

## Case Study - Importance of Accurate Data while doing Power System Study

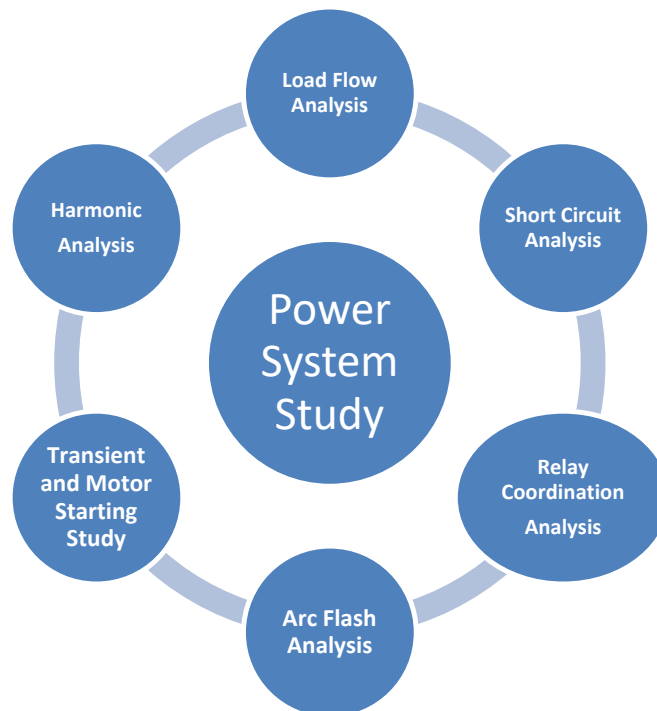
**P**ower System Study, Relay Co-ordination and Short Circuit studies are being done by many industries for smooth operation of their plants. These studies are helpful in avoiding mal-operation tripping of plants and bring out loopholes in Electrical Protection system.

First step of such study is Data collection and Verification from Plants. In coming paragraphs, we will see why data collection is necessary for Power System Study and its importance in Power System Study Process!

Data collection involves the process of collecting data in streamlined manner related to electrical system of plant. It is the **backbone** for entire Power System Study process. **Whether it is qualitative or quantitative data collection, ACCURATE collection ascertains the accurate conclusions!!** It is important to be accurate while collecting data on site and data needs to be based on upto date system modification after installation. One cannot always refer existing system drawings for present system study of any plant.

### Background

Power System Study involves some of following studies as below:



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What data we need for Study?

- Plant electrical Single Line Diagram
- System Voltage
- Utility data (From Electricity Board)
- Source data
- Load data (Connected loads/ Running loads/ Maximum load)
- Switchgear data (Breaker Type/Make/ Rating/Model number/Fuse rating/ Relay Model and make/CT Ratio)
- System grounding details
- Plant operating philosophies
- HT & LT Cable details
- Plant Future expansion details
- Bus-bar ratings
- Motor/Generator/VFD/DG manufacturer datasheet
- Power and Distribution Transformer Data
- Capacitor bank details

Study also requires one dedicated site authorized person to accompany engineer during data verification and allow access to all Equipments, switchgear and rooms (Having permit). All the data collected should be documented in precise manner as it serves as Encyclopaedia for the plant.

**Significance of Accurate data:**

There are many tools available in market for Power System Study and Analysis i.e. ETAP, PSCAD, MATLAB and many others. However, output of these tools totally dependent on data used to create the system model. Incorrect data can lead to poor results. It is always a good idea to verify maximum data in the field/site and that is the reason why System Protection always sent Engineer to site for data verification.

Following are some examples how inaccurate data leads to inaccurate results:

1. Transformer Impedance data:

We can observe impact of different % impedance on fault current value.

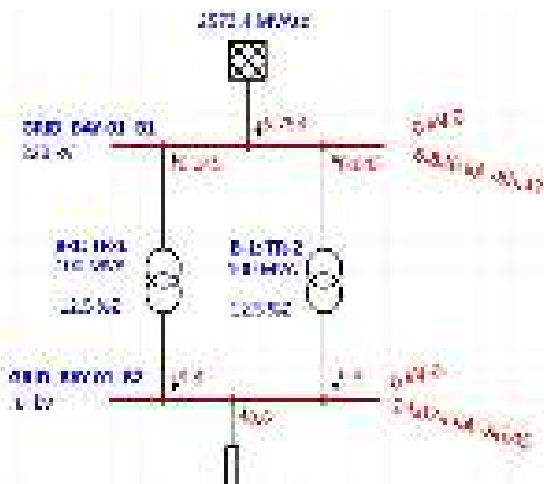


Fig - A.1 (with %Z = 12.5%)

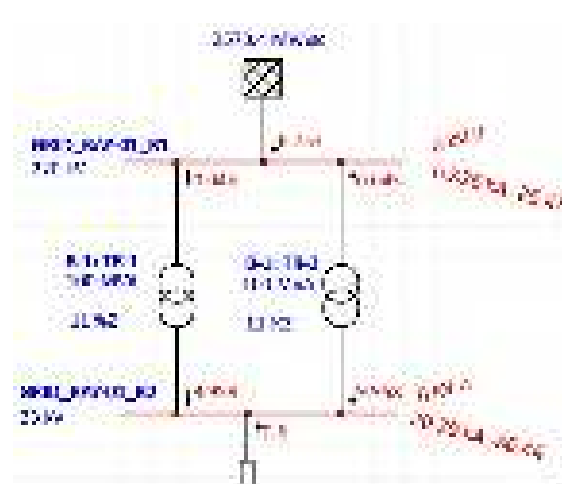


Fig - A.2 (with %Z = 11%)

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2. Cable data:

Major difference in cable length can result into higher or lower fault current and voltage drop.

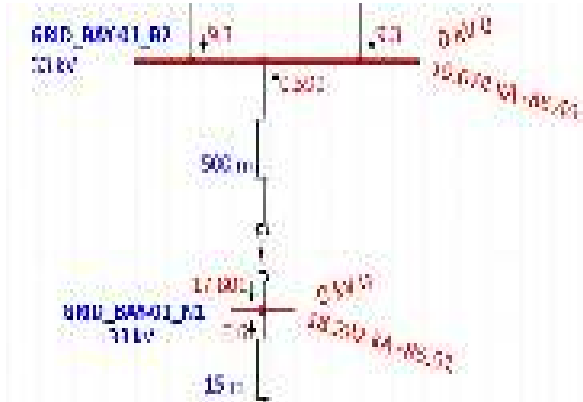


Fig - B.1 (Cable length = 500 mtr)

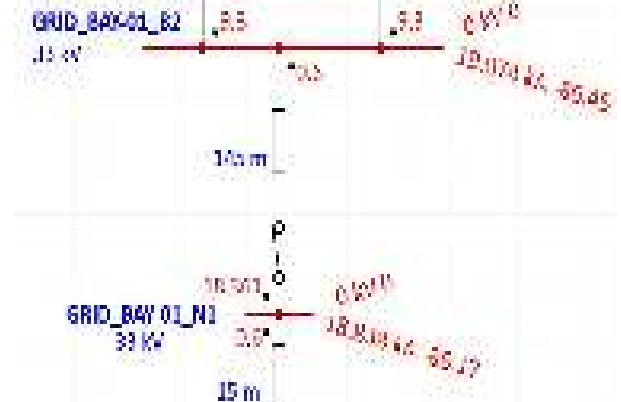


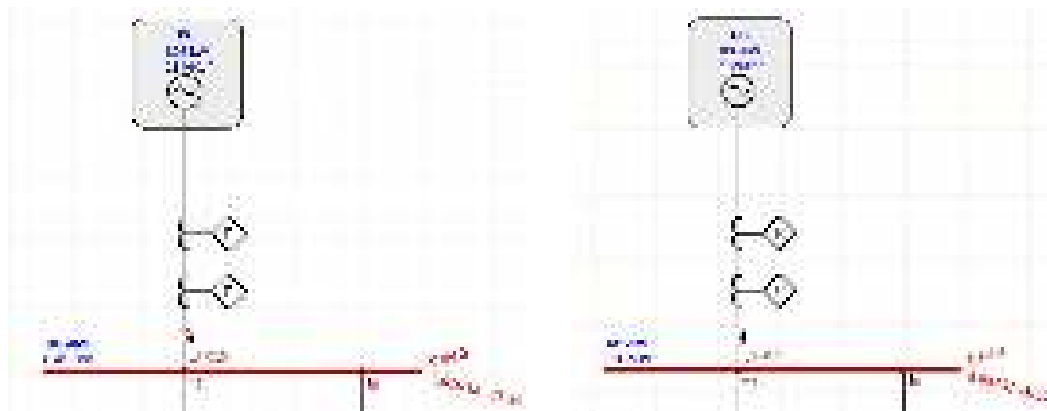
Fig - B.2 (Cable length = 145 mtr)

3. Motor data:

Assumed motor starting time, Hot/Cold withstand time can lead to inaccurate protection settings for Motor Relay. Motor starting current data is also necessary to calculate Phase Overcurrent protection and avoid nuisance tripping during motor starting.

4. Generator Impedance data:

Here we can see, how different impedance data for Generator impact on fault current value. Wrong fault current value can lead to wrong Relay setting calculation and arc flash hazards.



From all above results, you can understand the importance of accurate data. However, we also understand that in old plants, all such accurate data may not be available, so in that case few data must be assumed. It is understood that all data must be verified on site and with its

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documentation and drawings. This practice will lead to near to accurate results in any Power system study tool.

### Conclusion & Precaution:

This article shows how **Data collection** for Power System Study stands as **backbone for the entire process** of Power System Study and helps in providing effective results of the study. This is the reason we always request Plant people to keep their data safe in hard and soft both, so that even after a decade such study can be conducted in a much effective manner.

We, as an Electrical asset consultant and service provider always suggest what is best to run your industries smoothly and without hiccups of maloperation and breakdown.

And if you are looking for a dedicated agency that understands the direct link between your assets and your revenue, call/write to us, we will be happy to assist you.

### SYSTEM PROTECTION

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(Servicing & Testing of Circuit Breaker, Relay, CT, PT, Transformer, Other Switchyard Equipment's, Relay Co-ordination Studies, Cable, etc.)

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