66 KV. SUBSTATIONS.

The following table shows the installed capacity of each substation, together with the maximum demand and units output:—

Substation.	Installed Capacity.	Maximum Demand.	Units supplied.
	Kw.	Kw.	
Addington	17,000	17,610	78,427,359
Timaru	5,000	2,247	9,235,173
Ashburton	5,000	1,402	5,451,510
Oamaru	1,050*	869	3,677,587
Hororata	295	264	900,149

* 300 kv.a. bank added 4th November, 1928.

Addington Substation.

After a period of twelve months' shut-down, during which new field coils were obtained and fitted, the 6,000 kv.a. condenser was placed again in regular service on the 31st July, 1928, and has since operated satisfactorily.

On the 18th September, 1928, a second new bank of 12,000 kv.a. transformers arrived, and the old north bank of transformers (5,000 kv.a.) was dismantled in November, the station operating with a transformer capacity of 17,000 kv.a. pending the completion of the installation of the new 12,000 kv.a. bank. This bank is now completed and ready for service, and the bank being replaced is being converted to outdoor self-cooling type for use at Oamaru Substation. The capacity of the transformers at Addington Substation has now been brought to 29,000 kv.a.

Further trouble, due to low insulation readings on the bushings of the ironclad switch-gear, was experienced, and more replacement of bushings has been found necessary.

INTERRUPTIONS TO SUPPLY.

(*a*) *Christchurch Supply.*

The total number of interruptions to Christchurch supply exceeding 1 minute was nine, and the total time of same was 1 hour 47¼ minutes. The longest period, of 1 hour 15 minutes, occurred on the 22nd February. The trouble was due to a period of dry dusty conditions, followed by heavy early-morning fog, causing a flash-over and damage to several insulators on all lines between Hororata and Christchurch. The interruption occurred at 5.30 a.m., and fortunately caused a minimum of inconvenience to consumers. Steps were immediately taken to have all insulators wiped down on the sections of lines affected, and no trouble has since been experienced. Of the remaining eight interruptions, totalling 32¼ minutes, three were due to failures of insulators on transmission-lines, two to trees blowing over on the lines, one to failure of O.C.B. bushing, and two to troubles at the power-house.

(*b*) *Ashburton Substation.*

The total number of interruptions to supply at Ashburton, apart from those prearranged, was sixteen, and the time of same 1 hour 42½ minutes. Of this number, five of the interruptions affecting Christchurch also affected Ashburton, the total time of same being 24½ minutes. Of the remaining twelve, four were due to broken wires on the transmission-line between Hororata and Ashburton, one to insulator-failure on transmission-line between power-house and Hororata, two to trouble at Hororata Substation, three to trouble at Ashburton Substation, and one unknown.

(*c*) *Timaru Substation.*

The total number of interruptions to this supply, apart from those prearranged, was twenty, and the time of same 2 hours 15½ minutes. Of this number, thirteen of the interruptions affecting Ashburton also affected Timaru, of a total time of 1 hour 5½ minutes. Of the remaining seven interruptions, six were due to transmission-line troubles (causes not ascertained), and one due to failure of insulator on air-break switch at Timaru Substation.

(*d*) *Oamaru Substation.*

The total number of interruptions to this supply, apart from those prearranged, was twenty-one, totalling 1 hour 33½ minutes. Of this number, twenty of the interruptions affecting Timaru also affected Oamaru. The remaining interruptions, therefore, were caused by faults on the transmission-line between Timaru and Oamaru.

DESIGN WORK.

The design and layout of No. 1 unit (8,830 kv.a.) involved considerable work, owing to space-restrictions in the existing building, which had been originally built to accommodate machines of smaller capacity, and for architectural reasons the extension was built to the same width as the original.

Special provision had to be made to accommodate the turbine relief valve which is of the jet dispersing type, a feature which is not incorporated in the other turbines in this station. To provide for the heavy hydraulic thrusts developed, particular care was called for in designing anchorages for the valve and hood, and adequate steel reinforcement had to be provided to withstand the stresses imposed.