from eight 18in. reflectors carrying 500 watt lamps. A unique emergency lighting scheme is also incorporated, comprising three 50 candlepower 12-volt lights supplied from a storage battery. The

April 8, 1940—General view of the main engine room taken from the overhead crane.





Facade of the building, with inset of structure nearing completion.

system is automatic, being controlled by an electro-magnetic switch, which is normally held in the "off" position. Approximately ¼ amp. at 240 volts energises the electro-magnet and also trickle-charges the battery through a suitable resistance, thus at all times engine room lighting is assured.

On the exhaust side of the building are four A.C. wall plugs and on the opposite side two D.C. plugs. For use with the former there is a "Rowco" 100-watt portable transformer, giving 12 volts for an inspection light.

Starting Air Equipment.—The engines are started by compressed air at 300 lbs. per square inch, each engine cylinder having a starting air valve combined with a relief valve. Two independent air compressors are supplied, one a 2-stage "Ruston" machine driven through an internal ring gear by a "Lancashire" 5 h.p. motor running at 1,250 r.p.m. Cooling water for this machine is tapped off one of the main water runs and a sight flow indicator is provided. The second set is for emergency use and is a combined Ruston and Hornsby Engine/Compressor Unit of 2½ b.h.p. at 560 r.p.m., this being independently cooled from a small tank. Two interconnected air receivers, each of 23 cu. ft. capacity provide the necessary storage.

Cooling System.—A new concrete sump has been constructed of approximately 24 ft. x 24ft. x 2ft. and superimposed thereon is a heavy timber stand, a vat and a cooling tower, all of which were transferred from the old power station. The vat is 21ft. diameter and has a capacity of 11,000 gallons. The cooling tower is 16ft. square at the base and 20ft. high. There are two Ruston/Lancashire motor-driven centrifugal pumps, one being a standby; the pumps have 2½in. deliveries and 3in. suctions and the motors are 8 h.p. at 1,880 r.p.m. The majority of the external pipe work is in fibrolite and two complete sets of mains are provided, the first for units 1 and 2 and the second for units 3 and 4. Integral chain-driven centrifugal pumps are incorporated in the engines to assist the water circulation. Priming pipes for the motor-driven pumps are tapped off the inlet pipes to units 3 and 4. The height of the vat makes effective "after-cooling" possible when an engine is shut down.

Fuel System.—At a distance of 100 yards or so from the power station, the Council has set down a number of old boilers, which will constitute the main fuel storage. Those already in service provide approximately 10,000 gallons capacity. The storage is located at such a height that it is possible to gravitate the fuel from rail tankers, which are hauled to a nearby siding. A 1½in. Kent fuel meter records the incoming fuel. A ¾in. centrifugal pump in the power station transfers the fuel from the main storage to two settling tanks adjacent to the main engine room, these holding approximately 1,000 and 1,500 gallons respectively. From thence the fuel is transferred by means of a ⅜in. gear pump to a small tank located in the engine room roof ridge, from which it gravitates to four individual engine daily service tanks, each of which is provided with a ½in. "Kent" fuel meter and a float level indicator. The ¾in. and ⅜in. pumps are each driven by ½ h.p. motors.

The COUNCIL

OF THE MUNICIPALITY OF BOULDER

as at the date when a decision was reached to purchase the new Diesel Plant, namely, April 20, 1939:—

August 29, 1939—His Worship the Mayor, Walter F. Coath, Esq., J.P., laying the Foundation Stone of the new Power Station.

WALTER F. COATH, ESQ., J.P., MAYOR

Councillors:

W. Smythe
J. P. Butler
F. E. Claridge
A. B. Campbell
G. M. Cumming
J. D. Teahan, J. P.
K. McLean
W. Julian
W. A. G. Richards
E. McMahon
J. D. Robertson
L. J. Triat

Electrical Engineer:
A. R. E. BOSUSTOW

Town Clerk:
H. J. EDWARDS

As at the date of the official opening, namely, April 18, 1940:—

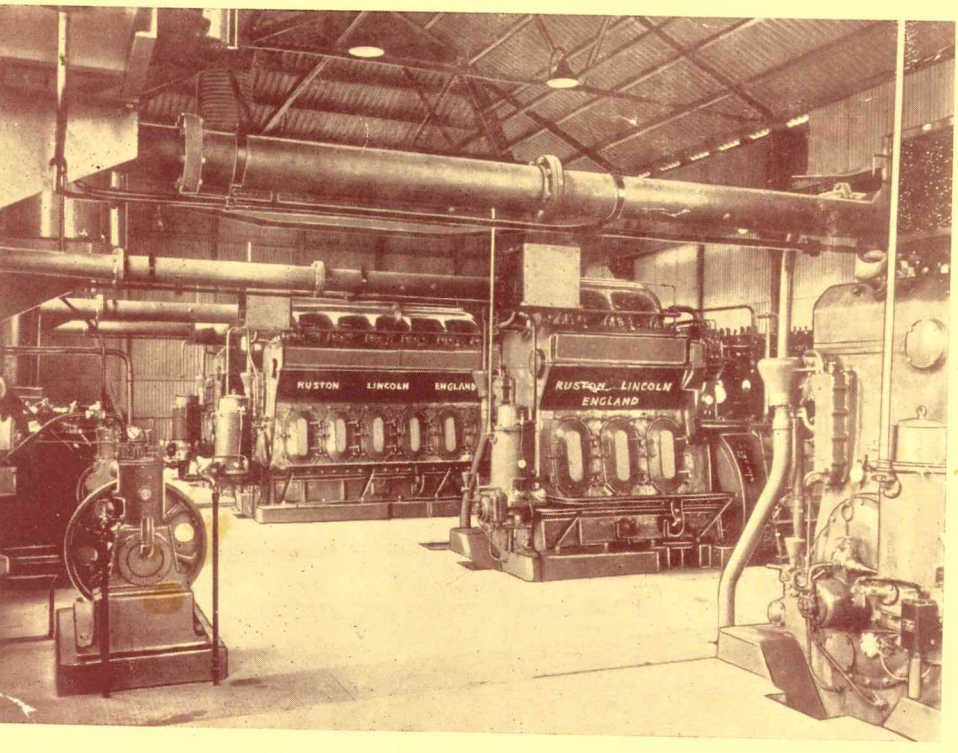
WALTER F. COATH, ESQ., J.P., MAYOR

Councillors:

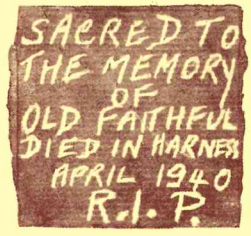
W. Smythe
J. P. Butler
F. E. Claridge
A. B. Campbell
G. M. Cumming
J. D. Teahan, J. P.
K. McLean
W. Julian
R. W. Fletcher
W. H. Barber
C. Kenneally
W. F. Bingley, J. P.

Electrical Engineer:
A. R. E. BOSUSTOW

Town Clerk:
C. L. McLLHENEY



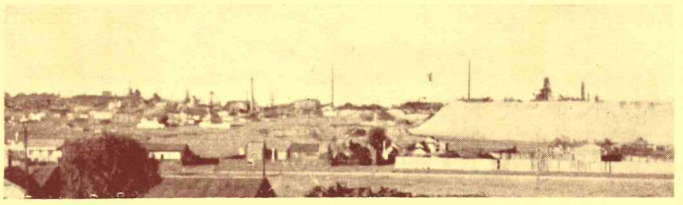
April 8, 1940—Main engines from the opposite-end-to-flywheel, showing the integral "Streamline" filters. Starting air compressors in left foreground



The above is a reproduction of a placard found hanging on the Ruston gas engine which served for the past 32 years in the old power house. The placard — written by one of the shift engineers — is a tribute to an old and loyal friend.

THE CITY OF BOULDER

The city of Boulder, Western Australia, adjoins the famous "Golden Mile," the centre of the Eastern Goldfields district. The Municipality was proclaimed on the 6th August, 1897, and has an area of 5½ square miles. The Boulder centre has, to date, produced 23,234,504 fine ozs. of gold. From the inception of the Municipality the Council has adopted progressive methods in the whole of its administration, and confidence in the future of the Goldfields is shown by the installation of the new diesel-engined Power Station.



A view of part of "The Golden Mile" taken from the top of the cooling tower of the new power station.

The Foundation Stone of the old Power House in Piesse Street was laid on November 30, 1899, and a new section was added to the station in 1905. The prime movers which have been in operation up to the time of the new Power Station taking over the load were, in the beginning, two 25 kw. 220 volt Sturtevant generators direct coupled to steam engines. These were followed by an additional 50 kw. 220 volt Sturtevant steam engined unit and two Willans engines with generators of 150 k.w. 440 volts.

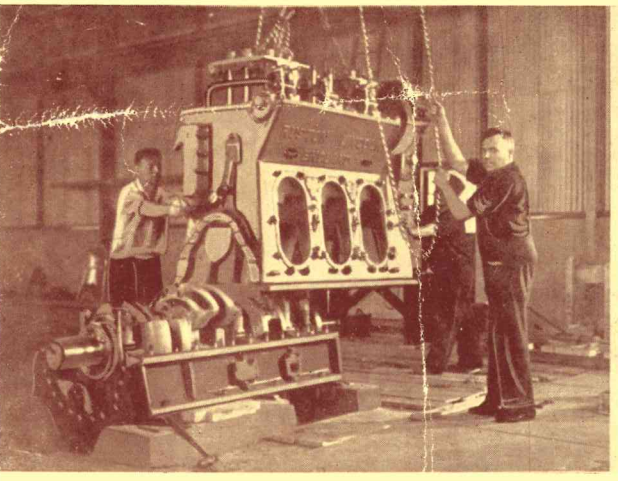
In 1908 an Allen steam engine, with a 150 kw. A.E.G. generator and a Ruston Proctor gas engine with an 80 kw. A.E.G. generator, were installed, both being 440 volts.

In 1923, with the introduction of two motor generators of 80 kw. each, and the purchase of power from the Kalgoorlie Electric Power & Lighting Corporation, steam went out of commission.

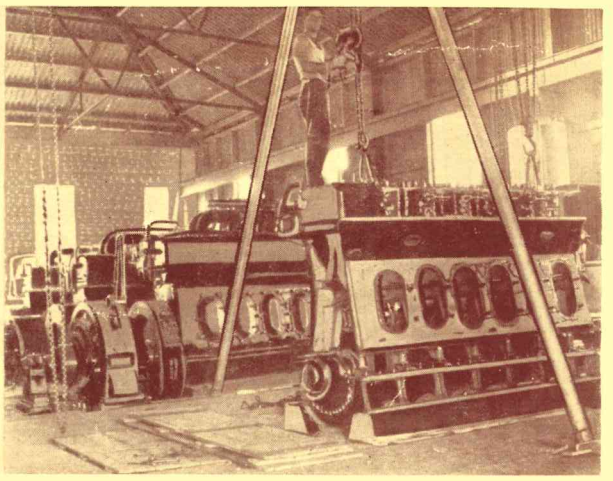
The Ruston engine and motor generators carried the full load from 1923 to 1932, when the National gas engine was attached to an existing 150 kw. Westinghouse generator and from 1932 to the present, both gas engines and motor generators have been in commission.

The old plant has been working up to full capacity and the demand for electricity was increasing, so early in 1939 the Council called tenders for a complete new Diesel Engined Power Station of such a size as to make Boulder entirely independent of outside resources. The new plant will be the means of effecting substantial economies in generating costs.

The contract for the supply of the whole power station was placed with Messrs. Harris, Scarfe & Sandovers Ltd., whose engineers, Mr. K. J. Hicks and staff, were responsible for the supply and installation of the entire plant.



November 7, 1939—No. 1 Unit: Bedplate and crankshaft in position, and the housing just being lifted over. Mr. C. J. Garraty—contractors' engineer in charge of erection—on extreme right.



February 12, 1940—No. 4 Unit: Lowering the housing—one end suspended from the overhead crane, and the other from a chain block on pipe sheer legs.

Miscellaneous.—Suppressors are fitted to all generators and motors in order to eliminate wireless interference. All surface trenches in the engine room are fitted with steel curbing and ⅜in. checker plate. Two "shadowed" spanner boards are also provided, one of them being mounted on rubber-tyred castors.

The main objective in the plant layout was the provision of ample space around all main units and auxiliaries. The Contract provided for handing over the whole Power Station in working order.