

ABSTRAK

Ruth Theresia Br. Silitonga: *Studi Koordinasi Proteksi Rele Arus Lebih (OCR), Rele Gangguan Tanah (GFR), dan Rele Diferensial pada Bay Trafo TD1 PT PLN Gardu Induk Paya Pasir*. Skripsi. Fakultas Teknik Universitas Negeri Medan. 2024.

Koordinasi rele proteksi merupakan koordinasi rele arus lebih yang disebut juga sebagai *overcurrent relay* (OCR) yang memproteksi jaringan dari gangguan antarfasa dan rele arus lebih proteksi gangguan ke tanah atau disebut juga sebagai *ground fault relay* (GFR) yang memproteksi jaringan dari gangguan fasa ke tanah, serta rele diferensial yang memproteksi perbedaan arus antara sisi primer dan sisi sekunder transformator. Tujuan dari penelitian ini adalah mengetahui hasil simulasi koordinasi *existing* rele OCR, GFR, dan rele diferensial pada bay transformator TD1 Gardu Induk Paya Pasir, menghitung nilai *resetting* rele OCR, GFR, dan rele diferensial pada bay transformator TD1 Gardu Induk Paya Pasir sesuai dengan standar pelaksanaan rekomendasi proteksi dan koordinasi pada sistem tenaga listrik, dan mengetahui hasil simulasi koordinasi *resetting* rele OCR, GFR, dan rele diferensial pada bay transformator TD1 Gardu Induk Paya Pasir. Simulasi koordinasi rele OCR dan GFR menggunakan ETAP pada bay transformator TD1 PT PLN Gardu Induk Paya Pasir menghasilkan kurva karakteristik waktu setelan rele OCR dan GFR berdasarkan perhitungan elemen setelan waktu pengoperasian dan setelan arus *pickup*. Hasil analisis hubungan singkat dan perhitungan setelan yang baru menunjukkan kurva karakteristik waktu tipikal koordinasi rele OCR BLWCC1 mengalami *overlapping* terhadap OCR 150 kV, tetapi rele pada BLWCC1, MABAR1, dan 150 kV tidak saling berkoordinasi karena ketiga rele tersebut bersifat sebagai beban, tetapi berkoordinasi dengan rele PGELI1 dan SROTN1 yang bersifat sebagai sumber. Kurva karakteristik waktu tipikal koordinasi rele PGELI1, SROTN1, dan penyulang 20 kV tidak mengalami *overlapping* sesuai dengan standar koordinasi rele, yaitu setelan terendah rele berada dekat dengan beban. Kurva karakteristik waktu tipikal koordinasi rele *Bus Section* PP-PY, yang mengalami *overlapping*, tidak mengindikasikan rele tidak berkoordinasi dengan baik karena jenis kurva yang dikoordinasikan berbeda. Sementara pada rele diferensial tidak ada kurva karakteristik waktu karena rele bekerja terhadap perbedaan arus antara sisi primer dan sekunder transformator. Untuk mengoreksi arus tersebut, perlu menggunakan nilai aktual yang divisualisasikan dalam kurva karakteristik rele diferensial. Daerah di atas kurva adalah daerah kerja rele diferensial, sedangkan daerah di bawah kurva adalah daerah rele tidak akan bekerja.

Kata kunci: koordinasi rele, OCR, GFR, dan diferensial.

ABSTRACT

Ruth Theresia Br. Silitonga: *Coordination Study of Protection of Overcurrent Relays (OCR), Ground Fault Relays (GFR), and Differential Relay at Bay Transformer TD1 PT PLN Paya Pasir Main Substation. Thesis. Faculty of Engineering, State University of Medan. 2024.*

Protection relay coordination is the coordination of overcurrent relays also known as overcurrent relays (OCR) which protect the network from interphase faults and overcurrent relays for ground fault protection or also known as ground fault relays (GFR) which protect the network from phase to ground faults, as well as differential relays which protect the current difference between the primary and secondary sides of the transformer. The purpose of this study was to determine the results of the simulation of the existing coordination of OCR, GFR, and differential relays in the TD1 transformer bay of the Paya Pasir Substation, to calculate the resetting values of the OCR, GFR, and differential relays in the TD1 transformer bay of the Paya Pasir Substation in accordance with the implementation standards for protection and coordination recommendations in the electric power system, and to determine the results of the simulation of the resetting coordination of the OCR, GFR, and differential relays in the TD1 transformer bay of the Paya Pasir Substation. Simulation of OCR and GFR relay coordination using ETAP on TD1 transformer bay of PT PLN Paya Pasir Main Station produces characteristic curves of OCR and GFR relay settings based on calculation of operating time setting elements and pickup current settings. The results of short circuit analysis and new setting calculations show that the typical characteristic curve of OCR BLWCC1 relay coordination overlaps with OCR 150 kV, but the relays on BLWCC1, MABAR1, and 150 kV do not coordinate with each other because the three relays act as loads, but coordinate with relays PGELII and SROTN1 which act as sources. The typical characteristic curve of relay coordination PGELII, SROTN1, and 20 kV feeder do not overlap according to relay coordination standards, namely the lowest relay setting is close to the load. The typical characteristic curve of Bus Section PP-PY relay coordination, which overlaps, does not indicate that the relays are not coordinating well because the types of coordinated curves are different. While in the differential relay there is no time characteristic curve because the relay works against the difference in current between the primary and secondary sides of the transformer. To correct the current, it is necessary to use the actual value visualized in the differential relay characteristic curve. The area above the curve is the working area of the differential relay, while the area below the curve is the area where the relay will not work.

Keywords: relay coordination, OCR, GFR, and differential.