

GENERATOR TRANSFER SWITCH

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Power Distribution: Normal Operating Conditions

All site power comes into panel MDP on the loading dock. From here it goes to:

- SDSS Observers Trailer
- SDSS Engineer Trailer
- Utility Building
- Operations Building
- Dormitories
- SDSS Plug Lab
- All Telescopes

All power distribution on the site is 3-phase Y 208 VAC phase-to-phase and 120 VAC phase-to-neutral.

SDSS Engineering trailer has it's own generator and automatic transfer switch. The generator is powered by LPG from its own tank and powers about 2/3rds of the trailer. It runs one time per week for about 15 minutes to exercise the motor. Load does NOT transfer during this exercise.

SDSS Observers trailer has NO backup power.

Utility building is backed up by the main site generator but through its own transfer switch located at the generator.

2.5m Enclosure has a 3-phase 208 generator as a backup to the main generator to just stow and close up the telescope.

Dormitories, Operations building, SDSS Plug Lab and all Telescopes: The main diesel generator supplies back up power through the automatic transfer switch in the Operations building (and Utility building as noted above).

All critical systems have a UPS (Utility Power Supply) that supplies power for 10-30 minutes based on UPS and load. Note: power loss for more than 10 minutes causes Computer room to warm and air pressure to the 2.5m and 3.5m primary mirror supports to bleed off.

Main Generator: Normal Operating Conditions

The main diesel generator has AC-powered heaters for coolant, batteries and fuel, and a battery charger to help ensure start up when needed. It also has numerous monitoring systems to alarm APO staff if something goes wrong.

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There is a light and horn on the exterior of the generator cabinet (Operations building) if there is trouble with the generator.

There is a Man-Auto switch (Manual-Automatic) on the main panel inside the generator cabinet. It is normally in Auto mode, which is necessary for the transfer switch to start the generator.

There is a Start-Stop switch that starts and stops the generator when the switch is in Manual mode. These are momentary switches - hold for 1-2 seconds to activate.

Operations Building Transfer Switch: Normal Operating Conditions

*****WARNING HIGH VOLTAGE INSIDE; DO NOT CONTACT ANY LIVE CONDUCTORS WHEN CABINET DOOR IS OPEN *****

The transfer switch is inside the Operations building by the loading dock door (Figure 1). This supplies power to the Operations building, Dormitories, SDSS Plug Lab, and all Telescopes.



Figure 1

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Under normal conditions, the transfer switch routes power from panel MDP to all loads in panels DPE (near Washer/Dryer) and SDP (in boiler room). At the front panel, the green light is “on” indicating normal operation. The Mode Switch is in “Automatic,” and the Selector switch is in “Auto.”

Power Failure: Operating Conditions

When Utility power fails, the transfer switch (based on preset conditions) starts the generator within a couple of seconds and transfers the generator power to the loads within about 45 seconds. Power stays on the generator until utility power is restored for a period of time (again based on preset conditions). The generator then transfers back to Utility power. After approximately 20 minutes, the generator shuts down automatically.

The same transfer (except with no generator Start/Stop) occurs in the transfer switch for the Utility building.

Manual Transfer: Operating Conditions

If there is a desire to manually transfer to generator power (transfer switch not functioning properly), there could be several reasons for this: 1. Fault in sense electronics; 2. Relay or limit switch failures; 3. Continuous short duration power spikes; or 4. Power anomalies that the transfer switch fails to sense. There are several methods to use and they are included in order of priority. (Figure 2).

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Figure 2

Method #1

1. On the front panel of transfer switch, take Mode Switch to “Normal Test Mode” Generator should start and switch (based on preset timing);

Alternate:

- 1A. On the front panel of the transfer switch, toggle Mode Switch to “Fast Test Mode.” Generator should start and switch within 5 seconds.

Method #2

1. Using the selector switch on the door, move selector from “Auto” to “STBY.”
2. Start the generator by going inside the generator cabinet, select “Man” and press and hold “Start” for 2 seconds. Generator should start and power loads.

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Figure 3

Method #3

This method requires manual activation of the Generator and transfer switch.

1. Inside the transfer switch cabinet, set Maintenance Disconnect switch (located lower left back of cabinet) to "Manual." (Figure 4)

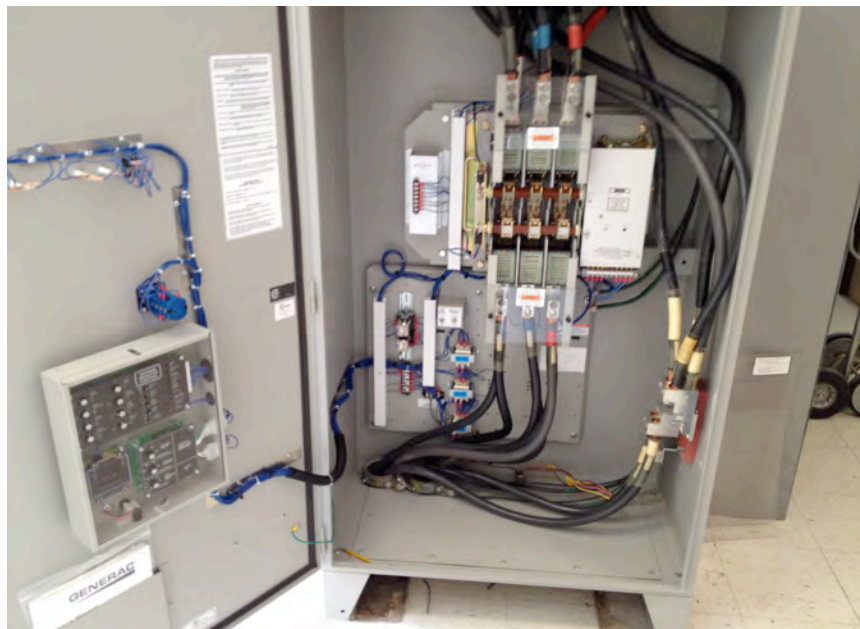


Figure 4

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2. Release the punch and handle mounted on cabinet door (Figure 5)

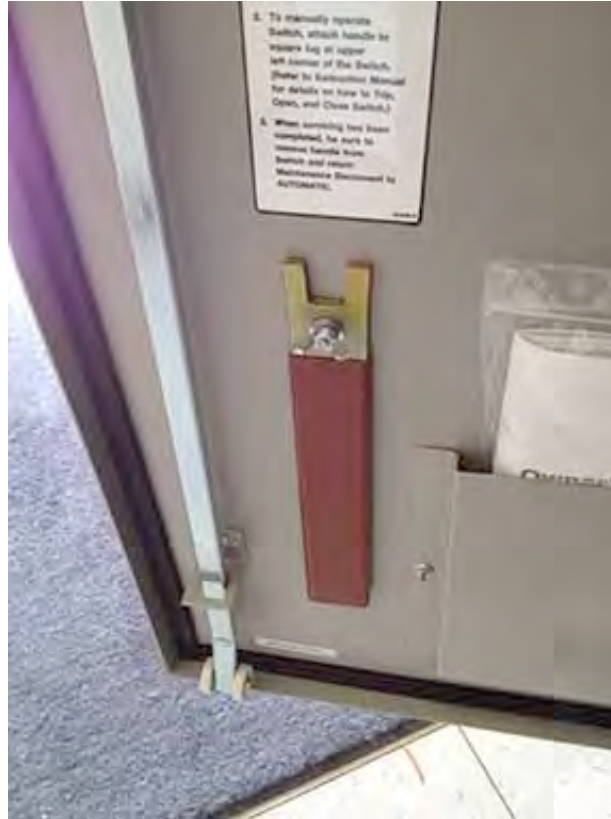


Figure 5: Manual Wrench; Yellow Punch behind

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- Using the yellow punch, push the hole labeled “Trip” on the main switch body. (Figure 6) The switch trips to the neutral position. NOTE: THE SWITCH ASSEMBLY IS NORMALLY UPSIDE DOWN

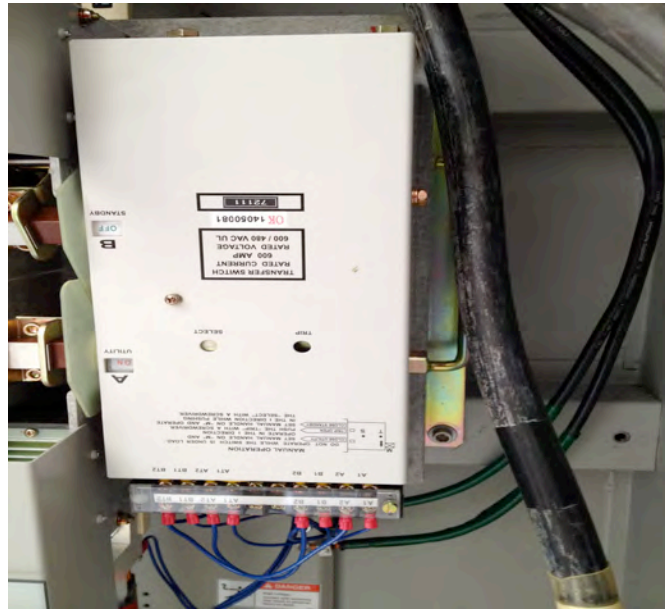


Figure 6
Switch Box A and B windows
Select and Trip holes and manual square lug on right side

- Using the red handle wrench, place it over the square lug on the side of switch box.
- Using the punch, press the hole labeled “Select” and rotate wrench until the window labeled “B” reads “ON.”
- Set Maintenance Disconnect switch from Method #1 Step #2 to “Automatic.” Generator should start.
- If generator fails to start, follow manual generator start procedure in Method 2 Step #2.

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Return to Normal

Under normal conditions you do not need to return to normal power, Contact Site Supervisor or Site Manager if you need to manually engage the transfer switches or start the generator, and they will ensure we are returned to normal power.

Utility Building Transfer Switch

There are no critical loads in the Utility building except fire pump and a third air compressor. Under normal conditions if this transfer switch fails there is no immediate need to do anything. Contact Site Supervisor or Site Manager.



Figure 7

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SDSS Engineering Trailer Generator

There are no critical loads in the SDSS Engineering trailer. If this generator fails to start or transfer load, contact Site Supervisor or Site Manager, and turn off UPS units inside.