

# Kwai Chung

SUB-STATION  
&  
CONTROL CENTRE

## Supplement

### DUAL FUNCTION FOR NEW PROJECT

New building

## China Light plans for the future

WITH the opening of the Kwai Chung substation and control centre, the China Light Co is tangibly demonstrating concern for the needs of the future — by providing for them in advance.

The Kwai Chung plant has two principal functions — that of substation and of control centre. It introduces into the company's activities a new dimension in that full-time, coordinated control of the generation/ transmission complex is now possible.

This brings with it the advantages of greater operational safety, economy and response. The company has also borne in mind the Colony's need to make the best possible use of land. Accordingly, it has broken with traditional power-supply practice and housed a full range of transmission, distribution and control equipment on ground that would normally contain only one-third of the transmission switchgear alone.

As such, the Kwai Chung control centre is a significant contribution to Hong Kong's progress. Proof that this progress is becoming substantial, quite apart from all the impressive statistics, lies in the fact that a control centre has become necessary at all.

As soon as more than one generating source supplies an electrical transmission system, there arises the need for system running conditions to be indicated in a central control room.

A technical expert in the China Light Co expressed the problem as follows:

"As load rises in the system, frequency will drop. You cannot have both power systems trying to correct it by increasing steam or overshoot will occur."

"One station must be in command and so a rudimentary form of system control is born. But this one station can hardly exercise judgment with so little knowledge at its disposal."

"Frequency dropping could just as easily be caused by the other station not being able to maintain the output assigned to it as by increasing load."

"A telephone call would settle that and so a rudimentary system of data transmission is born too."

"It is obviously undesirable to have to await telephone calls before knowing what action to take. But another example will illustrate why control must be taken away from either power station and why a telephone is definitely inadequate as a data transmitting medium."

The expert postulated a specific problem.

"If an 80 MVA transformer tripped at Kwai Chung, neither power station would be aware of it. The other would trip on overload throwing 160 MVA on to the Tsing Yi link. Hok On 132/66kV interbus transformers' circuits, and heavily overloading them all. Bringing on all the spare at Hok On would not leave us with a reserve."

The transmission system should be designed to accept short periods of overload, and this is a case in point, the expert said.

#### Capacity

"The plant available and the capacity of the system is such that, providing action can be taken quickly, there is no need to cause any disruption of the system for such an eventuality."

"The action is, of course, ordering the raising of steam at Hok On and dropping it at Tsing Yi to reduce the transfer to safe limits."

"Similar adjustments can be made to VAR flows by ordering adjustments of the power station busbar voltages and/or tap-changing at the 132/66kV transformers at Kwai Chung — but this can only be done by someone with knowledge of running conditions of the whole system. Telephoned messages could not possibly cope."

On the question of why Kwai Chung was selected as the venue for the system control room, the expert explained:

"With two generating sources, it would seem desirable to locate the control away from either and, to

minimise data transmission distances, midway between the two. Kwai Chung meets both points reasonably well and has the added advantages of

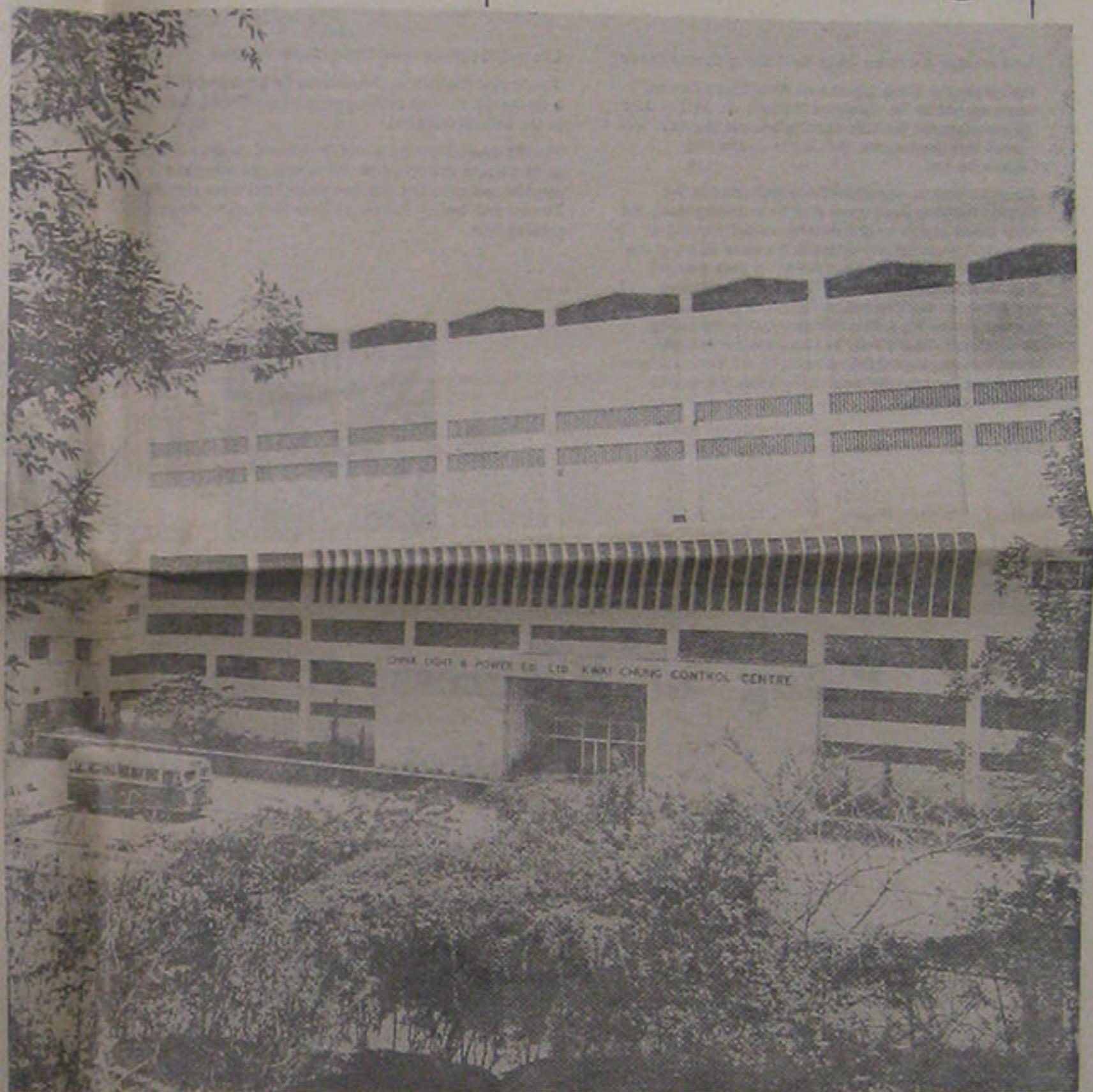
- being a building under construction when the control room is needed and with room available.
- being the junction of many important circuits and

- being the most decentralised complex of electrical switchgear and transformers on the outside system and being the main point of connection between the 132kV and 66 kV systems means that, with the control room in the same building, the requisite degree of surveillance can be exercised, there being no need to restrict data transmission. Control of this important installation is not dependent upon the correct functioning of remotely controlled indicators and the size of the data transmission system itself is greatly reduced.

"Modern forms of data transmission are based on voice frequency techniques operated from solid state circuitry. The company have made a comprehensive survey of what is available on the world markets and eventually settled for a Plessey system known as Duetum II."

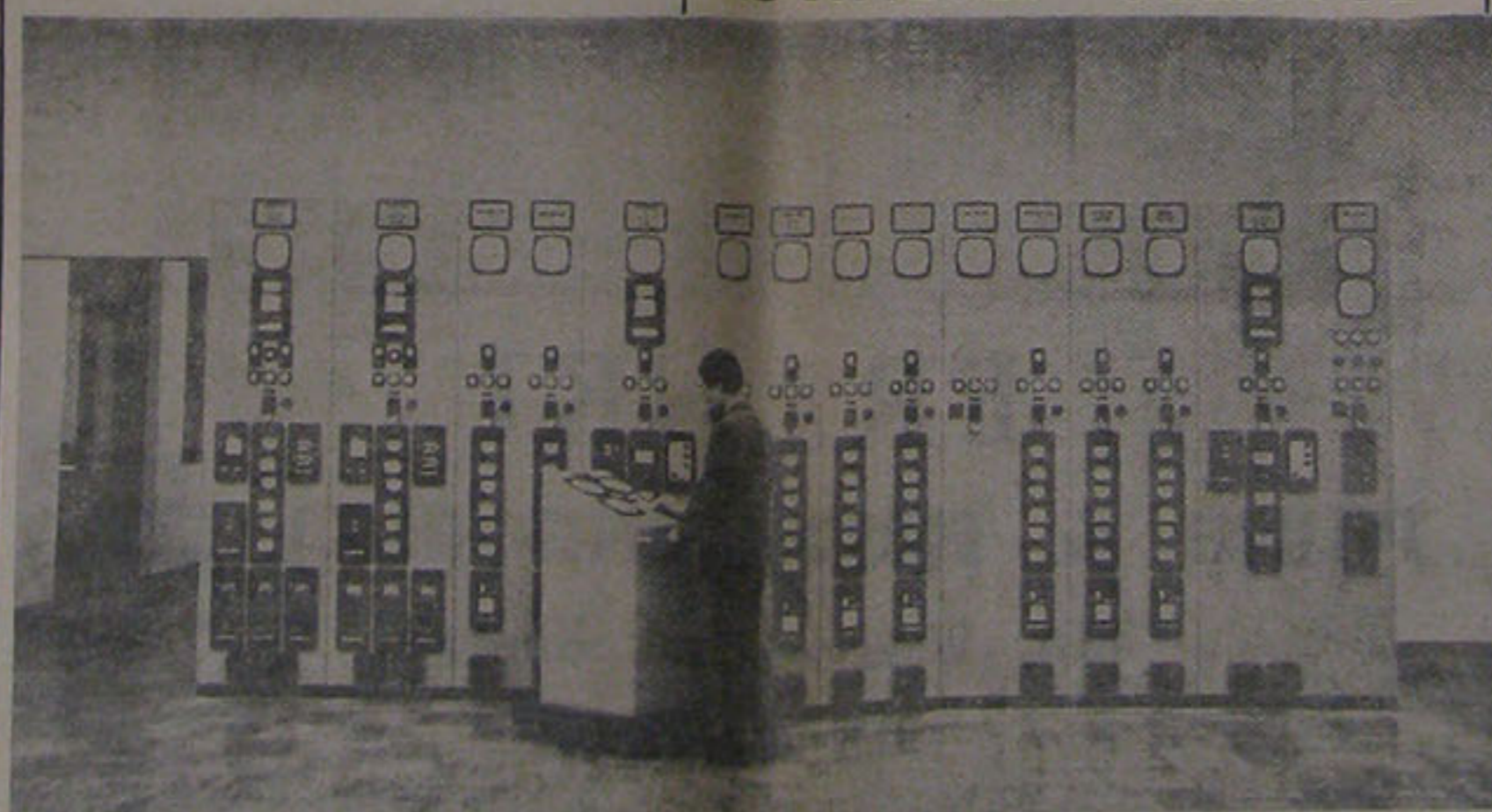
"This system is of the type known as 'Master Controlled' because all the logic is integral with the master station as opposed to the outstations. A frequency is sent out from the central master station to all outstations over telephone pilot pairs, this being known as the space frequency, 1,709 c/s, and it is

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A View of the newly-completed sub-station and control centre from Castle Peak Road.

### Station control



The 33 kV control board for the Kwai Chung station itself. The man in the picture is using a "synchronising trolley."

CONGRATULATIONS TO  
**CHINA LIGHT & POWER CO., LTD.**  
ON THE OPENING OF THE  
KWAI CHUNG SUB-STATION  
BY  
**SHUN FUNG IRON WORKS LTD.**  
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