STUDY ON POWER DISTRIBUTION SYSTEM AND SUBSTATIONOPERATION OF DESCO (DHAKA ELECTRIC SUPPLY COMPANY LIMITED)

An internship submitted in partial fulfillment of the requirements for The Award Degree of

Bachelor of Science in Electrical and Electronics Engineering

Submitted By

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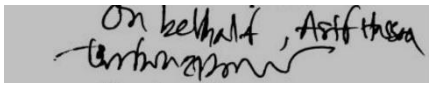
DAFFODIL INTERNATIONAL UNIVERSITY MAY 2024

DECLARATION

As a student pursuing a Bachelor of Science in Electrical and Electronic Engineering (EEE) at Daffodil International University (DIU), I hereby declare that, in partial fulfillment of the requirements, I am submitting this internship report to Daffodil International University on the topic study of Power Distribution and Substation Operation & Maintenance of Dhaka Electric Supply Company Ltd. (DESCO) in Bangladesh. It hasn't been ready for any other function, honor, or display.

Signature of the Supervisor:



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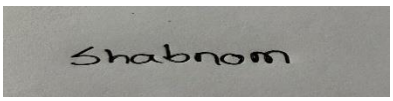

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The entitled "**ANALYSIS OF DISTRIBUTION SYSTEM OF DHAKA ELECTRIC SUPPLY COMPANY LIMITED (DESCO**)" submitted by **NAME: Nashid Shabnom Asha, ID:191-33-4928 AND Shadikur Rahman Shehab,ID:191-33-4928** has been accepted as satisfactory in partial fulfillment of the requirements for the degree of **Bachelor of Science in Electrical AND Electronic Engineering .**

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APPROVAL

This certifies that **Nashid Shabnom Asha**, Student ID: 191-33-4928, AND **Shadikur Rahman Shehab**, Student ID: 191-33-4989, a Daffodil International University (DIU) Bachelor of Science in Electrical and Electronic Engineering graduate, completed the **Distribution and Maintenance of Grid substation DESCO** report as part of his internship program and worked as an intern at DESCO. He finished the report all by himself. The report's data and conclusions appear to be reliable.

Md. Mamunor Rashid

Deputy General ManagerHRM Division
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% Percentage

º Degree

C Celsius

F Frequency

P Number of pole pairs

N Number of pole

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First and foremost, I would want to thank Allah for his generosity in granting me the opportunity to complete the research and compose my paper.
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Business Limited (DESCO). It made me happy and glad to work under Engineer's direction.

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during the duration of my internship.

Lastly, I would want to express my gratitude to Daffodil International University (DIU) for providing me with the opportunity to work in the real engineering profession. This will greatly aid in my quest to further my knowledge and succeed in my future endeavors.

CHAPTER 1
INTRODUCTION

1.1 INTRODUCTION OF THE REPOR

We had a fantastic chance to intern at DESCO. Electricity is imported from BPDB by DESCO, a distribution firm. There were opportunities to tour their sales and distribution departments throughout this internship. I only had the opportunity to visit four of DESCO's sixteen selling and distribution divisions in Dhaka. I worked in a variety of DESCO divisions throughout my internship, including station operation and maintenance, electrical distribution, line repair, and commercial operation.

1.2 HISTORY OF BANGLADESH POWER SECTOR

In 1910, the Indian Electricity Act was approved, marking the initial attempt to establish a legal framework for the industry. This Act effectively detailed the rights and duties of the provider and the consumer in order to control indoor story, which was still based on the conventional paradigmof separate privately-owned distribution networks supplied by local power plants. When India andPakistan gained independence in 1947, East Pakistan had a mere 21 MW of installed generating capacity. The district and sub-divisional headquarters only had a modest number of citizens with access to power. These cities possessed autonomous distribution networks powered by diesel generation or coal-fired steam power plants. To swiftly boost generation capacity to support a booming economy, the East Pakistan Water and Power Development Authority (EWAPDA) was founded in 1959 by an act passed by the country's then-government. The Ordinance eventually granted the government a monopoly in the business by enabling it to acquire all generating, transmission, and distribution assets from the private sector. East Pakistan's generating capacity expanded from 88 MW to 475 MW between 1960 and 1970, primarily from natural gas and oil fuelled, steam power, and hydroelectric projects. Then, 132 KV cables connected the networks of Chittagong and Dhaka. The first Government of Bangladesh approved an Ordinance in 1972 creating the Bangladesh Power Development Board (BPDB) as the replacement organization for EWAPDA's power side in an attempt to accelerate investment in the sector. The Ordinance recognized the variety of development difficulties linked to energy.The nation's production capacity was increased to 2818 MW and its 230 and 132 KV transmission networks were stretched to 419 and 2469 kilometers, respectively, thanks to the efforts of BPDB between 1972 and 1995. With the commissioning of the first East-West Interconnector in December 1982, which was a double circuit, 230 KV transmission line electrified at 132 KV between Iturbi and Tongi over the Jamuna River, the eastern and western regions of the nation were connected electrically for the first time. To diversify the country's production sources, a 230 MW hydropower station on the Kamahi River was employed, along with open and combined cycle power plants based on imported fuels and natural gas in the Eastern and Western regions. The Rural Electrification Board (REB) was established by government ordinance in 1977. It is a semi-autonomous body tasked with planning, developing, financing, and building rural distribution networks. It also encourages the creation of Rural Electric Cooperatives (PalliBidyutSamities) and transfers construction of these networks to them. As of June 1995, the REB had constructed more than 46,000 kilometers of distribution lines and connected more than950,000 customers in rural regions.

1.3 STRUCTURE OF POWER SECTOR IN BANGLADESH

Title Power Division oversees, manages, and keeps an eye on the nation's power development initiatives in addition to formulating power policy. To do its work, the Power Division is assistedby several businesses engaged in the production, transmission, and distribution of energy. The organizational relationship is as follows:

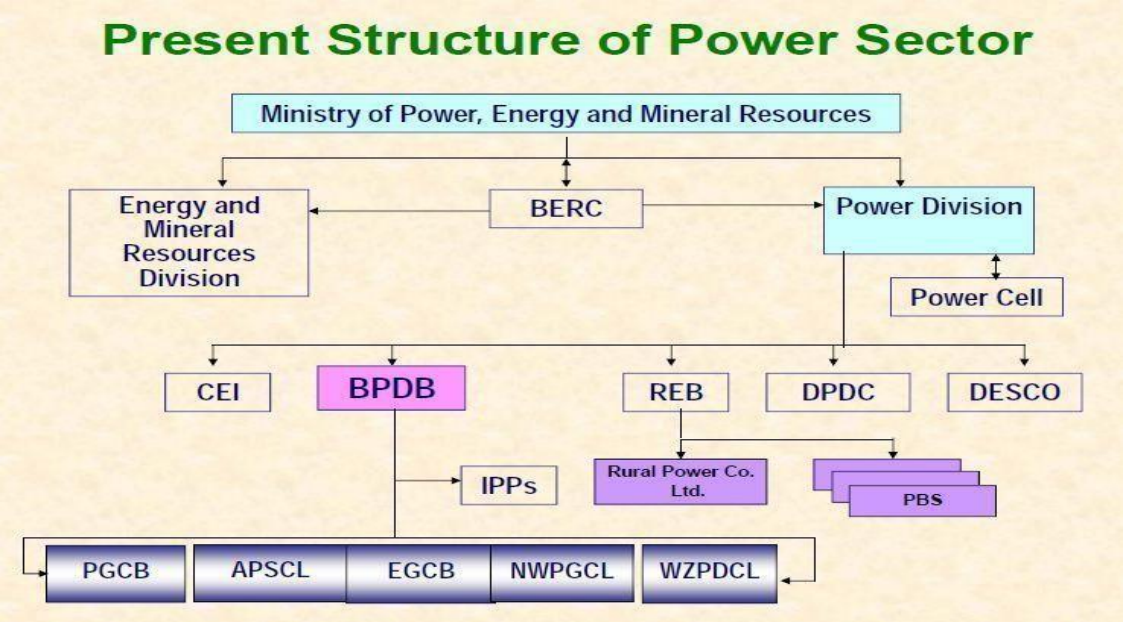


Figure 1.1: Power Sector Structure

1.4 HISTORY OF DESCO

One of the most respected electricity distributors in South Asia is DESCO (Dhaka Electric SupplyCompany Ltd.). The Bangladeshi government is now making the most money from it. There are six distribution companies in our nation; DESCO (Dhaka Electric Supply corporation Limited) isa public limited corporation that supplies energy to the northern regions of Dhaka City Corporation. The firm was founded in November 1996 under the Companies Act 1994 as a PublicLimited firm with an authorized capital of Tk 5.00 billion. Its objectives were to enhance the electricity industry, offer better services, and raise tax collection, especially in Dhaka. On the other hand, field operations for DESCO started on September 24, 1998. As of February 2015, the company serves 6,60,000 subscribers and is a component of the Power Division of the Ministry ofPower, Energy, and Mineral Resources in Bangladesh.

1.4 ORGANIZATION & SERVICE AREA OF DESCO

This area, which is approximately 250 square kilometers and is serviced by the company, is bounded by the following areas: Lake City Area; Greater Mirpur Area; Agargaon Area; Rokeya Sarani; Bijoy Sarani; Greater Gulshan Area; Mohakhali Jheel; Rarmpura Jheel; North-Western part of Blue River; Eastern part of Turag River; Tongi Municipal Area; Purbachal Model Town;Uttar khan Area; Dakkhinkhan Area. Service Area for DESCO.

1.5 OBJECTIVE

To obtain an electrical and electronic engineering summer internship. These days, electricity not only makes people's lives easier and more pleasant, but it has also been essential to the nation's economic progress. A stable, continuous, secure, and enough electricity supply is necessary for the country's development. The report's primary goal is to demonstrate how power transfusion, distribution station operations, regulating, and other protective systems operate in their entirety. Inaddition, I've learned more details regarding DESCO's operations. This report's other particular goals are as follows.

- Successfully use theoretical knowledge in practice.
- To study operation of 132/33/11 KV substation
- To analyze overall power consumption, various losses, and the power transmission anddistribution process
- To describe the fault and its defense mechanisms.
- This study considers the electrical power supply process in its whole, including related equipment. Additionally, the design and specifications of the items utilized in the substation aswell as maintenance procedures for the substation's normal functioning were covered. This substation will be crucial in meeting demand, but it will also greatly lessen low voltage issues, overloading of the grid substation, and the provision of high-quality electricity to Bangladesh'scapital city.

1.6 SCOPE OF THE STUDY

I've included a brief overview of the entire process for power distribution, transmission, substation operation, regulating, and different protective systems in this report. Furthermore, theexplanation of maintaining the regular operation of the substation was provided. It also includes details of the many electrical and mechanical devices that DESCO uses to deliver power.

1.6.1 RESEARCH METHOOOLOGY

Several data have been gathered from DESCO in order to prepare the report. The followingsources provided the information for this report.

1.6.2 PRIMARY SOURCE

Talk face-to-face with the engineers. First-hand observations

13.7.3 SECONDARY SOURCE

DESCO's website and many writers' works. One more distinct webpage. Daily journal that detailsmy actions.

1.6.3 LIMITATIONS OF THE STUDY

There is not much time to prepare reports.
One of the biggest challenges in preparing the study was gathering data. Collecting certain information was challenging since it was highly secret to the corresponding department.

Chapter 2

OVERVIEW OF DESCO

2.1 STRUCTURE OF DESCO

DESCO was formed under the Companies Act of 1994 and has its own Memorandum and Articles of Association. The corporation is fully owned by the government of Bangladesh, which is represented by DESA, which has acquired all of the shares. A part-time Board of Directors, chosen by the company's shareholders, oversees DESCO and makes policy decisions. The managing director and two full-time directors, who were also members of the board of directors, were nominated by the board of directors after their appointments. The company's organizationalstructure is as follows:

- The Board of Directors will select the Chairman DESA until DESA owns the majority ofDESCO's shares.
- The Managing Director oversees overall management and acts as the company's chiefexecutive officer.
- System development, supply and demand management, and operation and maintenanceare within the purview of the Director (Technical).
- The company's financial and commercial activities are overseen by the Director (Finance)[1].

2.1.1 START UP TO DESCO

DESCO was established on September 24, 1998, when it assumed control of the Mirpur region from DESA. Its goals were to reduce system losses and Cl ratios, improve customer service, and deliver a consistent and dependable power supply. The first tasks performed by DESCO were sub-station and line operation and maintenance; commercial tasks like billing, customer accounting, disconnecting and reconnecting customers, testing and installing consumer meters,
and so forth; and sub-station and line planning, design, and installation. The following regions areincluded in DESCO's service area and are where the aforementioned services are offered. [1]

2.1.1A. 1ST PHASE:

The low-lying area between Mirpur and Cantonment and Rokeya Sarani border the city on the east; Agargaon Road borders the city on the south; Mirpur Road borders the city on the west; andlow-lying lands border the city on the north. The included map shows the expected region. On September 24, 1998, DESCO assumed control of the region included by the 151 stages from DESA. [1]

2.1.1B. 2ND PHASE:

The Mirpur Area, which is bounded by the Balu River to the east, the Turag River to the west, and the Turag and Balu River to the north, is included in Gulshan Circle. Connected to the Balu River are Mirpur Road, Agargaon Road, Rokeya Sarani, Progoti Sarani, New Airport Road, Mymensingh Road, Mohalchali Jhell, and Rampura Jheel (Map enclosed). On April 9, 2003, DESCO assumed control of the extra territory covered by the second phase from DESA.DESCO used an open hiring procedure to choose its employees. Requirements for experience andqualifications were established based on what was

needed for candidates to carry out the duties and obligations of the particular position. Those with substantial expertise in the field of utility organization are chosen based on merit. They were employed under DESCO's service guidelines, which were approved by the board of directors, on a long-term contract. [1]

2.1 AIMS OF DESCO

With nearly 25% of the nation's energy sales going toward its consumption, the Dhaka region is Bangladesh's biggest single distribution area. The distribution agency for the Dhaka region, DESA, has a poor history with regard to accounts receivable and system failures. There was thought to bea limit to the gains that could be made, even though performance had improved significantly since 1992 as a result of intensive monitoring. Long-term progress was thought to be possible only if thebusiness environment, both internal and external to the organization, changed to allow theintroduction of more organizational accountability with control and management system. The Civil Service rules and arrangements that underpinned the current organizational structures—such as the management structure, employee compensation, authority delegation, conduct, discipline, and appeal rules, and promotion policies—were found to be inadequate for the demands of the commercially oriented power sector by the ADB. It became necessary, then, to establish a new firm with rules and regulations of its own that were better tailored to the new economic climate.

Figure 2.1: Vision & Mission of DESCO

2.2 COMMERCIAL ACTIVITIES

The following list of significant business endeavors for the year is highlighted:

1) New connections

Up to 69,550 additional connections have been added to our system this year. As of the end of thefiscal year, DESCO has 7,052,342 electric connections thanks to the installation of these new connections.

2) Dis-connections/reconnections

Disconnecting electricity lines has been seen to be a practical way to collect overdue bills or debts. Using this technology, 47,471 overdue clients had their services disconnected throughout the fiscal year. In addition, 149 illicit consumer services were tracked down and deactivated in fiscal year 14.

3) Energy saving & use of alternative energy

Power generation is synonymous with power conservation. With this slogan in mind, DESCO haslaunched a number of inspirational initiatives, including the distribution of leaflets, the exhibitionof posters, and festoons. Consumers are urged to convert to CFL (compact fluorescent lamps), turn off lights and fans when not in use, install energy-efficient products in their homes and offices, and follow other energy-saving measures.

4) Metering

DESCO has allocated substantial resources towards the replacement of faulty meters, sealing of meters, and regular inspection of meters, as these represent the company's "currency box." Throughout the fiscal year, 38,953 meters were sealed and 38,065 damaged meters were replaced.52,825 meters were also evaluated.

5) Annual bill clearance certificate

To improve customer satisfaction, DESCO issues bill payment clearing certificates to clients whoare debt-free.

6) Consumer complaints

For its valued clients, DESCO always strives to deliver exceptional customer service. We carefully consider customer complaints regarding blimp errors and name and address corrections. Throughout the fiscal year, adjustments were made to 18,764 bills. Names and addresses.

7) One Point service center

Every business's success depends on its ability to satisfy its customers. We must give our clients excellent customer service as deemed necessary because they are our first priority. The fact that DESCO is treating the issue seriously led to the establishment of "One Point Service Centers" forcustomers in each of the divisions responsible for sales and distribution. Every customer who visits DESCO's sales & distribution division office will receive the required support and solution from the "One Point Assistance Center" staff. To get the customer service center's standards up tothe required level, they are always being improved. To do this, DESCO is placing a strong emphasis on regular employee training.

8) By consistently working to keep a robust billing/collection ratio, the BILLING/COLLECTION aim of preserving the financial strength of the organization is accomplished. A billing collection ratio of 101.48% and a collection import (CJ) ratio of 92.99% are calculated for thisfiscal year based on sales of Tk. 27,358.16 million and collections of Tk. 28,763.56 million.

9) Accounts receivable/sales

One indication of good financial management is a decrease in the ratio of accounts receivable tosales. The company has a continuous strategy of managing accounts receivable through monthlyreporting and analysis. This year's ratio of accounts receivable to sales is 12.79%, down from 13.60% the previous year.

2.3 VISION, MISSION, SAFETY & CUSTOMER FOCUS NOISIA

To employ the most reliable technology in order to contribute to social development and serve asan example power supply company in the community. To facilitate social and economic advancement by supplying a sustainable, safe, and dependable electrical infrastructure.

Mission with a constant, stable power supply that delivers good value, customers are fullysatisfied. Provide your staff a friendly and comfortable place to work.

Security putting ourcommunities', clients', and workers' safety first.

Provide outstanding customer care with a consumer-focused approach to help clients bettermanage their power use.

2.4PRE-PAID METERING SYSTEM

In 2005, DESCO introduced the automated Smart Card Base, a pre-paid metering system, for its loyal clients. Thanks to the prepaid metering system's bi-directional communication capabilities, customers could pay their power bills in advance through DESCO's vending station, which also allowed DESCO to get all the data on consumer usage. In order to facilitate ongoing pre-paid meter delivery in the future, DESCO, BUET, and IICT collaborated to develop a "Meter Assembly Plant" at Mirpur in 2007. The firm has manufactured and installed twenty thousand single phase and two thousand three phase pre-paid meters.Pre-paid metering services will be available to more than 18,500 loyal clients in Bashundhara in Dhaka till June 30, 2015. Furthermore, during this fiscal year, DESCO installed 5645 pre-paid meters in total. In which 4825 were placed in the Lake CitySales & Distribution Division under the "Unified Pre-Paid Metering System" of the electricity division, and 820 were installed in the Bashundhara Sales & Distribution Division with the goal of enhancing customer service.

2.4.1HOW DOES A PRE-PAYMENT SCHEME WORKS?

A key component of pre-fundamental payment is informing the meter in several ways when making ahead energy purchases. The meter will cut the output line when the stored credit is zero,deducting it based on energy use.

If the customer buys more credit and recharges, he can experience uninterrupted energyconsumption. Customers purchase credit using vending machines.

2.1.1FEATURES OF THE PRE-PAYMENT SYSTEM

Adding credit to the meter is a straightforward process using smart cards. There is no noteworthyvoltage protection in the temporary defense of Ancona. Payments are received ahead of time.

Rejecting excessively sanctioned loads Poor credit history that was recorded during businesshours or the emergency credit of the Ho woman.

2.2TARIFF RATE AT DESCO

a tax imposed on goods and services imported. Since tariffs raise the price of imported goods and services, which raises the cost to consumers, they are used to restrict trade. A particular tariff witha set price is applied based on the kind of products. Ad valorem taxes are levied based on the worth of the item. Tariffs hurt consumers and foreign firms while helping governments and domestic companies. They are only one of many tools at our disposal to affect trade regulations. DESCO provides eight tariff rate categories tailored to individual customers. Agricultural pumping has the lowest tariff rate, whereas commercial and office spaces have the highest tariff rate during peak hours. [2]

A) Low pressure (LT)
230/400 volts power supply: Low pressure AC single phase 230 volts and three phase 400 volts
Frequency: 50 cycles / second
Authorized load: Single phase 0-6.5 kO and three phase 0-60 kV.

Order	Customer class		Energy rate / charge	Demand rate / charge
১	Class-LT: Residential			
		Life line: 0-50 units	৩.৭৫	৩০.০০
	১.	1st step: 1-75 units	৪.১৯	
	২.	Step 2: 6-200 units	৫.৭২	
	৩.	Step 3: 201-300 units	৬.০০	
	৪.	4th step: 301-400 units	৬.৩৪	
	৫.	Step 5: 401-600 units	৯.৯৪	
	৬.	Step 6: More than 600 units	১১.৪৬	
২	Class LT-B: Pump used in agriculture		৪.১৬	৩০.০০
৩	Class LT-C1: retail industry			
	Flat		৮.৫৩	৩০.০০
	Off peak		৭.৬৮	
	Peak		১০.২৪	
৪	Class LT-C2: Construction		১২.০০	১০০.০০
৫	Class LT-D1: Educational, religious and charitable institutions and hospitals		১৬.০২	৩৫.০০
৬	Class LT-D2: Street lights and water pumps		৭.৭০	৩০.০০
৭	Class LT-D3: Battery charging station			
	Flat		৭.৬৪	৩০.০০
	Off-peak		৬.৮৮	
	Super off-peak		৬.১১	
	Peak		৯.৫৫	
৮	Class LT-E: Commercial and Office			
	Flat		১০.৬০	৩০.০০
	Off peak		৯.২৭	
	Peak		১২.৩৬	
৯	Class LT-T: Temporary		১৬.০০	১০০.০০

B) Medium pressure (MT) 11 kV
Power supply: Medium pressure AC 11 kV
Frequency: 50 cycles / sec
Authorized load: From 50 kV immediately above 5 mV.

Order	Customer class	Price of electricity per unit	Demand charge
১	Class-MT1: Residential		
	Flat	৮.৪০	৬০.০০
	Off peak	৭.৫৬	
	Peak	১০.৫০	
২	Class-MT2: Commercial & Office		
	Flat	৯.১২	৬০.০০
	Off peak	৮.২১	
	Peak	১১.৪০	
৩	Class-MT3: Art		
	Flat	৮.৫৫	৬০.০০
	Off peak	৭.৭০	
	Peak	১০.৬৯	
৪	Class-MT4: Construction		
	Flat	১১.৪৬	১০০.০০
	Off peak	১০.৩১	
	Peak	১৪.৩৩	
৫	Class-MT5: General		
	Flat	৮.৪৫	৬০.০০
	Off peak	৭.৬১	
	Peak	১০.৫৬	
৬	Class MT-6: Temporary	১৫.০০	১০০
৭	Class-MT6: Battery Charging Station		
	Flat	৭.৫৬	৬০.০০
	Off peak	৬.৮০	
	Super off peak	৬.০৫	
	Peak	৯.৪৫	
৮	Class-MT6: Irrigation / Agricultural Pumps		
	Flat	৫.০০	৬০.০০
	Off peak	৪.৫০	
	Peak	৬.২৫	

B) High Pressure (HT) 33 kV
Power Supply: High Pressure AC 33 kV
Frequency: 50 cycles / sec
Authorized load: 5 mA to maximum 30 mA
(above 20 mA must be double circuit)

Order	Customer class	Price of electricity per unit	Demand charge
১	Class-HT1: General		
	Flat	৮.৪১	৬০.০০
	Off peak	৭.৫৭	
	Peak	১০.৫১	
২	Class-HT2: Commercial & Office		
	Flat	৯.০২	৬০.০০
	Off peak	৮.১২	
	Peak	১১.২৮	
৩	Class-HT3: Art		
	Flat	৮.৪৫	৬০.০০
	Off peak	৭.৬১	
	Peak	১০.৫৬	
৪	Class-HT4: Construction		
	Flat	১০.৬০	৮০.০০
	Off peak	৯.৫৪	
	Peak	১৬.২৫	

Table 2.1: Tariff Rate 2020 at DESCO [2]

Chapter 3
SYSTEM OPERATION

3.1INTRODUCTION

The DESCO's system functioning is another crucial component. The maintenance of the grid andsubstations is the primary focus of this section. In addition, load management, control room activities, power factor monitoring and upgrading, load sanction and Joad retention, and new connection maintenance are all handled in this part. DAS maintenance, wireless & communications, line maintenance, substation operation and maintenance, etc.

while working as an intern at DESCO. I gained a lot of knowledge about maintaining substation equipment and actually witnessed the Baridhara 33/11 KV substation's repair period. Substationsare inspected often, although DESCO conducts weekly, monthly, half-yearly, and annual inspections of the substation equipment. The graphic below displays the Baridhara 33/11KV substation's single line diagram.

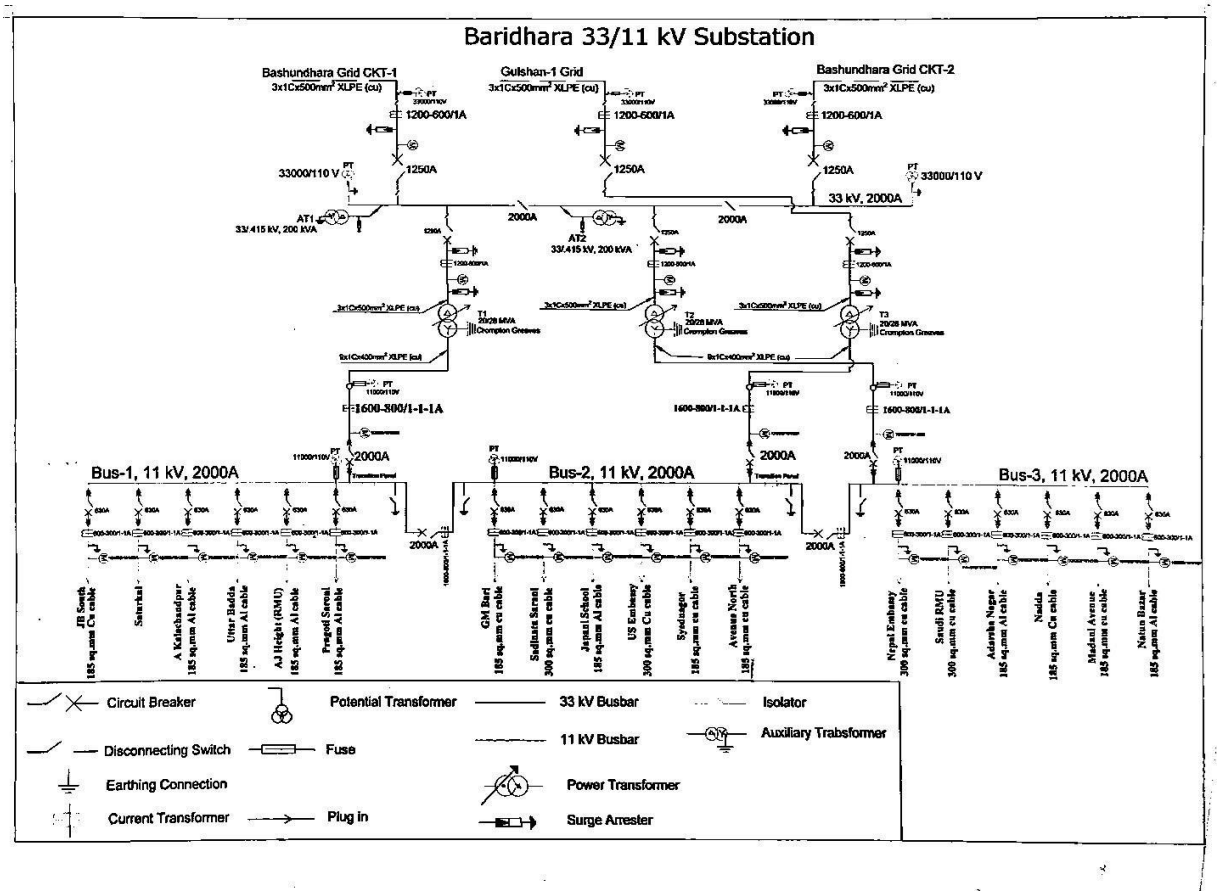


Figure 3.1: Baridhara 33/11KV substation

3.2 LOAD SANCTION & LOAD RETENTION

The authorization for load sanction is granted by DESCO. A customer will be aware of how much load they will require when they sign up for a new connection for their house or place of business. This is the reason the customer fills out an application. However, the user must indicate the load onthis application form. Customers receive single phase lines if the approved load is less than 7KW, triple phase lines if it exceeds 7KW, and a substation must be built by the customer if the demand is greater than or equal to SOKW. Approve the consumer-sanctioned load based on the DESCO load estimate. In the event that the customer notices that his overall demand load exceeds the maximum amount authorized. In order to enhance the penalty load, the customer must next submit an application to DESCO. The DESCO authority will approve the consumer application and provide the customer with an additional load, also known as load retention, if they believe that the consumers actually need to raise the sanction load.

3.3LOAD MANAGEMENT

There are now issues with power generation and delivery, especially with regard to electricity: Thisindustry, which is the postal emphasis on load management in the DESCO area, is influenced by the following factors: the reasons behind the country's and the DESCO region's lack of energy.
Policy for pricing in the electricity
industry.welfare loss brought on
by price policy.
DESCO's management of shortage.

3.4CONTROL ROOM ACTMTY

They control their substation from a control room. We went to the control room in Lake City. The most significant works that we observed were one control room panel and the measuring of voltageand current at various activities.

3.5POWER FACTOR MONITORING & UPGRADING

The grid company must maintain a power factor of 0 to 90, whereas the distribution business must maintain a power factor of 0.95. Low power factor does not always occur, which is why engineers continue to evaluate power factor. Low power factor 1s are mostly caused by inductive loads, which include electric motors, transformers, and high intensity discharge lighting and account for asignificant portion of the energy used in industrial complexes. This company's next goal involves increasing their power factor.

3.6SYSTEM LOSS

The primary performance metric of every electric distribution firm is the amount of energy purchased and sold. DESCO's system loss for this year is 8.40%, compared to 8.54% for the prioryear. Sales and import differences are equivalent in the event of system outage. Typically, we employ equipment, conductors, and cables that have some power or system loss to deliver energy.

This is because electrical energy transforms into heat, sound, and light energy due to the material'sresistance. The theoretical system loss for the complete system is calculated using the formula.
Sales (S) - Import (I) x 100% equals system loss (%). DESCO's real system loss is 6.32%.

3.7SUBSTATION OPERATION & MAINTENANCE

Transformers are used in substations for the generation, transmission, and distribution of electricityto convert high voltage to low voltage or vice versa. Electricity may go via several substations and have its voltage gradually altered in between the producing station and the consumer. A step-up transformer raises the voltage while decreasing the current for residential and commercial distribution, and a step-down transformer lowers the voltage while raising the current.

Since the power transformer is a substation's principal component, maintenance procedures are mostly based on it. Some maintenance is performed on the substation's other equipment in additionto the power transformer. In order to maintain the substation, check the SF6 gas pressure.

- C heck for oil leaks
- Deformation of stress rings
- Checking of insulation resistance

3.8LINE MAINTENANCE

Our sourcing team is responsible for the upkeep of DESCO. DESCO notifies their outsourcing team when a line malfunctions because to excessive voltage or thundering. The outsourcing gets there fast and behaves well. At times, customers also notify DESCO of any issues at their location,in which case DESCO dispatches a crew to address the issue.

DESCO's outsourcing team:

•COSS (Commercial Operation Support Service)

•LEM (Line and Equipment Maintenance)

•SSM (Substation and Switching Station Maintenance)

3.9WIRELESS & TELECOMMUNICATION

They are employed in wireless and communications applications where a stable signal replicationthroughout a broad frequency and voltage range is the goal.

3.10DAS MAINTENANCE

Data Acquisition System is the whole definition of DAS. It operates by keeping an eye on theswitching station's whole system.

Chapter 4

NIKUNJA, UTTARA S & D AND LAKE CITY GRID

4.1NIKUNJA SUBSTATION

Two incoming sources, Uttara 33KV bus-1 and Lake City 33KV bus-2, are connected to the Nikunja Substation. Figure 4.1 illustrates the 33KV bus coupler, Nikunja Substation insulator, bus PT-I (potential transformer), and bus PT-2 (potential transformer). One auxiliary transformer withline maintenance supplies is also included. Figure 4.1 displays the HT Bushing, lighting arrester (L.A.), potential transformer (PT), current transformer (CT), and 33KV incoming source from Uttara grid & Lake City to Nikunja substation. The 11 KV wire in this instance is the red one.

Figure 4.1: Nikunja Substation

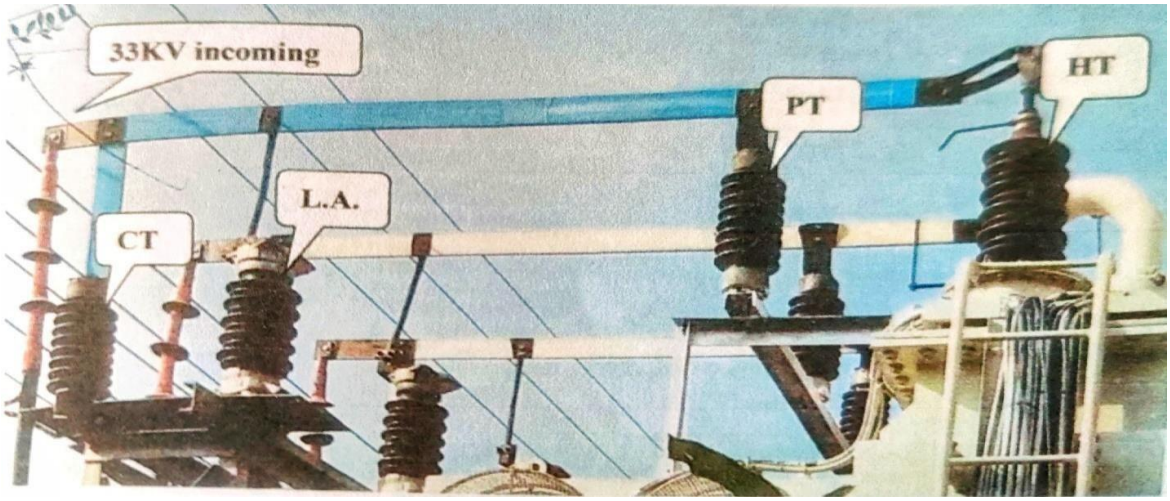


Fig 4.2: 33KV incoming source from Uttara grid & Lake City

In actuality, a single line diagram is the most basic layout for comprehending a substation's fundamental functions. The connection of 33KV incoming sources to the Lake City substation and the subsequent conversion from 33KV to 11KV are depicted in figure (4.2). 33KV bus-I is linked tothe safety equipment L.A. (lighting arrester), potential transformer (PT), HT Bushing, isolator, and current transformer (CT) after the 33KV incoming source from Uttara grid & Lake City is first connected to the Nikunja substation via UG, or underground.Then, 33KV bus coupling is utilized tooperate or maintain the activity of 33KV buses 1 and 2. Next, the voltages are changed from 33 KV to 11 KV via the power transformers (TI & T2), PT, Isolator, CT, L.A., and power transformer (PT). 11KV is then also linked to the 11KV bus by a vacuum circuit breaker (VCB). Here, too, II KV bus-2 and IKV bus-l are operated via an 11 KV bus connection. Figure 4.3 displays the 11KV output that is sent from the power transformer to the feeders. The feeder in the parallel connection receives this 1 IKV power distribution. Presently, power is delivered to consumers via the 11KV line via a single-phase and three-phase pole-mounted transformer.

Fig 4.3:11KV outgoing from power transformer

4.1.1SINGLE LINE DIAGRAM

DESCO has a distribution center at Lake City S & D. It provides service to the neighborhood of theLake City police station. Three power transformers with a 20/28 MVA rating

are present. To supplyelectricity to the transformer, there are two busses. In the line, two disconnecting switches or OS are employed. GIS type CBs with ratings of 1250A and 40KA-3sec are utilized in the line. CVD is a tool used to measure line voltage. The LA can handle up to 30 kV of power. Motor-driven VCB type CBs are employed on the secondary side. The TR's vector grouping is 0yn11. ONAN/ONAF isthe cooling technique used for TR.

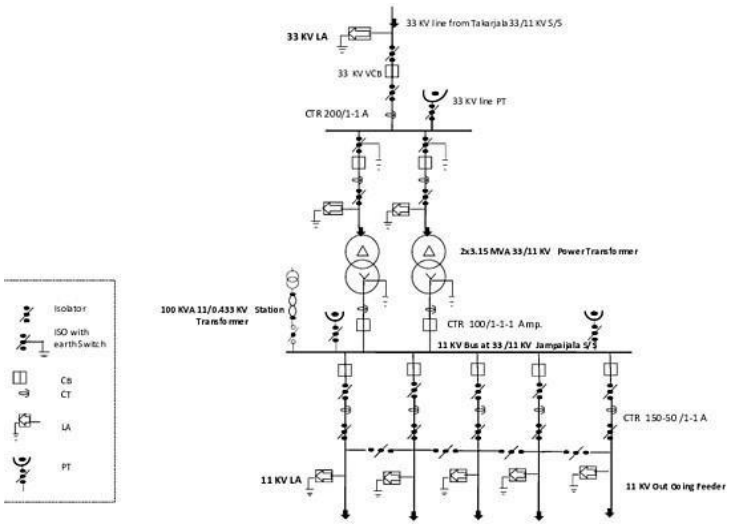


Figure 4.4: Single line diagram of 33/11kv bus and its feeder

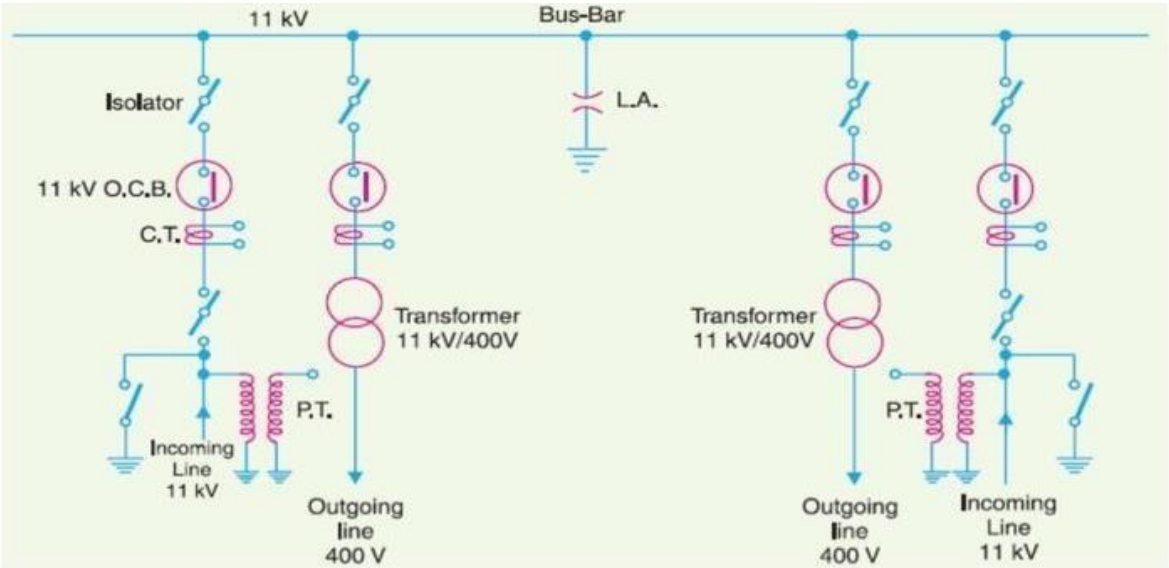


Figure 4.5: Single line diagram of 11kv/400V Power Transformer

4.1 MONTHLY OPERATIONAL DATA

Power Development Board (PDB) power is purchased by DESCO and sold to the general population. This table shows energy imports, sales, system losses, collection/import ratios, andother information during the fiscal year.

Dhaka Electric Supply Company Ltd. (DESCO)

S & D wise Monthly Operational Data

Month: February 2022

Dated: 22-03-2022

Name of Division	No. of Consumers	Import (KWH)	Sales (KWH)	VAT (in Taka)	Billing Amount (TK.)	Collection Amount (Tk.)	Selling Rate (Tk.)	System Loss (%)	Collection Ratio (%)	C.I.Ratio (%)
Agargaon	60409	13313477	12622265	4901446	98028923	99342694	7.77	5.19	101.34	96.08
Monipur	69937	13819012	13641247	5228745	104574903	103831082	7.67	1.29	99.29	98.01
Shahali	56334	11682268	11278316	4379655	87593098	94543805	7.77	3.46	107.94	104.20
Rupnagar	76128	22368505	21483708	8458376	169167526	178099160	7.87	3.96	105.28	101.12
Pallabi	82547	19824817	18962639	6930175	138603502	129924229	7.31	4.35	93.74	89.66
Kafrul	80124	18006992	17500097	6806448	136128970	148003640	7.78	2.81	108.72	105.66
Gulshan	34805	33908600	33092453	15785794	315715887	349264961	9.54	2.41	110.63	107.96
Baridhara	99106	30307410	29280832	12614058	252281163	259270093	8.62	3.39	102.77	99.29
Badda	70573	16106183	15724376	6362643	127252862	122964374	8.09	2.37	96.63	94.34
Joarshahara	61280	26916719	26271770	10904543	218090869	230529300	8.30	2.40	105.70	103.17
Uttara (East)	71200	27057197	25962360	11663520	233270400	219807334	8.98	4.05	94.23	90.42
Uttara (West)	98127	25083877	23309722	9436266	188725312	207830546	8.10	7.07	110.12	102.33
Dakshinkhan	71287	14685602	13813822	5452057	109041144	125307081	7.89	5.94	114.92	108.10
Uttarkhan	73198	14676113	14088644	5521013	110420269	116759795	7.84	4.00	105.74	101.51
Tongi (East)	63232	32525999	30764607	13014451	260289026	285333328	8.46	5.42	109.62	103.69
Tongi (West)	65577	20138579	18989949	7813419	156268372	184393843	8.23	5.70	118.00	111.27
East Zone 1	**275771**	**95007795**	**91911483**	**40214553**	**804291056**	**856806509**	**8.75**	**3.26**	**106.53**	**103.06**
East Zone 2	**273207**	**94397888**	**89805560**	**38012403**	**760248067**	**806294300**	**8.47**	**4.86**	**106.06**	**100.90**
West Zone 1	**322078**	**89832405**	**86044228**	**34077433**	**681548653**	**716287715**	**7.92**	**4.22**	**105.10**	**100.67**
West Zone 2	**262808**	**61183262**	**59025536**	**22968223**	**459364450**	**475816741**	**7.78**	**3.53**	**103.58**	**99.93**
Total	**1133864**	**340421350**	**326786807**	**135272611**	**2705452226**	**2855205265**	**8.28**	**4.01**	**105.54**	**101.31**

Table 4.1; Monthly operational data (MOD), (February - 2022) [3]

4.2 LAKE CITY GRID

One of the DESCO grids located in Lake City, RIA, is called Lake City Grid. It can hold three 33/11KY transformers and two 132/33 KV power transformers. Two more transformers are included for the internal power supply. This grid distributes the PGCB's 132KV supply to the appropriate feeder. The incomer portion is seen in figure 4.7. The GIS blocks include all of the arrangements. The main structures of a high-voltage substation with sealed environments are calledgas insulated substations (GIS), and they employ sulfur hexafluoride gas as the insulating medium.Japan was the birthplace of GIS technology, as there was a great need to create technologythat would enable substations to be as tiny as possible. Although the total amount of space requiredis just 10% larger in a GIS, phase to phase and phase to ground clearance requirements are much greater than in an air-insulated substation.

Figure 4.6 Lake City 132/33 KV Grid Substation

The BUS receives power from the incomer. The GIS consists of two buses: the regular bus and the reserve bus. Via the bus, the 132KV power transformer is linked. The line is used to measure and regulate various types of CT and PT. There are two motor-driven DS units, a spring-driven CB unit,a high-speed line ES unit, and a motor-driven OS-ES unit. A 110 KV linear alternator is utilized forsurge protection. Additionally, it connects to a 33KV feeder via two 33KV buses. The 33KV voltage measuring method uses

Chapter 5

SUBSTATION EQUIPMENT'S

5.1 WHAT IS SUBSTATION

Substations are located in metropolitan areas and beside roads. Substations lower the high-voltage electricity flowing from transmission and power plants. In addition to providing customers with electricity, they keep an eye on the distribution network and perform necessary maintenance, suchas installing circuit breakers to cut off power in the event of a malfunction. Substations are frequently categorized based on the switchgear that protects their circuits.

Air-insulated switchgear (AIS), which formerly dominated the market, needs a lot of space and isonly suitable for outdoor usage at higher voltages. However, in certain areas, such residential areas, AJS might not be appropriate or desirable. Gas-insulated switchgear (GIS) may cost more if unit cost alone is taken into consideration, but it is safer and requires less maintenance. The size difference of five times between GIS and AIS units allows for the construction of less expensive, less noticeable buildings. There are lines for electricity below as well as above ground. Above- ground cables have greater disruptions than subterranean lines, while being less expensive to build (due to poor weather, lightning strikes or accidents).Power transformers, switching devices, measurement, protection, and control devices, as well as circuit breakers and disconnectors to cutthe power in the case of a failure, are frequently found at substations.

The network that connects producers and consumers to transfer power is called a substation. There is no power plant owned by DESCO. Thus, at various points throughout Dhaka, they purchase electricity from the Power Development Board (PDB) through the Power Grid Company of Bangladesh (PGCB). Power transformers at a substation convert high voltages to low voltages. A step-down distribution transformer at a substation raises current while lowering voltage for usage inresidences and commercial buildings. Throughout the internship, the following substations were visited:

- Lake City Grid (132/33 KV)
- Nikunja-1 Substation (33/11 KV)
- Nikunja-2 Substation (33/11KV)
- Uttara 11KV Switching Station

5.2 DIFFERENT SUBSTATION EQUIPMENT

- Power transformer,
- Instrument transformer,
- Circuit breaker (air blast, SF6) (CT & PT),
- Isolator, auxiliary transformer, earth switch, surge arrester,

Battery and battery charger, SVS, Protection Relay, Bus Bar (Main Bus Bar and Reserve Bus Bar),Battery, and Battery Charger.

5.2.1POWER TRANSFORMER

A transformer is an apparatus that converts one circuit to another while maintaining the same frequency of electricity. Electromagnetic induction between the windings or circuits generates transformer power. The primary (source) and secondary (load) voltage and current values swap at asteady frequency, depending on the size of the windings. Most of the power transformers at DESCO, which convert electricity from 132 KV to 33 KV and 33 KV to 11 KV, are made and maintained by Energy Pack. PGCB is the supplier of the 132 KV. The Lake City substation houses grid (power) transformers TI and 12.

At Tongi Substation, three transformers—PTI, PT2, and PT3—have voltages ranging from 33 KV to 1 IKV (20/28 MVA range transformer is used). The power trail informers PTI, PT2, and PT3 areshown in Figure 5.1.
Each power transformer at DESCO is managed by two terms.

•Power transformer can function with a maximum load of JO+ 10-20MVA when the term ONAN(Oil Natural Air Natural) is used. Because each of these power transformers can handle a maximum load of 10 MVA.

•If needed, a power transformer, also known as an ONAF (Oil Natural Air Forced) transformer, can operate with a maximum load of 14+14-28MVA.

5.2.2 COMPONENTS FOR TRANSFORMERS

There are numerous transformer parts, including:

- Main tank winding container tank
- On-load tape changer; Transformer oil; Radiator; Cooling system; Oil level indicator meter;Breathing system; Cooling system; Radiator • On load tape changer; oil level indication meter
- Buchholz relay • Silica gel • Insulator • Oil temperature meter • Winding temperature meter •Pressure relief device.

5.2.3WINDING

A step-down transformer with a 33 kV primary winding and an 11 kV secondary winding is seen in Figure 5.1. Consequently, a & sign (delta) is used to link the primary winding, while a Y symbol(RYB) is used to connect the secondary winding. The ac source is the main winding. The load thatis pulled from the source is on the secondary winding. The transformer's core is made of silicon steel or soft iron.It is also connected to primary and secondary windings. The windings are isolatedfrom one another via insulation. Depending on the purpose, different conducting materials will beused for the windings (a conductor is a material that contains mobile electric charges). All cach tums need to be electrically insulated from one another in order to guarantee that the current passes through every one of them. Figure 5.2 shows the winding of the transformer.

5.2.4 MAIN TANK

One kind of protective device for the primary and secondary windings is the main tank. T The last edge of the primary winding is fastened from one side of the main tank. Additionally, the secondarywinding is linked from the main tank's opposite location. Oil is aliped into the main tank and loadedwith serums. Furthermore, oil acts as insulation between the main tank.

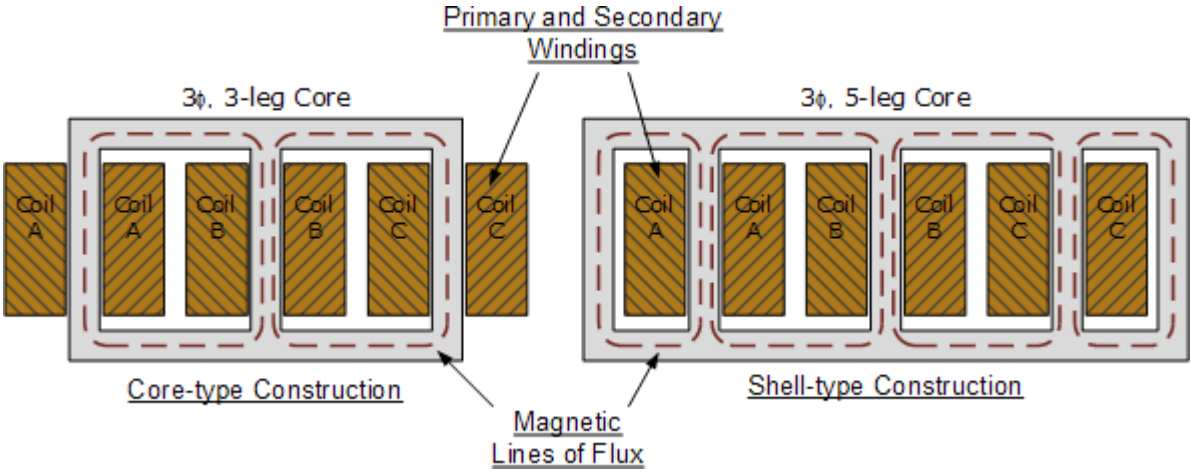


Figure 5.1: Main tank with primary & secondary winding.

5.2.5 CONSERVATOR TANK

Oil volume can rise when there is an internal transformer defect that causes the oil to expand, orwhen the load increases and the primary and secondary windings generate additional heat. A Buchholz relay can also be used to expand the oil volume entering the conservator tank from themain tank. The tank is really intended to be an expansion reservoir, allowing the oil to expand while it is in use. In Figure 5.2, the conservator tank is shown.

Figure 5.2: Conservator Tank.

5.2.6 BUCHHOLZ RELAY

Buchholz relays prevent internal transformer defects from occurring in transformers. Unexpectedfailures of the transformer or insulating oil can result in short circuit failures such as inter turn faults, incipient winding faults, and core faults.

Figure 5.3: Buchholz relay

5.2.7 COOLING EQUIPMENT

The cooling device gathers the hot oil on top of the main tank and returns the cooled oil to the sideof the main tank. The cooling system of DESCO's Transformer is mostly driven by oil.

5.2.8WINDING AND OIL TEMPERATURE INDICATOR

The correct winding temperature—typically 75 degrees—is shown by the winding temperatureindication (meter). (in Celsius). The oil temperature indicator, or meter, shows the proper oil temperature (65 degrees centigrade is the standard oil temperature). Figure 5.6 shows the oil temperature and winding temperature indicator picture.

- **F**

Figure 5.4:Winding temperature and oil temperature indicator

5.2.9 TRANSFORMER OIL

Rock oil is the name given to transformer oil. Transformer oil serves as insulation between the primary and secondary windings of the transformer and helps to keep it cool. Additionally, the submerged coils and core benefit from the high dielectric strength provided by the transformer oil.This makes transformers more affordable and small.

5.2.10 BREATHING APPARATUS

The transformer's breathing mechanism is controlled by silica gel. It acts as a moisture-absorbingmaterial. Some air may enter or depart the conservator tank as a result of the expansion and extraction of oil from the main tank during the oil's idleness in the transformer tank. To remove moisture from the air, silica gel is used. This is a picture of silica gel in Fig. 5.5.

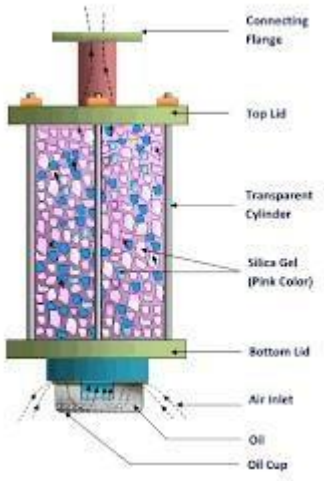


Figure 5.5: Transformer breathing system (s silica gel).

5.3LOSSES OF TRANSFORMER

Iron Losses: Despite lamina ton, eddy currents continue to generate some heat in real iron cores. Copper Losses: In actual use, the transformer's coils experience some resistance. Consequently, theheat produced by the resistance of the coils causes some energy to be wasted. Hysteresis Losses: The iron core is regularly magnetized through one full cycle by the alternating current flowing through the coils. Hysteresis causes energy to be lost.

5.4 TRANSFORMER PROTECTION

The primary relays and safeguards for transformer protection used at DESCO's grid substation aredescribed below.

- Buchholz devices defend against all types of incipient failures, or slow-developing defects,such as winding insulation failure, core heating, oil level drop owing to leaking joints, andso on.
- Earth-fault relays only provide protection against earth faults.
- Over current relays protect against overloading and phase-to-phase failures.
- A differential system (also known as a circulating current system) protects against earthand phase faults.

5.5 WIRES & CABLES

Rating of various wire & cable types and pole types used by DESCO is given below

Vol tage	Over Head Wires					
0.415KV	Wire Name	WASP	ANT			Shack Insulator
	Capacity	278 A	150 A			
	Power	200KW	100KW			
11KV	Wire Name	MARLIN	DOG	RABBIT	WOLF	DISC and PIN Type Insulator
	Capacity	465 A	300 A	220A	200 A	
	Power	7.5MW	5MW	4MW	3MW	
33 KV	Wire Name	HAWK	MARLIN			
	Capacity	650A	465A			
	Power	34MW	23MW			
Voltage	Underground Cable					
11 KV	Cross Section & Metal	185 mm2 Al	240 mm2 Al	185 mm2 388 A	300mm2 Cu	
	Capacity	306A	400A	6.5MW	490A	
	Power	5MW	6.5 MW		8MW	
33 KV	Cross Section &Metal	450mm2 Cu 600A	550mm2 Cu			
	Capcity	30MW	725A			
	Power		36MW			

Table 5.1: Wires and cable type

Rule of Thumb I disc type insulator is needed for each 1IKV line. So, a 132KV line would need 132/11=12disc type insulators. For strengthening the line, I or 2 more insulator might be given. Overhead Pole Heights

Voltage	Pole/Height	Pole/Type
33KV	15	Steel SPC
11KV	12	
230/400V	9-10	

Table 5.2: Pole sizes and types

5.6 OLTC

Transformers with a motor-driven on-load tap-changer are managed by the TAPCON® 230 electronic voltage regulator. The motor-drive mechanism receives the necessary control signals from the voltage regulator. By following these orders, the on-load tap-changer moves to the next position, bringing the voltage value of the transformer to the correct voltage level. Voltage dependent and/or current dependent restrictions can be accounted for by adjusting influential elements like as time delay, bandwidth, and even line-dependent and load-dependent parameters.This allows the control system to be tailored to the different field service scenarios that are experienced. The primary goal of the OLTC is to alter the transformer's voltage level when it is loaded. Moreover, OLTCs have the ability to continuously monitor the tap position and automatically adjust the voltage. It serves to safeguard the transformer among other things. A tap changer utilized in Basundhora Grid is seen in figure 5.8.

Figure 5.6: TAPCON 230 expert

Cross-monitoring

Limit Volt, Three-Winding Transformer Regulation, On-load Tap Changer Monitoring, Single-Phase Transformer Parallel Transformer Bank Operation, and Cooling System Control

5.8 CIRCUIT BREAKER (AIR BLAST, SF6)

The core of the gas-insulated switchgear is the three-pole encapsulated circuit breaker, which is made up of the interrupter unit and the mechanism of operation. Based on well-established and, forthe most part, similar designs, the unit and stored-energy spring mechanism have been installed in outdoor switchgear installations all over the world. Figure 5.9 displays a schematic of the Siemens GIS-CB.

F igure5.7: Vacuum Circuit Breaker (SF6)

This kind of circuit breaker is used to disconnect and regulate circuits, protect devices, and safeguard power delivery. This type of CB has a nominal current capacity of up to 15 0 kA. Thefollowing are the duties of the trip relay: Modbus/RS-485, RTC Timer installed, UVOV/OF/UF,Measurement VI AJW/WH/F/PF, Remote Reset, Event Recording, Fault Recording, etc.

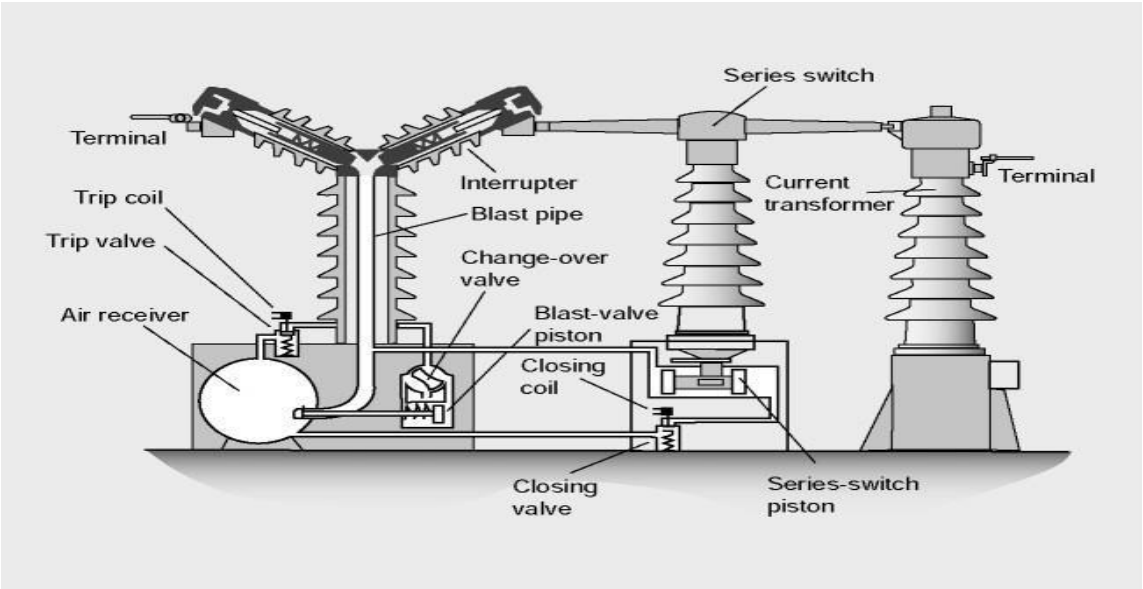


Figure 5.8: Air blast Circuit Breaker

5.4INSTRUMENT TRANSFORMER (CT & PT)

The CM-CT 600/1 plug-in current transformer is what it is. The primary current value of the current transformer is 600 A, and its secondary current rating is I A. The current transformer has aclass I accuracy load of 5 VA. A foot angle, an insulating protective cap, and bar fastening screwsas included with the CM-CT 600/1. A Snap-On DIN rail attachment is a viable option.

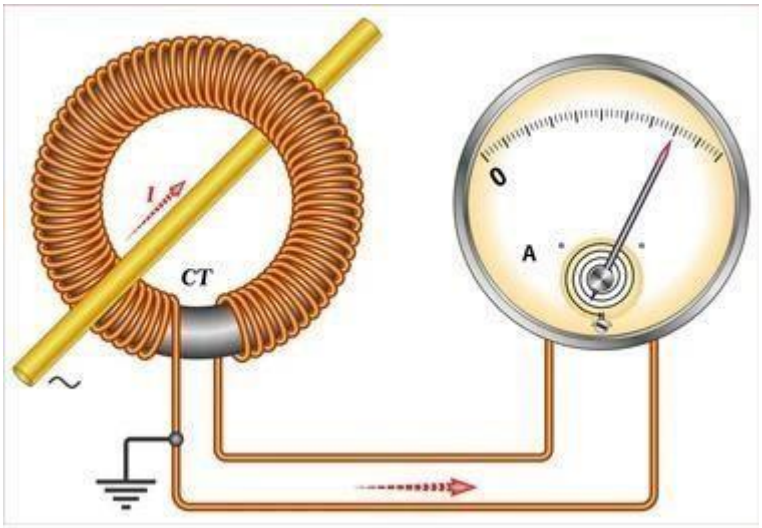


Figure 5.9: Current transformer

Voltage transformers are electrical equipment hence they should only be installed by a certifiedelectrician. Observe the minimum age restrictions outlined in local laws. qualification needed for employees that deal with or are close to electrical facilities. In high- voltage power networks, when frequencies of 50 Hz or 60 Hz and permissible voltages of up to 40. 5 kV are utilized, voltage transformers are employed to power protection and measurement circuits.

Figure 5.10: Potential Transformer

5.9 ISOLATOR

At the Nikunja substation, it was possible to observe a variety of isolators in action. The four kindsare pantograph, MCB isolator, double break, and single break. Isolators are used to cut the three- phase power circuit when there is no load. These are placed, commonly at substations, both beforeand after transformer repairs. Its main purpose is to turn off an electrical system's portion of the power supply. An electrical circuit can be completely de-energized for servicing or maintenance thanks to an isolator switch. It can only function in "no load" mode since it lacks arc extinguishingcapacity.

Figure 5.11: Isolator

5.5 EARTH SWITCH

Remaining charges from the isolator may persist on the bus even after it has been switched off, putting the passengers who are traveling for repairs in risk. An earth switch's principal function is toground an insulated bus or conductor, thus we must ground the isolated bus as well before starting any repair to prevent any accidents. The earth switch is closed while the isolator is opening the circuit and opened when it is closing it. Consequently, the earth switch offers the workers extra security

Figure 5.12: Earth Switch

5.6 SURGE ARRESTER

Surge arresters are designed with a strong emphasis on quality at every step, from raw materials to finished products, to ensure their safety and ability to endure high levels of stress. Specialized solutions can also be constructed for additional factors, such as protection levels and energy capacity. The following scenarios involve the employment of surge arresters: It is crucial to preserve the AIS and GIS substation equipment, place it in polluted regions and seismically active areas, and maintain transmission lines, AC and DC traction systems, HVDC protection, and series capacitor banks protection cable protection. The surge arrester is seen in Figure 5. 13.

Figure 5.13: Surge Arreste

5.12 AUXILIARY TRANSFORMER

This auxiliary transformer, which is next to the room of the grid-maintenance substation, supplieselectricity to the home. It provides electricity for auxiliary functions including ventilation, low- voltage power supply, and lights.
Either 230V single phase or 415V three phase.
(Auxiliary service; typical voltage rating: 33KV/0.415KV).

5.13 BUS BARS AND BUS COUPLER

The Lake City grid substation has four bus types: 33KV bus-1, 33KV bus-2, 11KV bus-1, and 11KV bus-2. In actuality, a bus bar is a distribution board, substation, or other electrical appliancemade of copper or aluminum. width of the bus bar strip used in switchboards to carry electricity.determines the maximum current that may be transmitted safely. A primary bus bar and a backupbus bar are often present. In a bus bar, the incoming and outgoing lines can be connected. However,the circuit's supply can be preserved by switching to the backup bus-bar in the event that the mainbus-bar has to be fixed or if a problem is detected with it. An device known as a bus coupler allowsthe backup bus and the main bus to run together.

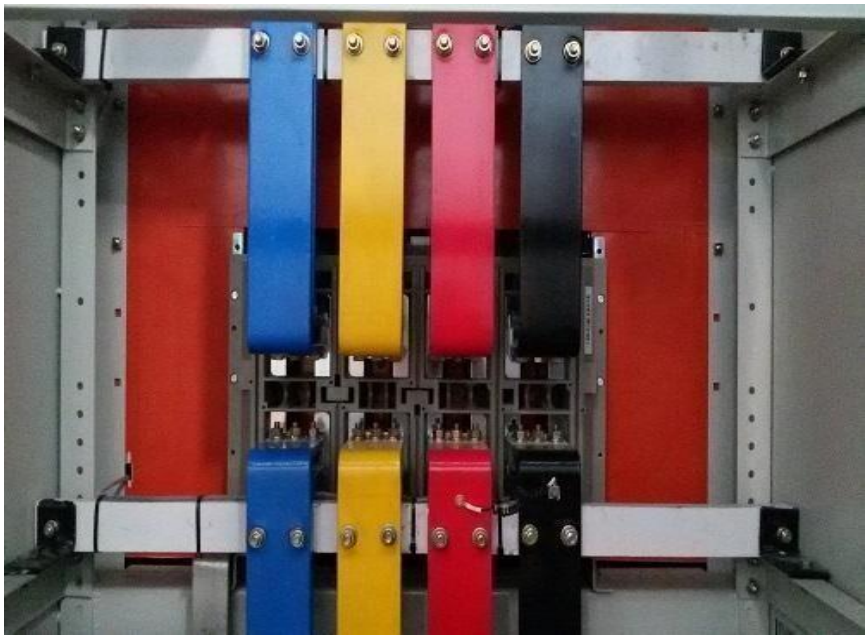


Figure 5.14: Bus bars and bus coupler

5.14 BATTERY & BATTERY CHARGER

The battery powers the substation. Batteries are a type of storage. It is necessary to have a backup de supply to provide protection. The battery supplies the control and protection circuit with I 10V of electricity in the event that the AC or charger fails. In a substation, devolt is required for signaling, control, and protection. In addition to charging the batteries, the battery charger transforms 400 volts of alternating current into 110 volts of direct current, which it then feeds to control panels for the aforementioned uses. Figure 5.15 shows a battery and battery charger picture.

Figure 5.15: Battery room.

5.15 Substation Automation System (SAS)

The modular station level solutions in the SAS6000 Series are engineered to provide the highest levels of safety, effectiveness, and dependability in local and remote substation management and monitoring. It combines a wealth of IEC618S0 knowledge, demonstrated system integration skills,and unparalleled substation automation and protection competence. For new stations, retrofits, andmigration projects, the SAS600 series is a great option since it offers the certainty that you can invest in the future now.

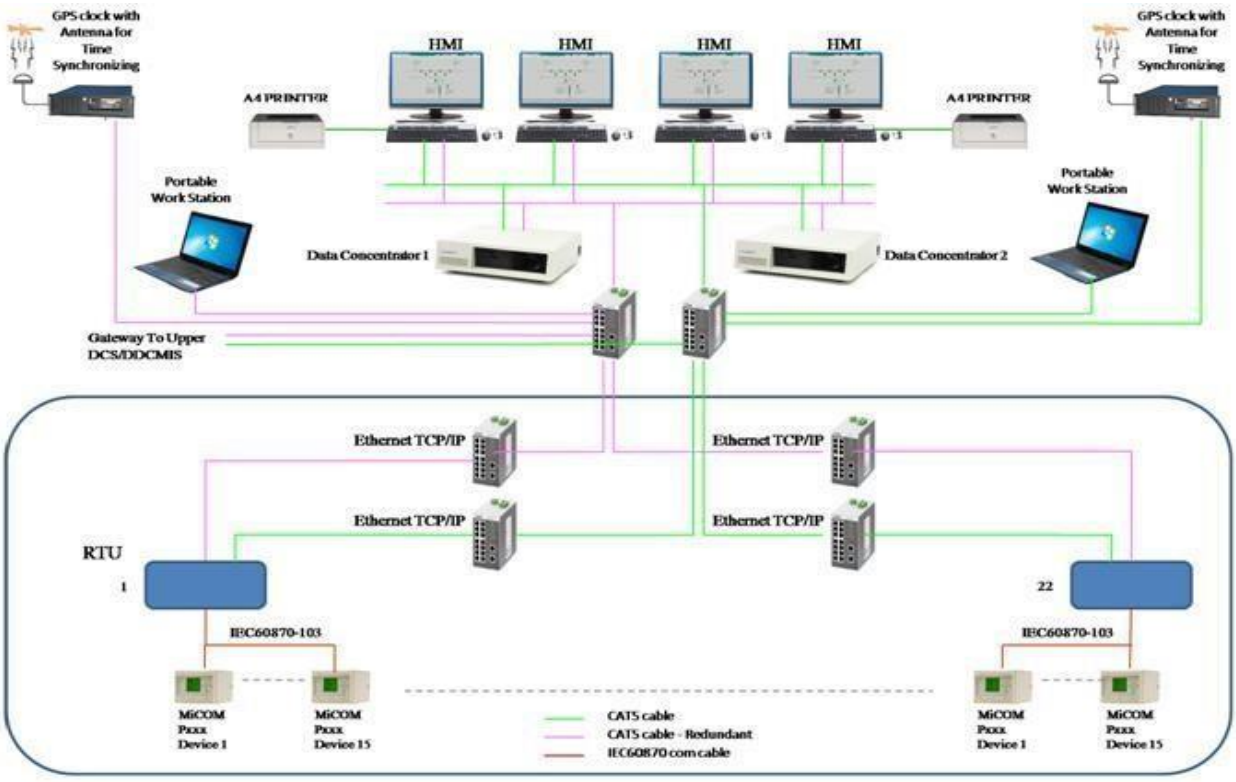
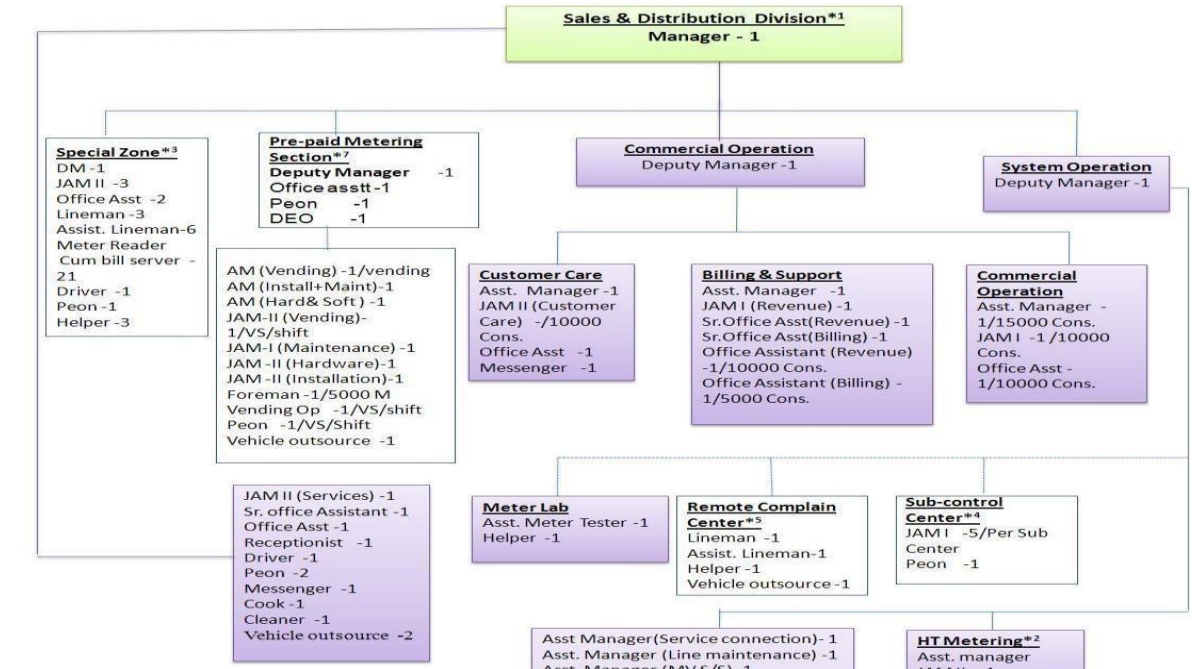


Figure 5.16: Substation Automation System (SAS)

Chapter 6
SALES & DISTRIBUTION BARIDHARA AND TESTING & REPAIRING DIVISION

6.1Baridhara S & D at a glance

Here is an organogram of Sales and Distribution Center of DESCO.



Sl	Post	No
1	Manager	12
2	DM	26
3	AM	100
4	JAM-1	66
5	JAM-2	103
6	Foreman	02
7	Sr. O.A	36
8	Assistant (All)	207
9	Receptionist	12
10	Vending Oper	04
11	SSA-II	156
12	C.A	48
13	A.meter tester	12
14	Lineman	16
15	Astt lineman	31
16	Driver (Heavy)	12
17	Meter Reader	21
18	Driver	12
19	Messenger	24
20	Cook	12
22	Helper	16
23	Peon	28
24	Cleaner	12
25	Vehicle*6 outsource-26	-
	Total	968

Notes:

1. Number of consumers will generally be limited upto 30,000 for each S&D Division. However, depending on location of the service area and/or growth in number of consumers in that particular area, new S & D division(s) may be created with approval of the Board;
2. S &D Division with more than 1500 HT connections will have additional one (1) no. of Assistant Manager and one (1) no. of Electrician for HT Metering Section;
3. One special zone shall be considered in DESCO. This zone shall be put under control of each of the S & D Division on rotational basis usually for a two-year period;
4. Sub-control center shall be responsible for load/feeder control activities for a no. of S & D Division as determined by the management from time to time and placed under the system operation wing of one of the respective S & D Divisions;
5. In consideration of distance and inconvenience in communication from S & D offices, Remote Complaint Center may be established in a particular geographical location with approval of DESCO management;
6. Management may increase/decrease the no. of outsourced vehicles in order to meet unforeseen requirement;
7. Prepaid metering section will be opened upon commencement of prepaid metering in S & D Division.
8. Manpower is calculated considering 12 (Twelve) S & D Division.

Figure 6.1 Organogram of Sales and Distribution Center of DESCO.

6.2Baridhara Operation

The operation of any S & D can be divided into two parts:

- Commercial Operation
- System Operation

6.3Commercial Operation

Commercial operation is the main function of DESCO. The Principal activities in commercialoperation are-

- Disconnection/Reconnection
- Metering
- One-point service center
- Billing/ Collection
- Outsourcing activities
- Regularization of illegal connection

Disconnection/Reconnection

The prime tool to recover dues is disconnection. Disconnection Occurs under the following causes:

- Meter tempering
- Meter By-pass
- Non-payment/Bill due (More than one month) •Over load use (More than sanction load)
- Illegal connection etc.

Metering

Since the corporation views the meter as their "cash box," DESCO has made every effort toexamine meters on a regular basis. The regular activities of metering section are- •Meter renovation

- Removal of circuit breaker before installed the meter
- Checking and sealing of meter

Meter Reading

Meter Readers collect readings from meters in compliance with the timetable. On the scheduledday, they go door to door once a month to visit customers. The card with the recorded meter reading is kept by the customer. They also log their meter readings in a Meter Book that is maintained at the DESCO office. The power bill is generated using this meter reading.

The timetables for meter readings are as follows: • Consumer Type L T (Low Tension): Usuallyoccurs between the fifth and the twenty-fifth of the month.

- Consumer LTI (Low Tension Industry): Usually from the 26th (of the current month) untilthe 05th (next month).
- High Tension Consumer (HT): Usually from the 28th (of the current month) to the 3rd (nextmonth).

One Point Service Center

To thrive, each firm must put the needs of its customers first. The primary focus of DESCO is itscustomers. In each S & D division, DESCO has set up a "One Point Service Center" to guaranteeexcellent client service. Its pursuits are:

- Customer service at one place
- Accepting new connection applications
- Listening to customer complain

Billing / Collection

The major goal of sustaining the company's financial strength is accomplished through ongoingefforts to keep a strong billing/collection ratio.

- Bill issue and decentralized collection
- Bill preparation staggered over month
- Bill correction
- Identification and deletion of duplicate accounts

6.2.2 System Operation

Critical issues are handled by system operation. All O/H & U/G lines under DESCO areconstructed and maintained by this section. Its duties are- •New connection approval & setup

- Load sanction & load retention
- Load management
- Control room activity
- Power factor monitoring & upgrading
- Substation operation & maintenance
- Wireless & Telecommunication •Line maintenance & handling etc.

Control Room Activity

In reality, the control room is crucial to the power system. This control room is accessible sevendays a week, round-the-clock. A control room’s fundamental functions are as follows:

- Interacts with other grids or control rooms.
- Communicates with line maintenance teams.
- Manage load shedding.
- Record data (Supply load, demand load, load shedding time).

6.3 Baridhara 33/11 KV Substation

The S & D visit's most fascinating aspect was this. Two of DESCO's thirty thirty-three and eleven KV substations are managed by Baridhara S & D. I only go to two. Two source lines supply power to the substation. For overhead distribution, two distribution transformers take 33 KV from the bus and change it into 11 KV. Each transformer has a 20/28 MVA capacity. Below is the Baridhara 33/11 KV substation's single line diagram:

6.3 New Services

With each sales and distribution division, DESCO created a decentralized divisional customersupport center. Any consumer can obtain the following services from this center:

- New relationship
- Meter test, Change, etc.;
- Load expansion or revision;
- Service or site relocation;
- Consumer name modification or tariff change.
- Any other commercially relevant service;
- Bill correction;
- Reconnection of disconnected consumers' services;

Information on customers, awareness campaigns, etc. Pre-paid meter service

DESCO's has introduced pre-paid meter in one part of the capital Dhaka city. The pre-paid meteredconsumer expresses their satisfaction with this service for many reasons.

- E-Governance

DESCO has implemented e-governance in their office management activity which promotes prompt customer service. Customer can enjoy dynamic web-based billing and collection (link page) related information through internet.

Testing & Repairing Division

6.5 Transformer Structure

At workshop I spent 2-3 hours. That time I saw the whole procedure of making a full transformerstarting from a primary coil. Some pictures of various parts of transformer are given bellow:

Figure 6.2: Core of Transformer

Figure 6.3: Coil of Transformer

Figure 6.4: Conservative tank of Transformar

6.8 Meter plant division

Current transformer meters are connected to any connections carrying loads greater than 100 Amps.Conventional meters would need to be far too massive to be of any use for these larger connections,hence they cannot be used to measure the current. A CT meter measures just a fraction of the current flowing through the connection; to make the reading represent the actual current, a multiplier is used.

Current Transformer (CT) meters come in two different varieties:

- Low Tension Current Transformer meter (LT-CT)
- High Tension Current Transformer meter (HT-CT)

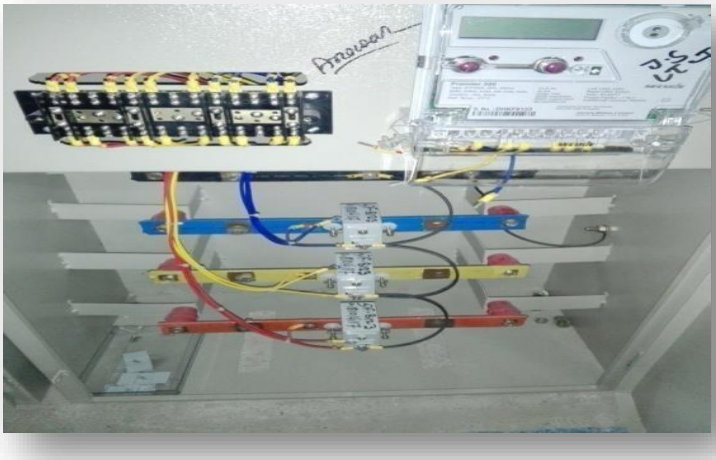


Figure 6.5: Low Tension Current Transformer meter

Figure 6.6: High Tension Current Transformer meter

CHAPTER 7
DISCUSSION& CONCLUSION DISCUSSION

Modern energy management and the country's economy both depend on switchgear, protection, andnetwork automation. The control of national and regional grids, as well as the control of voltage, frequency, power, and waveform under typical and constantly changing load conditions, are ensured by the computer-controlled network automation through the use of load control centers, power plant control rooms, substation control rooms, and communication channels. The task of managing the electricity distribution system fell to Dhaka Electric Supply Company Ltd. (DESCO). Power transmission and distribution systems, control and operation of breakers, isolators, acknowledgement of alert, and signal observation were all covered throughout the training time. Additionally, it has taught about several sorts of maintenance, such as conductor insulation testsand transformer dielectric strength tests. All agree that DESCO ought to keep offering these internships. Students who plan to finish their Bachelor of Science in Electrical and Electronic Engineering degree will find it very helpful.

CONCLUSION

Throughout his internship program, the author has experienced a few exceptional days at DESCO. DESCO is among the top training facilities for electrical and electronic engineers in the nation. Theauthor has to acknowledge that concepts from my university were used in a real-world setting at DESCO. I count it a great blessing that I have an internship with DESCO, a reputable power distribution firm. I now have the opportunity to use everything I've learned in school. The following are my accomplishments from DESCO Arc: DESCO's industrial training has improved my practical knowledge. As a result, I am now better able to consider how the various pieces of equipment function realistically.I feel more confident now that I'm getting ready for my next job interview. I was fortunate enough to have the opportunity to inspect the substation's equipment thanks to DESCO. I was motivated to collaborate with others at DESCO by the friendly environment. I gained a lot of knowledge and skills during my internship at DESCO that I would find beneficial in the future.

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THANK YOU