



SCHEME	Emergency Replacement of LVAC Panel
LOCATION	Streatham substation
CLIENT	Network Rail
COMPLETED	August 2018



RJ Power Rail (RJPR) has successfully installed, tested and commissioned a Technivel panel, which included providing a design for re-routing the cables, for this LVAC panel at Streatham substation on behalf of Network Rail (NR).

The rail team provided a tender and were subsequently awarded the LVAC panel replacement works, which came about as a result of a catastrophic failure to NR's Allen West LVAC panel located in Streatham substation's A rectifier room, which is being fed by 2No 415V supplies derived from the 33kv network and 1No 415V back up supply from the DNO.

The proposed replacement Technivel LVAC panel was actually a decommissioned panel located in Lewisham substation and due to the serious nature of this failure, RJPR immediately mobilised in order to assess both the condition and suitability of the pre-used Technivel panel. On confirmation, RJPR formed their design and constructability teams within just 48 hours, met with NR to agree the action plan and commenced their Form B E&P design.

The plan was to disconnect and remove the pre-used panel from its original location in Lewisham and install in Streatham substation's HV switchgear room. Incoming supplies to the LVAC panel were derived from AT516, AT552 and a DNO isolation transformer. Incoming supplies were rated 140kVA, 200A. The new Technivel LVAC panel was rated 300A.

Logistics at both ends were always going to be a challenge for this emergency replacement. By utilising machinery and equipment removal specialists, due to the panel size, weight and shape, RJPR were able to effectively manage the movement of the panel at both ends, with minimal impact on other adjacent stakeholders.



Once the panel was at Streatham, RJ Power Rail's Testing and Commissioning Engineers took control and commenced the important task of stripping down and testing the panel. After a period of intensive work, it was determined that the panel was in good condition. After the replacement of all BS88 fuses and the tightening of all the busbars the panel was ready to be connected.

The only route for the supply cables from the transformers to the LVAC panel were at high level on an existing ladder tray. With the ground beneath uneven, the erection of GRP scaffolding to allow existing supplies to be removed and new cables to be installed was also challenging. Once in place, the RJPR installation team laid all new cable route to internal areas using ladder tray and then safely installed the heavy duty LV power cables on top of the ladder tray and along the external containment.

RJ Power Rail's Lead Test and Commissioning Engineer (Peter Jackson) then formulated a complex and multiple staged changeover plan, in order to commission the LVAC panel and de-commission and make safe the existing damaged panel.

We are delighted to announce that all works were completed on time to an exemplary standard and to the complete satisfaction of the client Network Rail.



PROJECT DELIVERABLES

The project entailed the emergency replacement of a failed LVAC panel within Streatham substation B, without disrupting the railway or endangering personnel. RJ Power Rail's scope included for the full Form B E&P design in respect of the collection, delivery, installation and commissioning of a free-issue Technivel LVAC panel at Streatham substation. The existing Allen West LVAC panel at Streatham substation was also to be disconnected and removed.

RJ Power Rail's delivered a fully risk managed staged solution, providing all necessary HV assessments and delivering a fully tested and commissioned project for entry into service, which included the following works:

Pre-commencement stage

- 🌀 Condition assessment at Lewisham substation of the pre-used LVAC Technivel panel to determine its suitability for use at Streatham
- 🌀 Lift, Shift and Delivery of the LVAC panel from Lewisham to Streatham substation
- 🌀 Stripping down and testing of the panel

Design Stage

- 🌀 Constructability assessments and Form B Design

Implementation Stage 1

- 🌀 Install the new Technivel LVAC panel
- 🌀 Verify correct installation of LVAC panel control wires
- 🌀 Install all new cables
- 🌀 Terminate all new cables at the Technivel LVAC end
- 🌀 Terminate cable MC001 into the HV switchgear marshalling cabinet following disconnection and removal of the existing wiring
- 🌀 Carefully terminate cable MC002 into the Supervisory marshalling cabinet following disconnection and removal of the existing wiring
- 🌀 Pre commission the interface between the Technivel LVAC, the Selhurst ECR and the Streatham HV switchgear
- 🌀 Technivel LVAC panel 110V control supply is derived from 3No 750VA, 415/440 to 110V transformers



Implementation Stage 2

- 🌀 Confirm the Streatham PSP is supplied from PSP Supply No.1
- 🌀 Isolate AT552 LV in order to isolate PSP Supply No.2 at the Allen West LVAC panel
- 🌀 Isolate PSP Supply No. 2 at the PSP to prevent backfeed to the Allen West LVAC panel
- 🌀 Terminate the new 95mm² cable "TX552-LVAC C2" at the AT552 secondary
- 🌀 Energise the Technivel LVAC panel from AT552
- 🌀 Divert the existing 70mm² PSP Supply No.2 cable from the Allen West to the Technivel LVAC panel
- 🌀 Energise PSP Supply No.2 at the Technivel LVAC panel

Implementation Stage 3

- 🌀 At the PSP, changeover supply from PSP Supply No.1 to PSP Supply No.2
- 🌀 Isolate AT516 LV. This will in effect isolate PSP Supply No.1 at the Allen West LVAC panel
- 🌀 Isolate PSP Supply No.1 at the PSP to prevent backfeed to the Allen West LVAC panel
- 🌀 Terminate the new 95mm² cable "TX516-LVAC C1" at the AT516 secondary
- 🌀 Energise the AT516 feed into the Technivel LVAC panel
- 🌀 Divert the existing 70mm² PSP Supply No.1 cable from the Allen West to the Technivel LVAC panel
- 🌀 Energise PSP Supply No.1 at the Technivel LVAC panel

Implementation Stage 4

- 🌀 Divert substation A domestic supply from the Allen West to the Technivel LVAC panel
- 🌀 Divert substation B domestic supply from the Allen West to the Technivel LVAC panel
- 🌀 Isolate the DNO isolation transformer. Terminate the cable "DNO TX-LVAC C3" into the isolation transformer secondary
- 🌀 Energise the DNO transformer feed into the Technivel LVAC panel

Implementation Stage 5

- 🌀 Disconnect and remove the Allen West LVAC panel



CHALLENGES AND SOLUTIONS

Critical planning

Due to the project criticality, the planning, programming and coordination of the works was jointly carried out by RJ Power Rail and Network Rail, which involved several workshops being organised to ensure that all aspects of the project were covered and agreed well in advance of the commencement on site.

Multi-functional works

RJ Power faced challenges with the timescale of this project due to the number of different project interfaces during the course of these works. With the works being of a multi-functional nature and with access arrangements being key, RJ Power Rail's team needed to be extremely flexible and work collaboratively when approaching and delivering key milestones in their programme.

Design interface

The design complexities around the signalling interface, necessitated a staged approach.

By completing a pre-commencement stage in advance of the design work and then five separate implementation stages, RJ Power Rail's flexible approach, allowed the project to be effortlessly delivered, with a high degree collaborative interface throughout.

Logistics management

Careful logistical management in connection with the pre-used panel was required by RJ Power Rail. All deliveries were pre-planned in accordance with a detailed logistics and TM Plan. All vehicles accessing the site had to be compliant, and in line with the directives given by Traffic Marshals. All plant/pedestrian interfaces had to be managed around the nominated site area, with segregated zones provided and Banksman present during the transportation and lifting of the panel at both Lewisham and its final destination at Streatham substation.

Delivery knowhow

Poorly identified supervisory control, indication and alarm terminals also had to be identified with no drawings available for the 1950's supervisory marshalling panels. Original LVAC panel wiring had to be identified and carefully removed through fragile wiring and terminals. When, new supervisory wiring was installed and tested, a supervisory fault was traced to a blown fuse in the supervisory, which was also replaced. A number of fuses were found to be missing from all outgoing ways, these were sourced quickly and replaced, this prompted the question of what else had been removed or interfered with whilst the unit was out of use, a thorough investigation revealed no further issues.



WHY RJ POWER RAIL?

RJ Power Rail has an established team that combines design, engineering and delivery expertise across all rail electrification activities and can be trusted with the most complex and demanding of projects.

The company offers the full range of rail electrification and power services from one-off cable repairs to multi-million-pound HV, LV and Scada D&B projects.

They are an experienced power solutions delivery provider who work collaboratively with their clients and own supply chain as a reliable partner, providing exceptional expertise and proven project delivery in respect of HV Electrification and DC Switchgear schemes.