

System Overview

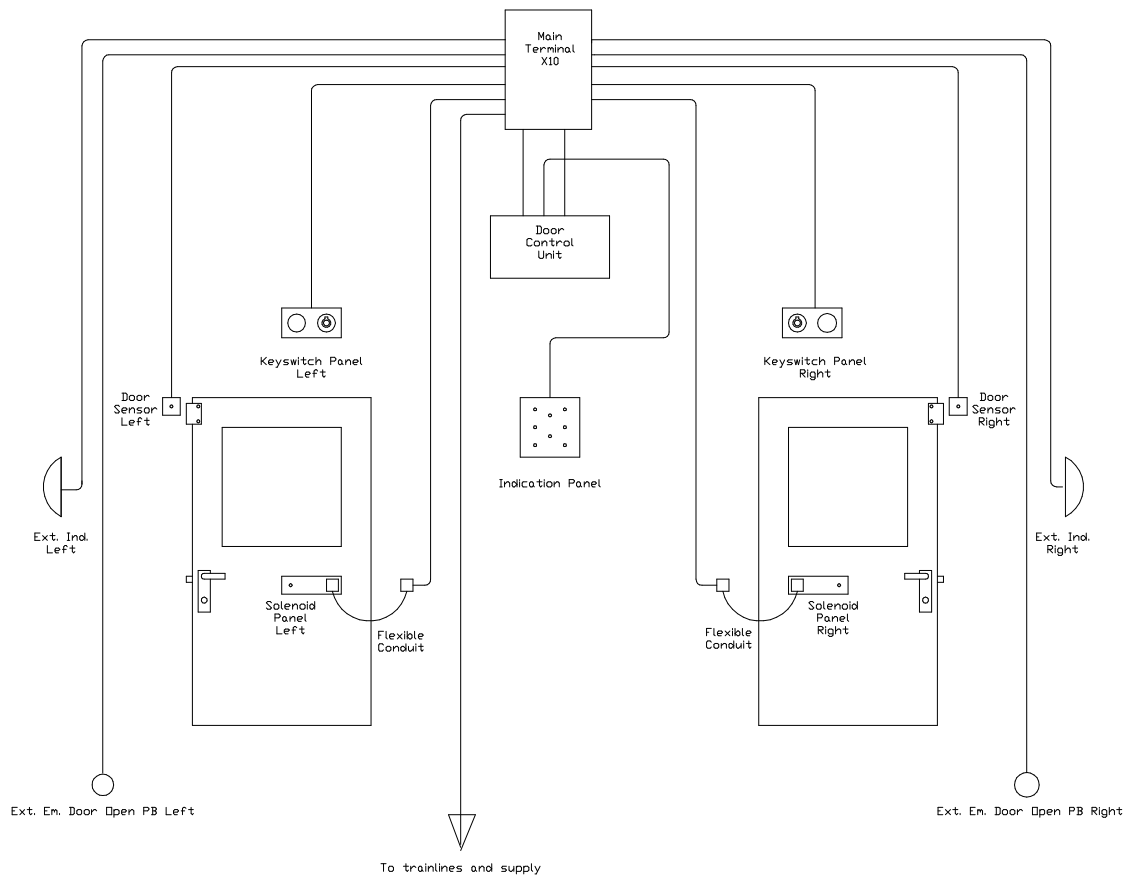


Fig 1, main components, one end of a trailer car

Important: All references to left or right in this manual, unless otherwise indicated, is facing the A-end of the trailer cars or the front of the power car

Each vestibule, except at the PSS' compartment in the luggage trailer car and the sleeping car, has the following equipment:

- One **Door Control Unit (DCU)**, located in the roof cavity, except for the B-end of the sleeper car, where it is located in the l.h.s. electrical locker
- One **Terminal Box**, with main terminal, located in the roof cavity, except for the sleeper car, where it is located adjacent to the DCU in the l.h.s. electrical locker. All wiring, with the exception of the cable between the DCU and the Indication Panel, is routed via the main terminal.
- One **Indication Panel** with LED indicators, mounted in the ceiling panel

Each door, except crew doors as above, has the following equipment:

- **Modified lock** with bowden cable and electrical cables, connected to the
- **Solenoid Plate** with solenoid, terminal block and dual colour LED
- **Flexible Conduit**, in which all wiring from the solenoid plate to the DCU is located. It runs from the solenoid plate to the adjacent wall
- **Door Sensor**, mounted on the door frame, working together with a **Permanent Magnet**, mounted on the door edge.

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- **Key Switch Panel** with an **Internal Emergency Door Open Pushbutton**, and a **Key Switch**. The Key Switch Panel is located adjacent to each door above the doors for the electrical lockers
- **External Emergency Door Open Pushbutton**, mounted externally on trainline or 3-phase junction box below each door.
- **External Indicator**, mounted externally on the side of the car, adjacent to each door

Furthermore, in the B-end (where the buffet area is located) of the buffet car, each Key Switch Panel has the following extra switches and indicators:

- Pushbutton to arm the DSIS
- Pushbutton to release the DSIS on adjacent side
- Indicator, showing whether the DSIS is armed or not on adjacent side

The 110V supply for both the A-end and B-end equipment in each car is coming from a 4A circuit breaker, located among the other circuit breakers in the A-end.

In each power car there is a **Power Car Control Unit (PCU)**. This unit is mounted on the drivers console.

Principle of operation

Lock and door equipment

The existing type of lock has been modified by adding a chopper pawl, which engages into a slot, cut in the mechanism lever barrel, thus preventing the door handle from movement when the locking mechanism is engaged. The movement of the pawl is made by an energised solenoid. When the solenoid is not energised, the chopper pawl is pulled out of the slot by a return spring. The movement of the solenoid is transferred to the lock by a bowden cable. This arrangement has the advantage that the door handle is blocked whenever the door is locked. It is also possible to close the door when the lock mechanism is engaged.

3 microswitches have been attached to each lock. They monitor the status of the lock tongue, the chopper pawl and the lock tongue for the manual lock arrangement (square key operated).

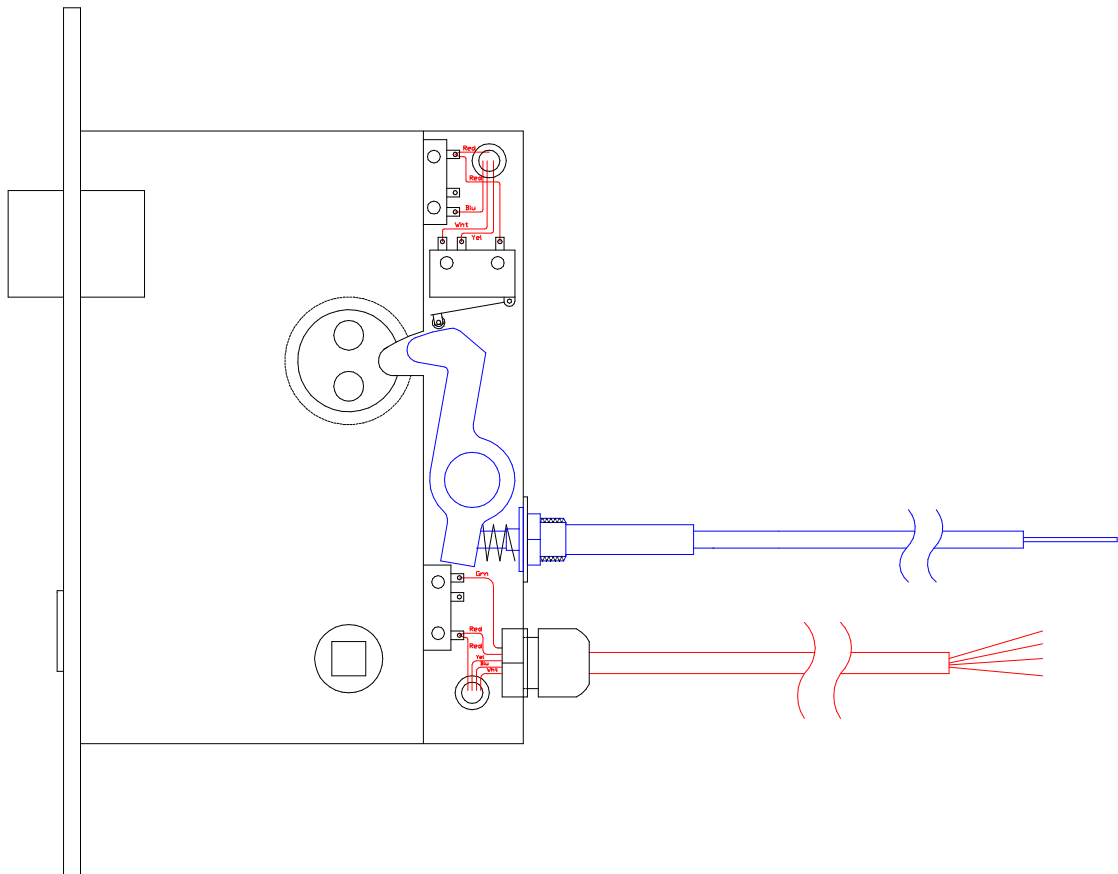


Fig. 2, modified lock

To monitor when the door is properly closed, each door has a Door Sensor. The Door Sensor is mounted on the door frame and operates together with a permanent magnet, mounted on the door. The Door Sensor is based upon a Hall sensor switch, which controls a relay. The output from the relay is connected in series with the the lock tongue limit switch. Consequently, for the DCU to receive the door closed signal, both the Door Sensor has to indicate door closed as well as the limit switch for the lock tongue, which have to be fully extended. This provides a reliable confirmation that the door is fully closed.

Principle of operation

Control System

The two doors in each vestibule are controlled from one Door Control Unit (DCU). Consequently all trailer cars are equipped with two DCUs, except for the luggage trailer car and the sleeper cars, which have only one DCU. Altogether in the fleet of XPT cars there are 206 doors equipped with the DSIS.

The DCU handles all the functions of the two doors in one vestibule. Furthermore it controls the Indication Panel and the External Indicators .

To enable the doors to be opened in case of an emergency, two Emergency Pushbuttons have been fitted for each door. One is located on the Key Switch Panel, inside the vestibule, accessible for the passengers. This Emergency Pushbutton has a blocking lever with a seal. In order to operate the pushbutton, the seal has to be broken and the lever turned.

The other Emergency Open Pushbutton is located on the trainline junction box, below each door. This pushbutton is intended for emergency crews to be able to open the door in case of a derailment or other emergency.

Finally, each door has a Key Switch, located together with the Internal Emergency Door Open Pushbutton on the Key Switch Panel. This keyswitch will enable the train crew to locally open the adjacent door to let passengers disembark on short platforms or similar.

Both Door Open Emergency Pushbuttons and the Key Switch are only operational when the train is stationary.

The control functions of the door is described more in detail in the software section of the DCU description.

To control the DSIS within the train, trainlines 43, 44, 45 and 46 are being used. These trainlines have the following functions:

Trainline 43: This trainline is temporarily brought high (110V), either by the driver operating his "arm" pushbutton on the PCU or the "arm" pushbutton being operated from the buffet car control panel.

This pulse will energize and latch two relays in each DCU and PCU, one for the r.h.s. doors and the other for the l.h.s. doors. The system is said to be **armed**. The following will now occur:

The two arm status indicators on the PCU will go from flashing to steady light, as well as the arm status indicators on the Key Switch Panel in the buffet end of the buffet car.

If a door is closed when the system is armed, it will lock immediately. If a door is open when the arm command is given, the External Indicator and the DNLI LED on the Indicator Panel will flash with a long flash sequence until the door is closed. It will then lock after 0.5 second delay and the external indicator as well as the DNLI LED will extinguish.

Trainline 44 & 45: When any of these trainlines are pulled to ground, either by the release selector switch on the PCU or the release pushbuttons on the buffet car control panel, the corresponding relays will unlatch and unlock the doors on the selected side.