

## Delhi Darbar Electric Lighting Arrangements.

On account of the risk of fire in connection with oil lamps, it was decided by the Central Committee to adopt electricity for lighting the Central Camp throughout.

It was also decided to employ the same method of illumination in the Fort for the State Ball and the Investiture.

The Director General, Military Works, was asked on 19th March 1902, to take charge of this portion of the Darbar preparations. It was also decided that, as far as possible, the machinery and other material obtained should be suitable for use afterwards in connection with schemes for electric lighting and punkah pulling in barracks.

The Central Camp being more than two miles distant from the Fort, the two installations were kept entirely distinct. The Camp lighting was arranged on the 3-wire system with a pressure of 220 volts on the lamps; the Fort lighting on the 2-wire system with a pressure of 120 volts on the lamps.

For the former the whole of the stores were obtained new, through the Director General, of Stores, India Office; Messrs. Preece and Cardew acting as his Consulting Electrical Engineers, as regards its purchase.

It was ordered principally by cablegrams between 27th March and 3rd April 1902, and letter No. 269-E., dated 10th April 1902.

For the Fort Installation, machinery already in charge of the Military Works Services was made available, supplemented by stores from England ordered in the same manner as those for the Central Camps.

Contracts for erection and maintenance were entered into in April with the following firms:—

For the Camp lighting—

Messrs. Kilburn & Co.

For the Fort—

Messrs. Osler & Co.

### Central Camp.

The installation comprised the whole of the Central Camp, as shown in the subjoined table.

It also included lighting the principal thoroughfares with arc lamps, and the remainder with incandescent lamps.

CAMP.	32 C. P.	16 C. P.	8 C. P.	Total in 8 C. P.	Arc lamps.
Baluchistan ...	...	100	30	230	
Punjab ...	14	186	69	497	
North-West Frontier ...	...	15	200	230	
Central Provinces ...	...	84	87	255	
Mysore ...	...	...	230	230	
Director General of Telegraphs ...	4	33	...	82	
Telegraph Office ...	...	88	...	176	
Director General, Post ...	3	15	20	62	
Post Offices ...	...	26	62	114	
Assam ...	...	83	64	230	
Madras ...	...	135	251	521	
Burma ...	6	10	394	438	
Bombay ...	40	93	225	571	
Central India ...	...	26	188	240	
Commander-in-Chief ...	...	230	140	600	
Four Commands ...	...	152	96	400	
Viceroy ...	...	694	412	1,600	
United Provinces ...	...	120	260	500	
Bengal ...	...	240	220	700	
Press ...	...	124	262	510	
Baroda ...	...	38	24	100	
Power House ...	...	100	50	250	
Rajputana ...	...	27	176	230	
Hyderabad ...	...	27	176	230	
Director General, Military Works ...	...	2	10	14	
Miscellaneous ...	...	3	220	226	
Main roads ...	...	...	...	...	100
Minor roads ...	220	...	...	880	
Total ...	287	2,551	3,866	116	
					100

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This, together with all flues, piping, etc., was sent out complete in all respects and ready for erection. The sizes of the units was governed by barrack requirements, and not by consideration of convenience in connection with the Darbar Lighting.

The dynamos were of the multipolar type, direct driven, shunt, not wound machines.

The Allen engines were two cylinder compound, double acting; the Paseme engines were of the Peache type, six cylinder, tandem compound, single acting.

All the plant worked satisfactorily.

The switch-board came out at the worst time of year and the instruments suffered somewhat on the voyage.

The machinery was housed in a galvanized iron shed, 125 feet long by 66 feet wide.

It was divided into two bays, one for the boilers, the other for the engines. One end of the latter was partitioned off as a workshop.

The chimneys were of Indian manufacture, made of iron, and two in number.

In addition it was necessary to construct sundry temporary buildings as godowns and offices, and also for the occupation of the staff and native workmen.

At one time the latter amounted to 800 men, exclusive of local labour.

The engine-house and foundations were constructed during July and August.

The machinery and other English stores began to arrive in August, and the work of erecting the machinery and aerial lines was commenced on receipt without delay.

Supply of current was commenced on December 7th and continued without interruption until January 22nd, inclusive.

The greatest difficulties experienced were due to sickness, delay in pitching camps and the passion for altering tent pegs.

At one time during October as much as 30 per cent. of the native staff was down with Delhi malarial fever.

Prior to the commencement of supply many faults were caused in the lead-covered cables by re-adjustment of tent pegs. As these pegs were of any length up to 4 feet, it was not possible to bury the cables deep enough to avoid them.

The early delivery of the English stores and the complete manner in which they were sent out, more especially the care and accuracy with which the pipe work and flues had been designed by Messrs. Preece and Cardew and manufactured by Messrs. Babcock and Wilson contributed in a very special degree to the completion of the work within the time available.

On behalf of Messrs. Kilburn & Co. Mr. C. W. Nicholls made all the preliminary arrangements for the erection of the plant, etc., but was taken seriously ill during August and obliged to resign further active connection with the work.

The distribution and tent lighting work was executed by Mr. J. J. Atkinson, and the erection of machinery by Mr. T. J. H. Blackley.

An engine erector and a wire man brought out from England were also employed.

For the overhead and tent work a staff of 19 Europeans and Eurasians and 800 natives was sent up by Messrs. Kilburn & Co. from Calcutta. In addition, twenty-two non-commissioned officers of Indian Submarine Mining Corps (electricians and engine fitters) were detailed by the Inspector of Submarine Defences to assist, owing to the difficulty experienced by the contractors in obtaining competent workmen for erecting the engines and reliable supervision for the tent wiring work.

Mr. H. H. Reynolds took charge of the Installation throughout the period of supply.

#### *Fort Installation.*

The Fort Installation included the illumination of the Dewan-i-Am with its extensions and accessory buildings, the Dewan-i-Khas, Hamam and Summun Burj, the covered ways from the Selingarh station to the Dewan-i-Am, a distance of 600 yards, and from the Dewan-i-Am to the Dewan-i-Khas. It also included the lighting with arc lamps of the gates and approaches inside the Fort, and the Selingarh railway station.

The following tabular statement gives the numbers of lamps provided in the various places.

Schedule of Incandescent and Arc Lamps erected in Delhi Fort.

Position.	INCANDESCENT LAMPS.			ARC LAMPS OF 5 AMPERE.	REMARKS.
	16 C. P.	8 C. P.	Equival- ent in 8 C. P.		
Lahore Gate ... ..	...	...	...	7	Five hundred and forty-eight 16 C. P. in the Dewan-i-Am were specially provided for the Investiture, and were not used on the occasion of the State Ball.
Delhi Gate and road ... ..	...	...	...	9	
Inside Fort ... ..	...	...	...	11	
Selimgarh ... ..	...	...	...	6	
Diwan-i-Am ... ..	759	...	1,518	...	One hundred and sixty-eight 16 C. P. lamps in the Ball Room were specially provided for the State Ball and were not used on the occasion of the Investiture.
Ball Room ... ..	373	...	746	...	
Buffet ... ..	189	...	378	...	
Cloak Rooms ... ..	205	...	410	...	
Dewan-i-Khas ... ..	...	294	294	...	
Hamam, Summun Burj, etc., ... ..	274	...	548	...	
Passage to Dewan-i-Khas ... ..	...	114	114	...	
Passage to Selimgarh ... ..	...	102	102	...	
Miscellaneous ... ..	...	240	240	...	
Total ... ..	1,800	750	4,350	33	

The power station was placed on the river wall of the Fort between the Guard Room and Officers' Mess. The distribution to the various buildings was by aerial conductors.

The distribution pressure was 120 volts on the internal circuits, and 110 volts on the arc Camps and passage circuits.

This pressure was adopted in order to enable existing machinery on Military Works Services charge to be utilized.

In the Dewan-i-Am the illumination was arranged by providing a ceiling cluster of seven 16 C. P. lamps in each of the 27 bays into which the building is divided. This arrangement was repeated in the Ball Room and buffet. Special illumination was also given to the throne in the Dewan-i-Am.

For the Investiture 548 cornice lights in addition were placed in the Dewan-i-Am itself, and for the State Ball 168 extra lamps in the Ball Room.

In the Dewan-i-Khas the lighting was effected by closely spaced 8 C. P. frosted cornice lights, special care being taken to conceal the wires and lampholders in hollow metal casings, so that only the lamp bulbs were visible.

The casings were carefully painted to match the decoration of the building.

The distributing cables were carried over the flat roofs of the buildings, and the distributing switch-boards placed there also.

The machinery consisted of—

Three vertical compound Paxman engines, driving by means of belts, three 32.5 K. W Siemens dynamos (250 amperes at 130 volts).

These engines were formerly at Viceregal Lodge, Simla; but had been removed to make room for more modern plant.

Three 25 N. H. P. Locomotive type boilers for the above obtained new from England.

Four small engines of sorts, with vertical boilers driving by belts, 4 dynamos of 9 to 11 K. W. out-put at 110 volts.

These were obtained from Boer Camps, had which been closed.

The above plant was contained in a building 62 ft. 6 inches long by 60 ft. wide.