



ARCO, Product Overview

ARCO is a software program to coordinate Over-current and Earth-fault relays for high voltage substations. It is flexible in which you may define any kind of modelled relays in any position of the substation protective diagram. According to the user's primary settings, ARCO considers all requirements and offers detailed and abstract trustful results. It relieves the relay engineers from the tedious and time-consuming tasks of leafing through stacks of printouts and plotting and re-plotting relay curves and single-line diagrams. It works quickly under the control of the engineer. The engineer can change the relay settings and network configuration to see the results of the change immediately.

The first version of this program so called OEMP (Over current and Earth fault Mechanization Program) was developed in 2004. It has been using in a relay protection unit of a regional electricity company on a daily basis till now. It has been making advantages with a very high level of satisfaction for the mentioned users and promoted the company's technical value and ranking among the other companies in the country.

Changing programming language, adding databases and taking advantages of web based programming techniques, we have utilized a couple of years of experiences with the old program. Then, the new version now fixes bugs in the former version and offers a bunch of new functionalities as follows:

New Features and Improvements in ARCO since Version 1.0

- i. General features
- ii. User Interface
- iii. Input data
- iv. Calculation algorithms:
- v. Substation protective model maker
- vi. Relay model maker
- vii. Reports



✚ General features:

- The ARCO new version is a Client-Server based application. It can be simply used either by single users separately on a Personal Computer or multi-user based via a server. It can be considered as two versions available:
 - a. **Single User:** It is a pc-based version for single users
 - b. **Multi User:** It is a Multi-user program while user may work on different categories or same database.
- Data-bases are used effectively in ARCO and new secure Database for Substations and Relays has made higher quality and security of working with the software.
- Program is practical and feasible to work with.
- Any kind of Substation Configuration is covered.
- There is no real limitation for the number of feeders or parallel transformers or Relays.
- Possible to choose any path for database such as server path or any shared folder.
- Possible to directly open and access output files (.txt).
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- User Interface
 - The user interface is Iconize.
 - Extra checking of all input data.
 - More input data to make more flexibility.
 - Two Optional language selections for Help.
 - There is a demo example to train users.
 - Demonstration shows how program works.
 - Possibility of making special backup and Restore for substations and Relays database.
 - Any company has its own substation database but common Relay database. Then, Relay model database may become more consistent while different users work with ARCO in a Company.
 - Guidance for all stage of program is present.
 - There are helpful dynamic tooltips in accordance with point of interest. Fault Currents illustrated as Ampere as well as Per unit.

Input Data:

- More input settings for relays are applied.
- I_{inst} (instantaneous current setting) has proper input value options and can be chosen by the user.



- Possible to add any comments for Substation, Feeders and relays.
- Possible to add any comments for Relay model and any relay setting item.
- ✚ **Calculation algorithms:**
 - Covers worldwide Standards of ANSI and SI for protection.
 - Covers important instructions of Tavanir (Iran Power Generation, Transmission & Distribution Management Co.).
 - Calculation of relay coordination for any number of Parallel Transformers is possible.
- ✚ **Substation Protective Model maker:**
 - A new feature to define new Companies and Groups to make individual calculations to keep related data and calculations secured is available.
 - Automatic search of Database for several repetitive ranges for any Item and any characteristics and any Relay is possible in the new version.
 - Extra checking of all input data is applied while running program.
 - Discrimination times are optional in the new version.
 - There is no limitation for substation Voltage level.
- Simple to make any kind of revision, duplicate, Edit, Remove, Insert data etc.
- Automatic double checking of input data prevents wrong settings to be issued.
- Accurate graphical Time-Current for Overcurrent and Earth fault relays can be customized by the user.
- Possible to coordinate HV-side buscoupler and Neutral protection with remote substation's relays.
- ✚ **Relay Model Maker:**
 - ARCO Relay database is a valuable tool that can help to bring order and efficiency to the task of managing Relays in an electric utility or industrial facility. The user interface is flexible, secure and customizable. The related helps work with two languages.
 - It is so simple to define any new O/C and E/F relay models.
 - 18 types of characteristics such as 'Standard Inverse', 'Very Inverse' ... are modelled in the database.
 - So Simple to improve relay models.
 - A Tree View makes a user friendly interface to work with an existing Relay model or revise it.
 - Many kinds of Relay characteristics are included and can be expanded.
 - More than 50 types of O/C and E/F Relays are modeled.



- Possibility of modeling any kind of O/C and E/F relays simply without need to write any code or module.
- Potentially possible to define many items for a relay.
- Possible to define as many as needed of multi range items for a relay.
- Possible to define separate O/C and E/F units.
- Simple to make any kind of revision, duplicate, Edit, Remove, Insert data etc.
- Link to related Datasheet to check model or any kind of improvement.
- It is possible to add comments either for data items or for the selected relay.
- There is extra link to data sheet of any relays which can be updated by the users.
- Abstract report of O/C & E/F relays together.
- Appropriate Graphical Time-Current scheme overview for O/C and E/F relays according to the final settings together with graphical features.
- Abstract data checking report.
- Operating time for relays according to important short circuit results like corresponding Maximum and Minimum fault currents.
- Report for details of any relay modelled (.txt and .pdf).



Bug Fixes Since ARCO Ver.1

✚ Reports

- Technical reports profile.
- Possibility of making password protected reports in PDF format in addition to Text files.
- It offers a couple of helpful output reports such as:
 - Possible Warnings.
 - Detailed report of O/C relays of the Substation.
 - Detailed report of E/F relays of the Substation.