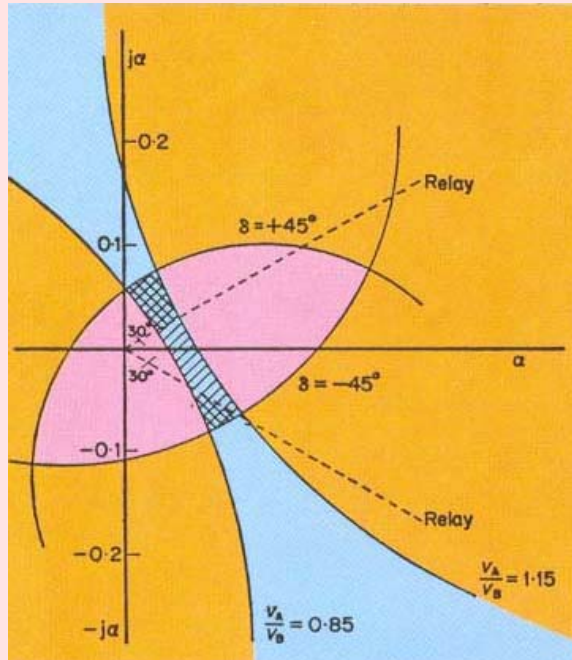


**SHORT CIRCUIT STUDIES/ENGINEERING STUDIES OF SELECTIVE COORDINATION OF PROTECTIVE RELAYS.**

Electrical systems must be protected against the effect of abnormal operating conditions, overloads, and short circuits.

Electrical protection is absolutely necessary and mandated by regulations (see MIE-RAT 09).



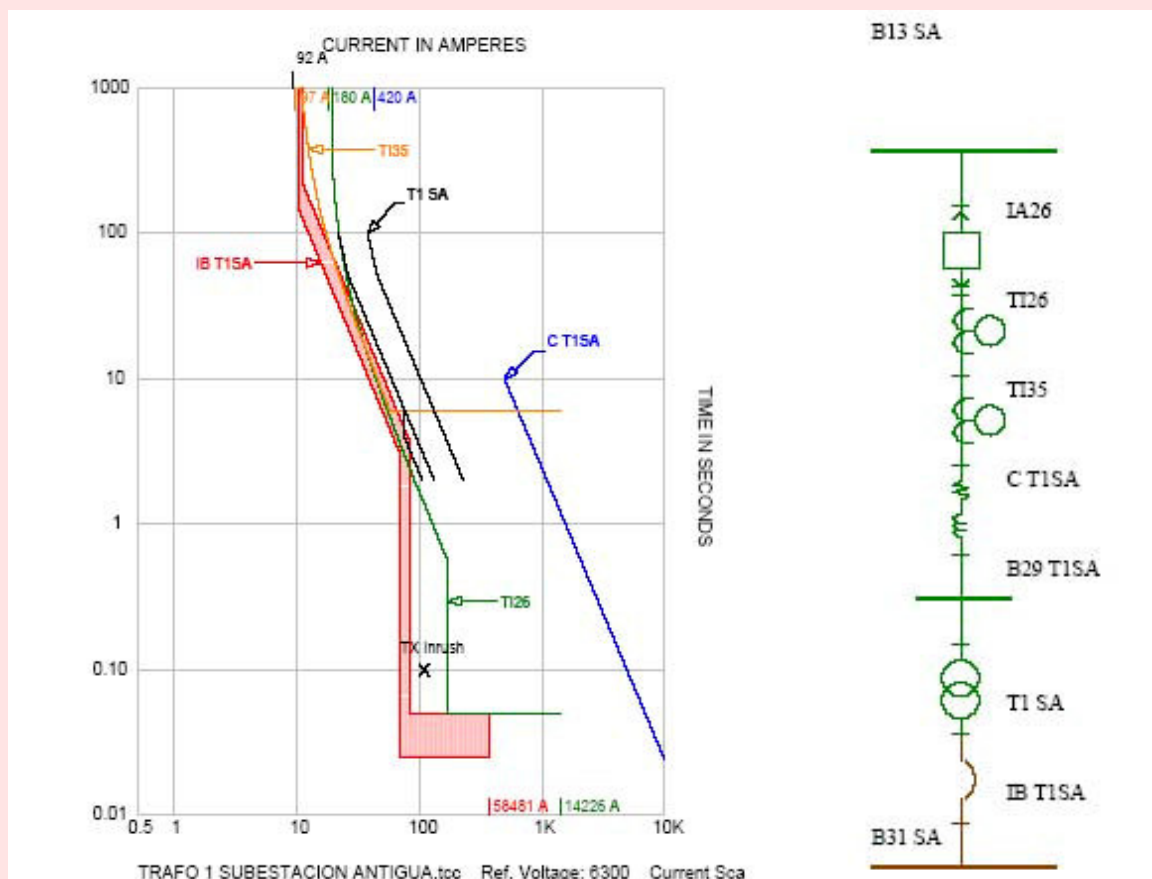
Besides the damages caused by an electrical fault, there are other factors to consider: the consequences derived from the process interruption, civil liability for damages to third parties...



Every electrical installation must have a more or less developed protective system.

The following steps are basic to determine if the analyzed protective system is optimal:

- Preventing faults.
- Fault detection.
- Fast isolation of the **affected** part of the installation, **keeping the rest operative**.
- Signaling and monitoring the location, nature, and magnitude of the fault.



A lack of rigor in the design of the installation, breakdowns or obsolete equipment are the most frequent reasons of the incorrect functioning of a protective system.

The most usual lack in a protective system is a selective coordination that isolates only the damaged part of the installation. The rest remains operative.



If the above-mentioned situations must be avoided, an engineering study of selective coordination is fundamental.

Necessary data are:

- Unifilar diagrams.
- Short-circuit power at external supply points.
- Conditions of use of the electrical system.
- Features of transformers, generators, power lines...
- Actual protective elements and their adjustment values.
- Serious incidents happened in the installation.

An electrical system is modeled using the previously-mentioned data. After this step, a short circuit study is performed considering all the possible variations in the installation.

Obtained results are useful for the selective coordination analysis and useful to question the dimensions of the installation and actual and future equipment.

Adjustment values are calculated from the short-circuit study, from the limits of the equipment, and from the properties of protective devices. The functions of adjustment values of protective relays are:

- First, giving a sufficient protection.
- Second, coordinating protective relays operation.

Graphically represented results obtained from the short circuit study evidence all the lacks in the actual protective system.

