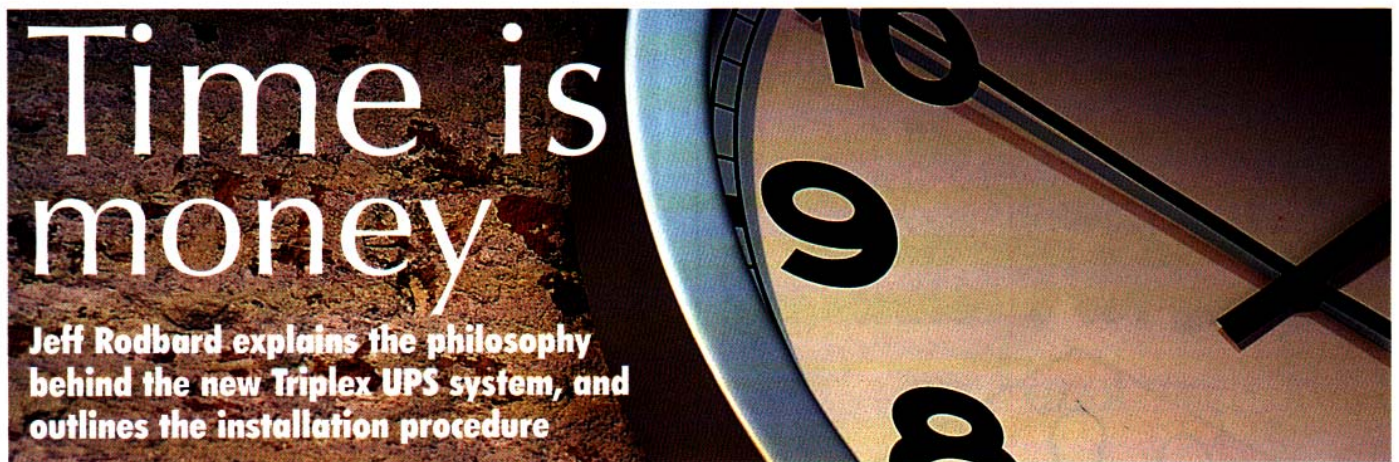


UPS Case Study



Failure of electrical power can create a nightmare scenario for businesses. For this reason, it is essential that business critical IT systems are run from UPS power. However, the power input to the UPS units must be reinstated from an alternative source well within the discharge time of the batteries. Although more than one generator may be installed to increase the reliability of the alternative supply, the availability of this power then hinges on the correct operation of the change-over switch system. But a chain is only as strong as its weakest link, and just one bad connection or blown fuse can cause total supply loss. But an alternative system is now available to evade this problem.

At Triplex Power Control (TPC) we have designed and developed a system, similar to that used in aircraft, where the occurrence of any one fault has no effect on the correct operation of the circuit overall. The system employs triplicated circuitry, which produces a 'two-out-of-three' priority system, such that any one fault on a power supply, component or wiring part, has no impact on the system.

Additionally, there is a need for any single first fault to be made clearly apparent, because a second fault in the same area could prove problematic. Therefore, the system includes a fault diagnostics system, wherein all inputs used are of high impedance and are routed via

resistors. Any fault within the diagnostics system itself will also indicate a fault. With this in place, any first fault can be readily verified and located, and then corrected to reinstate the full integrity of the system.

The TPC control circuits consist of conventional hard-wired relays, timers and phase failure relays, but triplicated and powered by three separate DC supplies. The fault diagnostic system monitors each of the three 'channels' of the system at various points, looking for any differences that may be present at one point compared with two similar points of the other channels. It also monitors the control circuit supplies. If an operating fault is detected by the system, it then operates an alarm and indicates the type of fault and the area within which it is located.

This information, together with the status of all power supplies in the building, is graphically displayed on screens in any locations required. Faults can then be corrected when convenient, without the power supply being affected at any time. Moreover, if a low voltage DC is used for the control circuits, components can be replaced without danger, while the supply is operational, generally without the need for isolation.

TPC recently installed the system in a major city building occupied by companies with financial operations, including a major dealer facility of Chase Manhattan Bank.

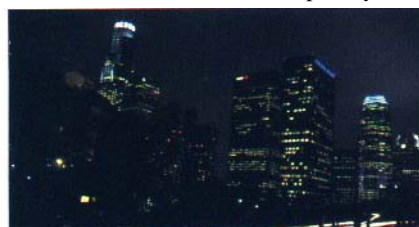
The system was initially installed without connection to the main switchboards, and before any change or interruption was made to the LV supply.

After testing, final active conversion to the new circuitry was achieved over one weekend. This is possible for any building by splitting conversion into the following stages. A design study and load analysis is followed by the construction of a working table-top model of the proposed system. This is used to check the circuit operates

Installation of the TPC system

properly when one of the three power supplies fails. It also demonstrates that component replacement is possible.

Construction and installation of control panels and interwiring is then initiated. After installation, the entire Triplex system



is tested and proven, by using hand-operated switches to represent phase-failure relays and generator running

signals, connected to the new building wiring and panels. For the final conversion, over one weekend, the main transformers are shut off.

The existing control wiring is disconnected, and the new wiring moved from the dummies to the actual system. The mains is restored and the system becomes active. If a closely controlled load-shed system is included, this can be carried out later.

Although the actual electrical requirements of each building are different, the basic approach described gives an enormously improved reliability of supply.