Configuration of Relay Using PCM600

Mr. Inamdar Mo. Sameer Mo. A. Zaker[1], Ms. Divya Ramnarayan Raut[2], Mr. Konge Onkar Sahebrao[3], Mr. Amit Shravan Sarbande[4], Mr.BelimShaneraza[5], Prof. Mandhare S. S.[6]

[1, 2, 3, 4] Dept of Electrical Engineering

[6]HOD, Dept of Electrical Engineering

[5]Senior Manager Quality Department, Schneider Electric India Pvt. Ltd.,Ahmednagar

[1, 2, 3, 4, 6] PDVVP COE,Ahmednagar

Abstract- *The need of electricity is increasing day by day.The electricity plays a vital role in everyone's life and the uninterrupted power supply is everyone's demand. To get this power supply constant i.e., uninterrupted and with less fault clearing time one must optimize the old equipment's with the most enhanced equipment's and software's. The relay plays very important role while clearing the faults and it becomes necessary to provide some data in the form of inputs to the relay i.e., logic and this logic is set by various software's. With the use of automation minimum time is required to get the work done in prescribed way. To optimize the control panel using PCM 600 we can add or remove every feature of the relay.PCM600 provides unique feature to edit and perform logic and this can be done by not only the administrative peoples but also the Frontline workers who are working on the actual field.*

Keywords- PCM- Protection and Control IED Manager, FDR- Factory Data Reset, DS- Disconnector Switch, Relay Feeder Protection (REF).

I. INTRODUCTION

The control panel is nothing but assembly of circuit breaker, relay disconnector switch and other electrical equipment's which are used for protection and measurement of various parameters. This control panels are employed at various Generating stations,Transmission stations, Distribution stations and Generating stations as well the use of this control panel is not only to just protect the system from various faultsbut also for isolation of the healthy system from faulty one. To measure the parameters such as current, voltage and frequency etc. with a consistent time domain the control panel consists of mainly circuit breaker, relay, disconnector switch, earthing switch and other electrical equipment's such as Ammeter,Voltmeter,Frequency meter,Watt meter etc.The main function of circuit breaker is to isolate the faulty part automatically and manually whenever necessary.

II. BRIEF ABOUT RELAY

Relay is nothing but an Electromagnetic coil which opposes the change in current the change in current is assumed to be the fault current for the excess current present in the line during fault condition. It mainly consists of relay coil which senses the fault current and then it provides a trip signal to the circuit breaker if the fault occurs at the bus-bar then the relay coil will sense the fault current that is provided by the city and it will provide a trip signal to the circuit breaker.

As soon as the trip signal is provided to the circuit breaker then the circuit breaker may trip hence the protection of the line is done by using relay and hence, we can call relay as a brain of power system.

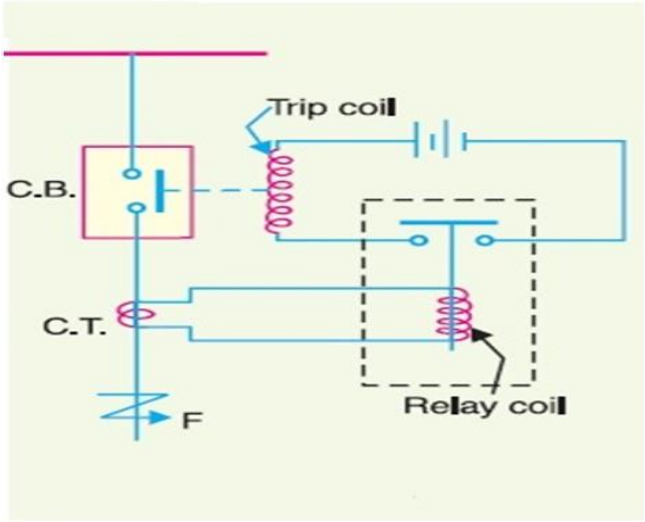

Figure 1: Generalized circuit diagram

The circuit breaker with the combination of relay is most accurate while handling various faults in the power system.The relays are now being enhanced to the closest accuracy so that maximum fault may be observed.There are numerous types of release that are used for the fault protection and also can be used for processing industries.

Some of the types of relays are as following:

- Differential Relays
- Electromagnetic Relays
- Distance Relays
- Electronic Relays
- Non-Latching Relays
- Reed Relays
- High-Voltage Relays
- Small Signal Relays
- Time Delay Relays
- Multi-Dimensional Relays
- Thermal Relays
- Etc.

III. REF FEEDER PROTECTION RELAY

The PCM600 with a combination of REF provides better performance to optimize the control panel. Old generation mechanical relays are removed now a days because they had a drawback due to vibrations and more power loss but REF is totally electronic module and it comes with good current carrying capacity so no mechanical devices are there and hence can be used for multi purposes i.e.,in the electrical utility field, processing industries and automation in various industries. The feeder protection relay has different modules 615, 620, 618 etc.

Figure 2: REF620 MODULE

Salient features of REF 620 moduleare as follows:

1) **Programmable-**The REF 620 module is Programmable which means anyone can provide various logic (programs) and the module is able to execute the logic as well.
2) **Editing Logic-**The editing feature of REF provides unique way to edit the logic as many times as you can until you get accuracy over it.

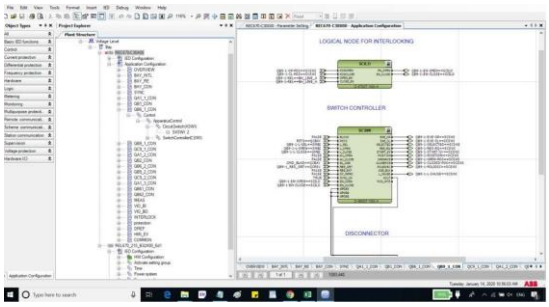

Figure 3: Editing Logic

3) **Memory Enhancement-**The REF620 consists of various memory units that are enhanced with storage capabilities.
4) **Compatible in Nature**-The REF620 relay is compatible in nature and hence it provides a harmonious relation with other devices such as circuit breaker, isolator, disconnector switch and other electrical equipment's.
5) **Universal Power Supply**: Sometimes the access of either DC or AC supply source is not possible for testing and operation of module in such cases REF 620 plays a very versatile role i.e. it can be operated over AC and DC as well. Due to this Universal power supply feature, it becomes very reliable mode of operation during testing of the module and it is made so that it can be operated over both supplies. Different supply'si.e.,auxiliary supply voltages are set for different models for the flexibility of the consumer.
6) **FDR(Factory Data Reset)**: The REF feeder protection module has quality feature to reset the settings of module through a single instruction. FDR feature enables us to delete technical key. It becomes very easy to reset the whole relay with a single instruction otherwise it becomes Complex during erasing every feature.
7) **High Current Rating**: The current rating of REF Feeder Protection Relay is generally 1-5 Amperes which provides us high measuring capacity.Higher current carrying capacity makes the system able to measure high magnitude of fault currents and feasibility of operation can be increased by measuring more current as well.
8) **On display and LED's:**Display provided by REF module is quite better to get all the information on your fingertips. LED provided over REF module are easy to understand for everyone this is important factor so that everyone can get to know about current operating condition of the control panel. The REF module being most important part in the control panel is very easy to operate and accessible.

IV. STUDY ON PCMIED MANAGER

1) **PCM600-** The PCM600 is protection and control IED manager. The specific function of PCM600 is to provide logic to the relay, the logic is nothing but simply a

program which provides logic in the form of input to the module over which the module works and gives output signals after occurrence of various conditions such as faults, overload condition, errors and other unwanted circumstances etc.

The primary function of PCM is to provide logic to the relay hence we can Create,Edit and Run the various logic's using PCM 600.

2) **Authority to Work-**The authority given to work over PCM600 can be given not only to the administrative peoples such as managers, directors but also it can be given to workers who are working on the line or working on actual field which is the best part about PCM 600. Alike other software's PCM600 provides greater reliability during designing new logic.

3) **Logic Setting-**Relay configuration by using PCM 600 iseasiest method to configure relay module –It mainly consists input and output setting.

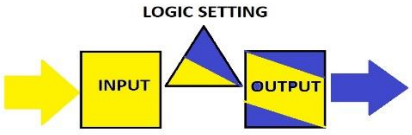

Figure 4: Editing Logic

A. **Input setting-**We provide input to the relay from various sensors, transducers and measuring equipment's over which the relay works. we may define various input terminals by configuration and we can get numerous outputs through it.
B. **Output setting-** The module works on the numbers of inputs provided by the sensors and measuring equipment's. The output is generated as per the conditions set in the logic and signal is sent to various equipment's such as DS, CB and isolator switch.

4) **Logic Scheme-**The logic scheme is the most important part in the software as it decides the overall operations of the various equipment's and the logic can be edited at any instant of time.

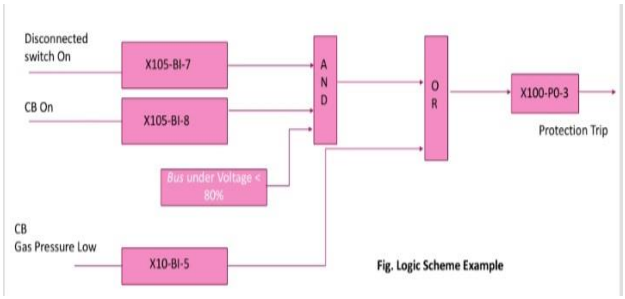

Figure 4: Logic Scheme

We can see the logic scheme in which input is provided from disconnector switch to AND gate via terminal X105- BI-7 which is Disconnector switch ON and another input from circuit breaker is provided to AND gate via X105-BI-8 terminal which is for Circuit breaker ON. As we know the function of AND Gate that it multiplies the two inputs and then provides a single output. but here we provided a third input which is Bus under voltage <80% so, it will multiply three inputs and provide single output. The AND Gate operates will provide output for this input which is again provided to OR gate another input is provided to OR Gate which is Circuit breaker gas pressure low via X105-BI-5. The ORGate performs the operation and provides output to X100-P0-3terminal which is protection trip signal to circuit breaker.

V. QUALITY CHECK

The quality check is the most important task that Industries perform very seriously to perform the quality over the equipment's. It provides us the details whether the product is manufactured with right requirements and it performs the specifications as per rules and standards.The good quality check gives the best product in the industries.In automation Industries the quality check is done to reduce errors and to check the working of every single electrical equipment properly. The drawing of logic is printed out which is then used by the quality department to check the arrears in process and condition monitoring of every equipment.The quality check of logic is performed by two methods:

A) Local Condition Testing
B) Remote Condition Testing

A. Local Condition Testing: It is manual way of testing and also called on-location testing.It includes HMI which is called Human Machine Interface and testing is taken on the actual field by the workers on the field.Hence, it becomes sometimes hazardous condition so the situation should be handled with due precautions.

B. Remote Condition Testing: In remote condition, the local-remote(L-R) switch is selected towards remote(R) and the control panel is now been connected with

Ethernet switch this enables us to operate the control panel from other location and hence, by using remote testing we can test the control panel from substation or from other locations except the field. Remote testing option helps us to test the logic working safely from the sub-station using a single click.In a remote testing the number of electrical pulses are generated for all the equipment's on which they work the pulses are generated for faulty conditions and also for healthy conditions and data is filled over quality check sheet.

VI. TRANSFER OF LOGIC

Transfer of logic from the laptop or PC to the module is made very easily with the use of data cable.Data cable is connected to laptop and other end of the data cable is connected to port of the module.The relay module consists of two port (i)front port and (ii)rear port.After connecting with module, the technical key is set in the PC which is important for the communication between laptop and relay.If technical key is not set, there will be no communication between laptop and module and hence there will be no transfer of logic.Once the technical key is set, we can configure the logic as per our requirement.

VII. CONCLUSION

From this project, we came to the conclusion that the relay configuration is the most important thing to get the required job done. With the combination of PCM600 and REF feeder protection relay we can optimize every single equipment of control panel.

- We can operate every single equipment of the control panel by only creating new logic for new operations within minimum time duration and we can add various conditions in the system within less time.
- We can achieve greater accuracy in the electrical utility by using PCM 600.
- This project will result in greatly profitable for the various stations and substations as they can clear the fault in minimum time and also, they can record the data for the future use.
- The main advantage of this project is that on the actual field we can improve the functionalities of control panel.
- With the use of REF relay, we can improve the feeder protection of the system at the substation and we can monitor every single condition appearing on the sub-station.
- With the use of PCM600 and REF feeder protection the condition-based operation of control panel is satisfied

VIII. APPENDIX

Configuration of relay using PCM600 is a technical approach in which engineers can add or remove feeder operations and they can simply supervise every single operation and monitor every single condition in electrical utility and hence, the reliability of the control panel can be increased. The REF feeder protection relay plays a vital role in clearing the fault with minimum time and setting of logic.

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