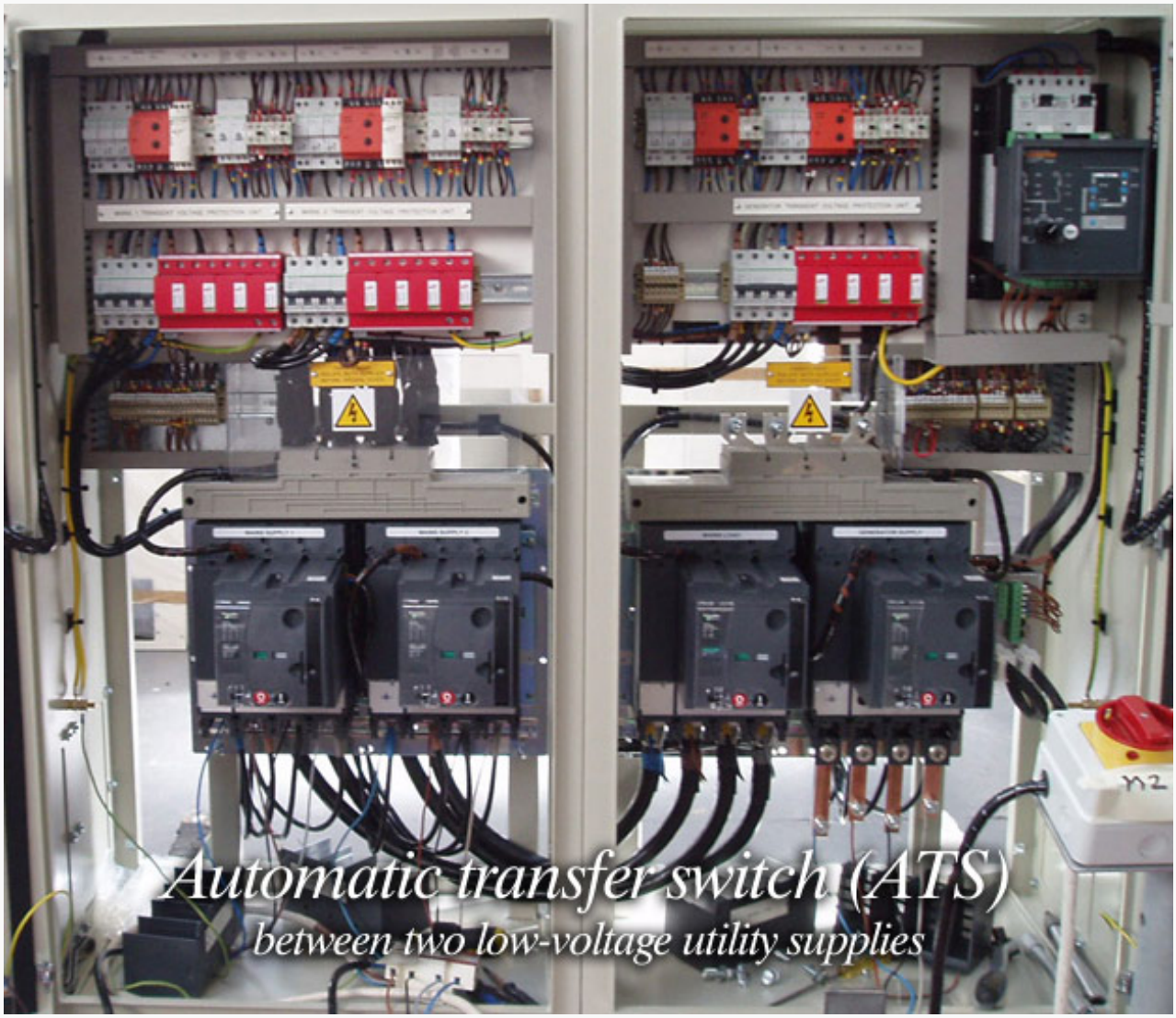
Automatic transfer switch (ATS) between two low-voltage utility supplies

Edvard



Automatic transfer switch between two low-voltage utility supplies (photo by Giffen Switchgear, UK)

ATS to Emergency / Standby Source

Multiple utility services may be used as an ***emergency*** or ***standby source of power***. Required is an additional utility service from a separate source and the required switching equipment.

Figure 1 shows automatic transfer between two low-voltage utility supplies.

Utility source 1 is the normal power line and ***utility source 2*** is a separate utility supply providing emergency power. Both circuit breakers are normally closed. The load must be able to tolerate the few cycles of interruption while the automatic transfer device operates.

Automatic switching equipment may consist of three circuit breakers with suitable control and interlocks, as shown in ***Figure 2***.

Circuit breakers are generally used for primary switching in which the voltage exceeds ***600 V***. They are more expensive but safer to operate, and the use of fuses for overcurrent protection is avoided.

Relaying is provided to transfer the load automatically to either source if the other one fails, provided that circuit is energized. The supplying utility will normally designate which source is for normal use and which is for emergency.

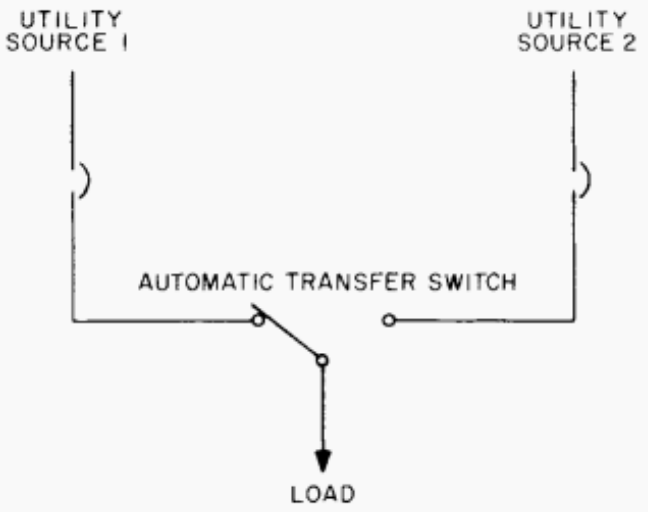


Figure 1 – Two-utility source system using one automatic transfer switch

If either supply is not able to carry the entire load, provisions must be made to drop noncritical loads before the transfer takes place. If the load can be taken from both services, the two R circuit breakers are closed and the tie circuit breaker is open.

This mode of operation is generally preferred by the supplying utility and the customer.

The three circuit breakers are interlocked to permit any two to be closed but prevent all three from being closed. The advantages of this arrangement are that the momentary transfer outage will occur only on the load supplied from the circuit that is lost, the loads can be balanced between the two buses, and the supplying utility doesn't have to keep track of reserve capacity for the emergency feeder.

However, the supplying utility may not allow the load to be taken from both sources, especially because a more expensive totalizing meter may be required. A manual override of the interlock system should be provided so that a closed transition transfer can be made if the supplying utility wants to take either line out of service for maintenance or repair and a momentary tie is permitted.

If the supplying utility will not permit power to be taken from both sources, the control system must be arranged so that the circuit breaker on the normal source is closed, the tie circuit breaker is closed, and the emergency-source circuit breaker is open.

If the utility will not permit dual or totalized metering, the two sources must be connected together to provide a common metering point and then connected to the distribution switchboard. In this case, the tie circuit breaker can be eliminated and the two circuit breakers act as a transfer device (*sometimes called a transfer pair*).

Under these conditions, the cost of an extra circuit breaker can rarely be justified.

The arrangement shown in ***Figure 2*** only provides protection against failure of the normal utility service.

Continuity of power to critical loads can also be disrupted by:

1. An open circuit within the building (*load side of the incoming service*)
2. An overload or fault tripping out a circuit
3. An electrical or mechanical failure of the electric power distribution system within the building

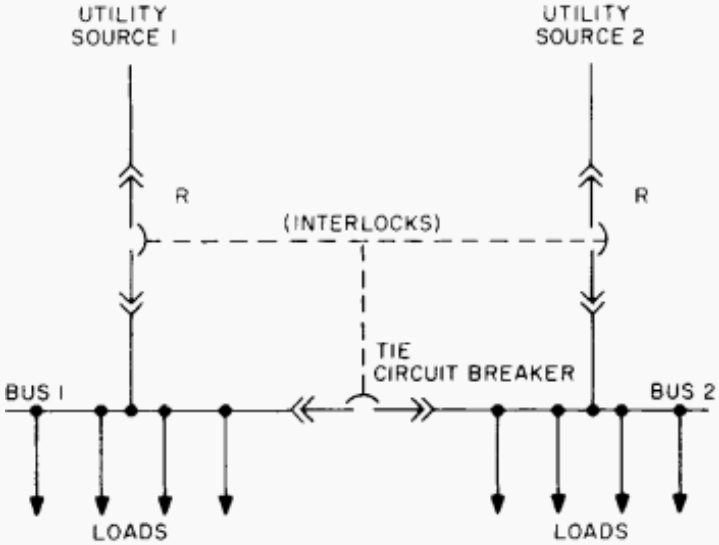


Figure 2 – Two-utility source system in which any two circuit breakers can be closed

It may be desirable to locate transfer devices close to the load and have the operation of the transfer devices independent of overcurrent protection. Multiple transfer devices of lower current rating, each supplying a part of

the load, may be used rather than one transfer device for the entire load.

The arrangement shown in ***Figure 2*** can represent the secondary of a double-ended substation configuration or a primary service. It is sometimes referred to as a ***"main-tie-main" configuration***.

Availability of multiple utility service systems can be improved by adding a standby engine-generator set capable of supplying the more critical load. Such an arrangement, using multiple automatic transfer switches, is shown in

Figure 3 .

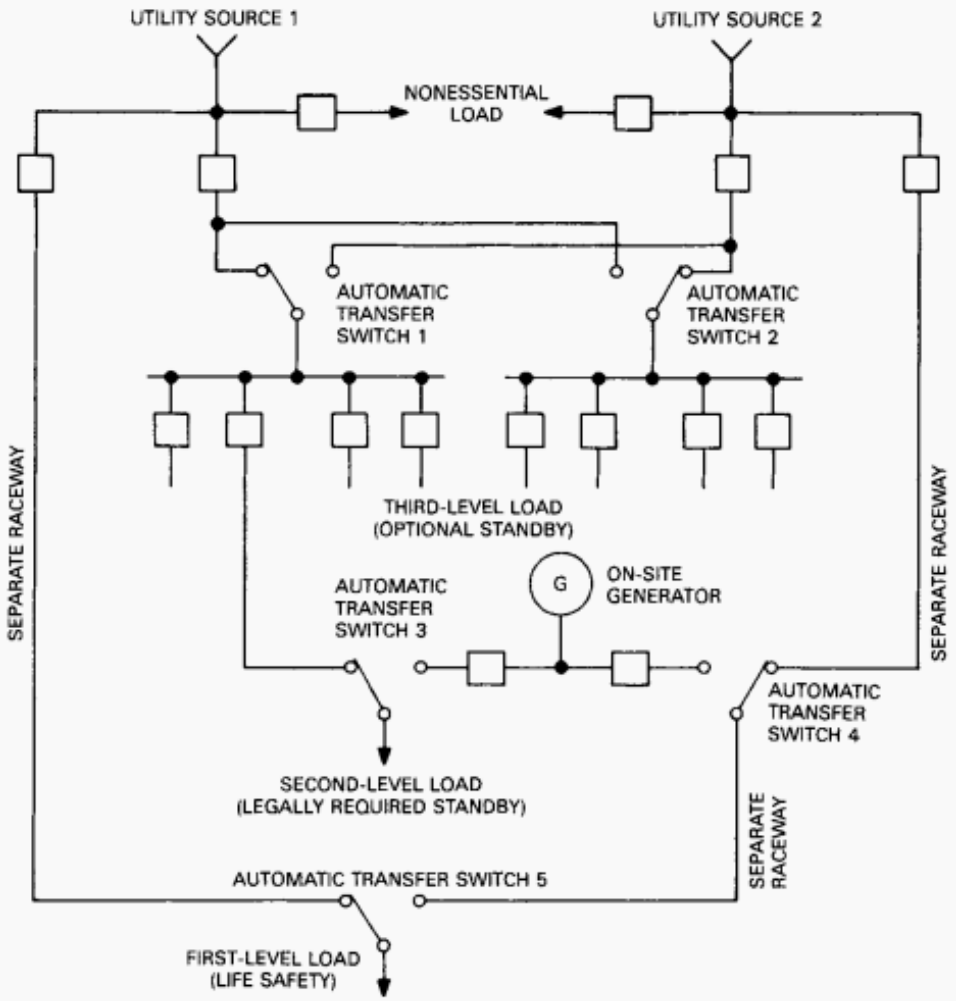


Figure 3 – Diagram illustrating multiple automatic double-throw transfer switches providing varying degrees of emergency and standby power

Reference: *ELECTRICAL ENGINEER'S PORTABLE HANDBOOK – ROBERT B.*

Source:
http://electrical-engineering-portal.com/automatic-transfer-switch-ats