PALESTINE POLYTECHNIC UNIVERSITY

College of Engineering

Electrical Department

Electrical Power Engineering

Analysis and Enhancement of Medium Voltage Network for Yatta City

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Dedication

To our Families ..... For their support

To our Teachers ..... For helping us until the end

To our friend ..... Who give us Positive sentiment

To oppressed people throughout the world and their struggle for social justice and egalitarianism

To our great Palestine

To our supervisor Prof. Dr. Sameer khader.

To all who made this work is possible.

Alaa Saleh Abu-Qubaita Aladdin Nader Sultan

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Abstract

Yatta city electrical network experiencing some tasks, firstly the network has only one calibrated Auto – recloser at the interconnection point, so any small disturbance will lead to electricity interruption. Secondly the maximum demand of the network is higher than the main feeder capacity, so the main feeder can't cover the maximum demand of the network. Thirdly the power factor for the industrial loads is below the acceptable range.

By presenting a new protection scenario and coordination, the problem of losing power due to the single auto – recloser will be minimized, and by suggesting a new interconnection points and PV systems design for the main feeder limited capacity problem, the maximum demand can be covered, also by installing capacitor banks for industrial loads, power factor will improved.

After applying these solutions, 20% of total energy demand will be produced by the PV systems, then the maximum demand can be covered, the critical point (over loaded branches) will delayed for four years, and any fault will restricted in one zone, so a continuity of service, dependability, and reliability can be achieved.

الملخص

شبكة كهرباء مدينة يطا تعاني من بعض المشاكل، أولها أن شبكة الجهد المتوسط محمية باستخدام قاطع آلي وحيد معاير، وبالتالي فإن حدوث أي خلل سوف يؤدي الى انقطاع التيار الكهربائي عن كامل المدينة. المشكلة الثانية هي محدودية القدرة الكهربائية للمغذي الرئيسي، حيث أن التيار الأقصى للشبكة يتجاوز قدرة المغذي الرئيسي. بالاضافة الى مشكلة تدني معامل القدرة على الاحمال الصناعية.

لحل هذه المشاكل سوف يتم اقتراح وحدات الحماية المناسبة والتنسيق في ما بينها لتفادي الانقطاع الكامل للتيار، وسيتم اقتراح نقاط ربط جديدة وتصميم أنظمة خلايا شمسية لحل مشكلة محدودية القدرة للمغذي الرئيسي، وإضافة المواسعات المناسبة للوحات الأحمال الصناعية من أجل تحسين معامل القدرة.

بعد تطبيق هذه الحلول، 20% من مجمل الطاقة اللازمة للشبكة سيتم انتاجها عن طريق أنظمة الخلايا الشمسية، وبالتالي توفير التيار الأقصى اللازم للشبكة، ومن ثم تأجيل وصول الشبكة للنقطة الحرجة (تجاوز الحد الاعلى لقدرة عناصر الشبكة الكهربائية) لأربع سنوات. بالإضافة الى امكانية حصر المنطقة التي حصل فيها مشكلة على خط الجهد المتوسط، وبذلك يمكن تحقيق استمرارية الخدمة والاعتمادية والموثوقية للشبكة.

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List of Abbreviations

IEC	Israel Electric Corporation
IEC	International Electrotechnical Commission
SELCO	Southern Electricity Company
ETAP	Electrical Transient Analyzer Program
MVA	Mega Volt Ampere
A.C.S.R.	Aluminum Conductor Steel-Reinforced
HV	High Voltage
GMD	Geometric Mean Distance
R	Resistance
L	Inductance
C	Capacitance
d.c.	direct current
a.c.	alternative current
PV	Photovoltaic
PSH	Peak Sun Hours
kW	kilo Watt
CF	Capacity Factor
MWh	Mega Watt hour
kVA	kilo Volt Ampere
MW	Mega Watt
kWh /m²	kilo Watt Hour per Square Meter
tr-r	Transformer
SLD	Single Line Diagram
Mvar	Mega var
P.F	Power Factor
kV	kilo Volt
A	Ampere
kA	Kilo Ampere
TCC Curve	Time Current Characteristic Curve
ms	millisecond
T8	Transformer 8

Chapter One

Introduction

1.1 Electrical power system overview

1.2 Literature review

1.3 Background related to the work site

1.4 Problem formulate

1.5 Objective

1.6 Motivation

1.7 Methodology

1.8 Time schedule

1.1 Electrical power system overview

Electric energy is the most popular form of energy, because it can be transported easily at high efficiency and reasonable cost.

The first electric network was established in the United States in 1882 at the Pearl Street Station in New York City by Thomas Edison. The station supplied dc power for lighting the lower Manhattan area. The power was generated by dc generators and distributed by underground cables. In the same year the first waterwheel driven generator was installed in Appleton, Wisconsin. Within a few years many companies were established producing energy for lighting - all operated under Edison's patents. Because of the excessive power loss, I^2R at low voltage, Edison's companies could deliver energy only a short distance from their stations.

With the invention of the transformer (William Stanley, 1885) to raise the Level of ac voltage for transmission and distribution and the invention of the induction motor (Nikola Tesla, 1888) to replace the dc motors, the advantages of the ac system became apparent, and made the ac system prevalent. Another advantage of the ac system is that due to lack of commentators in the ac generators, more power can be produced conveniently at higher voltages. The first single-phase ac system in the United States was at Oregon City were power was generated by two 300 hp waterwheel turbines and transmitted at 4 kV to Portland. Southern California Edison Company installed the first three phase system at 2.3 kV in 1893. Many electric Companies were developed through-out country.

In the beginning, individual Companies were operating at different frequencies anywhere from 25 Hz to 133 Hz. But, as the need for interconnection and parallel operation became evident. A standard frequency of 60 Hz was adopted throughout the U.S. and Canada. Most European countries selected the 50-Hz System.

Transmission voltages have since risen steadily, and the extra high voltage (EHV) in commercial use is 765 kV, first put into operation in the United States in 1969.For transmitting power over very long distances it may be more economical to Convert the EHV ac to EHV dc, transmit the power over two lines, and invert it back to ac at the other end.

The entire continental United States is interconnected in an overall network called the power grid. A small part of the network is federally and municipally owned, but the bulk is privately owned. The system is divided into several geographical regions called power pools. In an interconnected system, fewer generators are required as reserve for peak load and spinning reserve. Also interconnection makes the energy generation and transmission more economical and reliable.

Since power can rapidly be transferred from one area to others. At times, it may be cheaper for company to buy bulk power from neighboring utilities than to produce it in one of its older plants [1].

1.2 Literature Review

Since one of the main goals of our project is to minimize the possibilities of interruption of the Yatta's network and as ' Juha Haakana' stated in [2] ,his project was about the reliability of the system by study the effect of the location of the auto – recloser and disconnector switches ,it's works then was supported by ' Thomas Tamo Tatietse' who talked in [3] about the energy loss and he meant by it the loss of human effort searching about the source of the problem and losing money due to this problem which a simple example about it a fault.

In another different phase 'Li WeiLin' have worked [4], he focused in his project about the structure of the network itself and he create a mathematical model for the re-construction of an existence network, and through its project the result was reduce the

electrical losses via select the best location of each single component and the minimum time required for reconstruct it via an algorithm which can determine the best works to do in parallel so time and effort are reduced.

The work of 'Li WeiLin' lead us the think about cost and the best solutions from the view point of economy ," Patrick J. Balducci " worked in the analysis of eight phases project [5], through them he build a very nice economical method which tell us how much 1 KVA will cost us.

1.3 Background related to the work site

The described work site is a city of Yatta which located at 12 km south of Hebron city, with population of around 105 thousand of people, and area of about 24,500 acres [6].

The network configuration is radial with medium voltage level of 33kV; in addition to that the network has some ring connections.

The main transmission line passes through Al-Fawwar Camp, Al-Reheia until Al-Metiana road junction, then distributes to the most of transformers in the city, and the main protective device is the Auto-Recloser which interconnect Yatta's network with IEC as shown in Figure 1.1.

The types of transmission lines that used are overhead lines and underground cables, so in the central of Yatta, underground cables were used, but in remote areas, overhead lines were used.

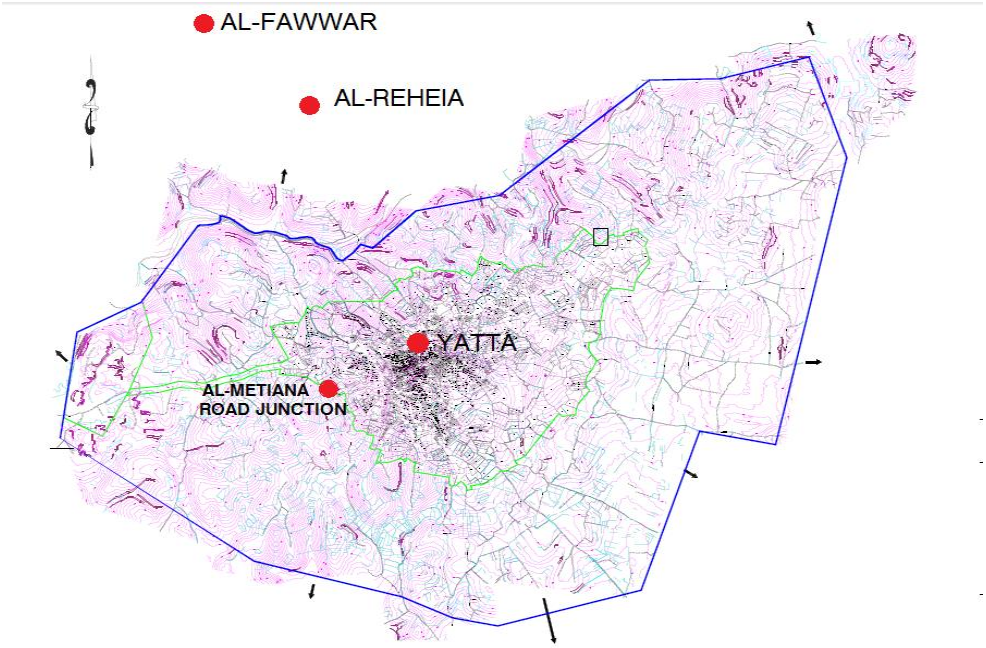


Figure 1. 1 The main transmission line path.

1.4 Problem formulation

Because of the network in Yatta is radial and doesn't separated into protective zones, any fault cannot be correctly mitigate by existed protection devices; the electricity will be completely interrupted. Furthermore the main feeder of Yatta's network has a max current capacity of 250A which presents the maximum load of Yatta in 2015.

1.5 Objectives

At the end of this project we will:

- Analyze the network.
- Make required load calculations.
- Present scenarios to get an optimum network.
- Conduct load forecasting.
- Design of network protection system.

1.6 Motivation

Protection, reliability and dependability are very important terminology in power system, for that we plane to analyze the network and design proper protection to realize fully protected and reliable network with reasonable way and:

• Take advantage of large amount of information's that will collected during the project implementation, and the ability examine the theoretical knowledge in the real practical environment.

• Creating collaborative work with SELCO in this project and for future studies.

• Throughout implementing this project, the gained knowledge will help us in understanding and meeting the market needs.

• Strengthening the student's teamwork which is one of important factors for future success.

1.7 Methodology

According to the Status of Yatta's network, the following Procedure is going to be conducted:

- Contacting SELCO representatives.
- Field survey and data collecting.
- Visiting the network substations.
- Building single line diagram.
- Analyzing the network by using related software packages such as ETAP.
- Build out the proper strategic plan for dealing with future tasks that may appear.
- Conduct load forecasting.

1.8 Time schedule

The proposed project is going to be implementing for two semesters as stated in table 1.1.

Table 1. 1 Time Schedule

Week / work	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Choosing project																															
Determine required software																															
Collecting data																															
Data analysis																															
Field tour& Single line building																															
Preparing the final report																															
Software analyzing																															
Protection design																															
Building strategies & making forecasting																															
Discussing the result and writing the conclusion																															

Where the blue squares at 16 and 31 week represent the date of delivery of the introduction and graduation project respectively.

Chapter Two

Electrical Network of Yatta City

2.1 Electrical Supplier

2.2 Network elements

2.3 Summery

2.1 Electrical supplier

Electrical power system is divided into three types, generation, transmission and distribution, SELCO considered as distribution Network Company, interconnected to IEC and serving four regions, Yatta, Dura, Al-Dhahria and Beit Ommar.

Yatta city network is provided by IEC through an overhead transmission line, with about 15 MVA.

The main supply transmission line passes through Al-Fawwar Camp, Al-Reheia until Al-Metiana road junction, And the voltage level of the existing distribution network is 33 kV, supplies all transformers in the city [7].

2.2 Network elements

2.2.1 Protection devices

Faults and other abnormal conditions on power systems cause:

- Damage to faulty equipment.
- Potential damage to un-faulted equipments.
- Potential hazard to surrounding environment.
- Voltage reduction / loss of supply.
- Loss of synchronism between generation sources.

So protection devices used to detect faults and abnormal conditions, Isolate faulty equipment and Take remedial action. The following devices used in Yatta's network.

2.2.1.1 Autoreclosers

In electric power distribution, a recloser, or auto-recloser, is a circuit breaker equipped with a mechanism that can automatically close the breaker after it has been opened due to a fault. Reclosers are used on overhead distribution systems to detect and interrupt momentary faults. Since many short-circuit on overhead lines clear themselves, a recloser improves service continuity by automatically restoring power to the line after a momentary fault. The following figure shows the configuration of autorecloser and its place in the network [8].

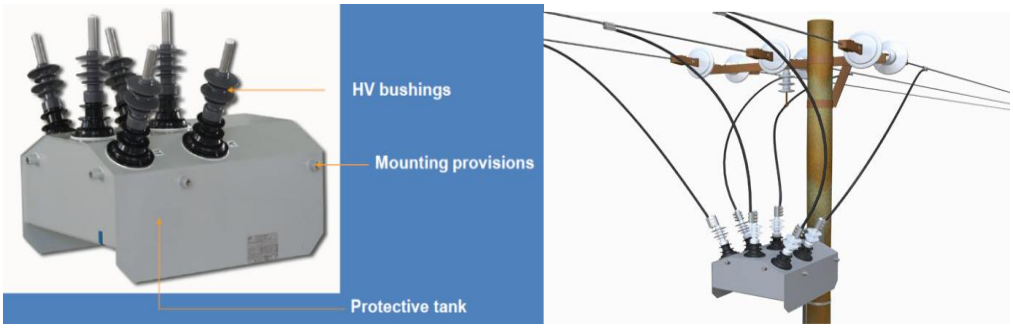


Figure 2. 1 Autorecloser configuration and place in the network

The network of Yatta city has 4 auto-Reclosers. One of them, which located at the main interconnection point, used as back-up protection for the others, and the auto-Reclosers specifications are illustrated in table2.1 [7].

Table2. 1 Autoreclosers data

model	Max. volt.(kV)	Cont. current(A)	Interrupting current (kA)	Impulse voltage withstand (kV)
GVR38	38	630	10	150(int.) 170(ext.)

2.2.1.2 Fuses

Figure2. 1 33kV fuse

A fuse is a short piece of metal, inserted in the circuit, which melts when excessive current flows through it and thus breaks the circuit.

The fuse element is generally made of materials having low melting point, high conductivity and least deterioration due to oxidation e.g., silver, copper etc. It is inserted in series with the circuit to be protected. Under normal operating conditions, the fuse element is at a temperature below its melting point. Therefore, it carries the normal current without overheating. However, when a short circuit or overload occurs, the current through the fuse increases beyond its rated value. This raises the temperature and fuse element melts (or blows out), disconnecting the circuit protected by it. In this way, a fuse protects the machines and equipment from damage due to excessive currents [9].

Glass fuse type used in Yatta's network in order to protect transformers with different values depending on transformers current, 10A, 16A, 20A and 25A [7].

2.2.1.3 Surge arresters

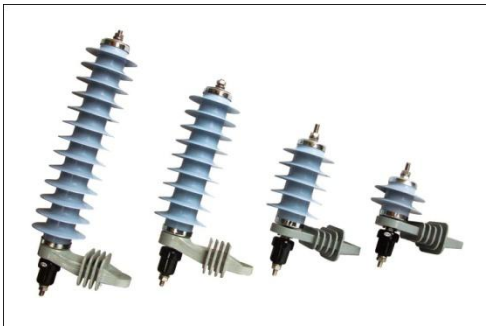


Figure2. 2 Surge arrester

A lightning arrester or a surge diverter is a protective device which conducts the high voltage surges on the power system to the ground.

To protect a unit of equipment from transients occurring on an attached conductor, a surge arrester is connected to the conductor just before it enters the equipment. The surge arrester is also connected to ground and functions by routing energy from an over-voltage transient to ground if one occurs, while isolating the conductor from ground at normal operating voltages. This is usually achieved through use of a varistor, which has substantially different resistances at different voltages.

Most of transformers in Yatta's network have surge arrestors, which produced by isoelectric company and have ISI-EGC33 model.

2.2.1.4 Isolators

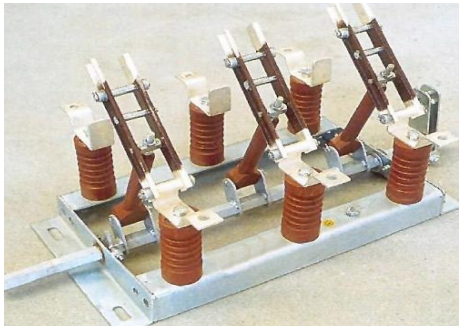


Figure2. 3 Isolators

In electrical engineering, a disconnector, disconnect switch or isolator switch is used to ensure that an electrical circuit is completely de-energized for service or maintenance.

Such switches are often found in electrical distribution and industrial applications, where machinery must have its source of driving power removed for adjustment or repair. High-voltage isolation switches are used in electrical substations to allow isolation of apparatus such as circuit breakers, transformers, and transmission lines, for maintenance. The disconnector is usually not intended for normal control of the circuit, but only for safety isolation. Disconnector can be operated either manually or automatically (motorized disconnector) [10].

Isolators used in Yatta's network in order to isolate transformers during fixing and replacing operations.

2.2.1.5 Load break switch

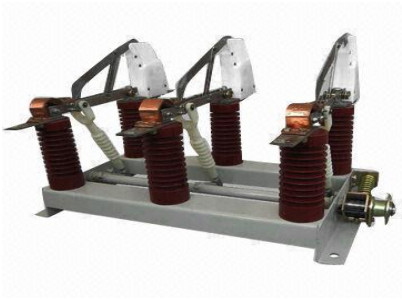


Figure2. 4 load break switch

A load break switch is a disconnector switch that has been designed to provide making or breaking of specified currents.

This is accomplished by addition of equipment that increases the operating speed of the disconnect switch blade and the addition of some type of equipment to alter the arcing phenomena and allow the safe interruption of the arc resulting when switching load currents.

Disconnect switches can be supplied with equipment to provide a limited load switching capability. Arcing horns, whips, and spring actuators are typical at lower voltages [11].

2.2.2 Transmission lines and cables

Electric power can be transmitted or distributed either by overhead system or by underground cables.

The underground cables have several advantages such as less liable to damage through storms or lightning, low maintenance cost, less chance of faults, smaller voltage drop and better general appearance.

However, their major drawback is that they have greater installation cost and introduce insulation problems at high voltages compared with the equivalent overhead system. For this reason, underground cables are employed where it is impracticable to use overhead lines. Such locations may be thickly populated areas where municipal authorities prohibit overhead lines for reasons of safety, or around plants and substations or where maintenance conditions do not permit the use of overhead construction.

The chief use of underground cables for many years has been for distribution of electric power in congested urban areas at comparatively low or moderate voltages. However, recent improvements in the design and manufacture have led to the development of cables suitable for use at high voltages. This has made it possible to employ underground cables for transmission of electric power for short or moderate distances [9].

Two kinds of conductors are used in the network, overhead transmissions lines and under-ground cables. Over headline conductors varies in lengths and in cross section area. All overhead line conductors are A.C.S.R., which classified under British standard. As shown in table 2.2.

Table2. 2 Overhead transmission line data

Name	**Cross section(mm^2)**	**X (Ω/km)**	**R (Ω/km)**	**Current capacity(A)**
Coyote	150	0.157	0.2192	311
Dog	120	0.192	0.2733	278
Ferret	50	0.364	0.5419	161

Underground cables are available in two categories, Aluminum and copper which have properties shown in table 2.3.

Table2.3 Underground cables data

type	Cross section(mm^2)	Current rating (A)
copper	50	185
aluminum	95	215

2.2.3 Insulators

Insulators are attached to support and insulate the conductors from the ground. The overhead lines conductors should be supported on the poles or towers in such a way that the currents from conductors do not leaks to earth.[9]

In general, the insulators should have the following desirable properties:

(a) High mechanical strength in order to withstand conductor load, wind load etc.

(b) High electrical resistance of insulator material in order to avoid leakage currents to earth.

(c) High relative permittivity of insulator material in order that dielectric strength is high.

(d) The insulator material should be non-porous, free from impurities and cracks otherwise the permittivity will be lowered.

(e) High ratio of puncture strength to flashover.

There are many types of insulators used in Yatta's network as shown in figure 2.6:

1- Post type insulators.
2- Suspension type insulator.
3- Strain type insulators.

a) Strain type

b) Suspension type

c) Post type

Figure2.5 Types of insulators used in the Yatta's network

Types of insulators regarding to Insulating Materials used in the network are Porcelain, Glass and Polymer Insulators.

2.2.4 Transformers

Figure2. 6 Distribution transformer

A distribution transformer is a transformer that provides the final voltage transformation in the electric power distribution system, stepping down the voltage used in the distribution lines to the level used by the customer.

- The network contains 109 transformers sorted into six types according to its capacities, as shown in table 2.4, and all transformers are connected delta/star (dyn11).
- Most of transformers are bridge mounted, except some of them are in special rooms.
- There are two devices used to protect the transformers, fuses and surge arresters.
- All transformers are Oil-immersed.

Figure 2.7, show one of the transformers used in the network.

Table2.4 Number of transformers and voltage impedance.

Transformer Rating (kVA)	Number	%voltage impedance
1600	2	6
1250	2	6
630	15	4.5
400	37	4.5
250	41	4.5
160	12	4.5

2.3 Summery

This chapter is talking about the network elements in details which used in Yatta's electrical network, so after analyzing the network, developing operation will use these elements.

Chapter Three

Electrical Power Concepts

3.1 Overview

The basic of an electric power system starts with generation, by which electrical energy is produced in the power plant and then transformed in the power station to high-voltage electrical energy that is more suitable for efficient long-distance transportation. High-voltage (HV) power lines in the transmission portion of the electric power system efficiently transport electrical energy over long distances to the consumption locations.

Finally, substations transform this HV electrical energy into lower-voltage energy that is transmitted over distribution power lines that are more suitable for the distribution of electrical energy to its destination, where it is again transformed for residential, commercial, and industrial consumption. A full-scale actual interconnected electric power system is much more complex than that described above [12].

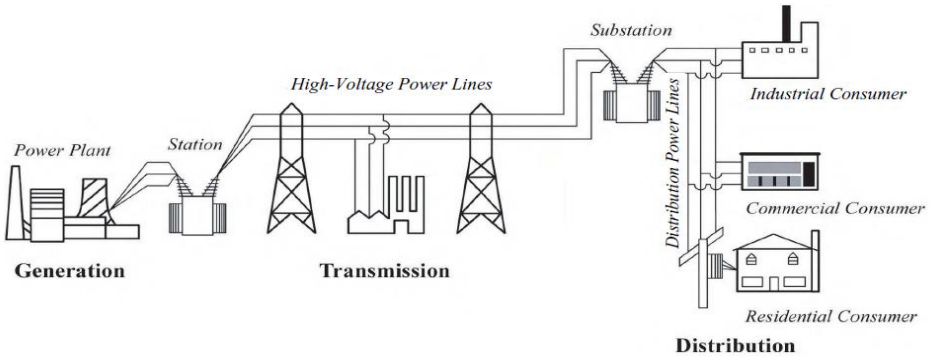


Figure 3. 1 System overview

3.2 Transmission lines

The important considerations in the design and operation of a transmission line are the determination of voltage drop, line losses and efficiency of transmission. These values are greatly influenced by the line constants R, L and C of the transmission line.

For instance, the voltage drop in the line depends upon the values of above three line constants. Similarly, the resistance of transmission line conductors is the most important cause of power loss in the line and determines the transmission efficiency [9].

3.2.1 Parameters of a transmission line

A transmission line has resistance, inductance and capacitance uniformly distributed along the whole length of the line.

3.2.2 Resistance of a transmission line

The resistance of transmission line conductors is the most important cause of power loss in a transmission line. The resistance (R) of a line conductor having resistivity (ρ), length (l) and area of cross-section (a) is given by;

$$R = \rho (l/a) \qquad (3.1)$$

The resistance of a conductor depends on the temperature. If R_1 and R_2 are the resistances of a conductor at t_1ºC and t_2ºC ($t_2 > t_1$) respectively, α_1 is the temperature coefficient at t_1°C, then,

$$R_2 = R_1 [1 + \alpha_1 (t_2 - t_1)] \qquad (3.2)$$

Where $\alpha_1 = \alpha_0 / (1 + \alpha_0 * t_1)$

α_0 = temperature coefficient at 0º C

3.2.3 Inductance formulas in terms of GMD

The use of self-GMD and mutual-GMD simplifies the inductance calculations, the symbols used for these are respectively D_s and D_m, where:

$$\text{Inductance/conductor/m} = 2 \times 10^{-7}((1/4) \times \log_e(d/r)) \quad (3.3)$$

Where (d) is the distance between conductors and (r) is the radius of the conductor.

a) D_s (also sometimes called Geometrical mean radius; GMR), consider the expression for inductance per conductor per meter.

$$\text{Inductance/conductor/m} = 2 \times 10 - 7 \log_e(d/ D_s). \quad (3.4)$$

It can be proved mathematically that for a solid round conductor of radius r,

$$D_s = \text{GMR} = 0 \bullet 7788 \text{ r}. \quad (3.5)$$

b) Mutual-GMD. The mutual-GMD is the geometrical mean of the distances form one conductor to the other and, therefore, must be between the largest and smallest such distance. In fact, mutual-GMD simply represents the equivalent geometrical spacing.

$$D_m = (d1.\, d2\, .\, d3)^{1/3} \quad (3.6)$$

Then,

$$\text{Inductance/conductor/m} = 2 \times 10^{-7} \log e(D_m / D_s) \quad (3.7)$$

3.2.4 Classification of overhead transmission lines

A transmission line has three constants R, L and C distributed uniformly along the whole length of the line. The resistance and inductance form the series impedance. The capacitance from a conductor to neutral for a 3-phase line forms a shunt path throughout the length of the line. Therefore, capacitance effects introduce complications in transmission line calculations. Depending upon the manner in which capacitance is taken into account; the overhead transmission lines are classified as short transmission lines, medium transmission lines and long transmission lines.

3.2.4.1 Short transmission lines

When the length of an overhead transmission line is up to about 50 km and the line voltage is comparatively low (< 20 kV), it is usually considered as a short transmission line. Due to smaller length and lower voltage, the capacitance effects are small and hence can be neglected. Therefore, only resistance and inductance of the line are taken into account.

While studying the performance of a transmission line, it is desirable to determine its voltage regulation and transmission efficiency.

a) Voltage regulation: The difference in voltage at the receiving end of a transmission line between conditions of no load and full load as a percentage of the receiving end voltage.

$$\% \text{ Voltage regulation} = \frac{V_S - V_R}{V_R} \text{x}100\ \% \qquad (3.8)$$

b) Transmission efficiency (η): is the ratio of receiving end power to the sending end power of a transmission line.

$$\eta_T = \frac{V_R\, x\, I_R\, x\ cos\, \emptyset_R}{V_S\, x\, I_S\, x\ cos\, \emptyset_S} \text{ x } 100\% \qquad (3.9)$$

3.2.4.2 Medium transmission lines

Since medium transmission lines have sufficient length (50-150 km) and usually operate at voltages greater than 20 kV, the effects of capacitance cannot be neglected. Therefore, in order to obtain reasonable accuracy in medium transmission line calculations, the line capacitance must be taken into consideration.

The capacitance is uniformly distributed over the entire length of the line. However, in order to make the calculations simple, the line capacitance is assumed to be lumped or concentrated in the form of capacitors shunted across the line at one or more points. Such a treatment of localizing the line capacitance gives reasonably accurate results. The most commonly used methods (known as localized capacitance methods) for the solution of medium transmissions lines are (a) End condenser method (b) Nominal T method (c) Nominal π method [9].

3.2.4.3 Long transmission lines

It is well known that line constants of the transmission line are uniformly distributed over the entire length of the line. However, reasonable accuracy can be obtained in line calculations for short and medium lines by considering these constants as lumped.

If such an assumption of lumped constants is applied to long transmission lines (having length excess of about 150 km), it is found that serious errors are introduced in the performance calculations.

Therefore, in order to obtain fair degree of accuracy in the performance calculations of long lines, the line constants are considered as uniformly distributed throughout the length of the line. Rigorous mathematical treatment is required for the solution of such lines [9].

3.3 Underground cables

An underground cable essentially consists of one or more conductors covered with suitable insulation and surrounded by a protecting cover. As shown in the following figure which shows the construction of 3-core underground cable [9].

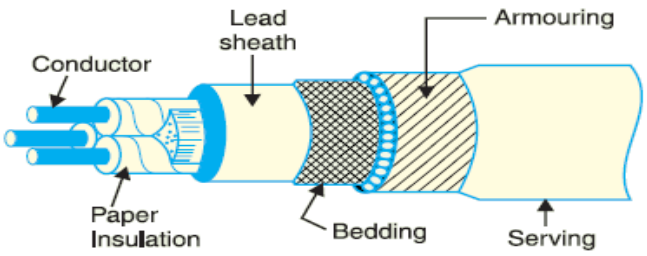


Figure 3. 2 construction of 3-core underground cable

3.3.1 Classification of cables

Cables for underground service may be classified into five types due to the voltage that they are manufactured for.

(a) Low-tension (L.T.) cables — up to 1000 V
(b) High-tension (H.T.) cables — up to 11,000 V
(c) Super-tension (S.T.) cables — from 22 kV to 33 kV
(d) Extra high-tension (E.H.T.) cables — from 33 kV to 66 kV
(e) Extra super voltage cables — beyond 132 kV

For a 3-phase service, either 3-single-core cables or three-core cable can be used depending upon the operating voltage and load demand.

3.4 Transformer

3.4.1 Introduction

A transformer is a device that changes ac electric power at one voltage level to ac electric power at another volt age level through the action of a magnetic field. It consists of two or more coils of wire wrapped around a common ferromagnetic core.

These coils are (usually) not directly connected. The only connection between the coils is the common magnetic flux present within the core.

One of the transformer windings is connected to a source of ac electric power, and the second (and perhaps third) transformer winding supplies electric power to loads.

The transformer winding connected to the power source is called the primary winding or input winding, and the winding connected to the loads is called the secondary winding or output winding. If there is a third winding on the transformer; it is called the tertiary winding [13].

3.4.2 Voltage and current relationships

Voltage Relationships

The following equation illustrate the relationship between primary and secondary side voltages.

$$\frac{V_1}{V_2} = \frac{N_1}{N_2} = a \tag{3.10}$$

Where a = the turns ratio determines the amount the voltage is changed.

Current Relationships

The following equation illustrate the relationship between primary and secondary side currents

$$\frac{I_2}{I_1} = \frac{N_1}{N_2} = a \tag{3.11}$$

Where I_2 is the secondary side current, I_1 is the primary side current, and a is the turns ratio.

3.4.3 Actual (Non-ideal) Transformer

An actual transformer differs from an ideal transformer in that is has:

- Resistive (I_2R) losses (copper losses) in the primary and secondary windings.
- Not all the flux produced by the primary winding links the secondary winding, and vice versa. This gives rise to some leakage of flux.
- The core requires a finite amount of m. m. f for its magnetization.
- Hysteresis and eddy current losses cause power loss in transformer core.

Effects of winding resistance, leakage flux and imperfect core are added to the ideal transformer circuit shown below to obtain the circuit for a practical transformer [14].

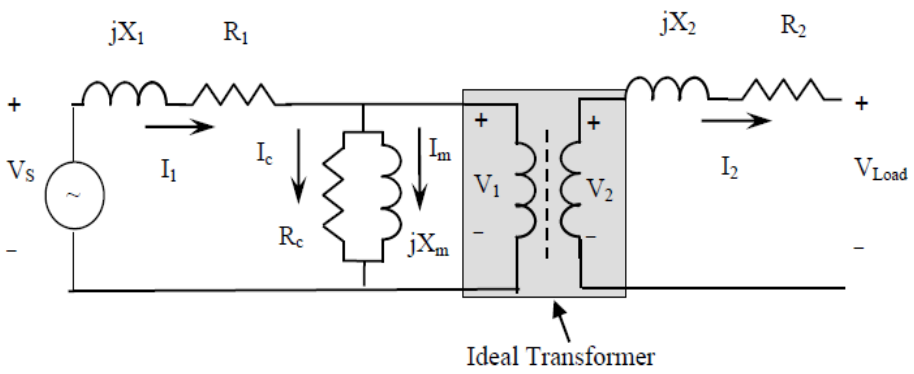


Figure 3. 3 Equivalent circuit of a practical transformer

Where,

R_1, R_2 - Resistances of primary and secondary windings

X_1, X_2- Leakage reactance of primary and secondary windings

I_m, X_m - Magnetizing current and reactance

I_c, R_c - Current and resistance accounting for core losses

The sum of I_m and I_c is called the exciting current.

So, the equivalent circuit is useful in determining the characteristics of the transformer.

3.4.4 Efficiency

Because of the resistances in the transformer equivalent circuit, not all of the power input to the transformer is delivered to the load. Efficiency is defined as the ratio of output to the input.

Since, Input power = Output power + Power losses

So;

$$\eta = \frac{P_{out}}{P_{out} + P_{losses}} \tag{3.12}$$

3.5 Distribution system

Distribution systems serve as the link from the distribution substation to the customer. This system provides the safe and reliable transfer of electric energy to various customers throughout the service region. Typical distribution systems begin as the medium-voltage three-phase circuit, typically about 30–60 kV, and terminate at a lower secondary three- or single-phase voltage typically below 1 kV at the customer's premise, usually at the meter [15].

3.5.1 Classification of distribution systems

A distribution system may be classified according to;

1. Type of construction: overhead system or underground system.
2. Nature of current: d.c. distribution system or a.c. distribution system.
3. Scheme of connection: radial system, ring main system or inter-connected system.

3.5.2 Distribution substations

A diagram of a very simple one-line distribution substation is shown in Figure 3.4, and it displays the simplest distribution substation; it illustrates the major components that will be found in all substations [16]. Most feeders emanate radially from the substation to supply the load.

There are five main functions of the distribution substation:

1. Voltage transformation: to step down the voltage to the primary distribution voltage level, includes 0,4kV, 11kV, and 33kV.
2. Switching and protection: Different kinds of switchgear will be located at the substation, including; Switches, Circuit breakers, Reclosers, Fuses.
3. Voltage regulation: to regulate a voltage and decrease the voltage drop at the feeder.
4. Metering: used for recording a large amount of substation operational information.

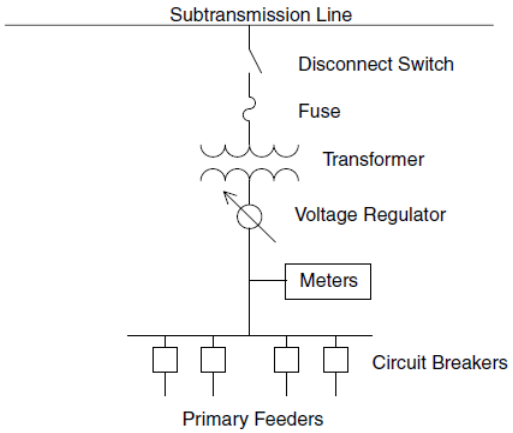


Figure 3. 4 Simple distribution substation scheme.

3.5.3 Connection schemes of distribution system

3.5.3.1 Radial electrical power distribution system

Lately in the electrical power distribution system, different feeders were radially come out from the substation and connected to the primary of distribution transformer directly. But radial distribution system has one major drawback that in case of any feeder failure, the associated consumers would not get any power as there was no alternative path to feed the transformer. In case of transformer failure also, the power supply is interrupted [17].

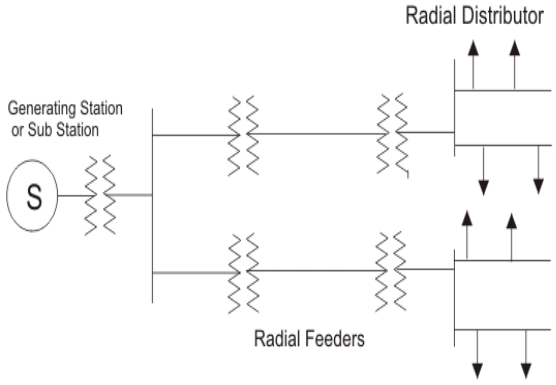


Figure 3. 5 Radial distribution system

3.5.3.2 Ring main electrical power distribution system

The drawback of radial electrical power distribution system can be overcome by introducing a ring main electrical power distribution system. Here one ring network of distributors is fed by more than one feeder.

In this case if one feeder is under fault or maintenance, the ring distributor is still energized by other feeders connected to it. In this way the supply to the consumers is not affected even when any feeder becomes out of service [17].

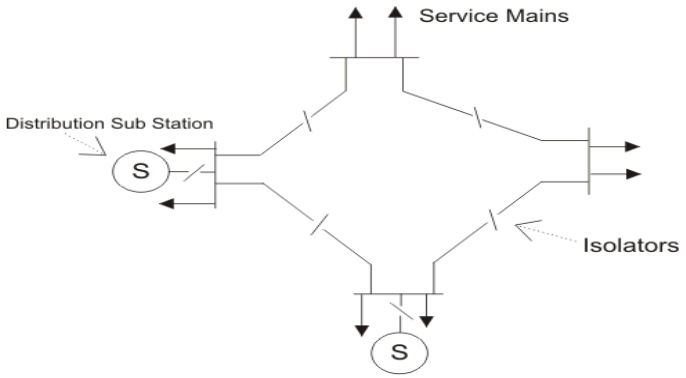


Figure 3. 6 Ring mains distribution system

3.5.3.3 Requirements of a distribution system

Efforts are being made in order to maintain an electric power supply within the requirements of various types of consumers [9]. Some of the requirements of a good distribution system are:

1. Proper voltage: the voltage variations at consumer's terminals should be as low as possible.
2. Availability of power on demand: Power must be available to consumer in any amount that they may require from time to time.
3. Reliability: the reliability can be improved to a considerable extent by interconnected system, reliable automatic control system and providing additional reserve facilities.

3.6 Loads

Loads of power systems are divided into industrial, Commercial, and residential. The industrial loads are composite loads, and induction motors form a high proportion of these load. These composite loads are functions of voltage and frequency and form a major pan of the system load. Commercial and residential loads consist largely of lighting, heating, and cooling. These loads are independent of frequency and consume negligibly small reactive power [1].

The real power of loads is expressed in terms of kilowatts or megawatts. The greatest value of load during a 24-hr period is called the *peak* or *maximum demand*. In order to assess the usefulness of the generating plant the *load factor* is defined. Load factors may be given for a day, a month, or a year.

Load Factor (LF)

Is defined as the ratio of the average demand over a period of time to the maximum demand within that period for the particular network [20].

$$\text{L. F.} = \frac{\text{average load(kW)}}{\text{peak load (kW)}} \tag{3.13}$$

Load Loss Factor (LLF)

Is defined as average power losses over a period of time to the losses at the time of peak demand.

There are methods giving the relationship between the Load Loss Factor (LLF) and the Load Factor (LF). The formulae used for the calculations are shown below. The methods outlined in this document are to be used to calculate the Loss Components for the various categories in the distribution network [20].

$$\mathbf{L.L.F} = \mathbf{k} * \mathbf{L.F} + (\mathbf{1} - \mathbf{k}) * \boldsymbol{L.F^2} \tag{3.14}$$

Where k is a constant, typically 0.1, 0.2 or 0.3. Typically k = 0.3 for sub-transmission systems.

As loss is an approximate square function of the demand as given in the equation above, it is required to calculate exact relation between LF and LLF for calculation of the losses. The empirical equation given below gives relationship between LF and LLF:

$$\text{Load Loss Factor} = \frac{\text{Actual loss(kWh) during period}}{\text{Loss at maximum demand (kWh)}} \tag{3.15}$$

3.7 Load flow studies

The power-flow problem is the computation of voltage magnitude and phase angle at each bus in a power system under balanced three-phase steady-state conditions. As a by-product of this calculation, real and reactive power flows in equipment such as transmission lines and transformers, as well as equipment losses, can be computed.

The starting point for a power-flow problem is a single-line diagram of the power system, from which the input data for computer solutions can be obtained. Input data consist of bus data, transmission line data, and transformer data [18].

As shown in Figure 3.7, the following four variables are associated with each bus k: voltage magnitude V_k, phase angle d_k, net real power P_k, and reactive power Q_k supplied to the bus.

At each bus, two of these variables are specified as input data, and the other two are unknowns to be computed by the power-flow program. For convenience, the power delivered to bus k in Figure 3.7 is separated into generator and load terms. That is,

$$P_k = P_{Gk} - P_{Lk}$$
$$Q_k = Q_{Gk} - Q_{Lk} \qquad (3.16)$$

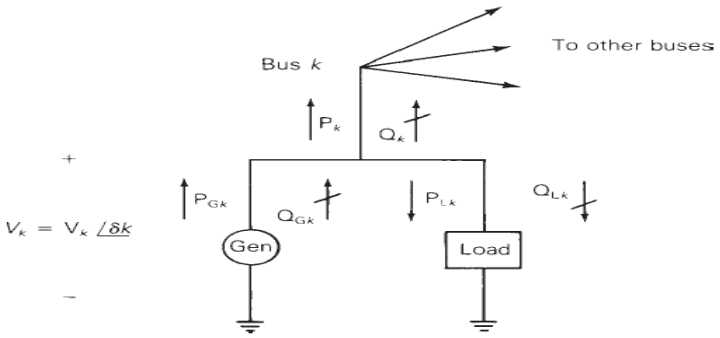


Figure 3. 7 Bus variables Vk, δk, and Pk.

Each bus k is categorized into one of the following three bus types:

1. Swing bus (or slack bus)—There is only one swing bus, the swing bus is a reference bus for which $V_1 \angle \delta_1$, typically $1.0 \angle 0$ per unit.
2. Load (PQ) bus—P_k and Q_k are input data. The power-flow program computes V_k and δ_k. Most buses in a typical power-flow program are load buses.
3. Voltage controlled (PV) bus—P_k and V_k are input data. The power-flow program computes Q_k and δ_k [10].

For the formulation of the real and reactive power entering k-bus

$$P_k = \sum_{n=1}^{N} |Y_{kn} V_k V_n| \cos(\theta_{kn} + \delta_n - \delta_k) \tag{3.17}$$

$$Q_k = -\sum_{n=1}^{N} |Y_{kn} V_k V_n| \sin(\theta_{kn} + \delta_n - \delta_k) \tag{3.18}$$

But we need to define the following quantities. Let the voltage at the k'th bus be denoted by

$$V_k = |V_k| \angle \delta_k \tag{3.19}$$

Also let us define the self-admittance at bus-k as

$$Y_{kk} = |Y_{kk}| \angle \theta_{kk} \tag{3.20}$$

Similarly the mutual admittance between the buses k and n can be written as

$$Y_{kn} = |Y_{kn}| \angle \theta_{kn} \tag{3.21}$$

There are a number of methods to solve power flow problems like, Newton-Raphson method and Gauss–Seidel method.

3.8 Fault analysis

Short circuits occur in power systems when equipment insulation fails due to system overvoltage's caused by lightning or switching surges, to insulation contamination (salt spray or pollution), or to other mechanical causes. The resulting short circuit or ‘‘fault’’ current is determined by the internal voltages of the synchronous machines and by the system impedances between the machine voltages and the fault. Short-circuit currents may be several orders of magnitude larger than normal operating currents and, if allowed to persist, may cause thermal damage to equipment.

Windings and bus bars may also suffer mechanical damage due to high magnetic forces during faults. It is therefore necessary to remove faulted sections of a power system from service as soon as possible.

Short circuits occur in three-phase power systems as follows, in order of frequency of occurrence: single line-to-ground, line-to-line, double line to ground, and balanced three-phase faults. The path of the fault current may have either zero impedance, which is called a bolted short circuit, or nonzero impedance.

Other types of faults include one-conductor-open and two-conductors-open, which can occur when conductors break or when one or two phases of a circuit breaker inadvertently open [18].

3.8.1 Fault current analysis

There are four methods to calculate the fault current, Ohmic method, Infinite Bus method, Per Unit method and MVA method [19].

3.9 Photovoltaic distribution generation

Solar photovoltaic system or solar power system is one of renewable energy system which uses PV modules to convert sunlight into electricity. The electricity generated can be stored or used directly, fed back into grid line or combined with one or more other electricity generators or more renewable energy source. Solar PV system is very reliable and clean source of electricity that can suit a wide range of applications such as residence, industry, agriculture, livestock, etc.[21].

Palestine has high potential of solar energy. It has around 3000 Sun-shine hours / year and high annual average solar energy radiation which is about 5.4 kWh / m2.day (5.4 h/day) [22].

As shown in figure 3.8, the lowest average solar energy is in January which is about 3.39 kWh /m² - day and the highest one is in June which is about 7.99 kWh/m² - day. Palestine has a high solar energy potential, where the daily average solar radiation intensity is 5.4 kWh / m2-day, and the PSH equal 5.4 [22].

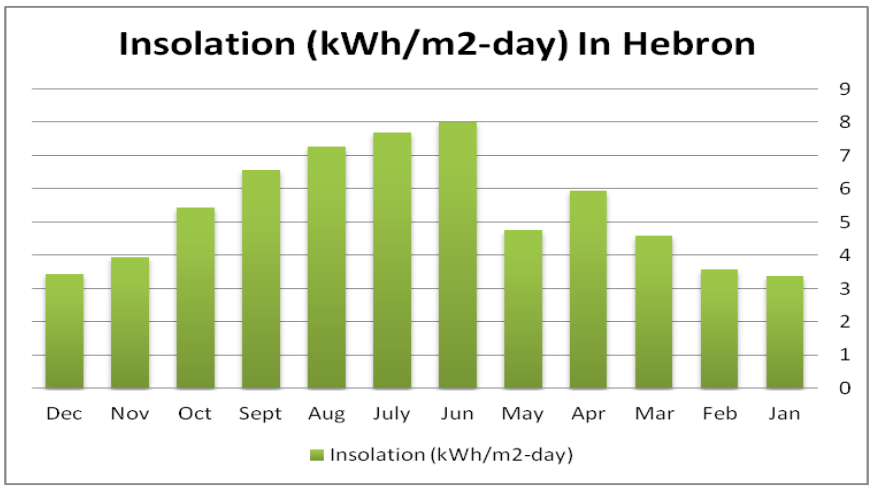


Figure 3. 8 Monthly solar energy for Hebron district on horizontal surface.

So average power that can be generated illustrated in the following equation.

$$\text{average power(kW)} = \text{rated power (kw)} * \text{CF} \quad (3.22)$$

Where;

$$\text{CF: capacity factor} = \frac{\mathbf{5.4}(\boldsymbol{h/d})}{\mathbf{24}(\boldsymbol{h})} = 0.225 \text{ for Palestine region.} \quad (3.23)$$

3.10 Summery

In this chapter we presented some of electrical power concepts, some of these concepts will be used in the next chapter where another will be used by Etap software.

Chapter Four

Load Demand

4.1 Load overview

4.2 Load in detail

4.3 Load Forecasting

4.4 load factors

4.5 Summery

4.1 Load overview

The average load in this study case for Yatta city in 2015 is about 7.548 MW which equal 8.386 MVA by applying 0.90 power factor. The maximum demand is 15.7 MVA.

The loads takes three forms, general, special and (general and special) loads. The special loads classified as industrial and hospital loads, the general loads classified as residential, educational, and commercial loads. Where the (general and special) loads are mixed between the two forms.

Fig. 4.1 illustrates the percentage for each form of the total load in the city of Yatta.

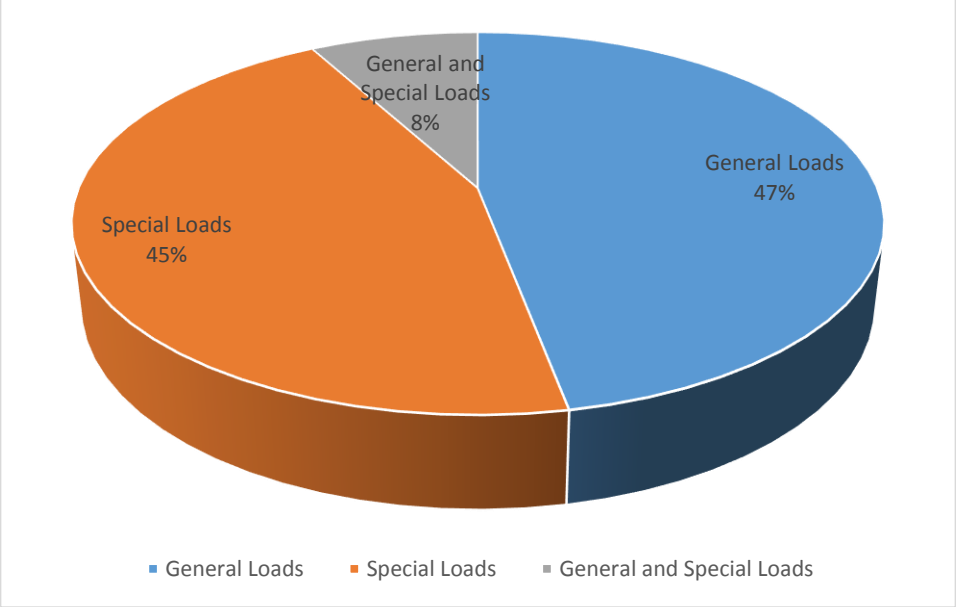


Figure 4. 1 percentage for load forms of the total load

4.2 Load in detail

In this section, available data and assumptions are used to illustrate and analyze the forms of load.

The loads are determined using power analyzer device, metering devices that connected to special transformer stations and using annual bills for Yatta city. See Appendix c.

Form 1: General Loads

This form as shown in Fig. 4.1 is the most dominant, which represent 47% of the total load in the network. As mentioned above it consists of residential, educational, and commercial loads.

This form has 65 transformers with total rating of about 21 MVA. The maximum load is about 7.3 MVA and the average load is 3.9 MVA. The power factor is high due to the load type which is between 0.92 and 0.97. The maximum load in this form is between 24% and 40% of the transformers rating.

Power analyzer and annual bills are used to analyze general loads, in order to determine the peak load, power factor, and load factor.

Form 2: Special Loads

This form is consist of (small and medium) factories and hospital load which represent 45% of the total load. The number of transformers is 33 having a total rating of about 17.5 MVA. The maximum load is 7.1 MVA and the average load is 3.8 MVA, but the power factor is low because the motor load is the dominant in this form, which is between 0.66 and 0.87. The maximum load is between 24% and 40% of the transformers rating.

Form 3: General and Special Loads (Mixed loads)

This form is consist of transformers that used for special and general loads which represent 8% of the total load in the network. This form consist of 11 transformers having rating of about 3.7 MVA. The maximum load is between 28% and 38% of the transformers rating with total magnitude of about 1.3 MVA. The power factor in this form is not high enough due to load type which is between 0.83 and 0.90.

Table 4.1 summaries the features and differences between the three forms, and chart 4.2 illustrate maximum load and transformers rating for each form.

Table 4. 1 features and differences between load forms

Form of Load	General Loads	Special Loads	General & Special Loads
Maximum Load Range of Transformer	(24% - 40%)	(32% - 51%)	(28% - 38%)
No. of Transformers	65	33	11
Total Transformers rating (MVA)	20.96	17.44	3.72
Maximum Load (MVA)	7.305	7.107	1.292
Load Type	10% constant KVA 90% constant Z	90% constant KVA 10% constant Z	50% constant KVA 50% constant Z
Total Avg. Load (MVA)	3.902	3.796	0.690
Percentage of Total Load	47%	45%	8%
Power Factor Range	(92%-97%)	(66%-87%)	(83%-90%)

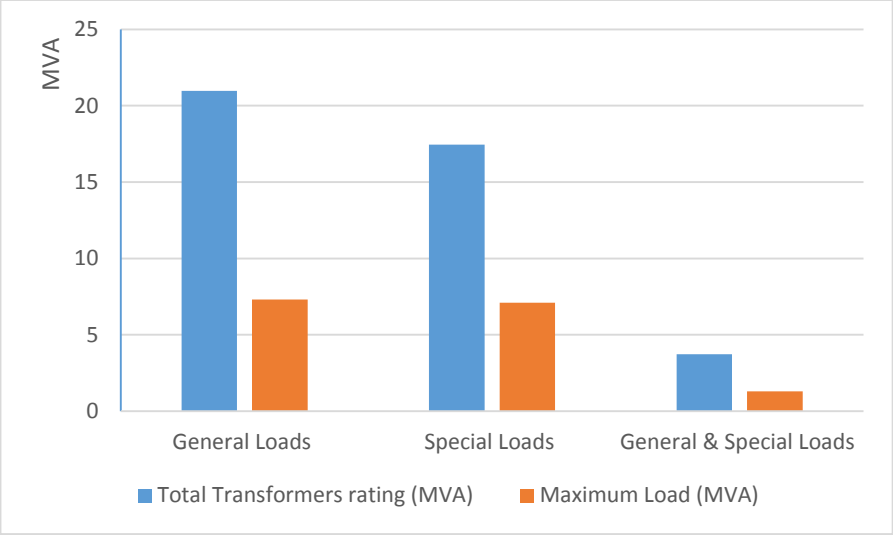


Figure 4. 2 maximum load and transformers rating for each form

Appendix C illustrate all transformers rating and loading.

4.3 Load Forecasting

In the network of Yatta there is no accurate statistics about the increment of loads so we consider the annual consumptions as a scale as shown in table 4.2.

Table 4. 2 annual consumption and growth of load

year	annual consumption (kWh)	average load (kW)	annual growth
2005	30,745,860	3,510	-
2006	29,938,885	3,418	-2.62%
2007	38,666,940	4,414	29.15%
2008	40,724,430	4,649	5.32%
2009	45,508,200	5,195	11.75%
2010	46,783,380	5,341	2.80%
2011	54,776,460	6,253	17.09%
2012	52,490,430	5,992	-4.17%
2013	56,516,669	6,452	7.67%
2014	66,124,502	7,548	17.00%

By considering the annual growth as shown in Fig. 4.3, the average growth of loads will be about 9%, so the increment of maximum and average load is illustrated in Fig. 4.4.

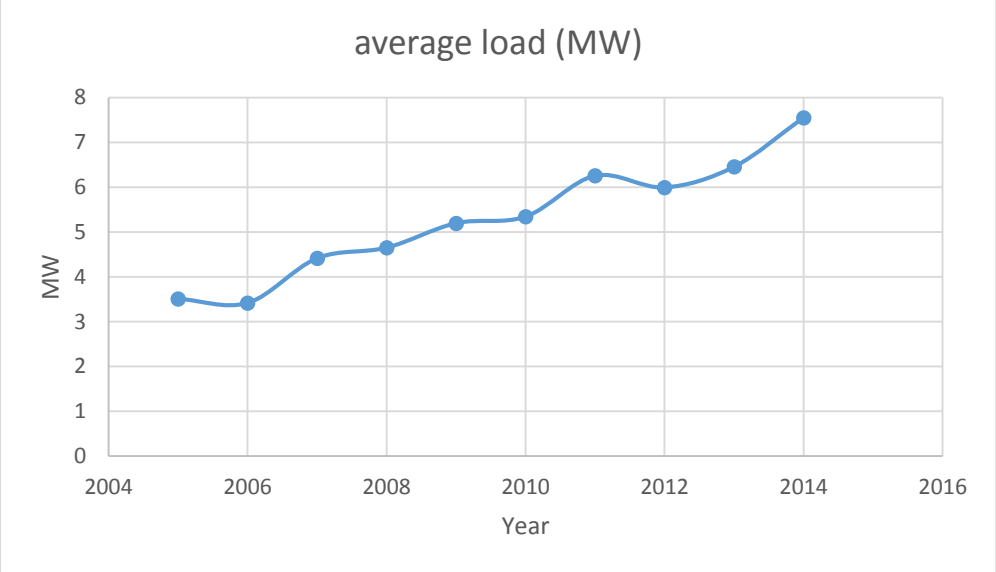


Figure 4. 3 Average load between 2005 and 2014

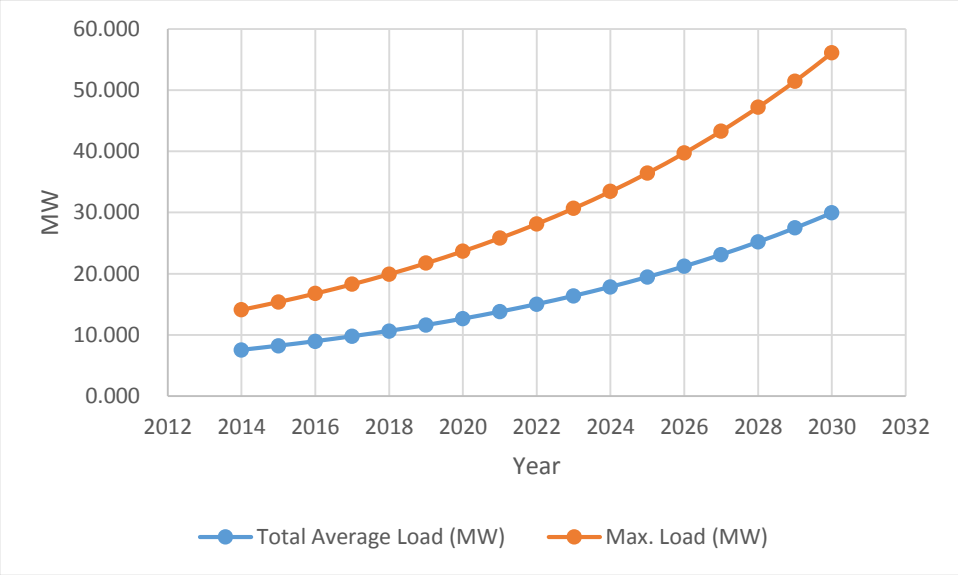


Figure 4. 4 Average and maximum growth of load

After applying the annual growth, the critical point will appear after 11 years, the maximum demand will be approximately equal the total rating of transformers as shown in fig.4.5.

$$\text{Demand } 2026(\text{MVA}) = \frac{\text{Demand } 2015(\text{kVA}) \text{ x } (1 + \text{annual increment})^{11}}{1000} \qquad (4.1)$$

$$\text{Demand } 2026(\text{MVA}) = \frac{15704 \text{ (kVA) x } (1 + 0.09)^{11}}{1000} = 40.523 \text{ MVA}$$

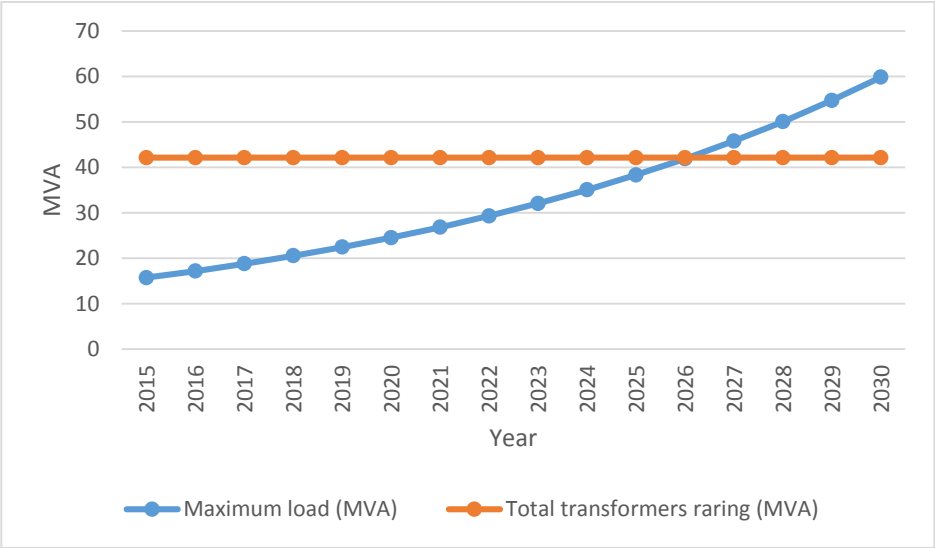


Figure 4. 5 Growth of maximum load due to tr-r's rating

According to equation (4.2), the forecasted demand for each load form after 11 years will be predicted as shown in Fig. 4.6, and the result for each transformer is presented in Appendix C.

Figure 4. 6 The forecasted demand for each load form after 11 years

4.4 Load factors

4.4.1 Power and Energy Losses

Power system losses are the difference in the amount of energy or power that is required to be delivered to a system to supply the customer's energy or power needs [20].

1) Power losses, defined in kW or MW create a need for the provision of additional capacity to be installed on the system over and above that required to meet the system demand.

2) Energy Losses, defined in kWh or MWh, is the integral of the power losses with respect to time and represents the amount of additional energy that needs to be purchased at the point of purchase by Aurora to supply the customer demand for the corresponding period.

4.4.2 Load Factor and Loss Load Factor

Load Factor (LF)

$$\text{LF} = \text{Average load} / \text{Maximum load} \tag{4.2}$$

$$\text{LF} = 7.548\ \text{MW} / 14.13\ \text{MW} = 53.42\%$$

Load Loss Factor (LLF)

$$\text{L. L. F} = \text{k} * \text{L. F} + (1 - \text{k}) * L.F^2 \tag{4.3}$$

$$\text{L. L. F} = 0.3 * 0.5342 + 0.7 * (0.5342)^2 = 36\%$$

Appendix E illustrates all losses in branches.

4.5 Summery

In this chapter, loads in details were illustrated, then, depending on data that comes from SELCO, load forecasting was illustrated, after that load factors were calculated.

Chapter Five

Load Flow and Network Study

5.1 Yatta's medium voltage network scheme

5.2 Etap software

5.3 Present case study

5.4 Problems that appears after analyzing the network

5.5 Solutions

5.6 Network state after 11 years

5.7 Summery

5.1 Yatta's medium voltage network scheme

In this project we started by building a scheme for our network in order to determine the sites of transformers, transmission line and cables paths and lengths, and interconnection point site, then we can build single line diagram and analyze the network. See Appendix A.

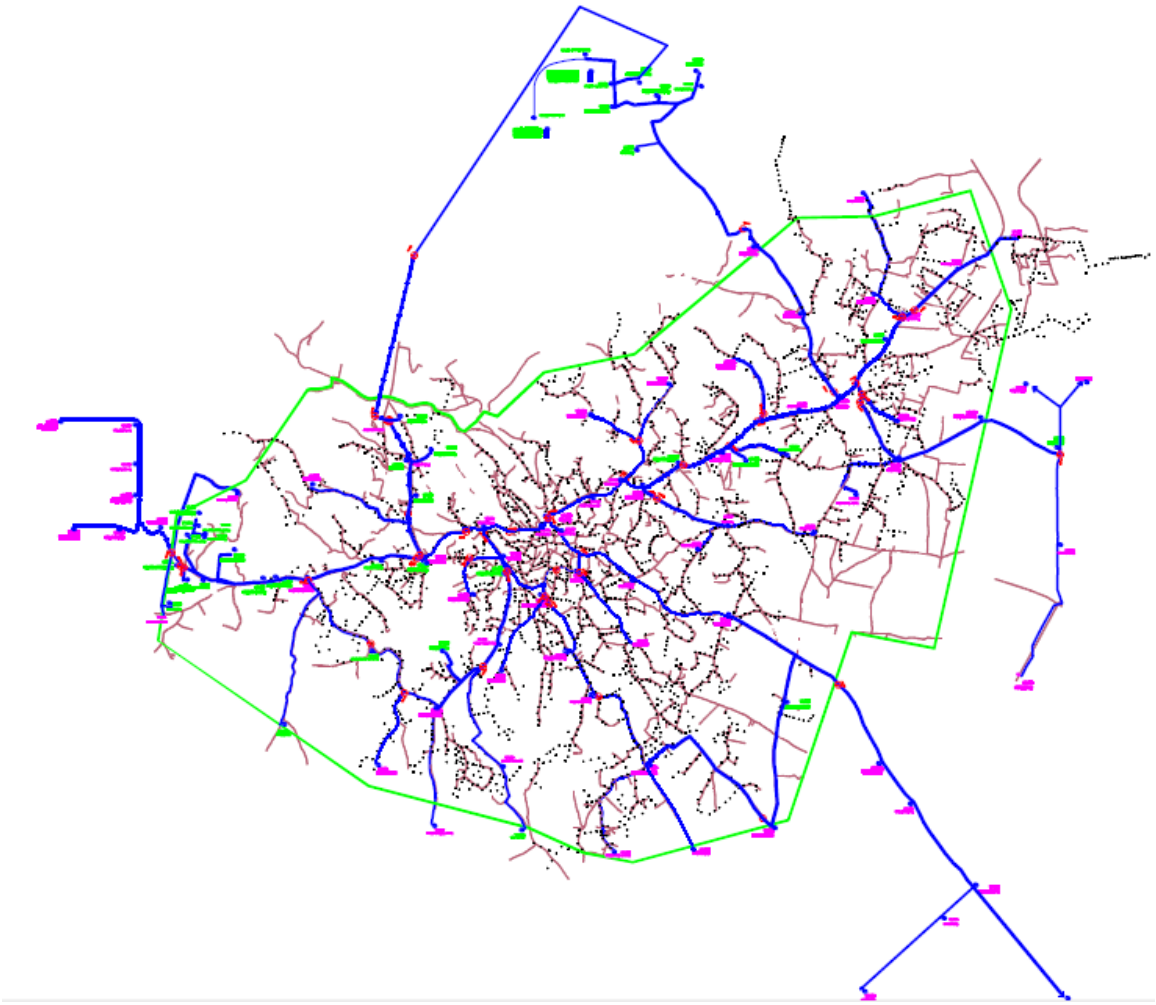


Figure 5. 1 Yatta's medium voltage network scheme

5.2 Etap software

For the last few years electrical engineers have been focusing on the power system studies using software tools. Recent advances in engineering sciences have brought a revolution in the field of electrical engineering after the development of powerful computer based software.

ETAP is a utility that will help electrical engineers in the processes of designing, simulating, operating and optimizing power systems.

ETAP offers a suite of fully integrated Electrical Engineering software solutions and large array of tools for power system design. The designed project can be studied by performing an , optimal load flow analysis, short-circuit analysis, motor acceleration analysis, harmonic analysis, transient stability analysis, relay coordination, cable ampacity, and others.

In our project we choose ETAP software due to its wide range properties, such as power flow studies, short circuit analysis, reliability studies, protection devices coordination, feasibility studies, availability and ease to use.

5.3 Present case study

In this section, present case of network is simulated using Etap to calculate and analyze power flow, currents, transformers loading, power factor, losses, and another parameters.

5.3.1 Single Line Diagram & Etap Input Data

Using Yatta's medium voltage network scheme, SLD has been built as shown in Figure5.2. The diagram shows all tr-r's, cables and transmission lines, ring connections, and loads. See Appendix B.

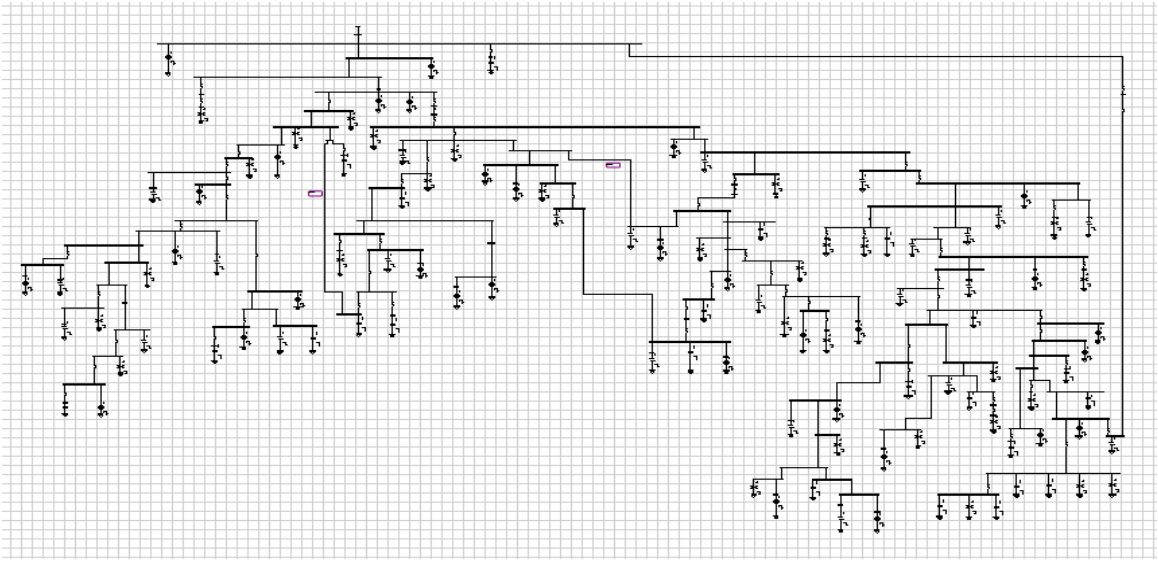


Figure 5. 2 Single Line Diagram for Yatta city using Etap Software

After building Yatta's network SLD using Etap, the total buses, transmission lines, cables, and transformers are illustrated in table 5.1.

All branches specification are illustrated in Appendix E.

Table 5. 1 Etap input data

Input Data	Number	Total Length (km)
Buses	247 (138 bus for 33 kV , 109 bus for 0.4 kV)	-
Transmission Lines	75 (67 with 50 mm2,1 with 95 mm2 ,7 with 120 mm2)	40.288
Cables	64 (62 with 50 mm2, 2 with 95 mm2)	23.924
Transformers	109	-

5.3.2 Etap Result Data

The following results appears after simulating the network

1- There is no over loaded transformers, cables, or transmission lines. The range of maximum loading is below 100%.
2- Voltage drop values are acceptable for cables, Transmission lines, and Transformers regarding to IEC standard.
3- The losses which evaluated in the network, were acceptable.

$$\text{average losses (kW)} = \text{LLF} * \text{maximum losses (kW)} \quad (5.1)$$

$$\text{average losses (kW)} = 0.36 * 186\ \text{(kW)} = 66.96\ \text{kW}$$

$$\text{percentage of losses} = \frac{\text{average losses(kW)}}{\text{average load(kW)}} \tag{5.2}$$

$$\text{percentage of losses} = \frac{66.96\text{(kW)}}{7458\text{(kW)}} = 0.9\%$$

4- The power factor is acceptable for general, and (general and special), but for the special loads is below the allowable value (motor loads) regarding to SELCO standerds.

Fig 5.3 showing the summery report using Etap for present case.

SUMMARY OF TOTAL GENERATION , LOADING & DEMAND

	MW	Mvar	MVA	% PF
Source (Swing Buses):	13.032	6.250	14.454	90.17 Lagging
Source (Non-Swing Buses):	0.000	0.000	0.000	
Total Demand:	13.032	6.250	14.454	90.17 Lagging
Total Motor Load:	5.576	4.899	7.422	75.13 Lagging
Total Static Load:	7.270	2.919	7.834	92.80 Lagging
Total Constant I Load:	0.000	0.000	0.000	
Total Generic Load:	0.000	0.000	0.000	
Apparent Losses:	0.186	-1.568		
System Mismatch:	0.000	0.000		

Number of Iterations: 3

Figure 5. 3 Etap result at maximum load in present case

Table 5.2 illustrates losses, over loading, and voltage drop results, Fig. 5.4 shows the percentage of each element losses to the total losses.

Table 5. 2 Cables, transmission line, and tr-rs results for present case

	MW Losses	**Mvar Losses**	**% Overloading**	**Voltage Drop**
Cables	0.072282	-1.75072	0.0	< 5%
Transmission Lines	0.041637	0.97389	0.0	< 5%
Transformer	0.072463	0.280541	0.0	< 5%

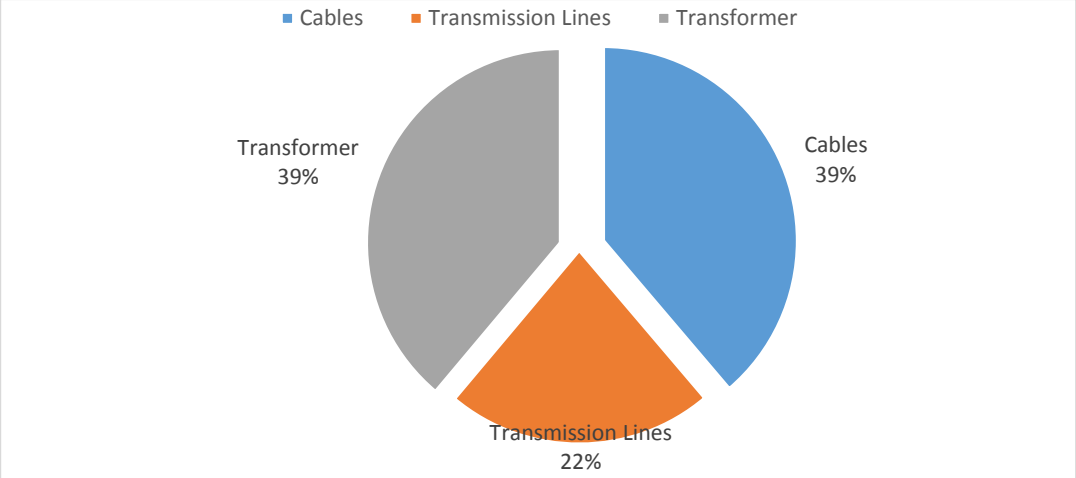


Figure 5. 4 Losses percentage for tr-rs, cables, and transmission lines

5.4 Problems that appears after analyzing the network.

After analyzing the network, two problems appears;

1- The maximum capacity of the main feeder at interconnection point is 250A, due to small cross section of the feeder, and the maximum current demand for Yatta's network in 2015 exceeds the limit. See fig 5.5.

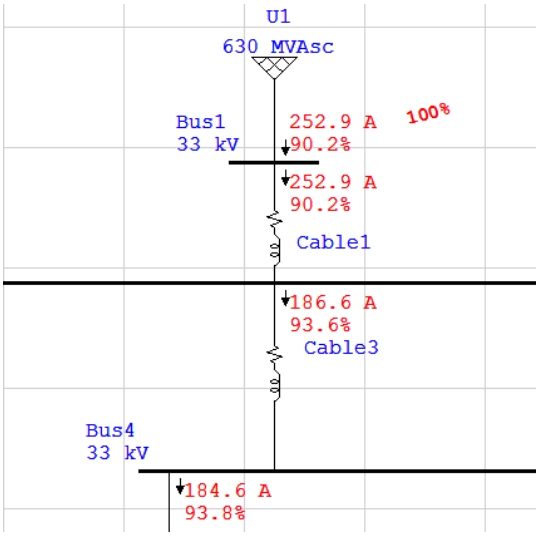


Figure 5. 5 Max. Current at interconnection point for present case

2- The power factor for special loads was below allowable limit. Figure 5.6 shows a real case of power factor for industrial feeders in the network.

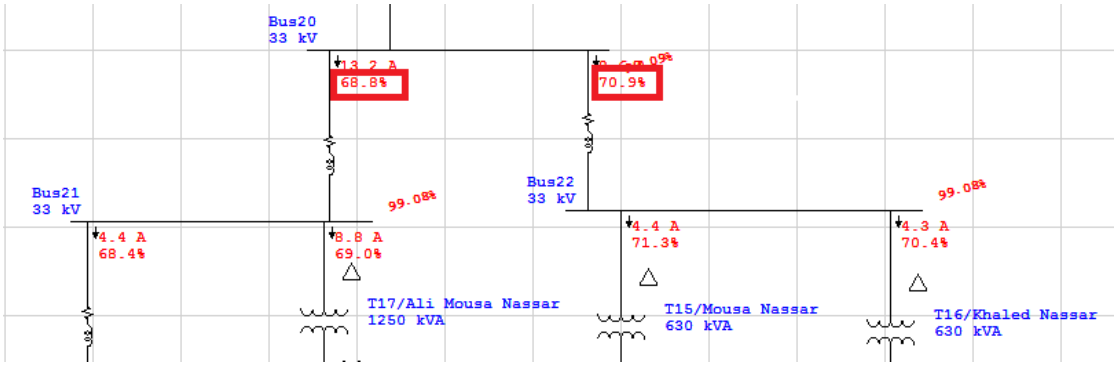


Figure 5. 6 Power factor for industrial load feeders

5.5 Solutions

5.5.1 Scenario one

By increasing the cross section of the main feeder of Yatta, but this solution is not applicable because this feeder is the only source for Yatta and another villages, so replacing this feeder will take long period and the cost will be high. In addition that this feeder is belong to IEC.

5.5.2 Scenario two

By adding another interconnection points to IEC, adding capacitor banks for industrial loads, dividing Yatta's network into zones, then making ring connections. This solution is applicable and profitable because ring connection will satisfy continuity of service for costumers, and increase the reliability.

The suggested solution is by adding two interconnection points, one at (Zeef) bus, and the second from (Khallet Al-Maiia) village, so Yatta will divided into 3 zones as shown in Figure 5.7.

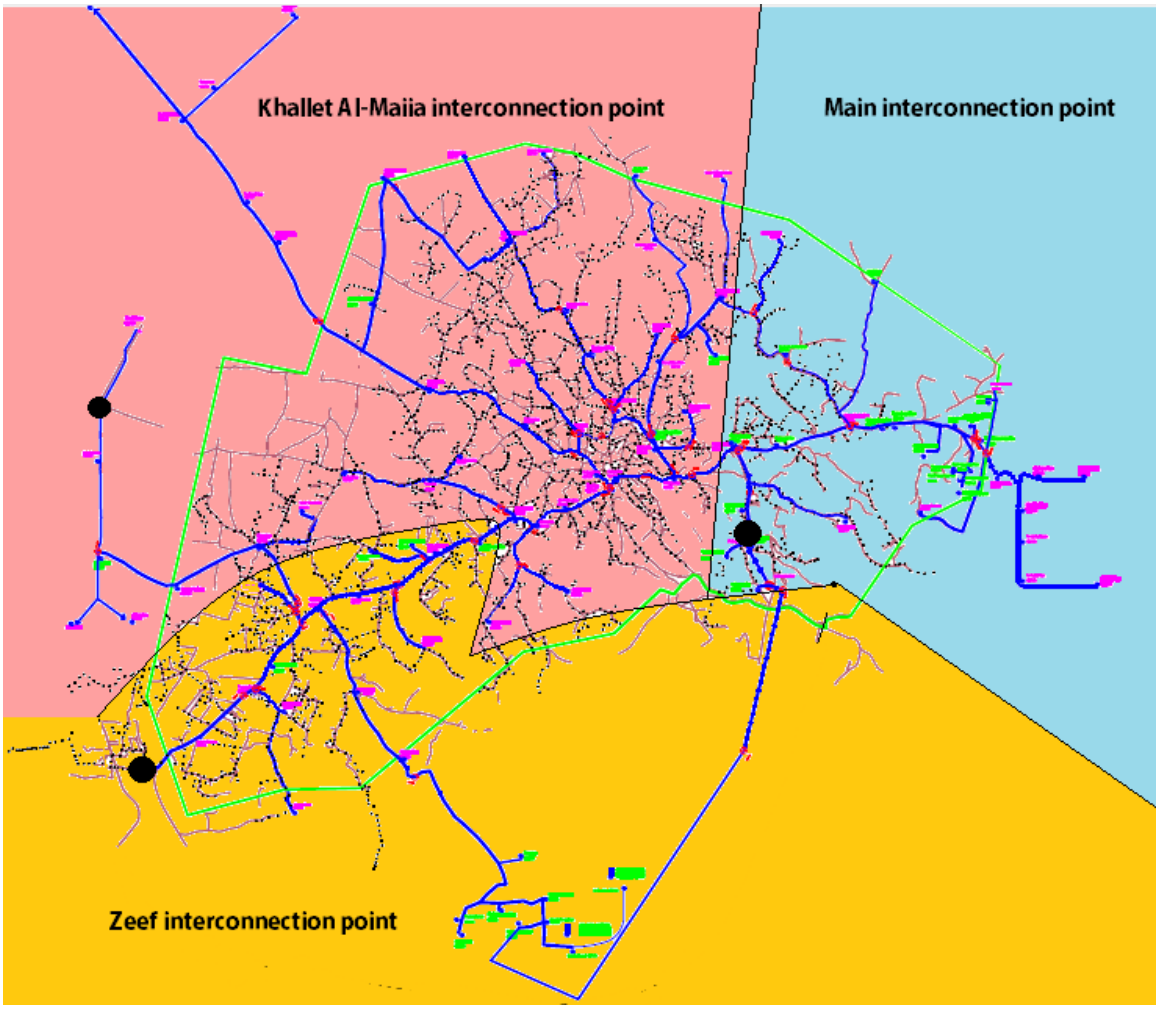


Figure 5. 7 Yatta's medium voltage scheme after adding 2 interconnection points

Now, for the second problem SELCO needs to impose industrial loads to connect capacitor banks in order to improve the power factor until 90%.

To calculate the size of capacitor banks to be installed at 0.4 kV bus, the following formula is given

$$Q_c = P * (\tan \emptyset_1 - \tan \emptyset_2) \quad (5.3)$$

Where P is the active power at certain$Cos\emptyset$, factor $(tan\ \emptyset_1 - tan\ \emptyset_2)$ can be found in Table 5.3 based on existing and desired power factor in the grid

Table 5. 3 Determination of desired factor (tan ∅_1- tan ∅_2)

Existing				Desired	Power	Factor	$Cos\emptyset_2$				
$Cos\emptyset_1$	0.7	0.75	0.8	0.82	0.84	0.86	0.88	0.9	0.92	0.94	0.98
0.66	0.12	0.26	0.39	0.45	0.49	0.55	0.60	0.66	0.71	0.78	0.85
0.68	0.06	0.20	0.33	0.38	0.43	0.49	0.54	0.60	0.65	0.72	0.79
0.70		0.14	0.27	0.33	0.38	0.43	0.49	0.54	0.60	0.66	0.73
0.72		0.08	0.22	0.27	0.32	0.37	0.43	0.48	0.54	0.60	0.67
0.74		0.03	0.16	0.21	0.26	0.32	0.37	0.43	0.48	0.55	0.62
0.76			0.11	0.16	0.21	0.26	0.32	0.37	0.43	0.50	0.56
0.78			0.05	0.11	0.16	0.21	0.27	0.32	0.38	0.44	0.51
0.80				0.05	0.10	0.16	0.21	0.27	0.33	0.39	0.46
0.82					0.05	0.10	0.16	0.22	0.27	0.33	0.40
0.84						0.05	0.11	0.16	0.22	0.28	0.35
0.86							0.06	0.11	0.17	0.23	0.30
0.88								0.06	0.11	0.17	0.25
0.90									0.06	0.12	0.19
0.92										0.06	0.13
0.94											0.07

Figure 5.8 shows an example of adding capacitor banks for industrial loads

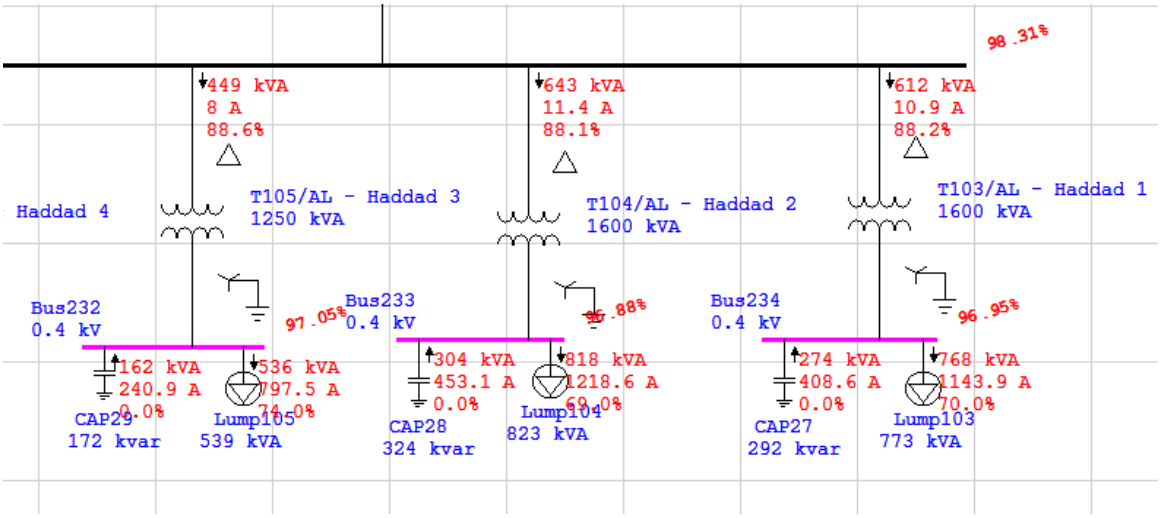


Figure 5. 8 Example of adding capacitor banks in Etap

Figure 5.9 shows the three interconnection points before connecting capacitor banks, and Figure 5.10 after connecting capacitor banks.

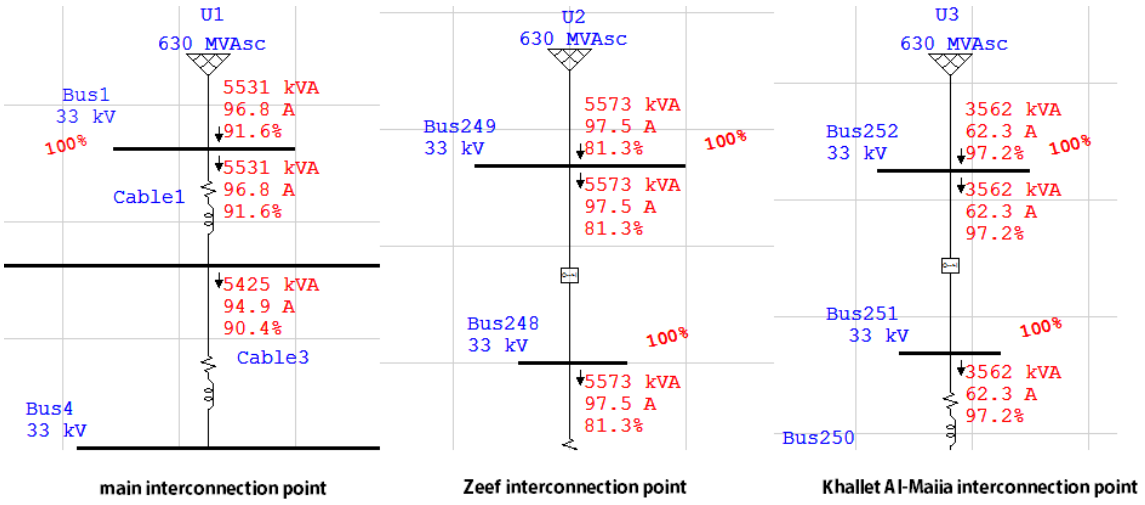


Figure 5. 9 Interconnection points before connecting capacitor banks

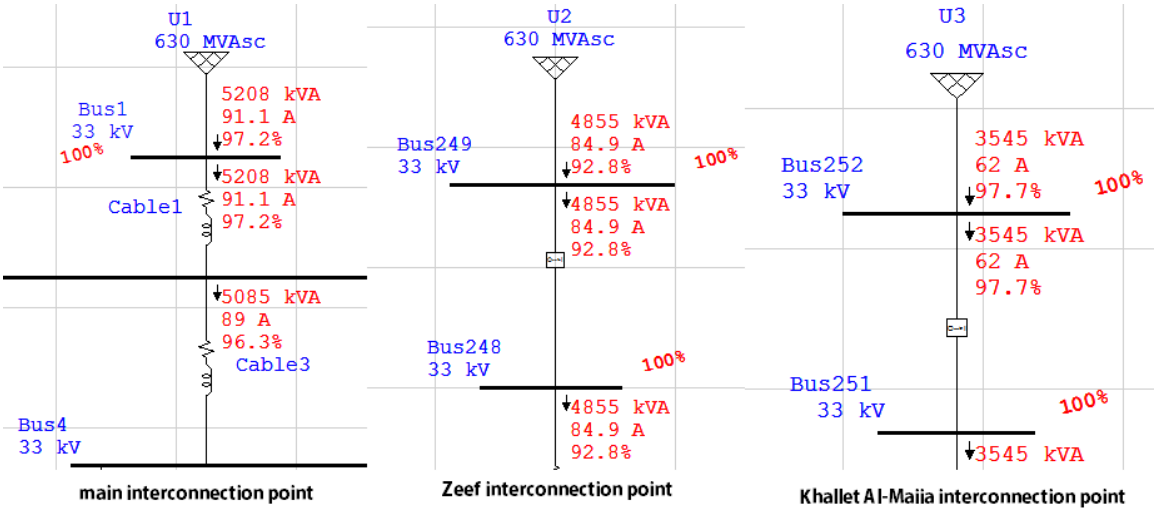


Figure 5. 10 Interconnection points after connecting capacitor banks

Table 5.4 illustrate the state of Yatta's network before adding interconnection points, then after adding interconnection points and capacitor banks.

U1: main interconnection point, U2: Zeef interconnection point, U3: Khallet Al-Mai interconnection point.

Table 5. 4 state of network before and after adding interconnection points

Value	Before	After		
Interconnection point	U1	U1	U2	U3
MVA	14.454	5208	4855	3545
Ampere	252.9	91.1	84.9	62
%Power Factor	90.2	97.2	92.8	97.7

Voltage profile

After installing capacitor banks, an improvement happened to voltage profile at the network buses as shown in Figures 5.11 and 5.12.

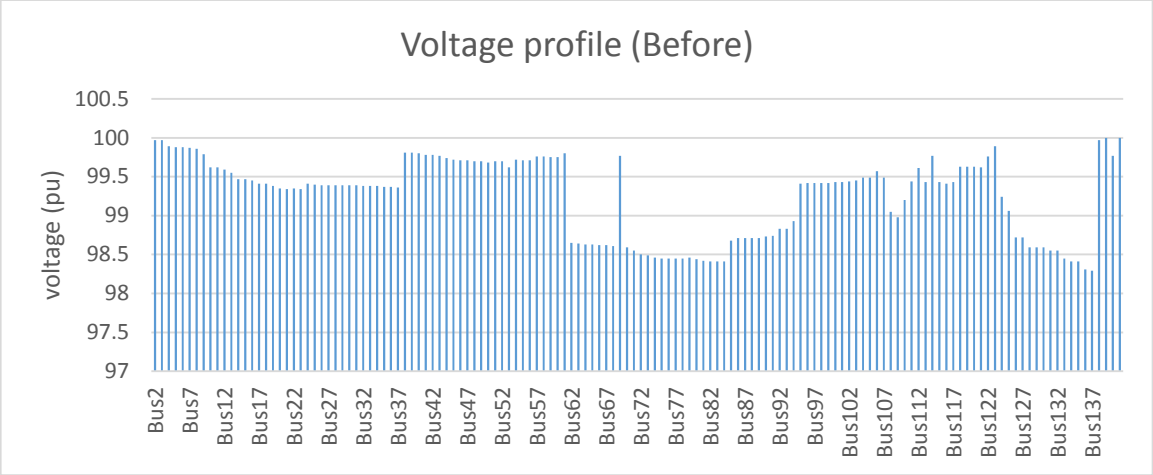


Figure 5. 11 Voltage profile before adding capacitor banks

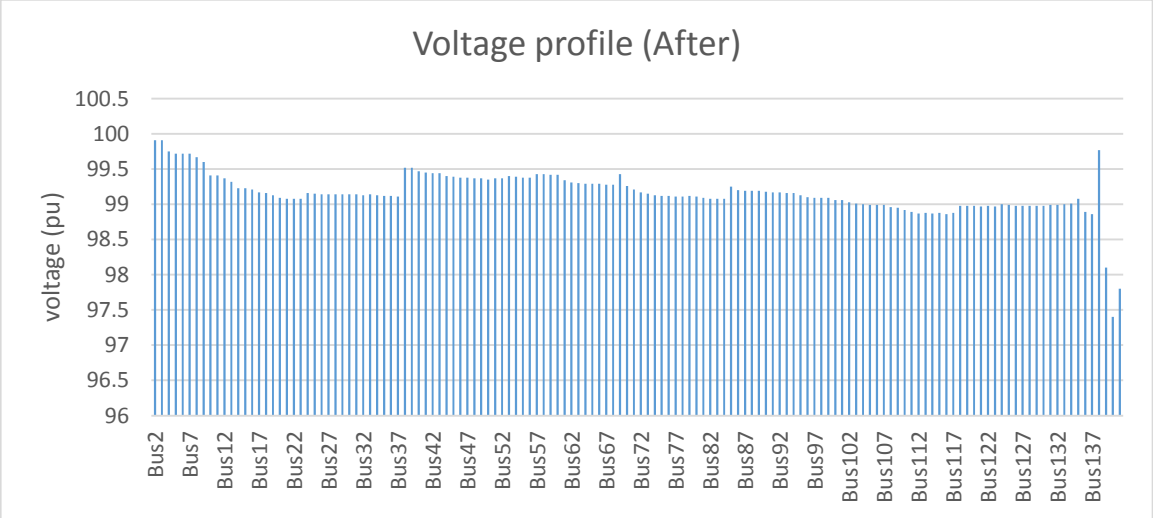


Figure 5. 12 Voltage profile after adding capacitor banks

5.5.3 Scenario three

Photovoltaic distribution generation

Palestine is located between the longitudes 34.15° and 35.40° east and between the latitudes 29.30° and 33.15° north. It has a high solar energy potential, where the daily average of solar radiation intensity on horizontal surface is 5.4 kWh/m2, while the total sunshine hour's amounts to about 3000 and this is enough to produce solar energy in a sustainable way, for that we suggest to build PV distribution generation for residential, government, and industrial buildings[22].

In Yatta's network there are 8219 residential customer, 39 government and educational customer, 34 industrial customer, and about 150 lightning poles on the main street.

5.5.3.1 PV system suggestion in details

Residential customers

If we suggest 10% of total customers installs a PV source with 5kW rated power, the number of PV's will be about 820 systems with total rated power of about 4100 kW.

$$\text{average power(kW)} = \text{rated power (kw)} * \text{cf} \tag{5.4}$$

Where CF= 0.225 for Palestine region.

$$\text{average power(kW)} = 4100 * 0.225 = 922.5 \text{ kW}$$

Government and educational customers

In this section, at least 80% of the buildings must install a PV system, so the number of systems will be 31, with 10 kW rated power for each. The total rated power for this section will be about 310 kW.

Depending on equation 5.6, the average power will be,

$$\text{average power(kW)} = 310 \text{ kW} * 0.225 = 69.75 \text{ kW}$$

Industrial customers

By suggestion, 80% of this section must install a PV system, so 27 PV systems must be installed with 50kW rated power for each. The total rated power will be about 1350 kW.

Depending on equation 5.6, the average power will be,

$$\text{average power(kW)} = 1350 \text{ kW} * 0.225 = 303.75 \text{ kW}$$

Lightning poles on the main street

The number of poles is 150, so by installing 0.5 kW system for each pole, the total rated power will be 75 kW. Depending on equation 5.6, the average power will be,

$$\text{average power(kW)} = 75 \text{ kW} * 0.225 = 16.875 \text{ kW}$$

Installing a PV system station in (Masafer Yatta)

In order to decrease depending on (IEC), we suggest installing a PV system station, with total rated power of 1MW.

The most appropriate region for this suggestion is in (Masafer Yatta) because it's a remote area.

By using Sharp NU-U235F1 model, 4256 modules are required to produce 1MW rated power, with total area of about 9000m2, and average power of about 225kW.

$$\text{Total area of PV system } (\text{m}^2) = \text{length(m)} * \text{width(m)} * \#\text{of modules} * 1.3 \quad (5.5)$$

$$\text{Total area of PV system } (\text{m}^2) = 1.64\ \text{m} * 0.994\ \text{m} * 4256 * 1.3 = 9000m^2$$

The factor 1.3 means that 30% additional area to avoid shading between modules.

Figure 5.13 shows the PV array specifications using Etap, and Figure 5.14 shows the PV physical specifications using Etap.

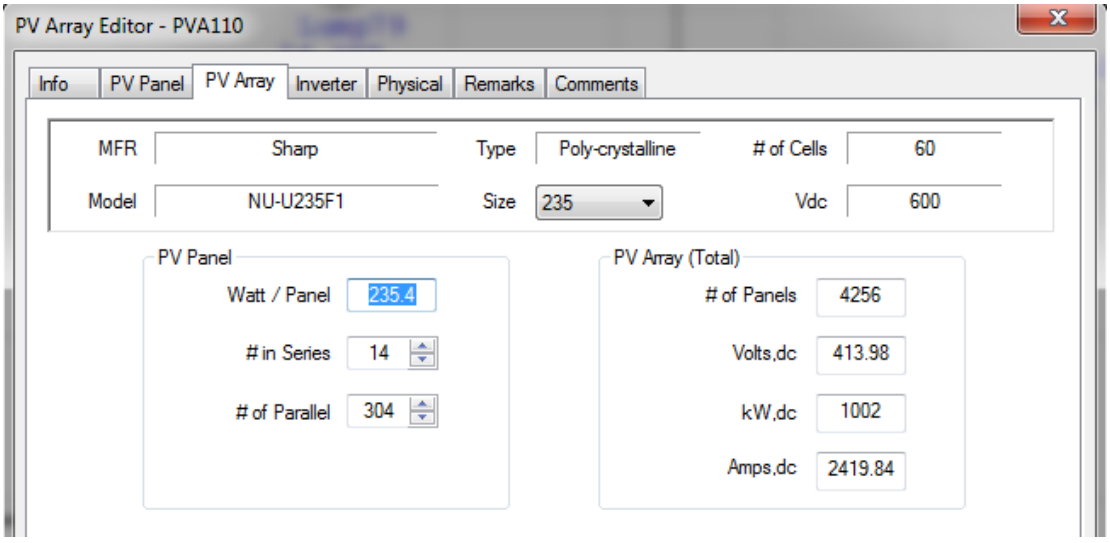


Figure 5. 13 Masafer Yatta PV array specifications using Etap

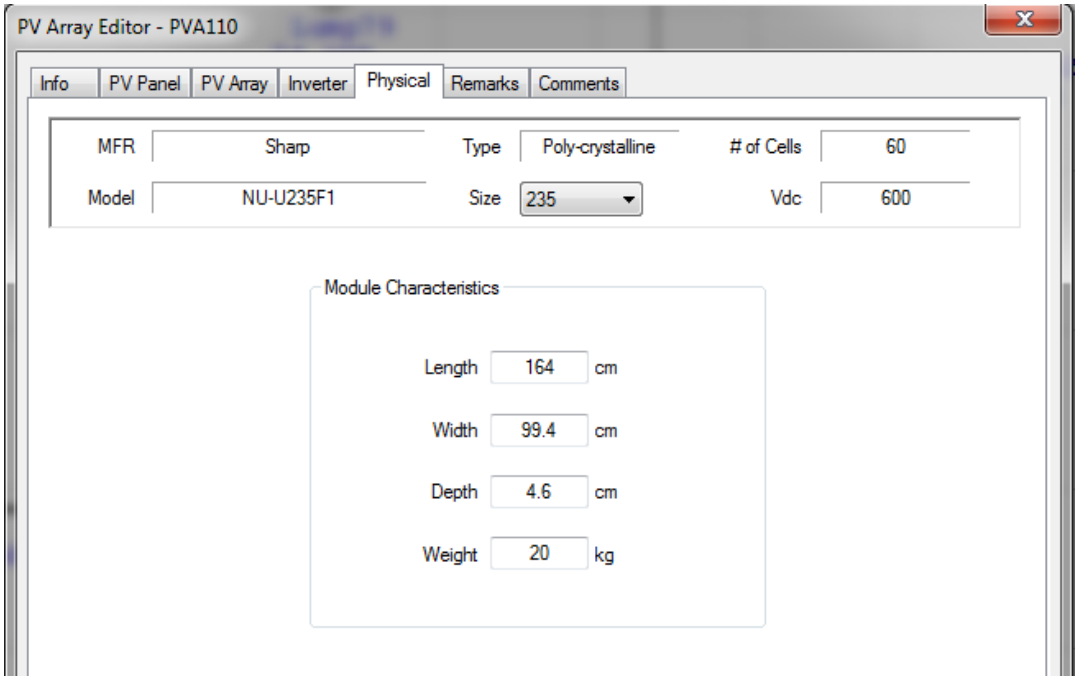


Figure 5. 14 Masafer Yatta PV physical specifications using Etap

5.5.3.2 Results

After building the PV system:

- the total rated power can be generated will equal 6.835 MW
- average power of 1.538 MW
- 20% of total consumption can be saved
- 3.62% of transformers lodging will be reduced.
- 29.4% of losses can be saved

Table 5.5 illustrate the calculations of PV systems for each load category. Table 5.6 illustrates average demand, average loading of transformers, and losses before and after installing the PV systems using Etap. Figure 5.15 and 5.16 shows the PV system contribution of total load demand in Yatta's network.

Table 5. 5 Summery of calculations for PV system scenario

Category	# of units	Suggested % of installation	#of expected installation	Suggested system size (kW)	Total rated installation (KW)	Total rated average installation (kW)
residential	8219	10%	820	5	4110	922.5
Government and civil institutions	39	80%	31	10	310	69.75
industrial	34	80%	27	50	1350	303.75
Lighting street poles	150	100%	150	0.5	75	16.875
PV stations	1	100%	1	1000	1000	225
Total					**6835**	**1538**

Table 5. 6 Effects of the PV system on the network

	Before PV	After PV	% of Reduction
MVA (at interconnection point)	7.4	5.9	20.27%
Avg. Loading of transformers	18.87%	15.24%	3.62%
losses (MW)	0.051	0.036	29.41%

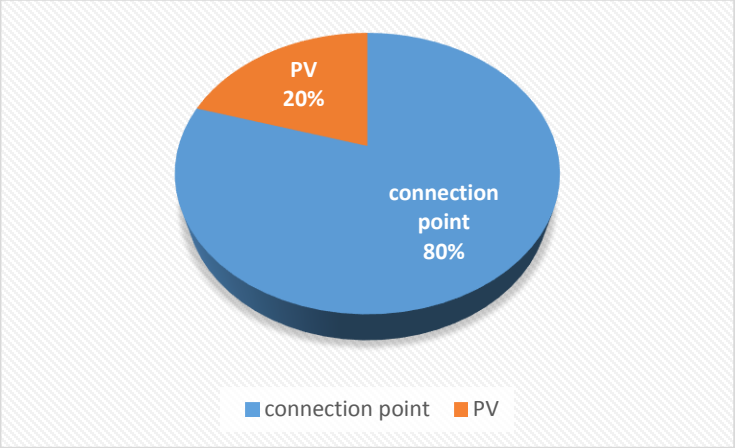


Figure 5. 15 PV system contribution of total load demand

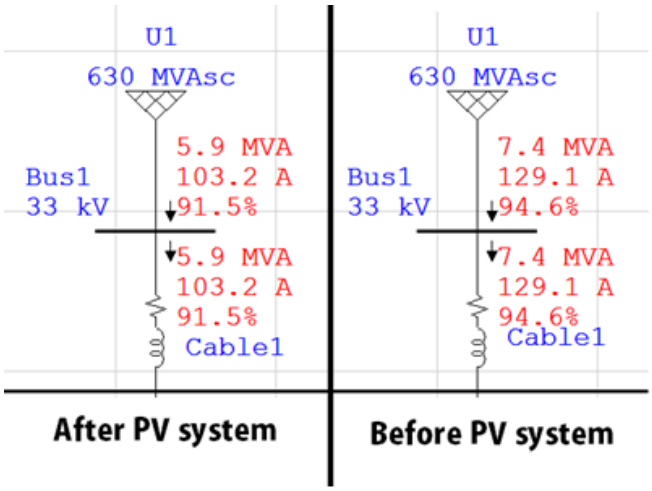


Figure 5. 16 Interconnection point state before and after adding PV system

5.5.3.3 After 10 years with PV scenario

If we suppose that the number of PV systems which belong to residential customers increase until become 40% of total customers, and a new PV station with 1MW rated power has been installed, then the total rated power will become 20.17MW with average power of about 4.538MW. Table 5.7 illustrates the calculations of PV systems for each load category after 10 years.

Table 5. 7 Summery of calculations for PV system scenario

Category	# of units	Suggested % of installation	# of expected installation	Suggested system size (kW)	Total rated installation (KW)	Total rated average installation (kW)
residential	8219	40%	3287	5	16435	3698
Government and civil institutions	39	80%	31	10	310	69.75
industrial	34	80%	27	50	1350	303.75
Lighting street poles	150	100%	150	0.5	75	16.875
PV stations	2	100%	2	1000	2000	500
Total					**20170**	**4538**

Average forecasted load for Yatta city after 10 years will become;

$$\text{Demand } 2025(\text{MW}) = \text{ Demand } 2015(\text{MW}) \text{ x } (1 + \text{annual increment})^{10} \quad (5.6)$$

$$\text{Demand } 2025(\text{MW}) = 7.548(\text{MW}) \text{ x } (1 + 0.09)^{10} = 17.87\text{MW}$$

So, the PV system contribution of total load demand after 10 years will be;

$$\frac{\text{average PV generation(kW)}}{\text{average consumption(kW)}} = \frac{4538 \text{ kW}}{17870 \text{ kW}} = 25.4\% \quad (5.7)$$

So we can produce 25.4% of our consumption after 10 years by this supposition, see Figure 5.17.

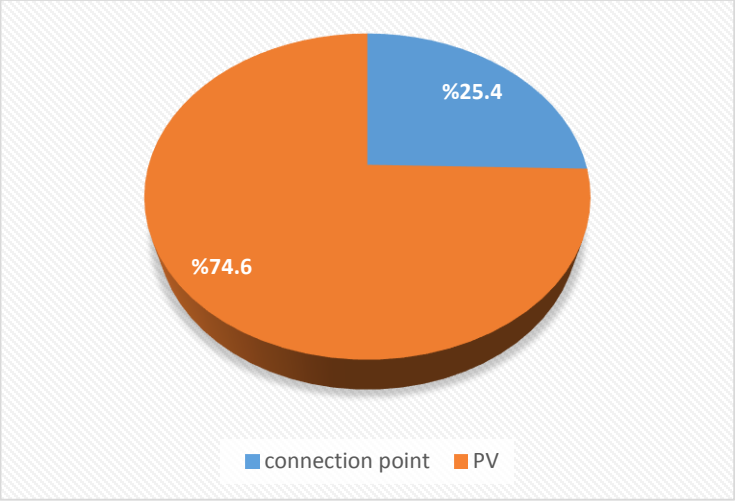


Figure 5. 17 PV system contribution of total load demand after 10 years

5.5.3.4 Transformers loading after installing PV system

PV arrays that connected at 0.4 kV buses will decrease transformers loading. The average power that produced by PV's at 0.4 kV buses equal 1313 kW in 2015 and 4038 kW in 2025 due to previous supposition, so annual growth of power that produced by PV system will be 11.89%.

By installing the PV system, the maximum demand will reaches transformers rating after 15 years, while without PV system after 11 years, so the critical point of transformers loading will be delayed for 4 years as shown in Figure 5.18. See Appendix F.

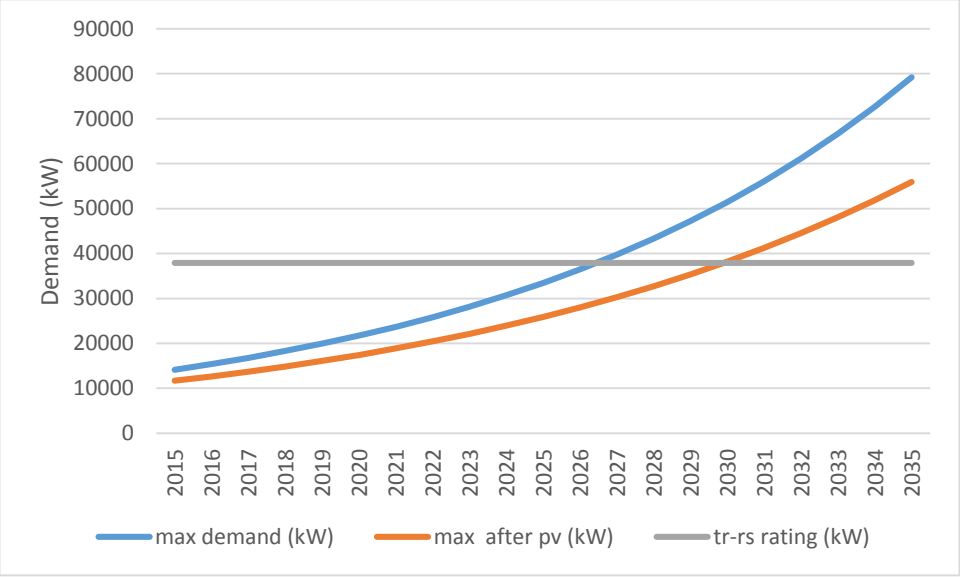


Figure 5. 18 Maximum demand before and after installing PV system

5.6 Network state after 11 years

The network will reach the critical point after 11 years due to load growth, the maximum apparent power will be about 39 MVA, power factor will become 85.57%, losses will become 1.307 MW, and 22% of transformers will be full and over loaded, as shown in Table 5.8. Figure 5.19 shows the losses percentage for each branch after 11 years, and Figure 5.20 illustrate the summery report of Etap in this case.

Table 5. 8 Transmission lines, cables, and transformers results after 11 years

	MW Losses	Mvar Losses	% of Overload	% Voltage Drop
Cables	516.481	-1544.315	0.0	< 10%
Transmission Lines	301.425	97.452	0.0	< 10%
Transformer	489.023	1922.035	22	< 10%

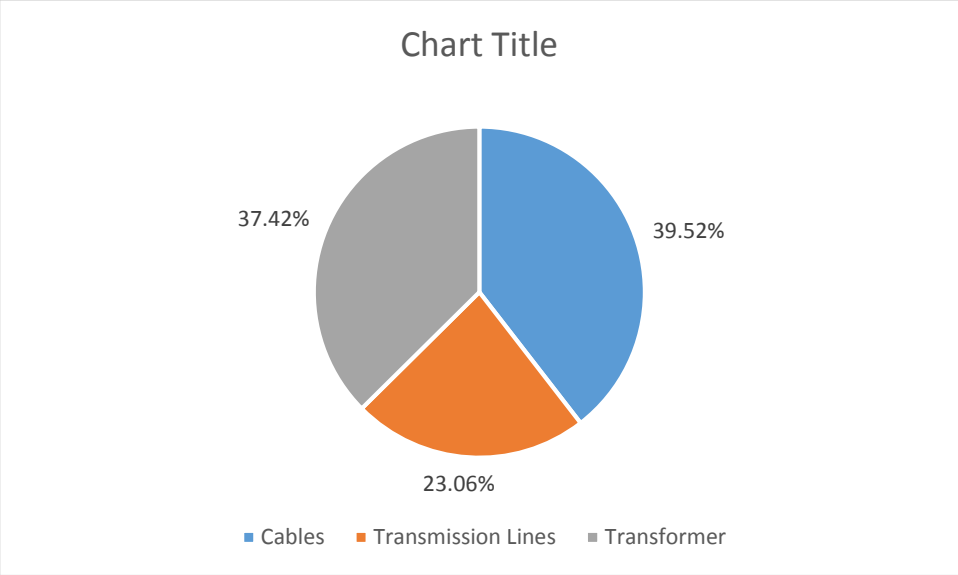


Figure 5. 19 Losses percentage for tr-rs, cables, and transmission lines after 11 years

SUMMARY OF TOTAL GENERATION , LOADING & DEMAND

	MW	Mvar	MVA	% PF
Source (Swing Buses):	33.372	20.179	38.999	85.57 Lagging
Source (Non-Swing Buses):	0.000	0.000	0.000	
Total Demand:	33.372	20.179	38.999	85.57 Lagging
Total Motor Load:	14.386	12.638	19.149	75.13 Lagging
Total Static Load:	17.679	7.067	19.039	92.86 Lagging
Total Constant I Load:	0.000	0.000	0.000	
Total Generic Load:	0.000	0.000	0.000	
Apparent Losses:	1.307	0.474		
System Mismatch:	0.000	0.000		

Number of Iterations: 3

Figure 5. 20 Summery report of Etap after 11 years.

5.7 Summery

In this chapter, present case of network has been analyzed and the problems have been determined, then three scenarios have been presented to solve these problems, after that, depending on load growth, the network state will be at the critical point (the maximum demand equals transformers rating) after 11 years, so the network has been analyzed at this case.

Chapter Six

Protection Coordination Studies

6.1 Automatic circuit reclosers

An automatic circuit recloser is a self-contained device with the necessary circuit intelligence to sense over-currents, to time and interrupt the over-currents, and to reclose automatically to reenergize the line. If the fault should be "permanent," the recloser will "lock open" after a preset number of operations (usually three or four) and thus isolate the faulted section from the main part of the system [23].

6.1.1 Reclosers locations and functions

Reclosers can be used anywhere in the system, and the reclosers ratings must be adequate for the system requirements. Logical locations are:

- In substations as the primary feeder protective device.
- On the lines at a distance from a substation, to sectionalize long feeders and thus prevent outages of the entire feeder when a permanent fault occurs near the end of the feeder.

6.1.2 Recloser application factors

Six major factors must be considered for proper application of automatic circuit reclosers, system voltage, maximum fault current, maximum load current, minimum fault current, coordination with other protective devices on both source and load sides of the recloser, ground-fault sensing. Figure 6.1, illustrates the principle of operation for the recloser.

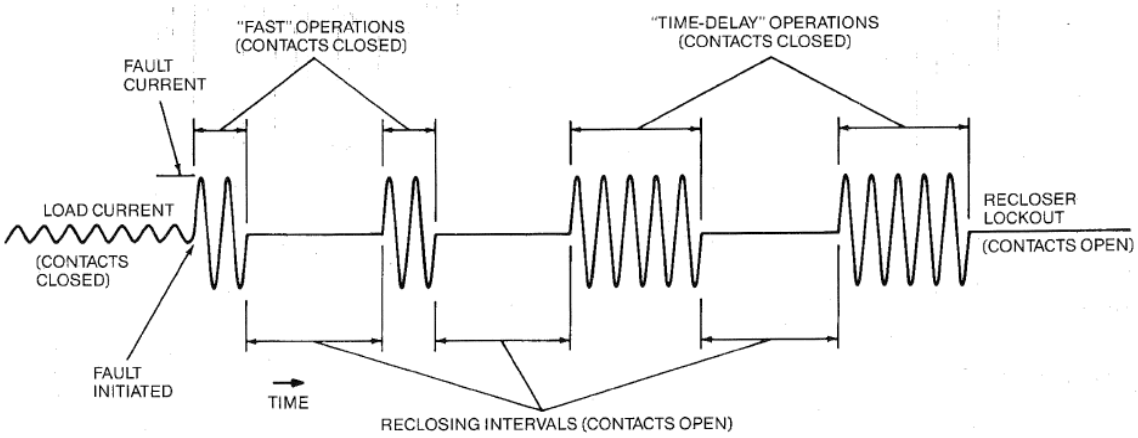


Figure 6. 1 Typical recloser operating sequence to lockout.

6.2 Auto-Reclosers in present case study

As mentioned in chapter two, Yatta's Network has three Auto-Reclosers, used as load break switch and don't have coordination or setting.

In this section we will add another two reclosers, and divide the network into four protection zones using Etap software. Then considering four reclosers as primary protection for each zone, also one as backup protection for the others.

Figure 6.2 shows these protection zones on Yatta's medium voltage network scheme, and Figure 6.3 illustrates protection criterias using Etap.

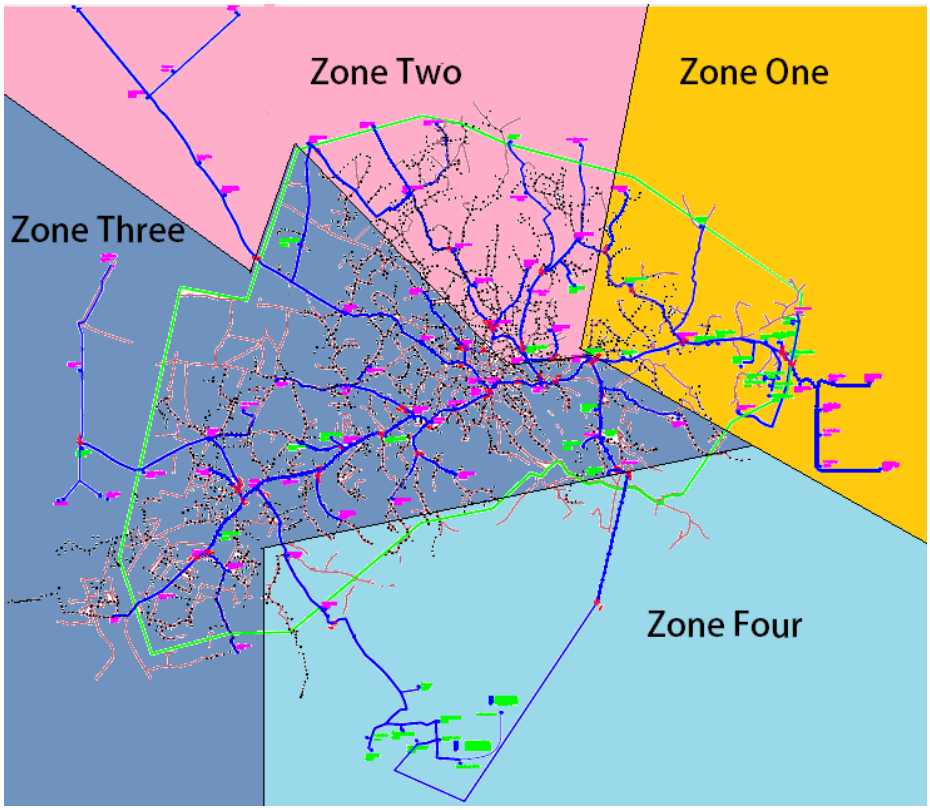


Figure 6. 2 Yatta's network suggested protection zones

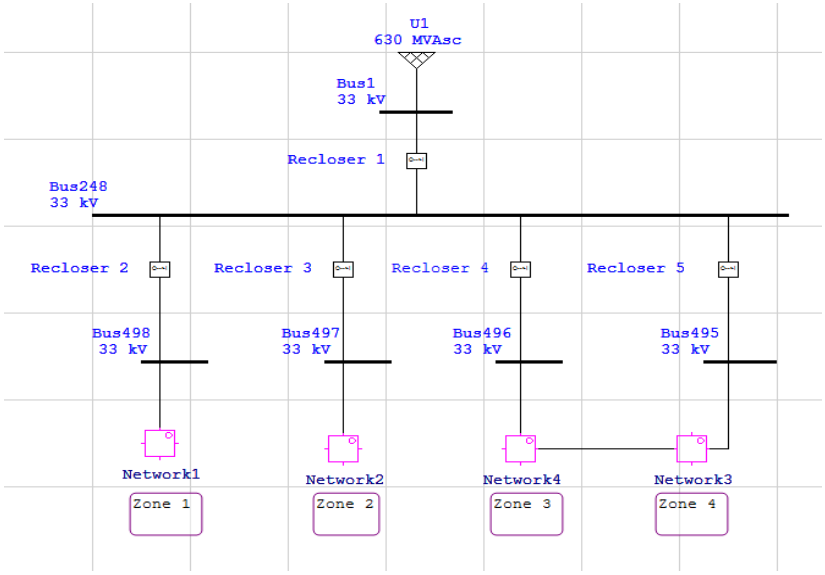


Figure 6. 3 Protection zones using Etap

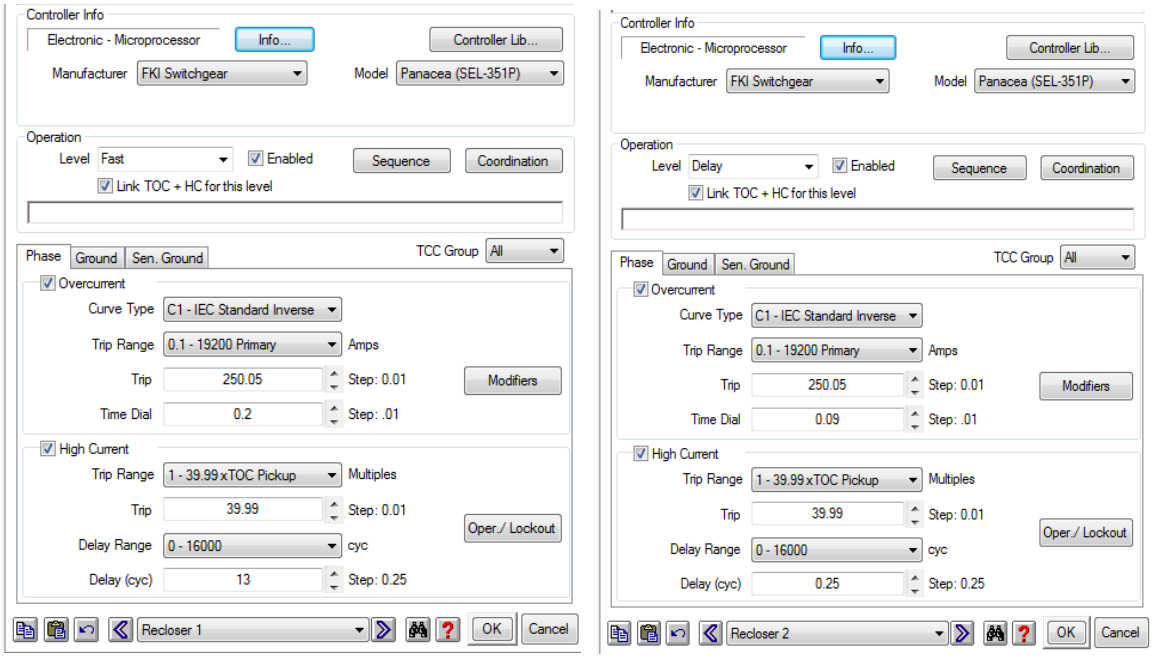
6.2.1 Reclosers setting

The ratings for GVR38 recloser are mentioned in Table 2.1, then entered to Etap.

The recloser-electronic type with model Panacea (SEL-351P) controller is used to control the operations of the recloser. This controller can operate in two modes:

1- Fast: To isolate the fault as soon as it detected, and lockout without any chance to re-energize the network.
2- Delay: To give a chance for the recloser to re-energize the network again, with time delay if the fault has been terminated.

The Recloser 1 is used to operate in Fast mode only, where the rest are used to operate in the two modes (Fast & Delay). Reclosers 2, 3, 4 and 5 have the same settings. Figure 6.4 shows the setting values of the reclosers.



a) Recloser 1 setting values. b) Recloser 2, 3, 4 and 5 setting values.

Figure 6. 4 Setting values of the reclosers.

6.2.2 Recloser-to-Recloser coordination

Short circuit current in the network is 11 kA at the main interconnection point, where it reduces as moving away from interconnection point due to the changing of impedance, so the devices must be coordinated with each other to pick -up the minimum value of short circuit current as soon as it detected and terminate it by the nearest recloser in the zone.

In order to coordinate these devices with each other, the difference between the operating time of the primary and backup protection should always be greater than 200 ms[24].

According to the mentioned setting values, the coordination between recloser1 and recloser2 using TCC curves -as example- is shown in Figure 6.5.

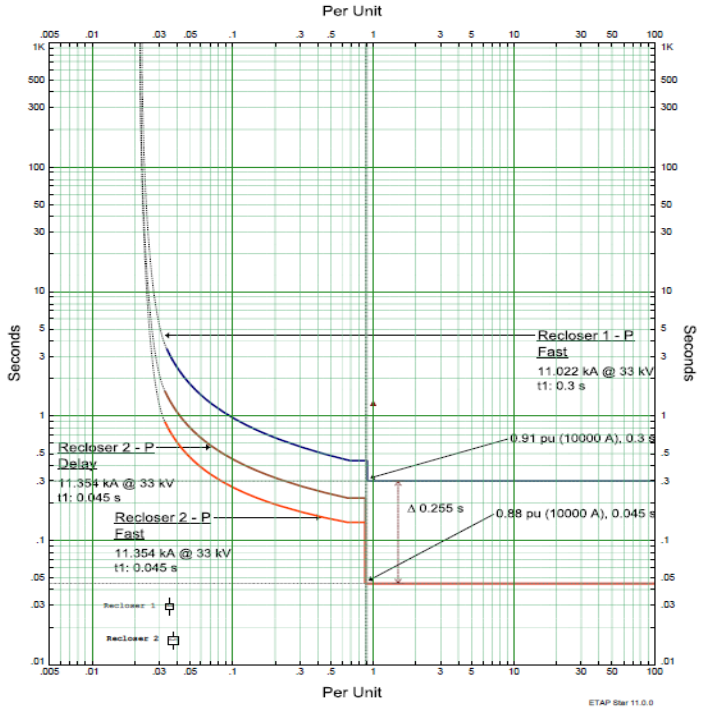


Figure 6. 5 TCC curves of recloser 1 and 2 as protection Coordination example.

The result of this coordination is illustrated in Figure 6.6, which showing that when recloser 2 detect a fault with a value of 11.354 kA, it will be activated for first operation (open) at 5.0 ms, then recloses with time delay of 250 ms, if the fault does not terminated, the second operation will also activate, and then recloses with time delay of 1000 ms, finally if the fault is still existing the third operation will activate, so the recloser will lockout (Open permanently). After all these sequences, if recloser 2 fail to isolate the fault, the backup protection (recloser 1) will operate. Figure 6.7 shows the sequence of operation for the primary and backup reclosers.

Sequence-of-Operation Events - Output Report: Untitled

3-Phase (Symmetrical) fault on bus: Bus498

Data Rev.: Base Config: Normal Date: 05-02-2015

Time (ms)	ID	If (kA)	T1 (ms)	T2 (ms)	Condition
45.0	Recloser 2	11.354	5.0	45.0	1st Operation - Phase - Fast - HC
295	Recloser 2		250		1st Recloser
300	Recloser 1	11.022	260	300	1st Operation - Lockout - Phase - Fast - HC
340	Recloser 2	11.354	5.0	45.0	2nd Operation - Phase - Delay - HC
1340	Recloser 2		1000		2nd Recloser
1385	Recloser 2	11.354	5.0	45.0	3rd Operation - Lockout - Phase - Delay - HC

Figure 6. 6 Result of recloser 1 & 2 coordination in Yatta's network.

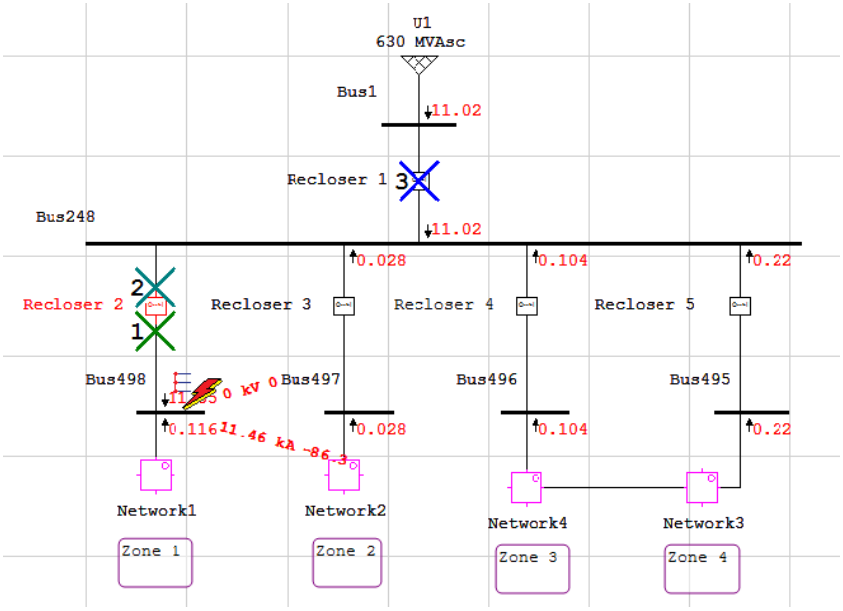


Figure 6. 7 The sequence of operation for the recloser 1 & 2.

6.2.3 Recloser and fuse coordination

For optimum operating of protection devices in the system, the following basic coordination principles must be observed:

1. The load-side protection device (fuse) must clear a permanent or temporary fault before the source-side protection device (recloser) interrupts the whole feeder.
2. Outrages caused by permanent faults must be restricted in the smallest section of the system.

So, in this section we will present a coordination between recloser 2 & fuse 8, which represents a real case in our project, where fuse 8 is considered as primary protection and recloser 2 as backup protection. T8/Haroon AL – Rasheed transformer was taken as an example to apply this coordination. The ratings of fuse 8 selected from Etap library is shown in Figure 6.8.

As in the previous section, the setting values of recloser 2 is the same. The coordination using TCC curves between recloser 2 and fuse 8 is shown in Figure 6.9.

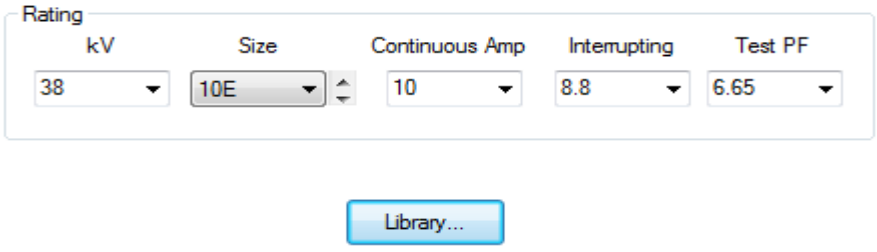


Figure 6. 8 Ratings of fuse used in the example of coordination.

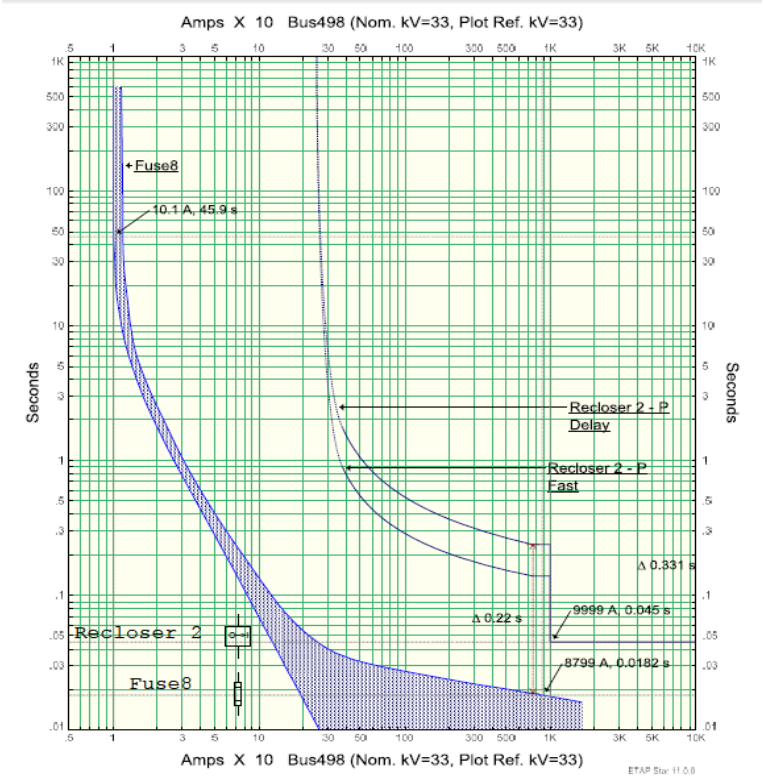
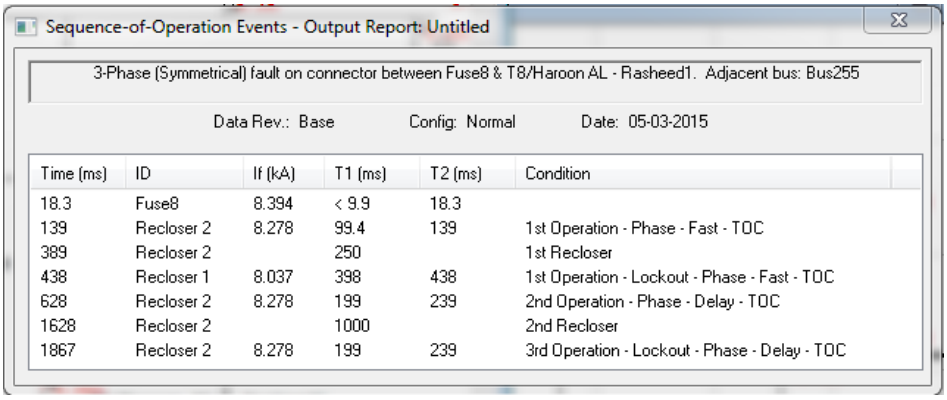


Figure 6. 9 TCC curves of recloser 2 and fuse 8 as protection coordination example.

The result of this coordination is shown in Figure 6.10. If we apply a fault at the transformer, the fuse must blow and isolate the fault at a maximum time of 9.9 ms, but if the fuse fail to isolate the fault, the backup protection (recloser 2) will activate as mentioned in the previous section. Figure 6.11 shows the sequence of operation for recloser 1, 2 and fuse 8.



Time (ms)	ID	If (kA)	T1 (ms)	T2 (ms)	Condition
18.3	Fuse8	8.394	< 9.9	18.3	
139	Recloser 2	8.278	99.4	139	1st Operation - Phase - Fast - TOC
389	Recloser 2		250		1st Recloser
438	Recloser 1	8.037	398	438	1st Operation - Lockout - Phase - Fast - TOC
628	Recloser 2	8.278	199	239	2nd Operation - Phase - Delay - TOC
1628	Recloser 2		1000		2nd Recloser
1867	Recloser 2	8.278	199	239	3rd Operation - Lockout - Phase - Delay - TOC

Figure 6. 10 Result of recloser 1, 2 and fuse 8 coordination in Yatta's network.

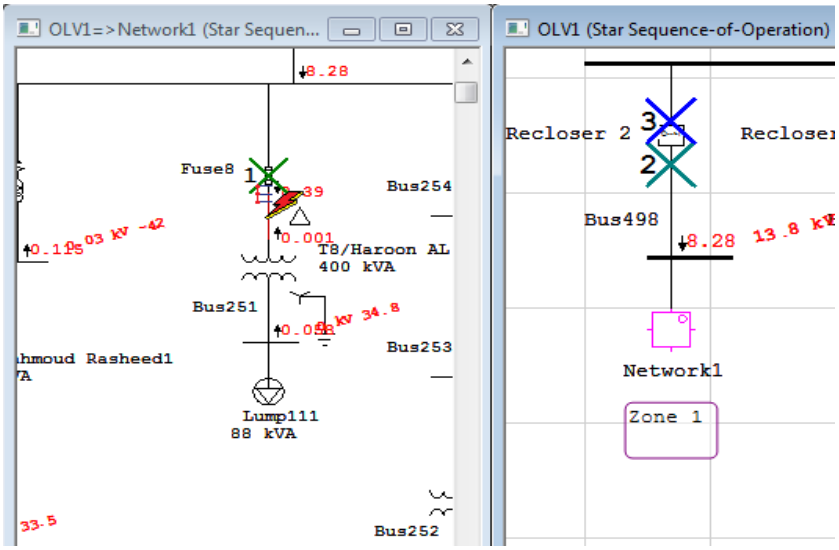


Figure 6. 11 The sequence of operation for the three protective devices.

6.3 Summery

In this chapter, Yatta's network has been divided into four protection zones, then appropriate protection devices has been designed and coordinated to restrict the fault zone and avoid whole system interrupt, so continuity of service and reliability can be achieved.

Chapter Seven

Conclusions and Recommendations

Conclusions

Present case overview

The average load in this study case for Yatta city in 2015 is about 7.548 MW which equal 8.386 MVA by applying 0.90 power factor. The maximum demand is 15.7 MVA.

1- There is no over loaded transformers, cables, or transmission lines.
2- Voltage drop values are acceptable for cables, Transmission lines, and Transformers.
3- The losses which evaluated in the network, were acceptable.
4- The power factor is acceptable for general, and (general and special), but for the special loads is below the allowable value.

Present case problems

1- The maximum capacity of the main feeder at interconnection point is 250A, due to small cross section of the feeder, and the maximum current demand for Yatta's network in 2015 exceeds the limit.
2- The power factor for special loads was below allowable limit. It's about 75%.
3- Any small disturbance at medium voltage network will lead to electricity interruption.

Solution scenarios

Scenario one

By increasing the cross section of the main feeder of Yatta, but this solution is not applicable because this feeder is the only source for Yatta and another villages, so replacing this feeder will take long period and the cost will be high. In addition that this feeder is belong to IEC.

Scenario two

By adding another interconnection points to IEC, adding capacitor banks for industrial loads, dividing Yatta's network into zones, then making ring connections. This solution is applicable and profitable because ring connection will satisfy continuity of service for costumers, and increase the reliability.

Scenario three

To install PV systems by residential, governmental, and industrial customers, so by this scenario we can provide the network and increase dependability.

By this scenario the PV systems will produce 20% of the annual consumption.

The solutions

For the first problem

Installing PV systems taking more than one year and the maximum demand of the network now is higher than the main feeder capacity.

So the best solution for this problem is by adding at least a new interconnection point and start installing PV systems, by this way we can produce amount of our electrical energy within the following years

For the second problem

By installing capacitor banks for industrial loads to improve the power factor until reaching 90%.

For the third problem

By presenting a new protection design and coordination using auto – recloser and fuses for transformers high voltage side.

After solving the problems

- Continuity of service will achieved by adding new interconnection points, protection devices, and ring connections.
- Increase of depending on renewable energy sources by installing PV systems.
- Installing our independent energy sources.
- The network will be ready and without problems until 2030.

The state of the network after 11 years

The network will reach the critical point after 11 years due to load growth, the maximum apparent power will be about 39 MVA, power factor will become 85.57%, losses will become 1.307 MW, and 22% of transformers will be full and over loaded.

Recommendations

For SELCO:

- To build accurate scheme for the electrical network
- Depending on multifunction metering devices
- Work hard to install SCADA system
- Installing renewable energy sources

For the future study

- To design a SCADA system for the network
- To design a new distribution generation
- Make economic study for our solution scenarios
- Study the low voltage network for Yatta city

For our university

- To make relationships with electrical companies to provide the necessary facilities.
- Add a new courses for teaching the students how to use Etap and other simulating softwares.

By applying this project the network will achieve continuity of service, reliability, dependability, and efficiently until 2030. And by installing SCADA system the network can be controlled moment by moment, and accurate data can be collected

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Appendices

Appendix A

Appendix B

Appendix C

Appendix D

Appendix E

Appendix F

Appendix A

Yatta City Medium Voltage Distribution Network Scheme Using AutoCAD Software

Appendix B

Single Line Diagram for Yatta City Medium Voltage Distribution Network Using Etap Software

Appendix C

Table of Maximum Loading for Each Transformer in Present Case (2015) & Future Case (2026)

#	Form	Transformer ID/Region	Rating (kVA)	% of 2015	Max. (kVA) 2015	% of 2015	Avg. (kVA) 2015	Max. (kVA) 2026	% of 2026
1	G	T1/Taiseer Obidat	400	29%	115.2	15%	61.5	297.3	74%
2	S	T2/Al-Dear	250	32%	81.0	17%	43.3	209.1	84%
3	S	T3/Mousa Arbad	400	34%	137.1	18%	73.2	353.7	88%
4	G	T4/Abu Al-Fool	250	35%	87.2	19%	46.6	224.9	90%
5	G	T5/AL- Shawaheen	400	36%	145.7	19%	77.8	376.0	94%
6	G	T6/AL- Metiana	400	38%	151.5	20%	80.9	391.0	98%
7	G	T7/AL- Ghowita	250	32%	79.6	17%	42.5	205.5	82%
8	G	T8/Haroon AL - Rasheed	400	37%	149.8	20%	80.0	386.5	97%
9	G	T9/Majd AL- Ba'a	160	34%	55.1	18%	29.4	142.2	89%
10	S	T10/Mahmoud Rasheed	400	36%	142.9	19%	76.3	368.7	92%
11	S	T11/Ahmad Rasheed	400	33%	133.6	18%	71.4	344.8	86%
12	S	T12/Ali Hassan Nassar	400	35%	141.2	19%	75.4	364.3	91%
13	S	T13/AL - Tatweer	160	41%	65.4	22%	34.9	168.8	106%
14	S	T14/Salah Mousa Nassar	400	39%	157.7	21%	84.2	406.9	102%
15	S	T15/Mousa Nassar	630	39%	244.0	21%	130.4	629.7	100%
16	S	T16/Khaled Nassar	630	38%	238.6	20%	127.5	615.8	98%
17	S	T17/Ali Mousa Nassar	1250	39%	489.6	21%	261.5	1263.4	101%
18	S	T18/Nafez Nassar	630	40%	249.5	21%	133.3	643.7	102%
19	S	T19/Ahmad H. Nassar	160	38%	61.3	20%	32.7	158.2	99%
20	S	T20/Rasmi Abu - Qubita	400	39%	156.7	21%	83.7	404.3	101%
21	G	T21/Bet- Emra 1	250	38%	94.7	20%	50.6	244.3	98%
22	S	T22/Mousa Rasheed	400	40%	161.8	22%	86.5	417.6	104%
23	G+S	T23/Um AL - Ammad	250	33%	82.9	18%	44.3	213.8	86%
24	G	T24/Ber - Emra 2	250	39%	96.8	21%	51.7	249.9	100%
25	G	T25/Bet - Emra 3	250	37%	92.5	20%	49.4	238.8	96%
26	G	T26/Khalet Arabi	160	36%	57.2	19%	30.5	147.5	92%
27	S	T27/AL - Nukhba	250	37%	93.6	20%	50.0	241.6	97%
28	G	T28/AL - Hadab 1	250	34%	86.1	18%	46.0	222.1	89%
29	G	T29/AL - Hadab 2	250	36%	89.3	19%	47.7	230.5	92%
30	G	T30/AL - Bhesat	400	38%	151.5	20%	80.9	391.0	98%
31	G	T31/AL - Sawakna	250	38%	95.8	20%	51.2	247.1	99%
32	G	T32/Abu Ali	630	36%	225.1	19%	120.2	580.8	92%
33	S	T33/Ma'asaret Rasheed	160	36%	57.2	19%	30.5	147.5	92%
34	G	T34/AL - Kaziea	250	38%	94.7	20%	50.6	244.3	98%
35	S	T35/AL - Mostashfa	250	43%	107.6	23%	57.5	277.7	111%
36	G	T36/E3zeez	400	29%	115.4	15%	61.6	297.7	74%
37	G+S	T37/Hajar AL - Sakhainah	400	36%	144.6	19%	77.3	373.2	93%
38	G	T38/Marah Jaber	160	34%	54.4	18%	29.1	140.4	88%

39	G	T39/AL - Mentar	250	35%	88.2	19%	47.1	227.7	91%
40	G+S	T40/Da'erat AL - Sair	160	32%	51.7	17%	27.6	133.3	83%
41	G	T41/Beer E3zeez	250	35%	87.2	19%	46.6	224.9	90%
42	G	T42/Wad AL- Baqee3	630	37%	230.5	20%	123.1	594.8	94%
43	G	T43/AL - Mosalla	400	39%	156.7	21%	83.7	404.3	101%
44	G	T44/Um AL - Satar 1	630	39%	244.0	21%	130.4	629.7	100%
45	G	T45/Um AL- Satar 2	250	35%	88.2	19%	47.1	227.7	91%
46	G	T46/AL - Karag	400	40%	160.1	21%	85.5	413.2	103%
47	G	T47/Basal	630	39%	244.0	21%	130.4	629.7	100%
48	G	T48/AL - Baladeia	400	36%	144.6	19%	77.3	373.2	93%
49	G	T49/Saleet	400	28%	112.3	15%	60.0	289.8	72%
50	G+S	T50/Abu - Aziza	630	35%	222.4	19%	118.8	573.8	91%
51	G	T51/AL - Emria	400	36%	142.9	19%	76.3	368.7	92%
52	G	T52/Swedan	400	26%	104.9	14%	56.0	270.6	68%
53	G+S	T53/Yasser Abu - Samra	250	28%	69.2	15%	36.9	178.4	71%
54	G	T54/Khalet Saleh	400	34%	134.3	18%	71.7	346.5	87%
55	G	T55/Talet AL - Somood 1	250	35%	88.2	19%	47.1	227.7	91%
56	G	T56/AL - Rahnneia	160	24%	39.0	13%	20.8	100.5	63%
57	G	T57/Talet AL - Somood 2	250	31%	78.6	17%	42.0	202.7	81%
58	G	T58/AL - Arqoob 1	250	36%	89.3	19%	47.7	230.5	92%
59	G	T59/AL - Arqoob 2	250	34%	85.0	18%	45.4	219.4	88%
60	G	T60/AL - Karmel	400	31%	124.0	17%	66.2	319.9	80%
61	G	T61/Raheela	400	35%	139.5	19%	74.5	359.9	90%
62	G+S	T62/Ma'aeen	250	30%	74.2	16%	39.7	191.6	77%
63	G	T63/AL- Tewani	160	38%	61.3	20%	32.7	158.2	99%
64	G	T64/Deer AL - Hawa	630	37%	230.5	20%	123.1	594.8	94%
65	G	T65/AL - Qafeer	250	35%	87.2	19%	46.6	224.9	90%
66	G	T66/Abu - Hmaid	400	34%	134.3	18%	71.7	346.5	87%
67	G	T67/AL - Farhania	250	37%	92.5	20%	49.4	238.8	96%
68	G	T68/AL – Mazra’a	630	37%	230.5	20%	123.1	594.8	94%
69	G	T69/Fatooh	400	37%	149.8	20%	80.0	386.5	97%
70	G+S	T70/AL - Mahkama	250	31%	78.6	17%	42.0	202.7	81%
71	G	T71/AL - Waha	250	35%	88.2	19%	47.1	227.7	91%
72	G+S	T72/Islamic Bank	400	37%	149.8	20%	80.0	386.5	97%
73	G+S	T73/AL - Eskan Bank	630	38%	241.3	20%	128.9	622.8	99%
74	S	T74/Mouhammad Nassar	630	39%	244.0	21%	130.4	629.7	100%
75	G	T75/Markez AL - Da3wa	400	30%	118.1	16%	63.1	304.8	76%
76	G	T76/AL - Marmalah	160	30%	47.7	16%	25.5	123.1	77%
77	G	T77/Kaziet Basal	250	29%	71.7	15%	38.3	184.9	74%
78	G	T78/Raqa’a	400	33%	132.5	18%	70.8	342.0	85%
79	G	T79/Raq3a New	160	28%	44.5	15%	23.8	114.8	72%

80	G	T80/Kreesa (Shawaheen)	250	34%	85.0	18%	45.4	219.4	88%
81	S	T81/Nader Rasheed	250	37%	93.6	20%	50.0	241.6	97%
82	G	T82/Kreesa (AL- Kherba)	250	35%	87.2	19%	46.6	224.9	90%
83	G	T83/Wad Elma'	400	31%	125.7	17%	67.1	324.3	81%
84	G	T84/AL - Hadedia	250	32%	80.7	17%	43.1	208.3	83%
85	S	T85/AL - Junaidi	400	40%	160.1	21%	85.5	413.2	103%
86	G	T86/AL - Bowaib	250	36%	90.4	19%	48.3	233.2	93%
87	G	T87/AL - Dowair	160	36%	57.2	19%	30.5	147.5	92%
88	S	T88/AL - Deiar Co.	400	37%	146.9	20%	78.5	379.0	95%
89	G	T89/AL - Aroos 1	400	36%	142.9	19%	76.3	368.7	92%
90	G	T90/AL - Aroos 2	250	35%	87.2	19%	46.6	224.9	90%
91	G	T91/AL - Aroos 3	250	34%	86.1	18%	46.0	222.1	89%
92	G	T92/Marj AL - Doodah	250	34%	83.9	18%	44.8	216.6	87%
93	G	T93/Zeef	250	36%	89.3	19%	47.7	230.5	92%
94	G	T94/AL - Heela 1	250	37%	92.5	20%	49.4	238.8	96%
95	G	T95/AL - Heela 2	250	36%	89.3	19%	47.7	230.5	92%
96	G+S	T96/AL - Waseem	250	37%	91.5	20%	48.9	236.0	94%
97	G+S	T97/AL - Shaloodi	250	34%	85.7	18%	45.8	221.1	88%
98	S	T98/Abu - Turki	400	33%	133.6	18%	71.4	344.8	86%
99	S	T99/Abd - Gaith	400	38%	151.5	20%	80.9	391.0	98%
100	S	T100/Mazra'at AL- Nama'	400	38%	153.2	20%	81.9	395.4	99%
101	S	T101/Fayez Abu-Snaineh	400	40%	160.1	21%	85.5	413.2	103%
102	S	T102/Moustafa Rajab	250	39%	97.9	21%	52.3	252.7	101%
103	S	T103/AL - Haddad 1	1600	48%	772.9	26%	412.9	1994.5	125%
104	S	T104/AL - Haddad 2	1600	51%	823.1	27%	439.7	2124.1	133%
105	S	T105/AL - Haddad 3	1250	43%	538.7	23%	287.8	1390.1	111%
106	S	T106/AL - Haddad 4	630	42%	267.1	23%	142.7	689.2	109%
107	S	T107/AL - Sa'ad 1	630	40%	252.2	21%	134.7	650.7	103%
108	S	T108/AL - Sa'ad 2	630	37%	235.9	20%	126.0	608.8	97%
109	S	T109/AL - Sa'ad 3	400	39%	156.7	21%	83.7	404.3	101%
		Total (MVA)	42.12		15.703		8.389		

Appendix D

Table of Determination of desired Capacitor Bank kVAR
for each Special Loads to Improve P.F to 90%

#	Form	Transformer ID/Region	Rating (kVA)	Active power (kW)	Existing P.F.	Desired P.F.	Factor ($tan\ \emptyset_1 - tan\ \emptyset_2$)	Amount of Required capacitor banks (KVAR)
2	S	T2/Al-Dear	250	55.89	69%	90%	0.57	31.8573
3	S	T3/Mousa Arbad	400	95.9	70%	90%	0.54	51.786
10	S	T10/Mahmoud Rasheed	400	100	70%	90%	0.54	54
11	S	T11/Ahmad Rasheed	400	95.14	71%	90%	0.51	48.5214
12	S	T12/Ali Hassan Nassar	400	98.7	70%	90%	0.54	53.298
13	S	T13/AL - Tatweer	160	43.55	67%	90%	0.63	27.4365
14	S	T14/Salah Mousa Nassar	400	115	73%	90%	0.455	52.325
15	S	T15/Mousa Nassar	630	176	72%	90%	0.54	95.04
16	S	T16/Khaled Nassar	630	170	71%	90%	0.51	86.7
17	S	T17/Ali Mousa Nassar	1250	343	70%	90%	0.54	185.22
18	S	T18/Nafez Nassar	630	172	69%	90%	0.57	98.04
19	S	T19/Ahmad H. Nassar	160	44.53	73%	90%	0.455	20.26115
20	S	T20/Rasmi Abu - Qubita	400	111	71%	90%	0.51	56.61
22	S	T22/Mousa Rasheed	400	110	68%	90%	0.6	66
27	S	T27/AL - Nukhba	250	65.8	70%	90%	0.54	35.532
33	S	T33/Ma'asaret Rasheed	160	38.76	68%	90%	0.6	23.256
35	S	T35/AL - Mostashfa	250	91.8	85%	90%	0.135	12.393
74	S	T74/Mouhammad Nassar	630	163	67%	90%	0.63	102.69
81	S	T81/Nader Rasheed	250	65.8	70%	90%	0.54	35.532
85	S	T85/AL - Junaidi	400	125	78%	90%	0.32	40
88	S	T88/AL - Deiar Co.	400	99.96	68%	90%	0.6	59.976
98	S	T98/Abu - Turki	400	93.8	70%	90%	0.54	50.652
99	S	T99/Abd - Gaith	400	105	69%	90%	0.57	59.85
100	S	T100/Mazra'at AL- Nama'	400	121	79%	90%	0.295	35.695
101	S	T101/Fayez Abu-Snaineh	400	112	70%	90%	0.54	60.48
102	S	T102/Moustafa Rajab	250	69.58	71%	90%	0.51	35.4858
103	S	T103/AL - Haddad 1	1600	541	70%	90%	0.54	292.14
104	S	T104/AL - Haddad 2	1600	568	69%	90%	0.57	323.76
105	S	T105/AL - Haddad 3	1250	399	74%	90%	0.43	171.57
106	S	T106/AL - Haddad 4	630	190	71%	90%	0.51	96.9
107	S	T107/AL - Sa'ad 1	630	194	77%	90%	0.345	66.93
108	S	T108/AL - Sa'ad 2	630	175	74%	90%	0.43	75.25
109	S	T109/AL - Sa'ad 3	400	119	76%	90%	0.37	44.03
		Total (MVAR)						2.549

Appendix E

Tables of Medium Voltage Distribution Network Results by Etap Software

1- **Present case**
2- **Interconnection point case**
3- **PV Case**
4- **After 11 years Case**

1- Present case

Source

ID	Rating	Rated kV	MW	Mvar	Amp	% PF	% Generation
U1	630 MVA	33	13.032	6.25	252.9	90.17	-

General

Study ID	Untitled
Study Case ID	LF
Data Revision	Base
Configuration	Normal
Loading Cat	Design
Generation Cat	Design
Diversity Factor	Normal Loading
Buses	247
Branches	247
Generators	0
Power Grids	1
Loads	109
Load-MW	13.032
Load-Mvar	6.25
Generation-MW	13.032
Generation-Mvar	6.25
Loss-MW	0.186
Loss-Mvar	-1.568
Mismatch-MW	0
Mismatch-Mvar	0

Branch

ID	kW Flow	kvar Flow	Amp Flow	% PF	% Loading	% Voltage Drop	kW Losses	kvar Losses
Cable1	13020	6330	253.5	89.94		0.09	12.082	-79.422
Cable2	106	42.974	1.997	92.63		0	0.001	-13.958
Cable3	9980	3740	186.6	93.64		0.16	15.767	-16.555
Cable4	9865	3698	184.8	93.64		0.03	3.215	-40.558
Cable5	80.376	27.994	1.493	94.44		0	0.001	-15.295
Cable6	9780	3746	183.8	93.39		0.05	4.766	-60.807
Cable7	544	130	9.866	97.25		0.01	0.027	-13.735
Cable8	455	119	8.298	96.75		0	0.022	-15.797
Cable9	175	12.064	3.103	99.76		0	0.003	-14.429
Cable10	280	138	5.504	89.62		0	0.01	-17.174
Cable11	86.875	26.642	1.604	95.61		0	0.002	-48.096
Cable12	7033	1769	127.3	96.98		0.15	10.318	-27.451
Cable13	7023	1797	127.4	96.88		0.06	3.904	-10.344
Cable14	1673	340	30.03	98		0.02	0.343	-18.547
Cable15	90.146	27.687	1.659	95.59		0	0.002	-41.483
Cable16	708	206	12.98	96.01		0	0.032	-9.322
Cable17	667	114	11.91	98.57		0	0.022	-7.595
Cable18	126	45.937	2.358	93.94		0	0.002	-13.812
Cable19	80.775	30.458	1.52	93.57		0	0.002	-44.872
Cable20	49.594	-29.653	1.017	-85.83		0	0.001	-48.324
Cable22	144	54.551	2.711	93.52		0	0.007	-48.379
Cable23	309	75.803	5.603	97.12		0.01	0.026	-41.458
Cable24	82.683	25.289	1.522	95.63		0	0.001	-27.642
Cable26	5198	1470	95.14	96.23		0.13	6.475	-32.666
Cable27	5054	1413	92.44	96.31		0.03	1.268	-6.781
Cable28	1553	327	27.95	97.86		0.01	0.169	-10.488
Cable29	3278	1033	60.59	95.37		0.07	2.122	-27.482
Cable30	1419	287	25.52	98.02		0.01	0.138	-10.29
Cable31	1419	294	25.54	97.92		0.01	0.101	-7.545
Cable32	288	104	5.392	94.08		0	0.007	-12.609
Cable33	1131	241	20.39	97.8		0.03	0.321	-37.778
Cable34	186	118	3.885	84.41		0.01	0.015	-55.812
Cable35	667	106	11.89	98.75		0.01	0.081	-28.107
Cable37	1001	251	18.2	96.99		0.04	0.425	-63.255
Cable38	192	-13.56	3.394	-99.75		0	0.005	-20.809
Cable39	73.084	-26.56	1.373	-93.99		0	0.002	-51.51
Cable40	3068	972	56.76	95.33		0.05	1.613	-23.848
Cable41	2778	952	51.8	94.6		0.02	0.576	-10.245
Cable42	210	25.911	3.733	99.25		0	0.007	-26.139
Cable43	124	42.448	2.313	94.61		0	0.002	-18.572
Cable44	85.994	29.551	1.604	94.57		0	0.001	-27.515
Cable45	2282	872	43.11	93.41		0.04	0.994	-25.758
Cable46	289	26.477	5.125	99.58		0	0.003	-11.309
Cable47	69.934	32.748	1.362	90.56		0	0.001	-25.437
Cable48	82.301	-30.72	1.55	-93.69		0	0.002	-55.892

Cable49	2147	833	40.66	93.23		0.03	0.699	-20.351
Cable50	1932	745	36.56	93.3		0.01	0.189	-6.797
Cable51	108	40.472	2.036	93.64		0	0.003	-40.844
Cable52	1660	584	31.07	94.33		0.03	0.453	-22.689
Cable53	1615	596	30.41	93.81		0.03	0.481	-25.203
Cable54	1549	591	29.3	93.43		0.02	0.377	-21.252
Cable55	1271	351	23.3	96.39		0.01	0.169	-15.083
Cable56	549	126	9.951	97.47		0.01	0.054	-26.7
Cable57	40.668	13.817	0.759	94.68		0	0	-20.62
Cable58	65.974	68.364	1.68	69.44		0	0.002	-37.173
Cable59	448	36.157	7.953	99.68		0.01	0.026	-19.856
Cable60	159	35.844	2.874	97.54		0	0.003	-20.547
Cable61	160	-28.31	2.864	-98.46		0	0.007	-41.436
Cable62	80.178	22.934	1.474	96.14		0	0.001	-19.178
Cable63	82.941	25.382	1.533	95.62		0	0.002	-41.093
Cable64	2873	2608	68.04	74.04		0.14	4.932	-107
Line1	80.372	30.292	1.507	93.57		0.01	0.004	-2.299
Line2	2472	1873	54.44	79.71		0.07	2.067	0.129
Line3	2395	1847	53.13	79.19		0.19	5.399	0.233
Line4	51.678	12.188	0.934	97.33		0	0	-0.564
Line5	2202	1780	49.83	77.78		0.04	1.155	-0.017
Line6	2101	1676	47.31	78.17		0.05	1.157	-0.078
Line7	2004	1580	44.95	78.53		0.09	2.088	-0.261
Line8	98.981	102	2.512	69.48		0	0.006	-1.245
Line9	1903	1479	42.49	78.96		0.02	0.56	-0.11
Line10	1859	1430	41.35	79.26		0.04	0.884	-0.205
Line11	880	434	17.32	89.68		0.01	0.081	-0.289
Line12	977	997	24.63	69.99		0.04	0.548	-0.831
Line13	861	888	21.83	69.62		0.04	0.492	-1.012
Line14	515	543	13.22	68.77		0	0.025	-0.159
Line15	346	344	8.618	70.86		0	0.012	-0.196
Line16	172	184	4.444	68.35		0	0.003	-0.194
Line17	724	280	13.69	93.28		0.01	0.065	-0.39
Line18	112	113	2.802	70.41		0	0.002	-0.342
Line19	180	165	4.306	73.81		0.01	0.022	-1.423
Line20	111	121	2.894	67.42		0	0.002	-0.279
Line21	69.531	44.035	1.452	84.48		0	0	-0.249
Line22	279	139	5.512	89.5		0.01	0.024	-0.923
Line23	227	122	4.548	88.02		0	0.007	-1.039
Line24	161	56.639	3.009	94.32		0.01	0.008	-2.743
Line25	81.307	30.672	1.534	93.56		0	0.002	-1.26
Line26	669	166	12.14	97.07		0.04	0.233	-1.81
Line27	579	143	10.5	97.1		0.02	0.087	-0.92
Line28	453	111	8.214	97.12		0.01	0.04	-0.704
Line29	91.688	58.463	1.914	84.32		0	0.003	-0.969
Line30	361	54.556	6.436	98.88		0.01	0.029	-0.847
Line31	130	-45.082	2.429	-94.51		0	0.002	-1.016
Line32	122	77.194	2.537	84.44		0.02	0.033	-6.242

Line33	51.675	15.788	0.951	95.64		0.01	0.003	-3.6
Line34	126	47.967	2.371	93.44		0.01	0.009	-2.03
Line35	82.61	21.868	1.504	96.67		0	0.002	-1.251
Line36	904	218	16.4	97.21		0.05	0.417	-1.674
Line37	380	43.094	6.756	99.36		0.01	0.047	-1.224
Line38	523	181	9.761	94.51		0.04	0.221	-2.699
Line39	317	22.202	5.61	99.76		0.02	0.073	-2.769
Line40	192	-16.04	3.397	-99.65		0.01	0.024	-2.48
Line41	37.376	7.961	0.675	97.81		0	0.001	-2.03
Line42	440	153	8.232	94.43		0.01	0.056	-0.97
Line43	363	126	6.78	94.43		0.02	0.083	-2.139
Line44	190	80.11	3.647	92.17		0.01	0.009	-2.015
Line45	56.274	19.359	1.051	94.56		0	0.002	-6.407
Line46	61.969	39.154	1.294	84.54		0	0.002	-3.034
Line47	289	28.403	5.129	99.52		0.01	0.027	-1.926
Line48	164	185	4.356	66.37		0	0.006	-0.402
Line49	44.387	15.125	0.828	94.66		0	0.001	-2.27
Line50	156	215	4.691	58.61		0.01	0.04	-2.187
Line51	722	252	13.52	94.4		0.01	0.061	-0.375
Line52	681	261	12.89	93.39		0.03	0.22	-1.488
Line53	536	207	10.16	93.28		0.03	0.16	-1.792
Line54	454	188	8.688	92.37		0.04	0.176	-2.728
Line55	193	55.299	3.549	96.12		0.01	0.02	-1.887
Line56	261	135	5.196	88.81		0	0.007	-0.307
Line57	75.415	22.982	1.395	95.66		0.01	0.005	-3.405
Line58	136	34.007	2.487	97.03		0	0.005	-0.927
Line59	53.624	14.213	0.982	96.66		0	0.001	-0.867
Line60	82.756	28.399	1.548	94.59		0.02	0.015	-7.738
Line61	80.175	24.497	1.482	95.64		0	0.003	-1.563
Line62	69.862	187	3.536	34.92		0.01	0.019	-1.854
Line63	13.126	-166	2.94	-7.89		0.01	0.026	-3.714
Line64	89.205	-120	2.637	-59.78		0	0.008	-1.455
Line65	76.07	48.278	1.593	84.43		0	0.001	-0.62
Line66	166	142	3.865	75.87		0	0.009	-0.71
Line67	255	22.122	4.526	99.63		0	0.009	-0.539
Line68	94.002	97.24	2.391	69.5		0	0.002	-0.372
Line69	105	112	2.716	68.44		0	0.001	-0.17
Line70	360	133	6.791	93.78		0.01	0.044	-1.131
Line71	481	228	9.404	90.37		0.01	0.043	-0.57
Line72	2189	2187	54.67	70.75		0.12	3.475	0.248
Line73	2742	2485	65.34	74.1		0.07	2.471	0.473
Line74	2873	2608	68.04	74.04		0.69	18.619	6.958
Line75	489	431	11.53	75.01		0.03	0.174	-1.495
T1/Taiseer Obidat	106	42.974	1.997	92.63	28.3	0.82	0.451	1.395
T2/Al-Dear	56.105	59.613	1.433	68.54	32.3	1.33	0.372	1.15
T3/Mousa Arbad	96.255	99.581	2.429	69.5	34.1	1.4	0.668	2.063
T4/Abu Al-Fool	80.372	30.292	1.507	93.57	21.3	0.96	0.411	1.271
T5/AL- Shawaheen	136	46.769	2.528	94.58	35.7	0.97	0.723	2.235

T6/AL- Metiana	139	56.878	2.629	92.51	37	1.08	0.782	2.418
T7/AL- Ghowita	74.654	25.498	1.386	94.63	31.3	0.85	0.348	1.074
T8/Haroon AL - Rasheed	136	55.847	2.59	92.52	36.4	1.07	0.759	2.345
T9/Majd AL- Ba3	51.675	15.788	0.951	95.64	33.5	0.87	0.256	0.791
T10/Mahmoud Rasheed	100	104	2.545	69.47	35.6	1.47	0.733	2.265
T11/Ahmad Rasheed	95.398	95.968	2.384	70.5	33.4	1.36	0.643	1.987
T12/Ali Hassan Nassar	98.981	102	2.512	69.48	35.1	1.45	0.714	2.206
T13/AL - Tatweer	43.716	49.193	1.161	66.43	40.4	1.71	0.381	1.178
T14/Salah Mousa Nassar	116	110	2.82	72.39	39.3	1.59	0.9	2.781
T15/Mousa Nassar	176	173	4.354	71.34	38.5	1.51	1.083	4.29
T16/Khaled Nassar	170	172	4.264	70.36	37.8	1.5	1.039	4.114
T17/Ali Mousa Nassar	343	360	8.776	68.96	39	1.95	1.685	11.959
T18/Nafez Nassar	172	184	4.444	68.35	39.3	1.58	1.128	4.468
T19/Ahmad H. Nassar	44.656	42.529	1.088	72.41	37.9	1.53	0.335	1.035
T20/Rasmi Abu - Qubita	112	113	2.802	70.41	39.1	1.6	0.889	2.746
T21/Bet- Emra 1	88.736	27.241	1.638	95.6	36.8	0.96	0.486	1.501
T22/Mousa Rasheed	111	121	2.894	67.42	40.3	1.69	0.948	2.928
T23/Um AL - Ammad	69.531	44.035	1.452	84.48	32.5	1.14	0.382	1.18
T24/Ber - Emra 2	88.552	33.519	1.671	93.52	37.5	1.06	0.506	1.562
T25/Bet - Emra 3	86.875	26.642	1.604	95.61	36	0.94	0.466	1.439
T26/Khalet Arabi	52.672	18.067	0.983	94.59	34.5	0.94	0.273	0.844
T27/AL - Nukhba	65.994	68.382	1.677	69.44	37.4	1.55	0.509	1.574
T28/AL - Hadab 1	79.489	27.227	1.483	94.6	33.3	0.91	0.398	1.231
T29/AL - Hadab 2	81.307	30.672	1.534	93.56	34.4	0.98	0.426	1.316
T30/AL - Bhesat	141	48.57	2.627	94.56	37	1.01	0.781	2.413
T31/AL - Sawakna	90.146	27.687	1.659	95.59	37.4	0.97	0.498	1.54
T32/Abu Ali	207	78.195	3.891	93.54	34.8	0.9	0.865	3.425
T33/Ma'asaret Rasheed	38.894	42.523	1.014	67.49	35.5	1.48	0.291	0.899
T34/AL - Kaziea	90.167	23.984	1.642	96.64	37	0.91	0.488	1.509
T35/AL - Mostashfa	91.688	58.463	1.914	84.32	42.8	1.51	0.664	2.051
T36/E3zeez	109	28.687	1.991	96.73	28.1	0.68	0.449	1.386
T37/Hajar AL - Sakhainah	122	77.194	2.537	84.44	35.6	1.25	0.729	2.251
T38/Marah Jaber	49.593	18.671	0.933	93.59	32.8	0.93	0.246	0.761
T39/AL - Mentar	80.775	30.458	1.52	93.57	34.2	0.97	0.418	1.293
T40/Da'erat AL - Sair	43.217	27.35	0.9	84.5	31.6	1.11	0.229	0.709
T41/Beer E3zeez	82.61	21.868	1.504	96.67	33.9	0.83	0.41	1.266
T42/Wad AL- Baqee3	214	73.537	3.977	94.56	35.6	0.88	0.904	3.579
T43/AL - Mosalla	144	54.551	2.711	93.52	38.1	1.08	0.831	2.569
T44/Um AL - Satar 1	227	78.157	4.217	94.53	37.7	0.93	1.016	4.024
T45/Um AL- Satar 2	82.683	25.289	1.522	95.63	34.3	0.89	0.419	1.295
T46/AL - Karag	143	63.318	2.758	91.46	38.7	1.17	0.861	2.661
T47/Basal	221	90.977	4.211	92.47	37.6	1.01	1.013	4.012
T48/AL - Baladeia	133	50.166	2.503	93.56	35.2	1	0.709	2.19
T49/Saleet	102	41.365	1.936	92.64	27.2	0.8	0.424	1.31
T50/Abu - Aziza	186	118	3.885	84.41	34.6	1.15	0.862	3.414
T51/AL - Emria	130	53.039	2.467	92.54	34.6	1.02	0.689	2.128
T52/Swedan	97.488	33.072	1.815	94.7	25.6	0.69	0.373	1.152
T53/Yasser Abu - Samra	63.259	23.661	1.192	93.66	26.8	0.76	0.257	0.795

T54/Khalet Saleh	125	38.242	2.312	95.65	32.5	0.84	0.605	1.87
T55/Talet AL - Somood 1	81.313	27.877	1.517	94.6	34.1	0.93	0.417	1.288
T56/AL - Rahnneia	37.376	7.961	0.675	97.81	23.8	0.54	0.129	0.398
T57/Talet AL - Somood 2	73.082	24.95	1.363	94.64	30.6	0.83	0.336	1.04
T58/AL - Arqoob 1	82.236	28.207	1.535	94.59	34.4	0.94	0.426	1.317
T59/AL - Arqoob 2	77.69	29.258	1.465	93.58	32.9	0.93	0.389	1.202
T60/AL - Karmel	116	35.272	2.14	95.67	30.1	0.78	0.518	1.602
T61/Raheela	128	43.989	2.396	94.6	33.6	0.92	0.65	2.008
T62/Ma'aeen	61.969	39.154	1.294	84.54	29	1.02	0.303	0.937
T63/AL- Tewani	56.274	19.359	1.051	94.56	36.8	1.01	0.312	0.965
T64/Deer AL - Hawa	208	85.53	3.969	92.5	35.4	0.96	0.9	3.564
T65/AL - Qafeer	79.622	30.011	1.501	93.57	33.7	0.96	0.408	1.26
T66/Abu - Hmaid	124	42.448	2.313	94.61	32.5	0.88	0.605	1.87
T67/AL - Farhania	85.994	29.551	1.604	94.57	36	0.98	0.466	1.439
T68/AL - Mazra3a	206	90.786	3.966	91.48	35.3	0.99	0.899	3.558
T69/Fatooh	137	51.812	2.585	93.54	36.3	1.03	0.756	2.337
T70/AL - Mahkama	69.934	32.748	1.362	90.56	30.6	0.95	0.336	1.039
T71/AL - Waha	82.298	25.172	1.518	95.63	34.1	0.89	0.417	1.29
T72/Islamic Bank	134	59.062	2.583	91.5	36.2	1.1	0.755	2.333
T73/AL - Eskan Bank	215	95.095	4.151	91.46	36.9	1.03	0.985	3.899
T74/Mouhammad Nassar	164	185	4.356	66.37	38.5	1.58	1.084	4.294
T75/Markez AL - Da3wa	108	40.472	2.036	93.64	28.6	0.81	0.469	1.45
T76/AL - Marmalah	44.387	15.125	0.828	94.66	29.1	0.79	0.194	0.6
T77/Kaziet Basal	65.109	26.485	1.242	92.63	27.9	0.82	0.279	0.863
T78/Raq3a	123	41.985	2.292	94.62	32.1	0.88	0.595	1.837
T79/Raq3a New	40.668	13.817	0.759	94.68	26.6	0.72	0.163	0.504
T80/Kreesa (Shawaheen)	79.225	24.194	1.465	95.64	32.8	0.85	0.388	1.2
T81/Nader Rasheed	65.974	68.364	1.68	69.44	37.4	1.55	0.511	1.579
T82/Kreesa (AL- Kherba)	81.937	21.69	1.499	96.67	33.6	0.83	0.407	1.257
T83/Wad ELma	117	35.723	2.171	95.67	30.4	0.79	0.533	1.648
T84/AL - Hadedia	75.415	22.982	1.395	95.66	31.3	0.81	0.352	1.089
T85/AL - Junaidi	124	102	2.845	77.36	39.6	1.53	0.916	2.831
T86/AL - Bowaib	82.756	28.399	1.548	94.59	34.7	0.95	0.434	1.341
T87/AL - Dowair	53.624	14.213	0.982	96.66	34.4	0.85	0.273	0.842
T88/AL - Deiar Co.	100	110	2.626	67.47	36.6	1.53	0.78	2.411
T89/AL - Aroos 1	130	49.17	2.462	93.56	34.5	0.98	0.686	2.119
T90/AL - Aroos 2	78.421	32.088	1.498	92.55	33.6	0.99	0.406	1.255
T91/AL - Aroos 3	80.175	24.497	1.482	95.64	33.2	0.86	0.398	1.229
T92/Marj AL - Doodah	76.603	28.837	1.447	93.59	32.4	0.92	0.379	1.171
T93/Zeef	82.941	25.382	1.533	95.62	34.4	0.9	0.426	1.315
T94/AL - Heela 1	85.69	29.447	1.601	94.57	35.9	0.98	0.464	1.435
T95/AL - Heela 2	82.961	25.388	1.533	95.62	34.4	0.9	0.426	1.316
T96/AL - Waseem	76.07	48.278	1.593	84.43	35.6	1.26	0.459	1.419
T97/AL - Shaloodi	71.915	45.582	1.505	84.46	33.6	1.19	0.41	1.267
T98/Abu - Turki	94.002	97.24	2.391	69.5	33.3	1.38	0.647	1.999
T99/Abd - Gaith	105	112	2.716	68.44	37.8	1.58	0.835	2.58
T100/Mazra'at AL- Nama'	121	95.48	2.717	78.39	37.9	1.45	0.836	2.582
T101/Fayez Abu-Snaineh	112	117	2.859	69.41	39.8	1.65	0.925	2.857

T102/Moustafa Rajab	69.779	70.374	1.751	70.41	39	1.6	0.555	1.716
T103/AL - Haddad 1	541	572	13.92	68.71	48	2.42	3.312	23.51
T104/AL - Haddad 2	567	618	14.84	67.63	51.1	2.6	3.766	26.734
T105/AL - Haddad 3	399	375	9.684	72.83	42.9	2.06	2.051	14.561
T106/AL - Haddad 4	190	192	4.779	70.28	42.1	1.68	1.305	5.167
T107/AL - Sa'ad 1	194	165	4.504	76.29	39.8	1.49	1.159	4.59
T108/AL - Sa'ad 2	175	162	4.216	73.35	37.3	1.44	1.016	4.023
T109/AL - Sa'ad 3	120	104	2.807	75.38	39	1.54	0.892	2.756

2- Interconnection point case

Source

ID	Rating	Rated kV	MW	Mvar	Amp	% PF	% Generation
U1	630 MVA	33	5.061	1.231	91.12	97.17	
U2	630 MVA	33	4.507	1.803	84.94	92.85	
U3	630 MVA	33	3.462	0.763	62.03	97.65	

General

Study ID	Untitled
Study Case ID	LF
Data Revision	Base
Configuration	Normal
Loading Cat	Design
Generation Cat	Design
Diversity Factor	Normal Loading
Buses	252
Branches	249
Generators	0
Power Grids	3
Loads	109
Load-MW	13.03
Load-Mvar	3.797
Generation-MW	13.03
Generation-Mvar	3.797
Loss-MW	0.176
Loss-Mvar	-1.588

Branch

ID	MW Flow	Mvar Flow	Amp Flow	% PF	% Loading	% Voltage Drop	kW Losses	kvar Losses
Cable1	5.059	1.314	91.48	96.79		0.03	1.571	-83.298
Cable2	0.106	0.043	1.998	92.63		0	0.001	-13.973
Cable3	4.894	1.388	89.09	96.2		0.07	3.586	-21.035
Cable4	4.797	1.382	87.44	96.09		0.02	0.719	-41.591
Cable5	0.081	0.028	1.495	94.44		0	0.001	-15.343
Cable6	4.715	1.432	86.34	95.69		0.02	1.05	-62.372
Cable7	0.546	0.095	9.752	98.52		0.01	0.027	-13.804
Cable8	0.457	0.084	8.171	98.36		0	0.022	-15.877
Cable9	0.176	0.012	3.109	99.77		0	0.003	-14.501
Cable10	0.28	0.103	5.26	93.84		0	0.01	-17.261
Cable11	0.087	0.027	1.607	95.61		0	0.002	-48.339
Cable12	1.969	0.353	35.06	98.43		0.04	0.78	-31.074
Cable13	1.968	0.365	35.1	98.32		0.02	0.296	-11.732
Cable14	1.682	0.306	29.97	98.38		0.02	0.342	-18.672
Cable15	0.091	0.028	1.664	95.59		0	0.002	-41.761
Cable16	0.712	0.172	12.84	97.2		0	0.031	-9.385
Cable17	0.671	0.115	11.94	98.57		0	0.022	-7.646
Cable18	0.127	0.046	2.364	93.94		0	0.002	-13.904
Cable19	0.081	0.031	1.524	93.57		0	0.002	-45.173
Cable20	0.05	-0.03	1.02	-85.8		0	0.001	-48.649
Cable22	0.145	0.055	2.718	93.52		0	0.007	-48.703
Cable23	0.311	0.076	5.618	97.13		0.01	0.026	-41.736
Cable24	0.083	0.025	1.526	95.63		0	0.001	-27.827
Cable26	0.144	0.064	2.768	91.46		0	0.005	-35.301
Cable28	1.535	0.324	27.83	97.84		0.01	0.167	-10.347
Cable29	1.754	0.404	31.92	97.45		0.03	0.588	-27.69
Cable30	1.404	0.285	25.41	98.01		0.01	0.137	-10.152
Cable31	1.404	0.292	25.43	97.9		0.01	0.1	-7.444
Cable32	0.285	0.103	5.384	94.04		0	0.007	-12.44
Cable33	1.118	0.239	20.28	97.8		0.03	0.318	-37.271
Cable34	0.185	0.117	3.885	84.41		0.01	0.015	-55.064
Cable35	0.671	0.107	11.92	98.75		0.01	0.081	-28.296
Cable37	0.99	0.249	18.11	96.99		0.04	0.421	-62.407
Cable38	0.189	-0.013	3.375	-99.75		0	0.005	-20.53
Cable39	0.072	-0.026	1.365	-94.02		0	0.002	-50.819
Cable40	1.96	0.461	35.7	97.35		0.03	0.638	-23.945
Cable41	2.248	0.466	40.69	97.92		0.02	0.355	-10.228
Cable42	0.208	0.026	3.719	99.24		0	0.007	-25.885
Cable43	0.123	0.042	2.304	94.61		0	0.002	-18.392
Cable44	0.085	0.029	1.598	94.57		0	0.001	-27.248
Cable46	2.453	0.546	44.53	97.61		0.01	0.225	-11.09
Cable47	0.07	0.033	1.359	90.56		0	0.001	-25.266
Cable48	2.661	0.593	48.26	97.6		0.1	2.664	-54.605

Cable49	0.135	0.059	2.589	91.5		0	0.003	-20.729
Cable50	0.351	0.134	6.612	93.4		0	0.006	-6.908
Cable51	0.109	0.041	2.041	93.64		0	0.003	-41.114
Cable52	0.623	0.209	11.57	94.79		0.01	0.062	-22.991
Cable53	0.668	0.199	12.26	95.82		0.01	0.078	-25.548
Cable54	0.734	0.201	13.38	96.46		0.01	0.078	-21.543
Cable55	3.889	1.777	75.21	90.96		0.04	1.765	-14.646
Cable56	3.932	1.755	75.71	91.32		0.08	3.152	-25.865
Cable57	0.041	0.014	0.762	94.68		0	0	-20.832
Cable58	2.812	0.597	50.82	97.82		0.07	1.977	-36.497
Cable59	4.035	1.779	77.48	91.5		0.06	2.457	-19.219
Cable60	0.16	0.036	2.889	97.54		0	0.003	-20.818
Cable61	4.33	1.825	82.51	92.15		0.13	5.802	-39.928
Cable62	0.081	0.023	1.482	96.15		0	0.001	-19.43
Cable63	4.413	1.815	83.68	92.49		0.13	5.919	-39.648
Cable64	0	-0.11	1.923	0		0	0.001	-110
Line1	0.081	0.03	1.509	93.57		0.01	0.004	-2.306
Line2	2.47	1.006	46.72	92.62		0.06	1.523	-0.132
Line3	2.394	0.98	45.34	92.54		0.17	3.931	-0.471
Line4	0.052	0.012	0.936	97.33		0	0	-0.566
Line5	2.201	0.913	41.85	92.37		0.04	0.814	-0.181
Line6	2.1	0.862	39.88	92.5		0.04	0.822	-0.24
Line7	2.004	0.815	38.02	92.63		0.08	1.494	-0.548
Line8	0.099	0.05	1.95	89.15		0	0.004	-1.252
Line9	1.904	0.767	36.09	92.76		0.02	0.404	-0.185
Line10	1.859	0.744	35.23	92.84		0.04	0.641	-0.323
Line11	0.882	0.258	16.18	95.97		0.01	0.071	-0.295
Line12	0.976	0.487	19.21	89.47		0.03	0.333	-0.938
Line13	0.86	0.429	16.93	89.48		0.03	0.296	-1.112
Line14	0.515	0.264	10.19	88.96		0	0.015	-0.165
Line15	0.346	0.165	6.747	90.21		0	0.008	-0.2
Line16	0.172	0.087	3.395	89.17		0	0.002	-0.196
Line17	0.726	0.18	13.16	97.07		0.01	0.06	-0.394
Line18	0.112	0.057	2.204	89.16		0	0.001	-0.344
Line19	0.18	0.1	3.624	87.47		0.01	0.016	-1.433
Line20	0.11	0.056	2.18	89.12		0	0.001	-0.281
Line21	0.07	0.044	1.452	84.48		0	0	-0.25
Line22	0.28	0.104	5.266	93.73		0.01	0.021	-0.929
Line23	0.227	0.087	4.288	93.38		0	0.006	-1.045
Line24	0.162	0.057	3.015	94.32		0.01	0.008	-2.757
Line25	0.082	0.031	1.537	93.56		0	0.002	-1.266
Line26	0.673	0.154	12.1	97.47		0.04	0.232	-1.824
Line27	0.582	0.131	10.46	97.55		0.02	0.087	-0.927
Line28	0.455	0.1	8.174	97.69		0.01	0.04	-0.709
Line29	0.092	0.047	1.808	89.12		0	0.003	-0.976
Line30	0.363	0.055	6.446	98.89		0.01	0.03	-0.853
Line31	0.131	-0.045	2.436	-94.49		0	0.002	-1.023
Line32	0.122	0.077	2.537	84.44		0.02	0.032	-6.284

Line33	0.052	0.016	0.953	95.64		0.01	0.003	-3.616
Line34	0.127	0.048	2.376	93.44		0.01	0.009	-2.044
Line35	0.083	0.022	1.508	96.67		0	0.002	-1.259
Line36	0.893	0.216	16.31	97.2		0.05	0.413	-1.651
Line37	0.376	0.043	6.72	99.36		0.01	0.047	-1.208
Line38	0.517	0.179	9.715	94.51		0.04	0.219	-2.662
Line39	0.313	0.022	5.581	99.75		0.02	0.072	-2.732
Line40	0.189	-0.016	3.379	-99.66		0.01	0.024	-2.447
Line41	0.037	0.008	0.671	97.81		0	0.001	-2.002
Line42	0.435	0.152	8.195	94.42		0.01	0.055	-0.957
Line43	0.359	0.125	6.75	94.42		0.02	0.082	-2.111
Line44	0.188	0.079	3.634	92.16		0.01	0.009	-1.988
Line45	0.056	0.019	1.045	94.56		0	0.002	-6.321
Line46	0.062	0.039	1.294	84.54		0	0.002	-2.993
Line47	2.455	0.534	44.48	97.71		0.09	2.033	-0.528
Line48	0.164	0.083	3.228	89.2		0	0.003	-0.406
Line49	0.045	0.015	0.831	94.66		0	0.001	-2.287
Line50	3.031	1.555	59.94	88.97		0.21	6.591	0.898
Line51	0.041	-0.007	0.733	-98.46		0	0	-0.408
Line53	2.898	0.585	52.14	98.03		0.15	4.227	0.125
Line54	2.987	0.607	53.62	98		0.24	6.738	0.353
Line55	3.255	0.703	58.48	97.74		0.17	5.407	0.638
Line56	0.262	0.096	4.918	93.88		0	0.006	-0.31
Line57	3.379	0.74	60.65	97.68		0.16	5.227	0.741
Line58	0.138	0.034	2.498	97.03		0	0.005	-0.938
Line59	0.054	0.014	0.986	96.66		0	0.001	-0.877
Line60	0.084	0.029	1.555	94.59		0.02	0.015	-7.825
Line61	0.081	0.025	1.49	95.64		0	0.003	-1.584
Line62	2.939	1.525	58.37	88.76		0.17	5.282	0.63
Line63	2.85	1.499	56.88	88.51		0.34	10.033	1.028
Line64	2.765	1.45	55.33	88.55		0.13	3.717	0.309
Line65	0.076	0.048	1.593	84.43		0	0.001	-0.617
Line66	0.165	0.093	3.366	87.21		0	0.007	-0.705
Line67	2.595	1.358	51.98	88.61		0.05	1.221	0.039
Line68	0.094	0.048	1.868	89.11		0	0.001	-0.369
Line69	0.105	0.054	2.093	88.95		0	0.001	-0.169
Line70	2.489	1.304	49.89	88.58		0.09	2.386	-0.012
Line71	2.367	1.243	47.51	88.52		0.05	1.108	-0.059
Line72	2.184	1.149	43.87	88.5		0.1	2.238	-0.321
Line73	0.112	0.059	2.247	88.62		0	0.003	-0.686
Line75	0.488	0.251	9.765	88.88		0.02	0.125	-1.499
Line76	4.507	1.803	84.94	92.85		0.11	3.907	2.385
Line77	0.077	0.023	1.405	95.66		0	0.003	-1.734
Line78	3.462	0.763	62.03	97.65		0.23	6.669	1.515
Line79	2.746	0.563	49.56	97.96		0.04	1.064	-0.229
T1/Taiseer Obidat	0.106	0.043	1.998	92.63	28.3	0.82	0.452	1.396
T2/Al-Dear	0.056	0.028	1.094	89.63	24.8	0.78	0.217	0.669
T3/Mousa Arbad	0.096	0.048	1.881	89.51	26.6	0.84	0.4	1.237

T4/Abu Al-Fool	0.081	0.03	1.509	93.57	21.3	0.96	0.412	1.274
T5/AL- Shawaheen	0.137	0.047	2.532	94.58	35.8	0.97	0.725	2.241
T6/AL- Metiana	0.139	0.057	2.633	92.51	37.2	1.09	0.785	2.425
T7/AL- Ghowita	0.075	0.026	1.388	94.63	31.4	0.85	0.349	1.078
T8/Haroon AL - Rasheed	0.137	0.056	2.594	92.52	36.5	1.07	0.762	2.353
T9/Majd AL- Ba3	0.052	0.016	0.953	95.64	33.6	0.87	0.257	0.793
T10/Mahmoud Rasheed	0.1	0.051	1.973	89.27	27.8	0.89	0.441	1.362
T11/Ahmad Rasheed	0.095	0.048	1.872	89.46	26.4	0.84	0.397	1.226
T12/Ali Hassan Nassar	0.099	0.05	1.95	89.15	27.5	0.88	0.43	1.33
T13/AL - Tatweer	0.044	0.023	0.864	88.81	30.4	0.98	0.211	0.653
T14/Salah Mousa Nassar	0.116	0.059	2.285	89.01	32.1	1.03	0.591	1.826
T15/Mousa Nassar	0.176	0.079	3.396	91.16	30.3	0.86	0.659	2.61
T16/Khaled Nassar	0.17	0.086	3.352	89.21	29.9	0.89	0.642	2.542
T17/Ali Mousa Nassar	0.343	0.177	6.797	88.83	30.5	1.07	1.011	7.173
T18/Nafez Nassar	0.172	0.087	3.395	89.17	30.3	0.91	0.658	2.607
T19/Ahmad H. Nassar	0.045	0.023	0.882	88.99	31	1	0.22	0.681
T20/Rasmi Abu - Qubita	0.112	0.057	2.204	89.16	31	0.99	0.55	1.699
T21/Bet- Emra 1	0.089	0.027	1.641	95.6	36.9	0.96	0.488	1.507
T22/Mousa Rasheed	0.11	0.056	2.18	89.12	30.6	0.98	0.538	1.661
T23/Um AL - Ammad	0.07	0.044	1.452	84.48	32.6	1.14	0.382	1.18
T24/Ber - Emra 2	0.089	0.034	1.674	93.52	37.6	1.07	0.508	1.568
T25/Bet - Emra 3	0.087	0.027	1.607	95.61	36.2	0.94	0.468	1.445
T26/Khalet Arabi	0.053	0.018	0.985	94.59	34.6	0.94	0.274	0.848
T27/AL - Nukhba	0.066	0.033	1.297	89.43	29.2	0.93	0.305	0.942
T28/AL - Hadab 1	0.08	0.027	1.486	94.6	33.5	0.91	0.4	1.236
T29/AL - Hadab 2	0.082	0.031	1.537	93.56	34.6	0.98	0.428	1.322
T30/AL - Bhesat	0.142	0.049	2.634	94.56	37.2	1.01	0.785	2.425
T31/AL - Sawakna	0.091	0.028	1.664	95.59	37.6	0.97	0.501	1.548
T32/Abu Ali	0.208	0.079	3.901	93.54	35	0.9	0.87	3.443
T33/Ma'asaret Rasheed	0.039	0.02	0.764	89.17	27	0.86	0.165	0.51
T34/AL - Kaziea	0.091	0.024	1.647	96.64	37.2	0.91	0.491	1.517
T35/AL - Mostashfa	0.092	0.047	1.808	89.12	40.7	1.3	0.592	1.828
T36/E3zeez	0.11	0.029	1.996	96.73	28.2	0.69	0.451	1.393
T37/Hajar AL - Sakhainah	0.122	0.077	2.537	84.44	35.7	1.25	0.728	2.251
T38/Marah Jaber	0.05	0.019	0.935	93.59	33	0.93	0.248	0.765
T39/AL - Mentar	0.081	0.031	1.524	93.57	34.4	0.97	0.421	1.299
T40/Da'erat AL - Sair	0.043	0.027	0.902	84.5	31.8	1.11	0.23	0.712
T41/Beer E3zeez	0.083	0.022	1.508	96.67	34.1	0.83	0.412	1.273
T42/Wad AL-Baqee3	0.215	0.074	3.988	94.56	35.8	0.88	0.909	3.598
T43/AL - Mosalla	0.145	0.055	2.718	93.52	38.3	1.08	0.836	2.583
T44/Um AL - Satar 1	0.228	0.079	4.229	94.53	37.9	0.93	1.022	4.046

T45/Um AL- Satar 2	0.083	0.025	1.526	95.63	34.5	0.89	0.421	1.302
T46/AL - Karag	0.144	0.064	2.768	91.46	39	1.18	0.867	2.68
T47/Basal	0.218	0.09	4.188	92.47	37.1	1.01	1.002	3.969
T48/AL - Baladeia	0.131	0.05	2.489	93.56	34.7	0.99	0.701	2.167
T49/Saleet	0.101	0.041	1.925	92.64	26.9	0.79	0.42	1.296
T50/Abu - Aziza	0.185	0.117	3.885	84.41	34.4	1.15	0.862	3.415
T51/AL - Emria	0.128	0.052	2.454	92.54	34.2	1.01	0.681	2.105
T52/Swedan	0.096	0.033	1.806	94.7	25.2	0.69	0.369	1.14
T53/Yasser Abu - Samra	0.062	0.023	1.185	93.66	26.5	0.75	0.254	0.786
T54/Khalet Saleh	0.124	0.038	2.3	95.64	32.1	0.84	0.599	1.85
T55/Talet AL - Somood 1	0.08	0.028	1.509	94.59	33.7	0.92	0.412	1.274
T56/AL - Rahnneia	0.037	0.008	0.671	97.81	23.5	0.53	0.127	0.394
T57/Talet AL - Somood 2	0.072	0.025	1.356	94.64	30.3	0.83	0.333	1.029
T58/AL - Arqoob 1	0.081	0.028	1.526	94.59	34	0.93	0.422	1.303
T59/AL - Arqoob 2	0.077	0.029	1.458	93.58	32.5	0.93	0.385	1.189
T60/AL - Karmel	0.115	0.035	2.129	95.67	29.7	0.78	0.513	1.584
T61/Raheela	0.127	0.043	2.383	94.6	33.2	0.91	0.643	1.986
T62/Ma'aeen	0.062	0.039	1.294	84.54	28.8	1.02	0.303	0.937
T63/AL- Tewani	0.056	0.019	1.045	94.56	36.4	1	0.309	0.955
T64/Deer AL - Hawa	0.206	0.085	3.951	92.5	35	0.95	0.892	3.532
T65/AL - Qafeer	0.079	0.03	1.495	93.57	33.4	0.95	0.405	1.25
T66/Abu - Hmaid	0.123	0.042	2.304	94.61	32.2	0.88	0.601	1.856
T67/AL - Farhania	0.085	0.029	1.598	94.57	35.7	0.98	0.462	1.428
T68/AL - Mazra3a	0.204	0.09	3.952	91.48	35	0.98	0.892	3.533
T69/Fatooh	0.136	0.051	2.578	93.54	36	1.03	0.752	2.325
T70/AL - Mahkama	0.07	0.033	1.359	90.56	30.4	0.95	0.334	1.033
T71/AL - Waha	0.082	0.025	1.516	95.63	34	0.88	0.416	1.285
T72/Islamic Bank	0.135	0.059	2.589	91.5	36.4	1.1	0.759	2.344
T73/AL - Eskan Bank	0.216	0.096	4.162	91.46	37.1	1.04	0.99	3.919
T74/Mouhammad Nassar	0.164	0.083	3.228	89.2	28.9	0.86	0.595	2.357
T75/Markez AL - Da3wa	0.109	0.041	2.041	93.64	28.8	0.81	0.472	1.457
T76/AL - Marmalah	0.045	0.015	0.831	94.66	29.3	0.79	0.195	0.603
T77/Kaziet Basal	0.066	0.027	1.246	92.63	28.1	0.82	0.281	0.868
T78/Raq3a	0.124	0.042	2.3	94.62	32.4	0.88	0.599	1.85
T79/Raq3a New	0.041	0.014	0.762	94.68	26.9	0.73	0.164	0.508
T80/Kreesa (Shawaheen)	0.079	0.024	1.466	95.64	32.9	0.86	0.389	1.202
T81/Nader Rasheed	0.066	0.033	1.304	89.28	29.2	0.94	0.308	0.951
T82/Kreesa (AL-Kherba)	0.082	0.022	1.502	96.67	33.8	0.83	0.409	1.263
T83/Wad ELma	0.119	0.036	2.184	95.67	30.8	0.8	0.54	1.667
T84/AL - Hadedia	0.077	0.023	1.405	95.66	31.8	0.82	0.358	1.105
T85/AL - Junaidi	0.125	0.063	2.457	89.28	34.5	1.1	0.683	2.11
T86/AL - Bowaib	0.084	0.029	1.555	94.59	35	0.95	0.438	1.353
T87/AL - Dowair	0.054	0.014	0.986	96.66	34.7	0.85	0.275	0.85
T88/AL - Deiar Co.	0.1	0.05	1.97	89.32	27.8	0.89	0.439	1.357

T89/AL - Aroos 1	0.132	0.05	2.475	93.56	34.9	0.99	0.693	2.142
T90/AL - Aroos 2	0.079	0.032	1.506	92.55	34	0.99	0.41	1.268
T91/AL - Aroos 3	0.081	0.025	1.49	95.64	33.6	0.87	0.402	1.242
T92/Marj AL - Doodah	0.078	0.029	1.456	93.59	32.9	0.93	0.384	1.186
T93/Zeef	0.084	0.026	1.545	95.62	35	0.9	0.432	1.335
T94/AL - Heela 1	0.086	0.03	1.604	94.57	36	0.98	0.466	1.44
T95/AL - Heela 2	0.083	0.025	1.534	95.62	34.4	0.9	0.426	1.317
T96/AL - Waseem	0.076	0.048	1.593	84.43	35.5	1.26	0.459	1.419
T97/AL - Shaloodi	0.072	0.045	1.505	84.46	33.5	1.19	0.41	1.267
T98/Abu - Turki	0.094	0.048	1.868	89.11	26.1	0.84	0.395	1.22
T99/Abd - Gaith	0.105	0.054	2.093	88.95	29.2	0.95	0.496	1.532
T100/Mazra'at AL-Nama'	0.12	0.061	2.394	89.27	33.3	1.08	0.649	2.004
T101/Fayez Abu-Snaineh	0.112	0.059	2.247	88.62	31.3	1.03	0.571	1.765
T102/Moustafa Rajab	0.07	0.037	1.397	88.53	31.1	1.02	0.353	1.092
T103/AL - Haddad 1	0.54	0.289	10.89	88.19	37.7	1.36	2.029	14.399
T104/AL - Haddad 2	0.567	0.304	11.44	88.13	39.6	1.43	2.237	15.881
T105/AL - Haddad 3	0.398	0.209	7.999	88.58	35.5	1.26	1.4	9.936
T106/AL - Haddad 4	0.189	0.098	3.799	88.72	33.5	1.02	0.824	3.265
T107/AL - Sa'ad 1	0.194	0.1	3.882	88.88	34.3	1.04	0.861	3.41
T108/AL - Sa'ad 2	0.174	0.09	3.49	88.95	30.8	0.94	0.696	2.756
T109/AL - Sa'ad 3	0.119	0.062	2.393	88.76	33.2	1.09	0.648	2.002

3- PV Case

Source

ID	Rating	Rated kV	MW	Mvar	Amp	% PF	% Generation
U1	630 MVA	33	5.396	2.383	103.2	91.48	

General

Study ID	Untitled
Study Case ID	LF
Data Revision	Base
Configuration	Normal
Loading Cat	Design
Generation Cat	Design
Diversity Factor	Normal Loading
Buses	247
Branches	247
Generators	0
Power Grids	1
Loads	109
Load-MW	6.977
Load-Mvar	2.383
Generation-MW	6.977
Generation-Mvar	2.383
Loss-MW	0.036
Loss-Mvar	-1.826

Branch

ID	kW Flow	kvar Flow	Amp. Flow	% PF	% Loading	% Voltage Drop	kW Losses	kvar Losses
Cable1	5394	2466	103.8	90.95		0.04	2.019	-83.131
Cable2	43.733	22.873	0.864	88.61		0	0	-13.973
Cable3	4133	1314	75.95	95.3		0.06	2.605	-21.393
Cable4	4092	1304	75.23	95.28		0.01	0.532	-41.665
Cable5	30.239	14.151	0.585	90.57		0	0	-15.346
Cable6	4061	1367	75.07	94.77		0.02	0.793	-62.479
Cable7	202	20.606	3.563	99.48		0	0.004	-13.877
Cable8	167	22.248	2.96	99.13		0	0.003	-15.958
Cable9	67.509	-31.673	1.31	-90.53		0	0	-14.571
Cable10	99.575	71.267	2.15	81.32		0	0.002	-17.346
Cable11	32.875	-34.826	0.841	-68.64		0	0	-48.569
Cable12	2905	419	51.44	98.98		0.06	1.681	-30.747
Cable13	2904	431	51.47	98.92		0.02	0.636	-11.605
Cable14	704	24.273	12.35	99.94		0.01	0.058	-18.773
Cable15	34.893	-27.406	0.778	-78.64		0	0	-41.761
Cable16	265	52.322	4.73	98.1		0	0.004	-9.395

Cable17	306	-4.157	5.372	-99.99		0	0.004	-7.654
Cable18	41.571	23.396	0.837	87.15		0	0	-13.915
Cable19	30.133	-29.18	0.736	-71.84		0	0	-45.217
Cable20	13.412	-38.839	0.721	-32.64		0	0	-48.696
Cable22	64.489	28.803	1.239	91.31		0	0.001	-48.713
Cable23	140	26.388	2.493	98.26		0	0.005	-41.752
Cable24	31.108	-14.628	0.603	-90.49		0	0	-27.835
Cable26	2137	435	38.25	97.99		0.05	1.045	-34.896
Cable27	2072	408	37.04	98.12		0.01	0.204	-7.227
Cable28	623	39.141	10.95	99.8		0	0.026	-10.628
Cable29	1342	360	24.39	96.59		0.03	0.343	-28.375
Cable30	565	23.213	9.924	99.92		0	0.021	-10.421
Cable31	565	30.855	9.93	99.85		0	0.015	-7.641
Cable32	129	28.667	2.311	97.6		0	0.001	-12.72
Cable33	437	53.12	7.716	99.27		0.01	0.046	-38.212
Cable34	86.903	62.941	1.883	80.99		0	0.003	-56.302
Cable35	306	-32.478	5.401	-99.44		0.01	0.017	-28.32
Cable37	380	89.134	6.854	97.36		0.02	0.059	-63.977
Cable38	63.24	-42.901	1.342	-82.75		0	0.001	-21.038
Cable39	25.872	-38.982	0.821	-55.3		0	0	-52.073
Cable40	1243	339	22.61	96.48		0.02	0.255	-24.572
Cable41	1126	369	20.8	95.04		0.01	0.093	-10.524
Cable42	86.452	-35.075	1.638	-92.66		0	0.001	-26.395
Cable43	54.032	22.548	1.028	92.29		0	0	-18.754
Cable44	32.418	15.311	0.629	90.42		0	0	-27.784
Cable45	912	384	17.37	92.17		0.02	0.16	-26.329
Cable46	116	-37.331	2.137	-95.18		0	0.001	-11.424
Cable47	24.18	17.327	0.522	81.29		0	0	-25.695
Cable48	31.027	-43.277	0.935	-58.27		0	0	-56.46
Cable49	853	373	16.35	91.61		0.01	0.112	-20.785
Cable50	749	330	14.38	91.54		0	0.029	-6.93
Cable51	44.944	21.472	0.875	90.23		0	0.001	-41.295
Cable52	629	275	12.05	91.59		0.01	0.067	-23.085
Cable53	619	295	12.04	90.25		0.01	0.075	-25.644
Cable54	597	303	11.76	89.18		0.01	0.06	-21.621
Cable55	320	68.116	5.739	97.8		0	0.01	-15.324
Cable56	46.331	-29.884	0.968	-84.04		0	0	-27.049
Cable57	8.97	-13.436	0.284	-55.52		0	0	-20.875
Cable58	23.545	35.943	0.755	54.8		0	0	-37.647
Cable59	4.714	-60.439	1.065	-7.78		0	0	-20.113
Cable60	59.569	-11.454	1.066	-98.2		0	0	-20.806
Cable61	112	54.816	2.186	89.78		0	0.004	-41.96
Cable62	30.031	11.56	0.565	93.32		0	0	-19.419
Cable63	140	28.162	2.507	98.03		0	0.005	-41.616
Cable64	1196	1242	30.19	69.36		0.06	0.945	-109
Line1	30.239	16.076	0.6	88.3		0	0.001	-1.925
Line2	1034	925	24.31	74.52		0.03	0.412	-0.481
Line3	1006	913	23.82	74.04		0.09	1.084	-1.341

Line4	14.002	5.079	0.261	94.01		0	0	-0.473
Line5	931	879	22.47	72.72		0.02	0.235	-0.342
Line6	889	825	21.28	73.32		0.02	0.234	-0.395
Line7	850	775	20.2	73.88		0.04	0.421	-0.815
Line8	41.072	53.943	1.19	60.58		0	0.001	-1.049
Line9	809	723	19.04	74.57		0.01	0.112	-0.252
Line10	797	697	18.59	75.26		0.02	0.178	-0.425
Line11	333	174	6.599	88.7		0	0.012	-0.269
Line12	463	525	12.29	66.18		0.02	0.136	-0.842
Line13	413	468	10.96	66.2		0.02	0.124	-0.98
Line14	252	287	6.707	66.05		0	0.006	-0.141
Line15	161	181	4.258	66.38		0	0.003	-0.169
Line16	80.327	97.117	2.214	63.73		0	0.001	-0.165
Line17	272	91.814	5.05	94.77		0	0.009	-0.349
Line18	48.228	59.649	1.347	62.87		0	0.001	-0.288
Line19	70.638	86.289	1.958	63.34		0	0.005	-1.204
Line20	47.079	63.578	1.389	59.51		0	0	-0.236
Line21	23.559	23.157	0.58	71.32		0	0	-0.21
Line22	99.572	72.052	2.159	81.01		0	0.004	-0.785
Line23	84.065	63.285	1.848	79.89		0	0.001	-0.868
Line24	60.517	29.623	1.183	89.82		0	0.001	-2.284
Line25	30.945	16.341	0.615	88.43		0	0	-1.062
Line26	255	31.064	4.505	99.27		0.01	0.032	-1.595
Line27	220	19.368	3.866	99.61		0.01	0.012	-0.801
Line28	178	10.491	3.127	99.83		0	0.006	-0.604
Line29	36.912	30.303	0.838	77.29		0	0.001	-0.815
Line30	141	-18.997	2.496	-99.11		0	0.004	-0.721
Line31	43.546	-68.862	1.429	-53.45		0	0.001	-0.843
Line32	51.465	40.672	1.151	78.46		0.01	0.007	-5.256
Line33	14.002	8.104	0.284	86.55		0	0	-3.024
Line34	41.57	25.105	0.852	85.6		0	0.001	-1.709
Line35	31.582	11.493	0.589	93.97		0	0	-1.052
Line36	341	73.194	6.123	97.77		0.02	0.058	-1.543
Line37	139	-15.573	2.452	-99.38		0	0.006	-1.047
Line38	202	91.11	3.893	91.17		0.02	0.035	-2.343
Line39	118	-27.1	2.125	-97.46		0.01	0.01	-2.357
Line40	63.244	-45	1.363	-81.48		0	0.004	-2.098
Line41	6.831	4.157	0.14	85.42		0	0	-1.712
Line42	171	76.957	3.288	91.16		0.01	0.009	-0.835
Line43	142	63.469	2.739	91.35		0.01	0.013	-1.83
Line44	76.038	41.679	1.523	87.69		0	0.001	-1.681
Line45	17.377	10.268	0.354	86.09		0	0	-5.33
Line46	20.193	21.038	0.512	69.25		0	0	-2.525
Line47	116	-25.908	2.084	-97.59		0	0.004	-1.624
Line48	75.687	97.342	2.165	61.38		0	0.002	-0.34
Line49	9.914	7.755	0.221	78.77		0	0	-1.915
Line50	225	230	5.648	69.9		0.02	0.058	-1.829
Line51	273	98.336	5.1	94.09		0	0.009	-0.336

Line52	264	113	5.048	91.93		0.01	0.034	-1.326
Line53	212	104	4.14	89.78		0.01	0.027	-1.563
Line54	180	94.675	3.575	88.51		0.02	0.03	-2.36
Line55	77.071	27.926	1.441	94.02		0	0.003	-1.601
Line56	103	68.612	2.175	83.22		0	0.001	-0.261
Line57	27.166	12.018	0.522	91.45		0	0.001	-2.881
Line58	47.489	15.192	0.876	95.24		0	0.001	-0.786
Line59	16.108	7.515	0.312	90.62		0	0	-0.733
Line60	31.379	14.959	0.611	90.27		0.01	0.002	-6.548
Line61	30.03	12.882	0.574	91.9		0	0	-1.321
Line62	192	216	5.084	66.48		0.01	0.04	-1.55
Line63	160	206	4.586	61.47		0.03	0.065	-3.108
Line64	133	182	3.955	58.95		0.01	0.019	-1.22
Line65	27.729	25.789	0.666	73.23		0	0	-0.524
Line66	63.458	74.91	1.726	64.64		0	0.002	-0.601
Line67	69.166	108	2.253	53.97		0	0.002	-0.457
Line68	38.252	51.028	1.121	59.98		0	0	-0.314
Line69	44.464	59.073	1.3	60.14		0	0	-0.144
Line70	24.7	49.939	0.979	44.33		0	0.001	-0.971
Line71	28.483	0.679	0.501	99.97		0	0	-0.497
Line72	1089	1149	27.82	68.78		0.06	0.9	-0.674
Line73	1143	1186	28.94	69.41		0.03	0.485	-0.315
Line74	1192	1248	30.32	69.08		0.34	3.673	-5.799
Line75	227	228	5.651	70.56		0.01	0.042	-1.308
T1/Taiseer Obidat	43.733	22.873	0.864	88.61	12.3	0.4	0.084	0.261
T2/Al-Dear	18.226	31.307	0.634	50.31	14.4	0.64	0.073	0.225
T3/Mousa Arbad	39.692	52.514	1.153	60.3	16.3	0.7	0.15	0.465
T4/Abu Al-Fool	30.239	16.076	0.6	88.3	8.5	0.44	0.065	0.201
T5/AL- Shawaheen	59.881	24.542	1.134	92.53	16.1	0.47	0.145	0.449
T6/AL- Metiana	61.03	29.914	1.191	89.79	16.9	0.53	0.16	0.496
T7/AL- Ghowita	26.937	13.451	0.528	89.47	12	0.38	0.05	0.156
T8/Haroon AL - Rasheed	59.954	29.475	1.172	89.74	16.6	0.52	0.155	0.48
T9/Majd AL- Ba3	14.002	8.104	0.284	86.55	10.1	0.34	0.023	0.07
T10/Mahmoud Rasheed	41.781	54.676	1.207	60.72	17.1	0.73	0.165	0.51
T11/Ahmad Rasheed	38.977	50.338	1.117	61.22	15.8	0.68	0.141	0.436
T12/Ali Hassan Nassar	41.072	53.943	1.19	60.58	16.8	0.72	0.16	0.495
T13/AL - Tatweer	11.991	26.146	0.505	41.69	17.8	0.81	0.072	0.223
T14/Salah Mousa Nassar	49.903	57.905	1.343	65.28	19	0.8	0.204	0.63
T15/Mousa Nassar	82.167	91.054	2.155	66.99	19.3	0.78	0.265	1.05
T16/Khaled Nassar	78.735	90.226	2.104	65.75	18.9	0.76	0.253	1.001
T17/Ali Mousa Nassar	172	190	4.497	67.13	20.3	1.02	0.442	3.14
T18/Nafez Nassar	80.327	97.117	2.214	63.73	19.8	0.82	0.28	1.109
T19/Ahmad H. Nassar	12.62	22.687	0.456	48.61	16.1	0.72	0.059	0.182
T20/Rasmi Abu - Qubita	48.228	59.649	1.347	62.87	19	0.81	0.205	0.634
T21/Bet- Emra 1	34.76	14.315	0.66	92.47	15	0.44	0.079	0.244

T22/Mousa Rasheed	47.079	63.578	1.389	59.51	19.6	0.85	0.218	0.675
T23/Um AL - Ammad	23.559	23.157	0.58	71.32	13.1	0.53	0.061	0.188
T24/Ber - Emra 2	34.634	17.724	0.683	89.02	15.5	0.5	0.085	0.261
T25/Bet - Emra 3	32.874	13.743	0.626	92.26	14.2	0.42	0.071	0.219
T26/Khalet Arabi	15.505	9.635	0.321	84.94	11.4	0.39	0.029	0.09
T27/AL - Nukhba	23.547	35.945	0.755	54.8	17.1	0.75	0.103	0.319
T28/AL - Hadab 1	29.572	14.345	0.577	89.97	13.1	0.41	0.06	0.186
T29/AL - Hadab 2	30.945	16.341	0.615	88.43	13.9	0.45	0.068	0.211
T30/AL - Bhesat	62.574	25.464	1.184	92.62	16.8	0.49	0.159	0.491
T31/AL - Sawakna	34.893	14.355	0.662	92.48	15	0.44	0.079	0.245
T32/Abu Ali	98.06	41.229	1.865	92.18	16.8	0.46	0.199	0.787
T33/Ma'asaret Rasheed	9.618	22.853	0.435	38.79	15.4	0.7	0.053	0.165
T34/AL - Kaziea	35.41	12.497	0.659	94.3	15	0.41	0.079	0.243
T35/AL - Mostashfa	36.912	30.303	0.838	77.29	19	0.72	0.127	0.393
T36/E3zeez	46.041	15.171	0.85	94.98	12.1	0.32	0.082	0.253
T37/Hajar AL - Sakhainah	51.465	40.672	1.151	78.46	16.3	0.61	0.15	0.463
T38/Marah Jaber	13.412	9.857	0.292	80.58	10.4	0.38	0.024	0.075
T39/AL - Mentar	30.133	16.037	0.599	88.28	13.6	0.44	0.065	0.201
T40/Da'erat AL - Sair	9.988	14.664	0.311	56.29	11	0.48	0.027	0.085
T41/Beer E3zeez	31.582	11.493	0.589	93.97	13.4	0.37	0.063	0.194
T42/Wad AL- Baqee3	102	38.77	1.915	93.48	17.3	0.45	0.209	0.83
T43/AL - Mosalla	64.489	28.803	1.239	91.31	17.6	0.53	0.174	0.536
T44/Um AL - Satar 1	109	41.016	2.036	93.55	18.3	0.47	0.237	0.938
T45/Um AL- Satar 2	31.108	13.207	0.593	92.05	13.5	0.4	0.064	0.197
T46/AL - Karag	64.535	33.762	1.278	88.61	18.1	0.58	0.185	0.571
T47/Basal	106	48.045	2.039	91.06	18.4	0.52	0.238	0.941
T48/AL - Baladeia	57.968	26.348	1.117	91.04	15.8	0.48	0.141	0.436
T49/Saleet	41.645	22.028	0.827	88.4	11.7	0.38	0.077	0.239
T50/Abu - Aziza	86.903	62.941	1.883	80.99	16.9	0.59	0.203	0.802
T51/AL - Emria	56.251	27.963	1.102	89.55	15.6	0.49	0.138	0.425
T52/Swedan	39.093	17.484	0.752	91.29	10.7	0.32	0.064	0.198
T53/Yasser Abu - Samra	20.833	12.575	0.427	85.61	9.7	0.33	0.033	0.102
T54/Khalet Saleh	54.747	20.256	1.025	93.79	14.5	0.41	0.119	0.367
T55/Talet AL - Somood 1	30.536	14.672	0.595	90.14	13.5	0.42	0.064	0.198
T56/AL - Rahnneia	6.831	4.157	0.14	85.42	5	0.17	0.006	0.017
T57/Talet AL - Somood 2	25.872	13.091	0.509	89.23	11.6	0.37	0.047	0.145
T58/AL - Arqoob 1	31.466	14.988	0.612	90.28	13.9	0.43	0.068	0.209
T59/AL - Arqoob 2	28.207	15.318	0.564	87.88	12.8	0.42	0.058	0.178
T60/AL - Karmel	49.059	18.534	0.921	93.55	13.1	0.37	0.096	0.297
T61/Raheela	55.845	23.166	1.062	92.37	15	0.44	0.128	0.394
T62/Ma'aeen	20.193	21.038	0.512	69.25	11.6	0.47	0.047	0.147
T63/AL- Tewani	17.377	10.268	0.354	86.09	12.6	0.43	0.036	0.11
T64/Deer AL - Hawa	99.417	45.402	1.918	90.96	17.3	0.49	0.21	0.832
T65/AL - Qafeer	30.076	16.016	0.598	88.27	13.6	0.44	0.065	0.2
T66/Abu - Hmaid	54.032	22.548	1.028	92.29	14.6	0.43	0.12	0.369

T67/AL - Farhania	32.418	15.311	0.629	90.42	14.3	0.44	0.072	0.222
T68/AL - Mazra3a	98.109	48.317	1.92	89.71	17.3	0.51	0.211	0.834
T69/Fatooh	60.662	27.361	1.168	91.16	16.6	0.5	0.154	0.477
T70/AL - Mahkama	24.18	17.327	0.522	81.29	11.8	0.43	0.049	0.153
T71/AL - Waha	31.026	13.183	0.592	92.04	13.4	0.4	0.063	0.196
T72/Islamic Bank	59.02	31.336	1.173	88.32	16.6	0.54	0.156	0.481
T73/AL - Eskan Bank	103	50.674	2.023	89.8	18.2	0.53	0.234	0.926
T74/Mouhammad Nassar	75.687	97.342	2.165	61.38	19.4	0.81	0.268	1.061
T75/Markez AL - Da3wa	44.944	21.472	0.875	90.23	12.4	0.39	0.087	0.268
T76/AL - Marmalah	9.914	7.755	0.221	78.77	7.8	0.29	0.014	0.043
T77/Kaziet Basal	21.341	13.893	0.447	83.81	10.1	0.36	0.036	0.112
T78/Raq3a	53.012	22.201	1.01	92.24	14.3	0.42	0.115	0.356
T79/Raq3a New	8.97	7.439	0.205	76.97	7.3	0.28	0.012	0.037
T80/Kreesa (Shawaheen)	29.078	12.594	0.557	91.76	12.6	0.38	0.056	0.173
T81/Nader Rasheed	23.545	35.943	0.755	54.8	17.1	0.75	0.103	0.319
T82/Kreesa (AL-Kherba)	31.435	11.455	0.588	93.96	13.3	0.37	0.063	0.193
T83/Wad ELma	49.904	18.79	0.937	93.59	13.3	0.37	0.099	0.307
T84/AL - Hadedia	27.166	12.018	0.522	91.45	11.8	0.36	0.049	0.152
T85/AL - Junaidi	55.487	54.205	1.363	71.53	19.2	0.78	0.21	0.65
T86/AL - Bowaib	31.379	14.959	0.611	90.27	13.8	0.43	0.068	0.209
T87/AL - Dowair	16.108	7.515	0.312	90.62	11.1	0.34	0.028	0.085
T88/AL - Deiar Co.	41.617	57.603	1.248	58.56	17.6	0.76	0.176	0.545
T89/AL - Aroos 1	56.892	25.944	1.098	90.99	15.6	0.48	0.137	0.422
T90/AL - Aroos 2	29.538	17.211	0.601	86.4	13.6	0.46	0.065	0.202
T91/AL - Aroos 3	30.03	12.882	0.574	91.9	13	0.39	0.06	0.184
T92/Marj AL - Doodah	28.175	15.306	0.563	87.87	12.8	0.42	0.057	0.177
T93/Zeef	31.922	13.454	0.608	92.15	13.8	0.41	0.067	0.207
T94/AL - Heela 1	32.342	15.286	0.628	90.41	14.2	0.44	0.072	0.221
T95/AL - Heela 2	31.89	13.445	0.608	92.15	13.8	0.41	0.067	0.207
T96/AL - Waseem	27.729	25.789	0.666	73.23	15.1	0.6	0.08	0.248
T97/AL - Shaloodi	25.206	24.196	0.614	72.14	13.9	0.56	0.068	0.211
T98/Abu - Turki	38.252	51.028	1.121	59.98	15.8	0.68	0.142	0.439
T99/Abd - Gaith	44.464	59.073	1.3	60.14	18.3	0.79	0.191	0.591
T100/Mazra'at AL-Nama'	53.183	50.618	1.291	72.44	18.2	0.73	0.188	0.582
T101/Fayez Abu-Snaineh	48.788	61.932	1.385	61.88	19.5	0.84	0.217	0.671
T102/Moustafa Rajab	25.464	36.875	0.788	56.82	17.8	0.78	0.112	0.347
T103/AL - Haddad 1	277	300	7.19	67.88	25.2	1.26	0.884	6.271
T104/AL - Haddad 2	292	324	7.677	66.9	26.9	1.36	1.007	7.15
T105/AL - Haddad 3	202	197	4.957	71.52	22.3	1.07	0.538	3.816
T106/AL - Haddad 4	90.098	102	2.39	66.31	21.4	0.87	0.326	1.292
T107/AL - Sa'ad 1	92.487	87.041	2.234	72.82	20	0.77	0.285	1.129
T108/AL - Sa'ad 2	81.773	85.512	2.081	69.11	18.6	0.74	0.248	0.98
T109/AL - Sa'ad 3	52.398	55.076	1.337	68.93	18.9	0.77	0.202	0.625

4- After 11 years Case

Source

ID	Rating	Rated kV	MW	Mvar	Amp	% PF	% Generation
U1	630 MVA	33	33.372	20.179	682.3	85.57	

General

Study ID	Untitled
Study Case ID	LF
Data Revision	Base
Configuration	Normal
Loading Cat	Design
Generation Cat	Design
Diversity Factor	Normal Loading
Buses	247
Branches	247
Generators	0
Power Grids	1
Loads	109
Load-MW	33.372
Load-Mvar	20.179
Generation-MW	33.372
Generation-Mvar	20.179
Loss-MW	1.307
Loss-Mvar	0.474

Branch

ID	MW Flow	Mvar Flow	Amp Flow	% PF	% Loading	% Voltage Drop	kW Losses	kvar Losses
Cable1	33.372	20.179	682.3	85.57		0.23	87.836	-51.709
Cable2	0.268	0.114	5.099	92.04		0	0.007	-13.914
Cable3	25.507	12.598	498.9	89.66		0.42	113	18.842
Cable4	25.144	12.314	493	89.81		0.09	22.923	-33.018
Cable5	0.202	0.078	3.821	93.24		0	0.004	-15.153
Cable6	24.919	12.284	489.7	89.69		0.13	33.927	-49.56
Cable7	1.347	0.513	25.8	93.45		0.01	0.188	-13.287
Cable8	1.129	0.456	21.8	92.72		0.01	0.154	-15.298
Cable9	0.431	0.111	7.972	96.82		0	0.019	-14.01
Cable10	0.698	0.375	14.18	88.07		0.01	0.07	-16.66
Cable11	0.213	0.07	4.026	94.96		0.01	0.015	-46.711
Cable12	17.824	6.802	336.7	93.43		0.4	72.146	-4.518
Cable13	17.751	6.806	336.9	93.37		0.15	27.277	-1.634
Cable14	4.182	1.447	78.57	94.5		0.06	2.353	-17.478
Cable15	0.224	0.074	4.185	94.93		0.01	0.014	-40.714
Cable16	1.782	0.749	34.32	92.18		0.01	0.224	-9.08
Cable17	1.66	0.502	30.81	95.72		0.01	0.147	-7.406
Cable18	0.313	0.126	5.998	92.8		0	0.01	-13.528
Cable19	0.201	0.08	3.857	92.87		0.01	0.013	-43.925
Cable20	0.124	0.049	2.37	92.91		0	0.005	-47.308
Cable22	0.356	0.144	6.827	92.74		0.01	0.044	-47.447
Cable23	0.77	0.25	14.39	95.13		0.02	0.173	-40.615
Cable24	0.207	0.068	3.867	95.01		0	0.008	-27.109
Cable26	13.19	5.25	251.9	92.91		0.34	45.529	-17.75
Cable27	12.791	5.102	245.2	92.88		0.07	8.927	-3.83
Cable28	3.863	1.334	72.86	94.52		0.03	1.147	-9.89
Cable29	8.371	3.542	162	92.09		0.17	15.221	-22.038
Cable30	3.534	1.213	66.62	94.59		0.03	0.94	-9.758
Cable31	3.534	1.22	66.67	94.52		0.02	0.691	-7.152
Cable32	0.724	0.364	14.45	89.35		0.01	0.054	-12.293
Cable33	2.807	0.905	52.64	95.18		0.08	2.146	-36.199
Cable34	0.47	0.311	10.06	83.43		0.02	0.11	-54.445
Cable35	1.66	0.494	30.77	95.84		0.03	0.542	-27.417
Cable37	2.485	0.827	46.79	94.88		0.11	2.829	-60.775
Cable38	0.474	0.108	8.716	97.51		0.01	0.032	-20.191
Cable39	0.18	0.065	3.425	94.05		0.01	0.012	-49.995
Cable40	7.84	3.34	152.1	92		0.14	11.624	-19.571
Cable41	7.111	3.162	139.1	91.38		0.06	4.161	-8.656
Cable42	0.519	0.145	9.639	96.33		0.01	0.049	-25.423
Cable43	0.308	0.112	5.858	93.98		0	0.013	-18.07
Cable44	0.211	0.078	4.027	93.88		0	0.009	-26.773
Cable45	5.879	2.762	116.3	90.51		0.12	7.255	-22.743
Cable46	0.714	0.206	13.29	96.09		0	0.02	-10.99
Cable47	0.172	0.084	3.421	89.87		0	0.006	-24.728
Cable48	0.204	0.067	3.846	95.01		0.01	0.016	-54.331

Cable49	5.544	2.627	110	90.37		0.09	5.121	-18.134
Cable50	5.014	2.386	99.56	90.3		0.03	1.4	-6.149
Cable51	0.267	0.105	5.145	93.05		0.01	0.021	-39.598
Cable52	4.319	1.849	84.31	91.93		0.07	3.339	-20.935
Cable53	4.207	1.836	82.43	91.66		0.08	3.546	-23.282
Cable54	4.045	1.787	79.46	91.47		0.07	2.779	-19.678
Cable55	3.16	1.346	61.75	92.01		0.04	1.189	-14.208
Cable56	1.362	0.57	26.54	92.24		0.03	0.386	-25.679
Cable57	0.102	0.036	1.939	94.16		0	0.002	-19.923
Cable58	0.171	0.182	4.489	68.47		0.01	0.014	-35.871
Cable59	1.102	0.298	20.52	96.54		0.02	0.172	-19.128
Cable60	0.39	0.128	7.376	95.04		0.01	0.023	-19.84
Cable61	0.392	0.102	7.291	96.77		0.01	0.044	-40.009
Cable62	0.197	0.063	3.723	95.25		0	0.005	-18.521
Cable63	0.204	0.067	3.863	95		0.01	0.012	-39.683
Cable64	7.328	7.464	184.1	70.05		0.38	36.538	-89.419
Line1	0.202	0.081	3.835	92.88		0.01	0.028	-2.266
Line2	6.375	5.257	145.8	77.15		0.19	14.834	6.18
Line3	6.175	5.184	142.6	76.59		0.51	38.854	16.101
Line4	0.129	0.039	2.39	95.78		0	0.003	-0.551
Line5	5.67	4.983	134.2	75.11		0.12	8.369	3.408
Line6	5.401	4.703	127.4	75.41		0.12	8.39	3.358
Line7	5.145	4.445	121.2	75.67		0.23	15.167	5.957
Line8	0.257	0.273	6.691	68.59		0.01	0.046	-1.195
Line9	4.873	4.168	114.5	75.99		0.07	4.066	1.559
Line10	4.755	4.034	111.4	76.25		0.11	6.416	2.429
Line11	2.216	1.35	46.43	85.41		0.02	0.585	-0.041
Line12	2.532	2.682	65.99	68.65		0.11	3.937	0.803
Line13	2.228	2.387	58.48	68.24		0.11	3.534	0.464
Line14	1.329	1.466	35.49	67.17		0.01	0.179	-0.081
Line15	0.895	0.92	23.02	69.73		0.01	0.089	-0.154
Line16	0.446	0.492	11.9	67.21		0	0.023	-0.179
Line17	1.81	0.936	36.46	88.83		0.02	0.464	-0.189
Line18	0.29	0.3	7.467	69.4		0	0.016	-0.326
Line19	0.462	0.438	11.4	72.62		0.02	0.154	-1.319
Line20	0.287	0.323	7.746	66.41		0	0.014	-0.266
Line21	0.175	0.115	3.75	83.63		0	0.003	-0.241
Line22	0.697	0.376	14.19	88.02		0.02	0.156	-0.834
Line23	0.568	0.33	11.76	86.48		0.02	0.111	-0.885
Line24	0.397	0.15	7.599	93.51		0.02	0.051	-2.617
Line25	0.2	0.08	3.869	92.85		0	0.007	-1.32
Line26	1.681	0.636	31.91	93.53		0.1	1.613	-1.12
Line27	1.456	0.572	27.8	93.06		0.04	0.613	-0.652
Line28	1.142	0.461	21.9	92.73		0.03	0.286	-0.573
Line29	0.235	0.153	4.991	83.87		0.01	0.02	-0.941
Line30	0.906	0.31	17.04	94.61		0.02	0.206	-0.745
Line31	0.325	0.038	5.824	99.31		0	0.011	-0.985
Line32	0.306	0.202	6.534	83.51		0.06	0.219	-6.021

Line33	0.129	0.042	2.409	95.04		0.01	0.017	-3.523
Line34	0.313	0.128	6.011	92.59		0.02	0.061	-1.964
Line35	0.206	0.059	3.818	96.12		0.01	0.015	-1.219
Line36	2.242	0.741	42.19	94.95		0.13	2.76	-0.515
Line37	0.943	0.245	17.43	96.8		0.03	0.314	-1.063
Line38	1.297	0.497	24.84	93.38		0.11	1.436	-2.045
Line39	0.785	0.187	14.46	97.28		0.06	0.485	-2.494
Line40	0.474	0.088	8.643	98.33		0.03	0.154	-2.346
Line41	0.093	0.021	1.714	97.48		0.01	0.005	-1.968
Line42	1.092	0.425	20.99	93.21		0.03	0.364	-0.795
Line43	0.9	0.351	17.32	93.16		0.06	0.542	-1.857
Line44	0.474	0.215	9.341	91.07		0.01	0.057	-1.904
Line45	0.139	0.051	2.654	93.84		0.01	0.014	-6.201
Line46	0.157	0.102	3.36	83.77		0.01	0.011	-2.932
Line47	0.714	0.207	13.3	96.02		0.03	0.182	-1.765
Line48	0.424	0.492	11.66	65.29		0.01	0.046	-0.371
Line49	0.109	0.039	2.075	94.1		0.01	0.008	-2.196
Line50	0.582	0.348	12.19	85.79		0.04	0.272	-2.003
Line51	1.798	0.801	35.39	91.34		0.02	0.421	-0.191
Line52	1.696	0.785	33.61	90.75		0.09	1.498	-0.829
Line53	1.33	0.577	26.08	91.75		0.08	1.059	-1.301
Line54	1.127	0.52	22.35	90.8		0.1	1.172	-2.155
Line55	0.471	0.15	8.917	95.3		0.03	0.126	-1.766
Line56	0.654	0.374	13.59	86.8		0.01	0.048	-0.276
Line57	0.184	0.06	3.492	95.1		0.02	0.034	-3.264
Line58	0.335	0.104	6.317	95.5		0.01	0.031	-0.88
Line59	0.131	0.038	2.467	96.1		0	0.004	-0.833
Line60	0.203	0.074	3.9	93.9		0.05	0.097	-7.408
Line61	0.197	0.065	3.731	95.03		0.01	0.018	-1.503
Line62	0.372	0.273	8.305	80.61		0.02	0.107	-1.75
Line63	0.168	0.21	4.835	62.53		0.03	0.072	-3.565
Line64	0.024	-0.085	1.591	-27.02		0	0.003	-1.408
Line65	0.192	0.127	4.137	83.48		0	0.009	-0.595
Line66	0.423	0.375	10.17	74.8		0.01	0.061	-0.66
Line67	0.447	0.29	9.58	83.93		0.01	0.041	-0.505
Line68	0.243	0.258	6.371	68.65		0	0.013	-0.354
Line69	0.272	0.298	7.253	67.48		0	0.007	-0.161
Line70	0.719	0.587	16.69	77.5		0.03	0.267	-0.987
Line71	1.029	0.84	23.89	77.49		0.02	0.28	-0.438
Line72	5.671	5.987	148.2	68.77		0.31	25.544	10.74
Line73	6.9	7.022	176.6	70.09		0.19	18.052	7.868
Line74	7.328	7.464	184.1	70.05		1.87	136	131
Line75	1.265	1.153	30.87	73.9		0.08	1.254	-0.924
T1/Taiseer Obidat	0.268	0.114	5.099	92.04	71.1	2.12	2.942	9.09
T2/Al-Dear	0.146	0.158	3.771	67.77	83	3.51	2.575	7.956
T3/Mousa Arbad	0.25	0.265	6.421	68.66	87.7	3.71	4.665	14.416
T4/Abu Al-Fool	0.202	0.081	3.835	92.88	84.9	2.47	2.663	8.23
T5/AL- Shawaheen	0.341	0.125	6.403	93.9	88.4	2.48	4.639	14.335

T6/AL- Metiana	0.345	0.15	6.643	91.73	91.5	2.77	4.993	15.429
T7/AL- Ghowita	0.186	0.067	3.495	94.04	77.3	2.16	2.211	6.832
T8/Haroon AL - Rasheed	0.338	0.146	6.539	91.74	89.4	2.73	4.839	14.954
T9/Majd AL- Ba3	0.129	0.042	2.409	95.04	82.8	2.23	1.642	5.073
T10/Mahmoud Rasheed	0.261	0.277	6.764	68.58	91.2	3.91	5.178	15.999
T11/Ahmad Rasheed	0.247	0.254	6.315	69.65	85.3	3.63	4.513	13.946
T12/Ali Hassan Nassar	0.257	0.273	6.691	68.59	90	3.87	5.067	15.657
T13/AL - Tatweer	0.115	0.132	3.129	65.43	104.3	4.61	2.769	8.556
T14/Salah Mousa Nassar	0.3	0.294	7.525	71.34	100.5	4.26	6.409	19.803
T15/Mousa Nassar	0.456	0.462	11.64	70.19	98.7	4.07	7.742	30.658
T16/Khaled Nassar	0.439	0.458	11.38	69.25	96.6	4.01	7.394	29.28
T17/Ali Mousa Nassar	0.883	0.975	23.59	67.13	99.5	5.28	12.175	86.418
T18/Nafez Nassar	0.446	0.492	11.9	67.21	100.8	4.26	8.097	32.064
T19/Ahmad H. Nassar	0.116	0.114	2.916	71.39	97.5	4.13	2.405	7.433
T20/Rasmi Abu - Qubita	0.29	0.3	7.467	69.4	99.7	4.29	6.309	19.495
T21/Bet- Emra 1	0.218	0.072	4.109	94.94	89.5	2.44	3.057	9.446
T22/Mousa Rasheed	0.287	0.323	7.746	66.41	103.1	4.54	6.789	20.979
T23/Um AL - Ammad	0.175	0.115	3.75	83.63	81.2	2.97	2.546	7.866
T24/Ber - Emra 2	0.218	0.088	4.2	92.75	91.2	2.71	3.194	9.869
T25/Bet - Emra 3	0.213	0.07	4.026	94.96	87.7	2.39	2.934	9.067
T26/Khalet Arabi	0.13	0.047	2.475	93.92	84.3	2.4	1.734	5.357
T27/AL - Nukhba	0.171	0.182	4.47	68.48	95.6	4.14	3.618	11.181
T28/AL - Hadab 1	0.196	0.071	3.74	93.96	81.5	2.32	2.532	7.825
T29/AL - Hadab 2	0.2	0.08	3.869	92.85	84.2	2.49	2.71	8.374
T30/AL - Bhesat	0.35	0.129	6.624	93.85	90.9	2.57	4.965	15.341
T31/AL - Sawakna	0.224	0.074	4.185	94.93	91.9	2.48	3.171	9.799
T32/Abu Ali	0.515	0.207	9.858	92.79	86.1	2.31	5.553	21.99
T33/Ma'asaret Rasheed	0.101	0.113	2.691	66.63	90.9	3.94	2.048	6.329
T34/AL - Kaziea	0.223	0.065	4.136	96.04	90.9	2.32	3.098	9.572
T35/AL - Mostashfa	0.235	0.153	4.991	83.87	68.4	2.47	2.819	8.711
T36/E3zeez	0.274	0.077	5.071	96.28	70	1.77	2.91	8.991
T37/Hajar AL - Sakhainah	0.306	0.202	6.534	83.51	88.7	3.24	4.832	14.931
T38/Marah Jaber	0.124	0.049	2.37	92.91	81.2	2.39	1.589	4.911
T39/AL - Mentar	0.201	0.08	3.857	92.87	84.5	2.49	2.693	8.322
T40/Da'erat AL - Sair	0.107	0.07	2.266	83.71	77.3	2.81	1.452	4.488
T41/Beer E3zeez	0.206	0.059	3.818	96.12	84	2.14	2.639	8.154
T42/Wad AL- Baqee3	0.533	0.196	10.1	93.84	88.1	2.27	5.824	23.064
T43/AL - Mosalla	0.356	0.144	6.827	92.74	93.4	2.76	5.275	16.3
T44/Um AL - Satar 1	0.563	0.209	10.68	93.77	93	2.4	6.513	25.791
T45/Um AL- Satar 2	0.207	0.068	3.867	95.01	85	2.29	2.708	8.368
T46/AL - Karag	0.354	0.165	6.953	90.6	94.6	2.99	5.471	16.906
T47/Basal	0.547	0.239	10.63	91.62	92.2	2.6	6.462	25.589
T48/AL - Baladeia	0.328	0.131	6.298	92.84	86	2.54	4.489	13.87
T49/Saleet	0.254	0.108	4.914	92.06	67.5	2.04	2.733	8.446
T50/Abu - Aziza	0.47	0.311	10.06	83.43	86.7	2.99	5.777	22.876
T51/AL - Emria	0.32	0.138	6.221	91.8	84.8	2.59	4.38	13.535
T52/Swedan	0.242	0.086	4.596	94.21	63.1	1.77	2.39	7.386
T53/Yasser Abu - Samra	0.157	0.061	3.011	93.12	66	1.93	1.641	5.071

T54/Khalet Saleh	0.311	0.101	5.855	95.06	79.9	2.17	3.879	11.987
T55/Talet AL - Somood 1	0.201	0.074	3.839	93.93	83.6	2.38	2.669	8.246
T56/AL - Rahnneia	0.093	0.021	1.714	97.48	59	1.38	0.832	2.57
T57/Talet AL - Somood 2	0.18	0.065	3.425	94.05	74.8	2.12	2.124	6.564
T58/AL - Arqoob 1	0.203	0.074	3.873	93.92	84.4	2.4	2.716	8.392
T59/AL - Arqoob 2	0.191	0.076	3.687	92.91	80.3	2.38	2.462	7.607
T60/AL - Karmel	0.287	0.093	5.402	95.13	73.8	1.99	3.303	10.205
T61/Raheela	0.317	0.116	6.059	93.94	82.4	2.35	4.155	12.838
T62/Ma'aeen	0.157	0.102	3.36	83.77	72.9	2.66	2.044	6.317
T63/AL- Tewani	0.139	0.051	2.654	93.84	90.1	2.58	1.993	6.159
T64/Deer AL - Hawa	0.516	0.224	10.04	91.7	87.1	2.45	5.761	22.815
T65/AL - Qafeer	0.197	0.079	3.793	92.88	82.7	2.44	2.605	8.05
T66/Abu - Hmaid	0.308	0.112	5.858	93.98	80	2.27	3.883	11.998
T67/AL - Farhania	0.211	0.078	4.027	93.88	87.8	2.5	2.936	9.072
T68/AL - Mazra3a	0.508	0.237	10.02	90.64	86.6	2.53	5.735	22.711
T69/Fatooh	0.338	0.136	6.51	92.79	88.5	2.63	4.796	14.818
T70/AL - Mahkama	0.172	0.084	3.421	89.87	74.6	2.41	2.119	6.547
T71/AL - Waha	0.204	0.067	3.846	95.01	84	2.28	2.678	8.275
T72/Islamic Bank	0.329	0.153	6.496	90.69	88.1	2.79	4.776	14.757
T73/AL - Eskan Bank	0.529	0.247	10.46	90.58	90.1	2.64	6.255	24.77
T74/Mouhammad Nassar	0.424	0.492	11.66	65.29	98.7	4.23	7.763	30.742
T75/Markez AL - Da3wa	0.267	0.105	5.145	93.05	70.2	2.07	2.996	9.258
T76/AL - Marmalah	0.109	0.039	2.075	94.1	70.8	2	1.218	3.763
T77/Kaziet Basal	0.16	0.068	3.117	92.04	68	2.07	1.759	5.436
T78/Raq3a	0.301	0.109	5.752	94	78.2	2.23	3.744	11.569
T79/Raq3a New	0.102	0.036	1.939	94.16	66.1	1.87	1.064	3.286
T80/Kreesa (Shawaheen)	0.194	0.064	3.68	95.05	80	2.18	2.453	7.578
T81/Nader Rasheed	0.171	0.182	4.489	68.47	95.5	4.16	3.649	11.274
T82/Kreesa (AL- Kherba)	0.202	0.058	3.781	96.12	82.1	2.12	2.588	7.997
T83/Wad ELma	0.287	0.093	5.443	95.12	73.9	2.01	3.353	10.361
T84/AL - Hadedia	0.184	0.06	3.492	95.1	75.8	2.06	2.208	6.824
T85/AL - Junaidi	0.32	0.271	7.563	76.25	100.4	4.1	6.474	20.003
T86/AL - Bowaib	0.203	0.074	3.9	93.9	84.3	2.42	2.754	8.51
T87/AL - Dowair	0.131	0.038	2.467	96.1	83.6	2.16	1.721	5.319
T88/AL - Deiar Co.	0.26	0.291	7.022	66.55	93.5	4.11	5.58	17.243
T89/AL - Aroos 1	0.319	0.128	6.188	92.85	83.8	2.49	4.334	13.392
T90/AL - Aroos 2	0.193	0.083	3.773	91.82	81.7	2.51	2.577	7.963
T91/AL - Aroos 3	0.197	0.065	3.731	95.03	81.1	2.21	2.521	7.79
T92/Marj AL - Doodah	0.188	0.075	3.643	92.92	79.1	2.35	2.403	7.427
T93/Zeef	0.204	0.067	3.863	95	83.9	2.29	2.702	8.35
T94/AL - Heela 1	0.209	0.077	4.01	93.88	86.9	2.49	2.911	8.995
T95/AL - Heela 2	0.204	0.067	3.864	95	83.9	2.29	2.704	8.354
T96/AL - Waseem	0.192	0.127	4.137	83.48	88.9	3.29	3.099	9.575
T97/AL - Shaloodi	0.18	0.118	3.873	83.57	83.4	3.07	2.717	8.394
T98/Abu - Turki	0.243	0.258	6.371	68.65	85.2	3.68	4.593	14.191
T99/Abd - Gaith	0.272	0.298	7.253	67.48	96.4	4.22	5.953	18.396
T100/Mazra'at AL- Nama'	0.31	0.254	7.208	77.33	96.2	3.87	5.88	18.169
T101/Fayez Abu-Snaineh	0.292	0.312	7.659	68.37	101.9	4.43	6.639	20.513

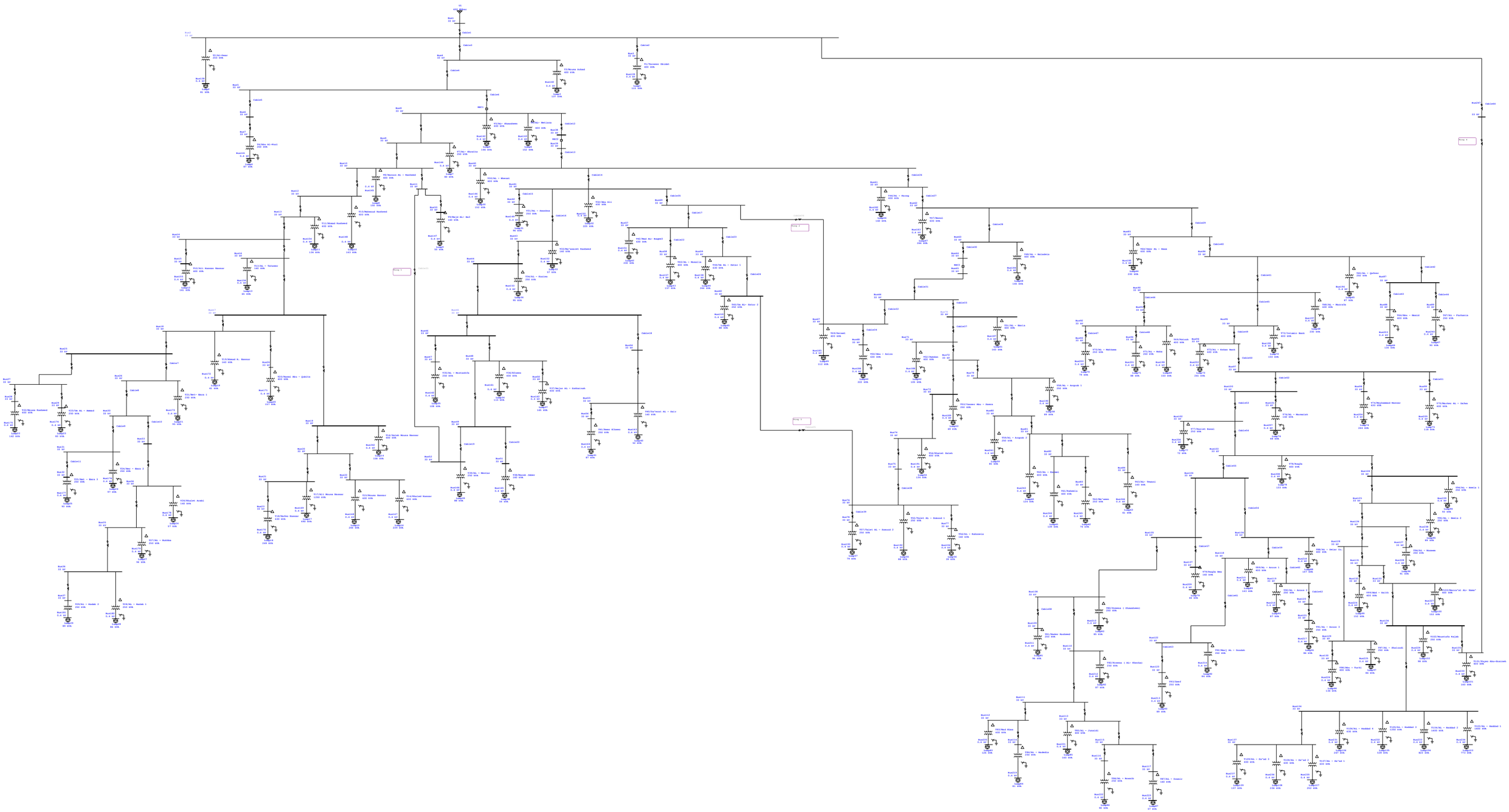
T102/Moustafa Rajab	0.181	0.188	4.695	69.38	99.8	4.32	3.991	12.332
T103/AL - Haddad 1	1.395	1.572	37.9	66.36	122.3	6.66	24.55	174
T104/AL - Haddad 2	1.465	1.707	40.58	65.13	130.2	7.2	28.138	200
T105/AL - Haddad 3	1.028	1.028	26.22	70.73	109.5	5.64	15.039	107
T106/AL - Haddad 4	0.492	0.516	12.85	69.01	107.8	4.53	9.427	37.332
T107/AL - Sa'ad 1	0.503	0.443	12.09	75.05	101.9	4.03	8.352	33.075
T108/AL - Sa'ad 2	0.452	0.433	11.3	72.21	95.4	3.88	7.29	28.867
T109/AL - Sa'ad 3	0.309	0.279	7.511	74.28	99.6	4.15	6.385	19.73

Appendix F

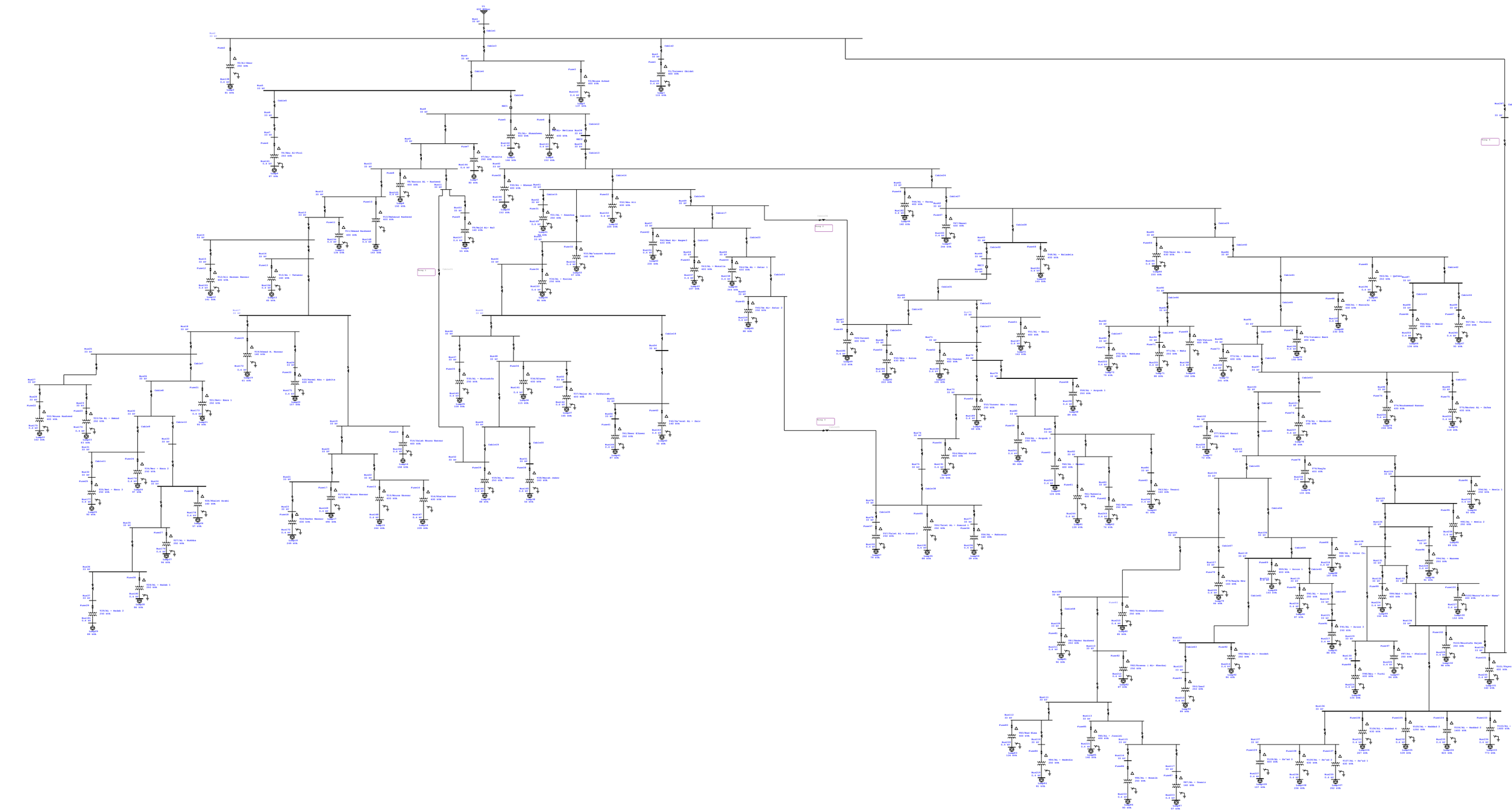
Maximum Demand at Interconnection Point before and after Installing PV Systems at 0.4 kV Buses

Year	Average load	Max. demand (kW)	PV system contribution (kW)	avg. load after PV (kW)	Max. after PV (kW)
2015	7548	14130	1313	6235	11672
2016	8227	15401	1469	6758	12651
2017	8968	16787	1644	7324	13710
2018	9775	18298	1839	7936	14855
2019	10655	19945	2058	8597	16093
2020	11614	21740	2303	9311	17430
2021	12659	23697	2576	10082	18874
2022	13798	25829	2883	10915	20433
2023	15040	28154	3225	11814	22116
2024	16393	30688	3609	12784	23932
2025	17869	33450	4038	13831	25891
2026	19477	36460	4518	14959	28002
2027	21230	39742	5055	16175	30278
2028	23141	43318	5657	17484	32730
2029	25223	47217	6329	18894	35369
2030	27493	51467	7082	20412	38210
2031	29968	56099	7924	22044	41266
2032	32665	61147	8866	23799	44551
2033	35605	66651	9920	25685	48081
2034	38809	72649	11099	27710	51872
2035	42302	79188	12419	29883	55940

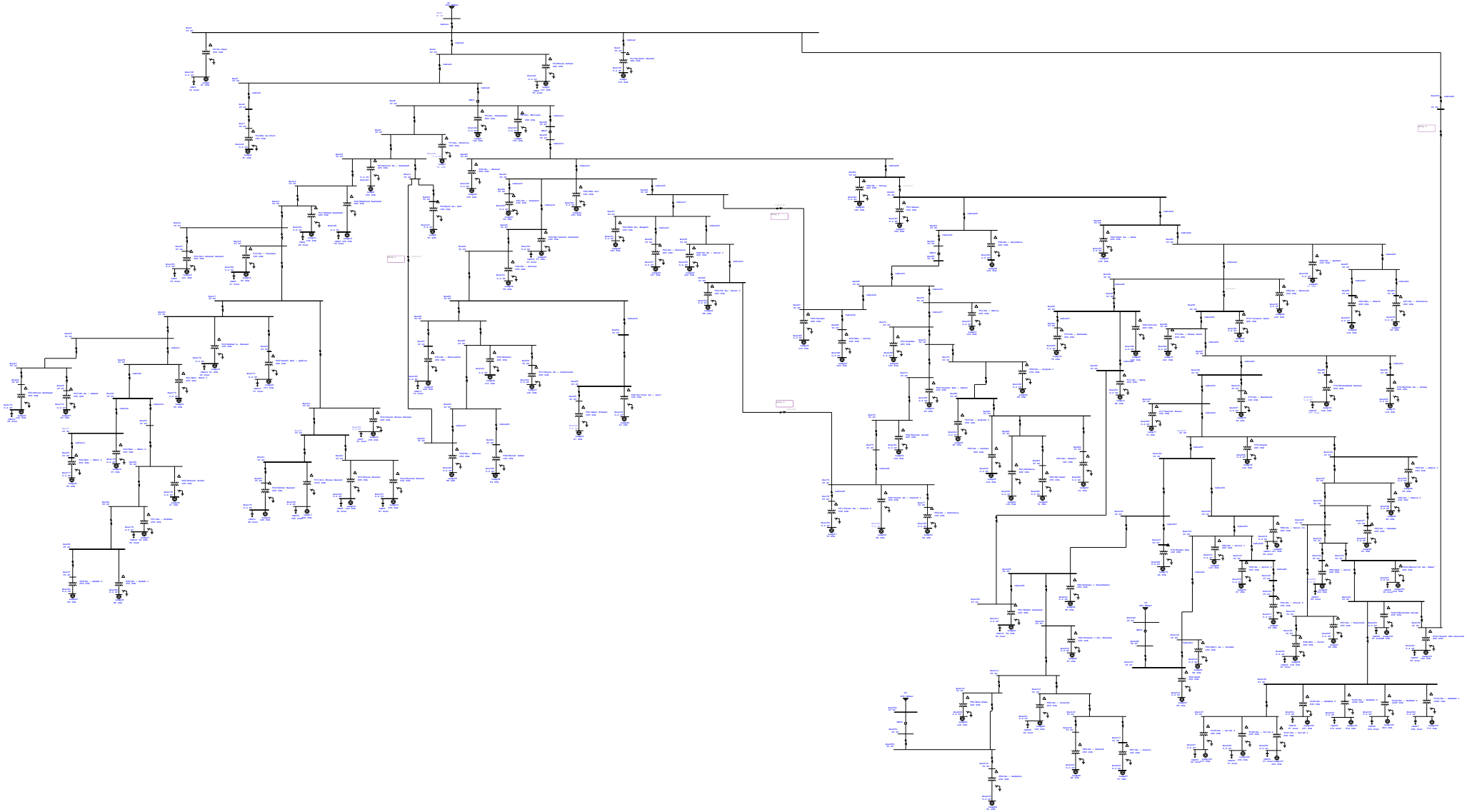
Appendix B - single line diagram for Yatta's electrical network - present case without protective devices



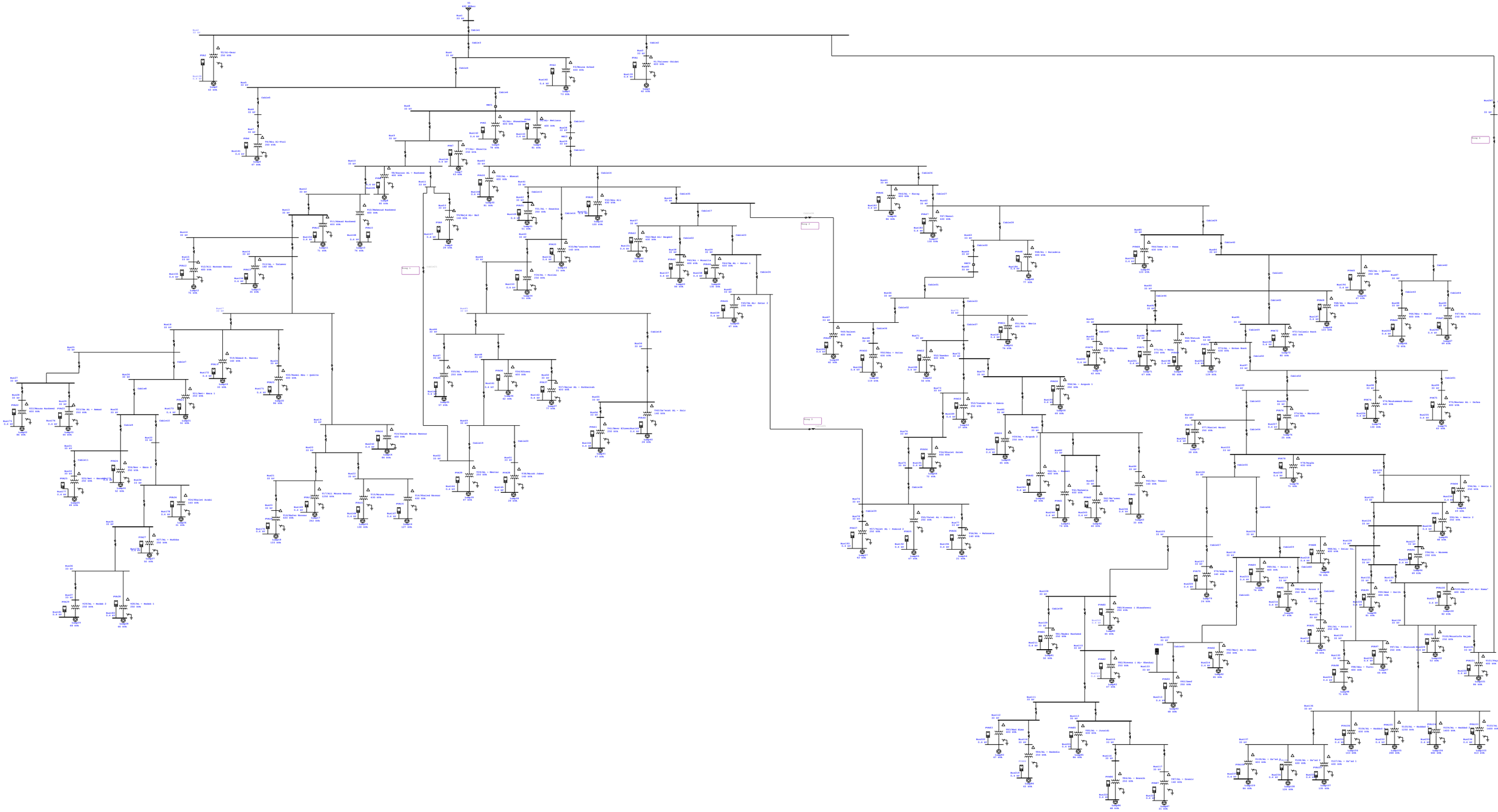
Appendix B - SLD for Yatta's electrical network - present case with protection scenario



Appendix B - SLD for Yatta's electrical network - scenario two : interconnection points with capacitor banks



Appendix B - SLD for Yatta's electrical network - scenario three: installing PV system



Electrical Transient Analyzer Program

Load Flow Analysis

Loading Category (1): Design

Generation Category (1): Design

Load Diversity Factor: None

	Swing	V-Control	Load	Total
Number of Buses:	1	0	246	247

	XFMR2	XFMR3	Reactor	Line/Cable	Impedance	Tie PD	Total
Number of Branches:	109	0	0	136	0	2	247

Method of Solution:	Newton-Raphson Method
Maximum No. of Iteration:	99
Precision of Solution:	0.0001000
System Frequency:	50.00 Hz
Unit System:	English
Project Filename:	Yatta_Final
Output Filename:	G:\Yatta_Final_Alaa\Untitled.lfr

Adjustments

Tolerance	Apply Adjustments	Individual /Global	Percent
Transformer Impedance:	Yes	Individual	
Reactor Impedance:	Yes	Individual	
Overload Heater Resistance:	No		
Transmission Line Length:	No		
Cable Length:	No		

Temperature Correction	Apply Adjustments	Individual /Global	Degree C
Transmission Line Resistance:	Yes	Individual	
Cable Resistance:	Yes	Individual	

Bus Input Data

Bus			Initial Voltage		Load							
					Constant kVA		Constant Z		Constant I		Generic	
ID	kV	Sub-sys	% Mag.	Ang.	MW	Mvar	MW	Mvar	MW	Mvar	MW	Mvar
Bus1	33.000	1	100.0	0.0								
Bus2	33.000	1	100.0	0.0								
Bus3	33.000	1	100.0	0.0								
Bus4	33.000	1	100.0	0.0								
Bus5	33.000	1	100.0	0.0								
Bus6	33.000	1	100.0	0.0								
Bus7	33.000	1	100.0	0.0								
Bus8	33.000	1	100.0	0.0								
Bus9	33.000	1	100.0	0.0								
Bus10	33.000	1	100.0	0.0								
Bus11	33.000	1	100.0	0.0								
Bus12	33.000	1	100.0	0.0								
Bus13	33.000	1	100.0	0.0								
Bus14	33.000	1	100.0	0.0								
Bus15	33.000	1	100.0	0.0								
Bus16	33.000	1	100.0	0.0								
Bus17	33.000	1	100.0	0.0								
Bus18	33.000	1	100.0	0.0								
Bus19	33.000	1	100.0	0.0								
Bus20	33.000	1	100.0	0.0								
Bus21	33.000	1	100.0	0.0								
Bus22	33.000	1	100.0	0.0								
Bus23	33.000	1	100.0	0.0								
Bus24	33.000	1	100.0	0.0								
Bus25	33.000	1	100.0	0.0								
Bus26	33.000	1	100.0	0.0								
Bus27	33.000	1	100.0	0.0								
Bus28	33.000	1	100.0	0.0								
Bus29	33.000	1	100.0	0.0								
Bus30	33.000	1	100.0	0.0								
Bus31	33.000	1	100.0	0.0								
Bus32	33.000	1	100.0	0.0								
Bus33	33.000	1	100.0	0.0								

Bus			Initial Voltage		Load							
					Constant kVA		Constant Z		Constant I		Generic	
ID	kV	Sub-sys	% Mag.	Ang.	MW	Mvar	MW	Mvar	MW	Mvar	MW	Mvar
Bus34	33.000	1	100.0	0.0								
Bus35	33.000	1	100.0	0.0								
Bus36	33.000	1	100.0	0.0								
Bus37	33.000	1	100.0	0.0								
Bus38	33.000	1	100.0	0.0								
Bus39	33.000	1	100.0	0.0								
Bus40	33.000	1	100.0	0.0								
Bus41	33.000	1	100.0	0.0								
Bus42	33.000	1	100.0	0.0								
Bus43	33.000	1	100.0	0.0								
Bus44	33.000	1	100.0	0.0								
Bus45	33.000	1	100.0	0.0								
Bus46	33.000	1	100.0	0.0								
Bus47	33.000	1	100.0	0.0								
Bus48	33.000	1	100.0	0.0								
Bus49	33.000	1	100.0	0.0								
Bus50	33.000	1	100.0	0.0								
Bus51	33.000	1	100.0	0.0								
Bus52	33.000	1	100.0	0.0								
Bus53	33.000	1	100.0	0.0								
Bus54	33.000	1	100.0	0.0								
Bus55	33.000	1	100.0	0.0								
Bus56	33.000	1	100.0	0.0								
Bus57	33.000	1	100.0	0.0								
Bus58	33.000	1	100.0	0.0								
Bus59	33.000	1	100.0	0.0								
Bus60	33.000	1	100.0	0.0								
Bus61	33.000	1	100.0	0.0								
Bus62	33.000	1	100.0	0.0								
Bus63	33.000	1	100.0	0.0								
Bus64	33.000	1	100.0	0.0								
Bus65	33.000	1	100.0	0.0								
Bus66	33.000	1	100.0	0.0								
Bus67	33.000	1	100.0	0.0								
Bus68	33.000	1	100.0	0.0								

Bus			Initial Voltage		Load							
					Constant kVA		Constant Z		Constant I		Generic	
ID	kV	Sub-sys	% Mag.	Ang.	MW	Mvar	MW	Mvar	MW	Mvar	MW	Mvar
Bus69	33.000	1	100.0	0.0								
Bus70	33.000	1	100.0	0.0								
Bus71	33.000	1	100.0	0.0								
Bus72	33.000	1	100.0	0.0								
Bus73	33.000	1	100.0	0.0								
Bus74	33.000	1	100.0	0.0								
Bus75	33.000	1	100.0	0.0								
Bus76	33.000	1	100.0	0.0								
Bus77	33.000	1	100.0	0.0								
Bus78	33.000	1	100.0	0.0								
Bus79	33.000	1	100.0	0.0								
Bus80	33.000	1	100.0	0.0								
Bus81	33.000	1	100.0	0.0								
Bus82	33.000	1	100.0	0.0								
Bus83	33.000	1	100.0	0.0								
Bus84	33.000	1	100.0	0.0								
Bus85	33.000	1	100.0	0.0								
Bus86	33.000	1	100.0	0.0								
Bus87	33.000	1	100.0	0.0								
Bus88	33.000	1	100.0	0.0								
Bus89	33.000	1	100.0	0.0								
Bus90	33.000	1	100.0	0.0								
Bus91	33.000	1	100.0	0.0								
Bus92	33.000	1	100.0	0.0								
Bus93	33.000	1	100.0	0.0								
Bus94	33.000	1	100.0	0.0								
Bus95	33.000	1	100.0	0.0								
Bus96	33.000	1	100.0	0.0								
Bus97	33.000	1	100.0	0.0								
Bus98	33.000	1	100.0	0.0								
Bus99	33.000	1	100.0	0.0								
Bus100	33.000	1	100.0	0.0								
Bus101	33.000	1	100.0	0.0								
Bus102	33.000	1	100.0	0.0								
Bus103	33.000	1	100.0	0.0								

Bus			Initial Voltage		Load							
					Constant kVA		Constant Z		Constant I		Generic	
ID	kV	Sub-sys	% Mag.	Ang.	MW	Mvar	MW	Mvar	MW	Mvar	MW	Mvar
Bus104	33.000	1	100.0	0.0								
Bus105	33.000	1	100.0	0.0								
Bus106	33.000	1	100.0	0.0								
Bus107	33.000	1	100.0	0.0								
Bus108	33.000	1	100.0	0.0								
Bus109	33.000	1	100.0	0.0								
Bus110	33.000	1	100.0	0.0								
Bus111	33.000	1	100.0	0.0								
Bus112	33.000	1	100.0	0.0								
Bus113	33.000	1	100.0	0.0								
Bus114	33.000	1	100.0	0.0								
Bus115	33.000	1	100.0	0.0								
Bus116	33.000	1	100.0	0.0								
Bus117	33.000	1	100.0	0.0								
Bus118	33.000	1	100.0	0.0								
Bus119	33.000	1	100.0	0.0								
Bus120	33.000	1	100.0	0.0								
Bus121	33.000	1	100.0	0.0								
Bus122	33.000	1	100.0	0.0								
Bus123	33.000	1	100.0	0.0								
Bus124	33.000	1	100.0	0.0								
Bus125	33.000	1	100.0	0.0								
Bus126	33.000	1	100.0	0.0								
Bus127	33.000	1	100.0	0.0								
Bus128	33.000	1	100.0	0.0								
Bus129	33.000	1	100.0	0.0								
Bus130	33.000	1	100.0	0.0								
Bus131	33.000	1	100.0	0.0								
Bus132	33.000	1	100.0	0.0								
Bus133	33.000	1	100.0	0.0								
Bus134	33.000	1	100.0	0.0								
Bus135	33.000	1	100.0	0.0								
Bus136	33.000	1	100.0	0.0								
Bus137	33.000	1	100.0	0.0								
Bus138	0.400	1	100.0	0.0	0.134	0.140	0.015	0.016				

Bus			Initial Voltage		Load							
					Constant kVA		Constant Z		Constant I		Generic	
ID	kV	Sub-sys	% Mag.	Ang.	MW	Mvar	MW	Mvar	MW	Mvar	MW	Mvar
Bus139	0.400	1	100.0	0.0	0.035	0.014	0.315	0.124				
Bus140	0.400	1	100.0	0.0	0.234	0.239	0.026	0.027				
Bus141	0.400	1	100.0	0.0	0.019	0.007	0.172	0.062				
Bus142	0.400	1	100.0	0.0	0.036	0.012	0.321	0.106				
Bus143	0.400	1	100.0	0.0	0.033	0.013	0.295	0.116				
Bus144	0.400	1	100.0	0.0	0.018	0.006	0.158	0.052				
Bus145	0.400	1	100.0	0.0	0.032	0.013	0.291	0.115				
Bus146	0.400	1	100.0	0.0	0.033	0.011	0.301	0.099				
Bus147	0.400	1	100.0	0.0	0.012	0.004	0.111	0.032				
Bus148	0.400	1	100.0	0.0	0.209	0.213	0.023	0.024				
Bus149	0.400	1	100.0	0.0	0.021	0.006	0.193	0.056				
Bus150	0.400	1	100.0	0.0	0.049	0.018	0.442	0.161				
Bus151	0.400	1	100.0	0.0	0.051	0.017	0.458	0.151				
Bus152	0.400	1	100.0	0.0	0.081	0.088	0.009	0.010				
Bus153	0.400	1	100.0	0.0	0.021	0.005	0.192	0.048				
Bus154	0.400	1	100.0	0.0	0.233	0.231	0.026	0.026				
Bus155	0.400	1	100.0	0.0	0.207	0.211	0.023	0.023				
Bus156	0.400	1	100.0	0.0	0.092	0.102	0.010	0.011				
Bus157	0.400	1	100.0	0.0	0.034	0.012	0.308	0.112				
Bus158	0.400	1	100.0	0.0	0.054	0.018	0.485	0.159				
Bus159	0.400	1	100.0	0.0	0.020	0.006	0.177	0.052				
Bus160	0.400	1	100.0	0.0	0.218	0.135	0.054	0.034				
Bus161	0.400	1	100.0	0.0	0.026	0.007	0.234	0.059				
Bus162	0.400	1	100.0	0.0	0.143	0.088	0.143	0.088				
Bus163	0.400	1	100.0	0.0	0.020	0.013	0.082	0.051				
Bus164	0.400	1	100.0	0.0	0.020	0.005	0.177	0.044				
Bus165	0.400	1	100.0	0.0	0.012	0.004	0.107	0.039				
Bus166	0.400	1	100.0	0.0	0.019	0.007	0.173	0.063				
Bus167	0.400	1	100.0	0.0	0.354	0.351	0.039	0.039				
Bus168	0.400	1	100.0	0.0	0.367	0.354	0.041	0.039				
Bus169	0.400	1	100.0	0.0	0.717	0.731	0.080	0.081				
Bus170	0.400	1	100.0	0.0	0.356	0.374	0.044	0.046				
Bus171	0.400	1	100.0	0.0	0.233	0.231	0.026	0.026				
Bus172	0.400	1	100.0	0.0	0.093	0.087	0.010	0.010				
Bus173	0.400	1	100.0	0.0	0.021	0.006	0.190	0.055				

Bus			Initial Voltage		Load							
					Constant kVA		Constant Z		Constant I		Generic	
ID	kV	Sub-sys	% Mag.	Ang.	MW	Mvar	MW	Mvar	MW	Mvar	MW	Mvar
Bus174	0.400	1	100.0	0.0	0.082	0.051	0.082	0.051				
Bus175	0.400	1	100.0	0.0	0.230	0.248	0.026	0.028				
Bus176	0.400	1	100.0	0.0	0.021	0.008	0.190	0.069				
Bus177	0.400	1	100.0	0.0	0.021	0.006	0.186	0.054				
Bus178	0.400	1	100.0	0.0	0.013	0.004	0.114	0.037				
Bus179	0.400	1	100.0	0.0	0.137	0.140	0.015	0.016				
Bus180	0.400	1	100.0	0.0	0.019	0.006	0.171	0.056				
Bus181	0.400	1	100.0	0.0	0.020	0.007	0.176	0.064				
Bus182	0.400	1	100.0	0.0	0.034	0.015	0.308	0.131				
Bus183	0.400	1	100.0	0.0	0.053	0.021	0.475	0.188				
Bus184	0.400	1	100.0	0.0	0.032	0.011	0.284	0.103				
Bus185	0.400	1	100.0	0.0	0.034	0.014	0.308	0.122				
Bus186	0.400	1	100.0	0.0	0.220	0.136	0.220	0.136				
Bus187	0.400	1	100.0	0.0	0.031	0.012	0.278	0.110				
Bus188	0.400	1	100.0	0.0	0.032	0.011	0.291	0.096				
Bus189	0.400	1	100.0	0.0	0.020	0.007	0.176	0.064				
Bus190	0.400	1	100.0	0.0	0.020	0.006	0.178	0.058				
Bus191	0.400	1	100.0	0.0	0.030	0.009	0.270	0.079				
Bus192	0.400	1	100.0	0.0	0.019	0.006	0.175	0.058				
Bus193	0.400	1	100.0	0.0	0.017	0.006	0.156	0.051				
Bus194	0.400	1	100.0	0.0	0.014	0.003	0.122	0.025				
Bus195	0.400	1	100.0	0.0	0.050	0.020	0.449	0.177				
Bus196	0.400	1	100.0	0.0	0.019	0.007	0.172	0.062				
Bus197	0.400	1	100.0	0.0	0.049	0.021	0.444	0.189				
Bus198	0.400	1	100.0	0.0	0.033	0.012	0.294	0.107				
Bus199	0.400	1	100.0	0.0	0.032	0.014	0.288	0.123				
Bus200	0.400	1	100.0	0.0	0.017	0.008	0.150	0.068				
Bus201	0.400	1	100.0	0.0	0.020	0.006	0.177	0.052				
Bus202	0.400	1	100.0	0.0	0.052	0.022	0.465	0.198				
Bus203	0.400	1	100.0	0.0	0.030	0.010	0.267	0.088				
Bus204	0.400	1	100.0	0.0	0.342	0.379	0.038	0.042				
Bus205	0.400	1	100.0	0.0	0.032	0.012	0.291	0.106				
Bus206	0.400	1	100.0	0.0	0.020	0.008	0.184	0.073				
Bus207	0.400	1	100.0	0.0	0.013	0.004	0.121	0.040				
Bus208	0.400	1	100.0	0.0	0.032	0.011	0.291	0.096				

Bus			Initial Voltage		Load							
					Constant kVA		Constant Z		Constant I		Generic	
ID	kV	Sub-sys	% Mag.	Ang.	MW	Mvar	MW	Mvar	MW	Mvar	MW	Mvar
Bus209	0.400	1	100.0	0.0	0.014	0.004	0.123	0.040				
Bus210	0.400	1	100.0	0.0	0.019	0.006	0.171	0.050				
Bus211	0.400	1	100.0	0.0	0.137	0.140	0.015	0.016				
Bus212	0.400	1	100.0	0.0	0.020	0.005	0.177	0.044				
Bus213	0.400	1	100.0	0.0	0.020	0.006	0.180	0.052				
Bus214	0.400	1	100.0	0.0	0.018	0.007	0.165	0.060				
Bus215	0.400	1	100.0	0.0	0.031	0.011	0.281	0.102				
Bus216	0.400	1	100.0	0.0	0.019	0.007	0.170	0.067				
Bus217	0.400	1	100.0	0.0	0.019	0.006	0.173	0.050				
Bus218	0.400	1	100.0	0.0	0.225	0.243	0.025	0.027				
Bus219	0.400	1	100.0	0.0	0.018	0.005	0.162	0.047				
Bus220	0.400	1	100.0	0.0	0.028	0.008	0.252	0.074				
Bus221	0.400	1	100.0	0.0	0.232	0.186	0.058	0.047				
Bus222	0.400	1	100.0	0.0	0.020	0.007	0.180	0.059				
Bus223	0.400	1	100.0	0.0	0.013	0.003	0.116	0.029				
Bus224	0.400	1	100.0	0.0	0.229	0.234	0.025	0.026				
Bus225	0.400	1	100.0	0.0	0.095	0.059	0.095	0.059				
Bus226	0.400	1	100.0	0.0	0.219	0.229	0.024	0.025				
Bus227	0.400	1	100.0	0.0	0.225	0.175	0.056	0.044				
Bus228	0.400	1	100.0	0.0	0.091	0.056	0.091	0.056				
Bus229	0.400	1	100.0	0.0	0.146	0.145	0.016	0.016				
Bus230	0.400	1	100.0	0.0	0.234	0.239	0.026	0.027				
Bus231	0.400	1	100.0	0.0	0.379	0.376	0.042	0.042				
Bus232	0.400	1	100.0	0.0	0.758	0.689	0.075	0.068				
Bus233	0.400	1	100.0	0.0	0.864	0.907	0.096	0.101				
Bus234	0.400	1	100.0	0.0	0.897	0.915	0.100	0.102				
Bus235	0.400	1	100.0	0.0	0.406	0.337	0.045	0.037				
Bus236	0.400	1	100.0	0.0	0.366	0.332	0.041	0.037				
Bus237	0.400	1	100.0	0.0	0.249	0.213	0.028	0.024				
Bus238	0.400	1	100.0	0.0	0.020	0.006	0.180	0.052				
Bus239	0.400	1	100.0	0.0	0.020	0.007	0.184	0.060				
Bus240	0.400	1	100.0	0.0	0.020	0.007	0.184	0.060				
Bus241	0.400	1	100.0	0.0	0.019	0.007	0.168	0.061				
Bus242	0.400	1	100.0	0.0	0.240	0.225	0.027	0.025				
Bus243	0.400	1	100.0	0.0	0.028	0.008	0.249	0.073				

Bus			Initial Voltage		Load							
					Constant kVA		Constant Z		Constant I		Generic	
ID	kV	Sub-sys	% Mag.	Ang.	MW	Mvar	MW	Mvar	MW	Mvar	MW	Mvar
Bus244	0.400	1	100.0	0.0	0.031	0.010	0.277	0.091				
Bus245	0.400	1	100.0	0.0	0.072	0.045	0.075	0.046				
Bus246	0.400	1	100.0	0.0	0.013	0.004	0.121	0.040				
Bus247	33.000	1	100.0	0.0								
Total Number of Buses: 247					12.550	10.903	18.052	7.206	0.000	0.000	0.000	0.000

Generation Bus				Voltage		Generation			Mvar Limits	
ID	kV	Type	Sub-sys	% Mag.	Angle	MW	Mvar	% PF	Max	Min
Bus1	33.000	Swing	1	100.0	0.0					
						0.000	0.000			

Line/Cable Input Data

Line/Cable						Ohms or Siemens/1000 ft per Conductor (Cable) or per Phase (Line)			
			Length						
ID	Library	Size	Adj. (ft)	% Tol.	#/Phase	T (°C)	R	X	Y
Cable1	33NCUS3	50	1312.3	0.0	3	75	0.143611	0.052304	0.0000196
Cable2	33NCUS3	50	656.2	0.0	1	75	0.143611	0.052304	0.0000196
Cable3	33NCUS3	50	1049.9	0.0	1	75	0.143611	0.052304	0.0000196
Cable4	33NCUS3	50	656.2	0.0	3	75	0.143611	0.052304	0.0000196
Cable5	33NCUS3	50	721.8	0.0	1	75	0.143611	0.052304	0.0000196
Cable6	33NCUS3	50	984.3	0.0	3	75	0.143611	0.052304	0.0000196
Cable7	33NCUS3	50	656.2	0.0	1	75	0.143611	0.052304	0.0000196
Cable8	33NCUS3	50	754.6	0.0	1	75	0.143611	0.052304	0.0000196
Cable9	33NCUS3	50	689.0	0.0	1	75	0.143611	0.052304	0.0000196
Cable10	33NCUS3	50	820.2	0.0	1	75	0.143611	0.052304	0.0000196
Cable11	33NCUS3	50	2296.6	0.0	1	75	0.143611	0.052304	0.0000196
Cable12	33NCUS3	50	1476.4	0.0	1	75	0.143611	0.052304	0.0000196
Cable13	33NCUS3	50	557.7	0.0	1	75	0.143611	0.052304	0.0000196
Cable14	33NCUS3	50	885.8	0.0	1	75	0.143611	0.052304	0.0000196
Cable15	33NCUS3	50	1968.5	0.0	1	75	0.143611	0.052304	0.0000196
Cable16	33NCUS3	50	442.9	0.0	1	75	0.143611	0.052304	0.0000196
Cable17	33NCUS3	50	360.9	0.0	1	75	0.143611	0.052304	0.0000196
Cable18	33NCUS3	50	656.2	0.0	1	75	0.143611	0.052304	0.0000196
Cable19	33NCUS3	50	2132.5	0.0	1	75	0.143611	0.052304	0.0000196
Cable20	33NCUS3	50	2296.6	0.0	1	75	0.143611	0.052304	0.0000196
Cable22	33NCUS3	50	2296.6	0.0	1	75	0.143611	0.052304	0.0000196
Cable23	33NCUS3	50	1968.5	0.0	1	75	0.143611	0.052304	0.0000196
Cable24	33NCUS3	50	1312.3	0.0	1	75	0.143611	0.052304	0.0000196
Cable26	33NCUS3	50	1663.4	0.0	1	75	0.143611	0.052304	0.0000196
Cable27	33NCUS3	50	344.5	0.0	1	75	0.143611	0.052304	0.0000196
Cable28	33NCUS3	50	502.0	0.0	1	75	0.143611	0.052304	0.0000196
Cable29	33NCUS3	50	1345.1	0.0	1	75	0.143611	0.052304	0.0000196
Cable30	33NCUS3	50	492.1	0.0	1	75	0.143611	0.052304	0.0000196
Cable31	33NCUS3	50	360.9	0.0	1	75	0.143611	0.052304	0.0000196
Cable32	33NCUS3	50	600.4	0.0	1	75	0.143611	0.052304	0.0000196
Cable33	33NCUS3	50	1804.5	0.0	1	75	0.143611	0.052304	0.0000196
Cable34	33NCUS3	50	2657.5	0.0	1	75	0.143611	0.052304	0.0000196
Cable35	33NCUS3	50	1335.3	0.0	1	75	0.143611	0.052304	0.0000196
Cable37	33NCUS3	50	3021.7	0.0	1	75	0.143611	0.052304	0.0000196

Line/Cable							Ohms or Siemens/1000 ft per Conductor (Cable) or per Phase (Line)		
			Length						
ID	Library	Size	Adj. (ft)	% Tol.	#/Phase	T (°C)	R	X	Y
Cable38	33NCUS3	50	994.1	0.0	1	75	0.143611	0.052304	0.0000196
Cable39	33NCUS3	50	2460.6	0.0	1	75	0.143611	0.052304	0.0000196
Cable40	33NCUS3	50	1164.7	0.0	1	75	0.143611	0.052304	0.0000196
Cable41	33NCUS3	50	498.7	0.0	1	75	0.143611	0.052304	0.0000196
Cable42	33NCUS3	50	1246.7	0.0	1	75	0.143611	0.052304	0.0000196
Cable43	33NCUS3	50	885.8	0.0	1	75	0.143611	0.052304	0.0000196
Cable44	33NCUS3	50	1312.3	0.0	1	75	0.143611	0.052304	0.0000196
Cable45	33NCUS3	50	1246.7	0.0	1	75	0.143611	0.052304	0.0000196
Cable46	33NCUS3	50	524.9	0.0	1	75	0.143611	0.052304	0.0000196
Cable47	33NCUS3	50	1213.9	0.0	1	75	0.143611	0.052304	0.0000196
Cable48	33NCUS3	50	2667.3	0.0	1	75	0.143611	0.052304	0.0000196
Cable49	33NCUS3	50	984.3	0.0	1	75	0.143611	0.052304	0.0000196
Cable50	33NCUS3	50	328.1	0.0	1	75	0.143611	0.052304	0.0000196
Cable51	33NCUS3	50	1952.1	0.0	1	75	0.143611	0.052304	0.0000196
Cable52	33NCUS3	50	1092.5	0.0	1	75	0.143611	0.052304	0.0000196
Cable53	33NCUS3	50	1213.9	0.0	1	75	0.143611	0.052304	0.0000196
Cable54	33NCUS3	50	1023.6	0.0	1	75	0.143611	0.052304	0.0000196
Cable55	33NCUS3	50	725.1	0.0	1	75	0.143611	0.052304	0.0000196
Cable56	33NCUS3	50	1279.5	0.0	1	75	0.143611	0.052304	0.0000196
Cable57	33NCUS3	50	987.5	0.0	1	75	0.143611	0.052304	0.0000196
Cable58	33NCUS3	50	1781.5	0.0	1	75	0.143611	0.052304	0.0000196
Cable59	33NCUS3	50	951.4	0.0	1	75	0.143611	0.052304	0.0000196
Cable60	33NCUS3	50	984.3	0.0	1	75	0.143611	0.052304	0.0000196
Cable61	33NCUS3	50	1984.9	0.0	1	75	0.143611	0.052304	0.0000196
Cable62	33NCUS3	50	918.6	0.0	1	75	0.143611	0.052304	0.0000196
Cable63	33NCUS3	50	1968.5	0.0	1	75	0.143611	0.052304	0.0000196
Cable64	33NCUS3	50	5019.7	0.0	1	75	0.143611	0.052304	0.0000196
Line1		49.5	2395.0	0.0	1	75	0.262433	0.124177	0.0000009
Line2		49.5	885.8	0.0	1	75	0.262433	0.124177	0.0000009
Line3		49.5	2427.8	0.0	1	75	0.262433	0.124177	0.0000009
Line4		49.5	590.6	0.0	1	75	0.262433	0.124177	0.0000009
Line5		49.5	590.6	0.0	1	75	0.262433	0.124177	0.0000009
Line6		49.5	656.2	0.0	1	75	0.262433	0.124177	0.0000009
Line7		49.5	1312.3	0.0	1	75	0.262433	0.124177	0.0000009
Line8		49.5	1312.3	0.0	1	75	0.262433	0.124177	0.0000009
Line9		49.5	393.7	0.0	1	75	0.262433	0.124177	0.0000009

Line/Cable			Ohms or Siemens/1000 ft per Conductor (Cable) or per Phase (Line)						
			Length						
ID	Library	Size	Adj. (ft)	% Tol.	#/Phase	T (°C)	R	X	Y
Line10		49.5	656.2	0.0	1	75	0.262433	0.124177	0.0000009
Line11		49.5	344.5	0.0	1	75	0.262433	0.124177	0.0000009
Line12		49.5	1148.3	0.0	1	75	0.262433	0.124177	0.0000009
Line13		49.5	1312.3	0.0	1	75	0.262433	0.124177	0.0000009
Line14		49.5	180.4	0.0	1	75	0.262433	0.124177	0.0000009
Line15		49.5	213.3	0.0	1	75	0.262433	0.124177	0.0000009
Line16		49.5	206.7	0.0	1	75	0.262433	0.124177	0.0000009
Line17		49.5	442.9	0.0	1	75	0.262433	0.124177	0.0000009
Line18		49.5	360.9	0.0	1	75	0.262433	0.124177	0.0000009
Line19		49.5	1509.2	0.0	1	75	0.262433	0.124177	0.0000009
Line20		49.5	295.3	0.0	1	75	0.262433	0.124177	0.0000009
Line21		49.5	262.5	0.0	1	75	0.262433	0.124177	0.0000009
Line22		49.5	984.3	0.0	1	75	0.262433	0.124177	0.0000009
Line23		49.5	1017.1	0.0	1	75	0.262433	0.124177	0.0000009
Line24		49.5	2673.9	0.0	1	75	0.262433	0.124177	0.0000009
Line25		49.5	1328.7	0.0	1	75	0.262433	0.124177	0.0000009
Line26		49.5	2011.2	0.0	1	75	0.262433	0.124177	0.0000009
Line27		49.5	1007.2	0.0	1	75	0.262433	0.124177	0.0000009
Line28		49.5	757.9	0.0	1	75	0.262433	0.124177	0.0000009
Line29		49.5	1017.1	0.0	1	75	0.262433	0.124177	0.0000009
Line30		49.5	902.2	0.0	1	75	0.262433	0.124177	0.0000009
Line31		49.5	984.3	0.0	1	75	0.262433	0.124177	0.0000009
Line32		49.5	6561.7	0.0	1	75	0.262433	0.124177	0.0000009
Line33		49.5	3773.0	0.0	1	75	0.262433	0.124177	0.0000009
Line34		49.5	2132.5	0.0	1	75	0.262433	0.124177	0.0000009
Line35		49.5	1312.3	0.0	1	75	0.262433	0.124177	0.0000009
Line36		49.5	1968.5	0.0	1	75	0.262433	0.124177	0.0000009
Line37		49.5	1312.3	0.0	1	75	0.262433	0.124177	0.0000009
Line38		49.5	2952.8	0.0	1	75	0.262433	0.124177	0.0000009
Line39		49.5	2952.8	0.0	1	75	0.262433	0.124177	0.0000009
Line40		49.5	2624.7	0.0	1	75	0.262433	0.124177	0.0000009
Line41		49.5	2139.1	0.0	1	75	0.262433	0.124177	0.0000009
Line42		49.5	1049.9	0.0	1	75	0.262433	0.124177	0.0000009
Line43		49.5	2296.6	0.0	1	75	0.262433	0.124177	0.0000009
Line44		49.5	1968.5	0.0	1	75	0.262433	0.124177	0.0000009
Line45		49.5	6233.6	0.0	1	75	0.262433	0.124177	0.0000009

Line/Cable			Ohms or Siemens/1000 ft per Conductor (Cable) or per Phase (Line)						
			Length						
ID	Library	Size	Adj. (ft)	% Tol.	#/Phase	T (°C)	R	X	Y
Line46		49.5	2952.8	0.0	1	75	0.262433	0.124177	0.0000009
Line47		49.5	1968.5	0.0	1	75	0.262433	0.124177	0.0000009
Line48		49.5	426.5	0.0	1	75	0.262433	0.124177	0.0000009
Line49		49.5	2395.0	0.0	1	75	0.262433	0.124177	0.0000009
Line50		49.5	2329.4	0.0	1	75	0.262433	0.124177	0.0000009
Line51		49.5	426.5	0.0	1	75	0.262433	0.124177	0.0000009
Line52		49.5	1683.1	0.0	1	75	0.262433	0.124177	0.0000009
Line53		49.5	1975.1	0.0	1	75	0.262433	0.124177	0.0000009
Line54		49.5	2975.7	0.0	1	75	0.262433	0.124177	0.0000009
Line55		49.5	2007.9	0.0	1	75	0.262433	0.124177	0.0000009
Line56		49.5	328.1	0.0	1	75	0.262433	0.124177	0.0000009
Line57		49.5	3608.9	0.0	1	75	0.262433	0.124177	0.0000009
Line58		49.5	984.3	0.0	1	75	0.262433	0.124177	0.0000009
Line59		49.5	918.6	0.0	1	75	0.262433	0.124177	0.0000009
Line60		49.5	8202.1	0.0	1	75	0.262433	0.124177	0.0000009
Line61		49.5	1653.5	0.0	1	75	0.262433	0.124177	0.0000009
Line62		49.5	1968.5	0.0	1	75	0.262433	0.124177	0.0000009
Line63		49.5	3937.0	0.0	1	75	0.262433	0.124177	0.0000009
Line64		49.5	1542.0	0.0	1	75	0.262433	0.124177	0.0000009
Line65		49.5	656.2	0.0	1	75	0.262433	0.124177	0.0000009
Line66		49.5	754.6	0.0	1	75	0.262433	0.124177	0.0000009
Line67		49.5	574.1	0.0	1	75	0.262433	0.124177	0.0000009
Line68		49.5	393.7	0.0	1	75	0.262433	0.124177	0.0000009
Line69		49.5	180.4	0.0	1	75	0.262433	0.124177	0.0000009
Line70		49.5	1217.2	0.0	1	75	0.262433	0.124177	0.0000009
Line71		49.5	623.4	0.0	1	75	0.262433	0.124177	0.0000009
Line72		49.5	1476.4	0.0	1	75	0.262433	0.124177	0.0000009
Line73		49.5	734.9	0.0	1	75	0.262433	0.124177	0.0000009
Line74		49.5	12155.5	0.0	1	75	0.262433	0.124177	0.0000009
Line75		49.5	1669.9	0.0	1	75	0.262433	0.124177	0.0000009

Line / Cable resistances are listed at the specified temperatures.

2-Winding Transformer Input Data

Transformer		Rating					Z Variation			% Tap Setting		Adjusted	Phase Shift	
ID	Phase	MVA	Prim. kV	Sec. kV	% Z1	X1/R1	+ 5%	- 5%	% Tol.	Prim.	Sec.	% Z	Type	Angle
T1/Taiseer Obidat	3-Phase	0.400	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T2/Al-Dear	3-Phase	0.250	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T3/Mousa Arbad	3-Phase	0.400	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T4/Abu Al-Fool	3-Phase	0.250	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T5/AL- Shawaheen	3-Phase	0.400	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T6/AL- Metiana	3-Phase	0.400	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T7/AL- Ghowita	3-Phase	0.250	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T8/Haroon AL - Rasheed	3-Phase	0.400	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T9/Majd AL- Ba3	3-Phase	0.160	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T10/Mahmoud Rasheed	3-Phase	0.400	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T11/Ahmad Rasheed	3-Phase	0.400	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T12/Ali Hassan Nassar	3-Phase	0.400	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T13/AL - Tatweer	3-Phase	0.160	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T14/Salah Mousa Nassar	3-Phase	0.400	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T15/Mousa Nassar	3-Phase	0.630	33.000	0.400	4.50	3.96	0	0	0	0	0	4.5000	Dyn	0.000
T16/Khaled Nassar	3-Phase	0.630	33.000	0.400	4.50	3.96	0	0	0	0	0	4.5000	Dyn	0.000
T17/Ali Mousa Nassar	3-Phase	1.250	33.000	0.400	6.00	7.10	0	0	0	0	0	6.0000	Dyn	0.000
T18/Nafez Nassar	3-Phase	0.630	33.000	0.400	4.50	3.96	0	0	0	0	0	4.5000	Dyn	0.000
T19/Ahmad H. Nassar	3-Phase	0.160	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T20/Rasmi Abu - Qubita	3-Phase	0.400	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T21/Bet- Emra 1	3-Phase	0.250	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T22/Mousa Rasheed	3-Phase	0.400	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T23/Um AL - Ammad	3-Phase	0.250	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T24/Ber - Emra 2	3-Phase	0.250	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T25/Bet - Emra 3	3-Phase	0.250	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T26/Khalet Arabi	3-Phase	0.160	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T27/AL - Nukhba	3-Phase	0.250	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T28/AL - Hadab 1	3-Phase	0.250	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T29/AL - Hadab 2	3-Phase	0.250	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T30/AL - Bhesat	3-Phase	0.400	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T31/AL - Sawakna	3-Phase	0.250	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T32/Abu Ali	3-Phase	0.630	33.000	0.400	4.50	3.96	0	0	0	0	0	4.5000	Dyn	0.000
T33/Ma'asaret Rasheed	3-Phase	0.160	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T34/AL - Kaziea	3-Phase	0.250	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000

Transformer		Rating					Z Variation			% Tap Setting		Adjusted	Phase Shift	
ID	Phase	MVA	Prim. kV	Sec. kV	% Z1	X1/R1	+ 5%	- 5%	% Tol.	Prim.	Sec.	% Z	Type	Angle
T35/AL - Mostashfa	3-Phase	0.400	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T36/E3zeez	3-Phase	0.400	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T37/Hajar AL - Sakhainah	3-Phase	0.400	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T38/Marah Jaber	3-Phase	0.160	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T39/AL - Mentar	3-Phase	0.250	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T40/Da'erat AL - Sair	3-Phase	0.160	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T41/Beer E3zeez	3-Phase	0.250	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T42/Wad AL- Baqee3	3-Phase	0.630	33.000	0.400	4.50	3.96	0	0	0	0	0	4.5000	Dyn	0.000
T43/AL - Mosalla	3-Phase	0.400	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T44/Um AL - Satar 1	3-Phase	0.630	33.000	0.400	4.50	3.96	0	0	0	0	0	4.5000	Dyn	0.000
T45/Um AL- Satar 2	3-Phase	0.250	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T46/AL - Karag	3-Phase	0.400	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T47/Basal	3-Phase	0.630	33.000	0.400	4.50	3.96	0	0	0	0	0	4.5000	Dyn	0.000
T48/AL - Baladeia	3-Phase	0.400	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T49/Saleet	3-Phase	0.400	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T50/Abu - Aziza	3-Phase	0.630	33.000	0.400	4.50	3.96	0	0	0	0	0	4.5000	Dyn	0.000
T51/AL - Emria	3-Phase	0.400	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T52/Swedan	3-Phase	0.400	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T53/Yasser Abu - Samra	3-Phase	0.250	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T54/Khalet Saleh	3-Phase	0.400	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T55/Talet AL - Somood 1	3-Phase	0.250	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T56/AL - Rahnneia	3-Phase	0.160	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T57/Talet AL - Somood 2	3-Phase	0.250	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T58/AL - Arqoob 1	3-Phase	0.250	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T59/AL - Arqoob 2	3-Phase	0.250	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T60/AL - Karmel	3-Phase	0.400	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T61/Raheela	3-Phase	0.400	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T62/Ma'aeen	3-Phase	0.250	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T63/AL- Tewani	3-Phase	0.160	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T64/Deer AL - Hawa	3-Phase	0.630	33.000	0.400	4.50	3.96	0	0	0	0	0	4.5000	Dyn	0.000
T65/AL - Qafeer	3-Phase	0.250	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T66/Abu - Hmaid	3-Phase	0.400	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T67/AL - Farhania	3-Phase	0.250	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T68/AL - Mazra3a	3-Phase	0.630	33.000	0.400	4.50	3.96	0	0	0	0	0	4.5000	Dyn	0.000
T69/Fatooh	3-Phase	0.400	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T70/AL - Mahkama	3-Phase	0.250	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000

Transformer		Rating					Z Variation			% Tap Setting		Adjusted	Phase Shift	
ID	Phase	MVA	Prim. kV	Sec. kV	% Z1	X1/R1	+ 5%	- 5%	% Tol.	Prim.	Sec.	% Z	Type	Angle
T71/AL - Waha	3-Phase	0.250	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T72/Islamic Bank	3-Phase	0.400	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T73/AL - Eskan Bank	3-Phase	0.630	33.000	0.400	4.50	3.96	0	0	0	0	0	4.5000	Dyn	0.000
T74/Mouhammad Nassar	3-Phase	0.630	33.000	0.400	4.50	3.96	0	0	0	0	0	4.5000	Dyn	0.000
T75/Markez AL - Da3wa	3-Phase	0.400	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T76/AL - Marmalah	3-Phase	0.160	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T77/Kaziet Basal	3-Phase	0.250	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T78/Raq3a	3-Phase	0.400	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T79/Raq3a New	3-Phase	0.160	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T80/Kreesa (Shawaheen)	3-Phase	0.250	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T81/Nader Rasheed	3-Phase	0.250	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T82/Kreesa (AL- Kherba)	3-Phase	0.250	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T83/Wad ELma	3-Phase	0.400	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T84/AL - Hadedia	3-Phase	0.250	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T85/AL - Junaidi	3-Phase	0.400	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T86/AL - Bowaib	3-Phase	0.250	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T87/AL - Dowair	3-Phase	0.160	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T88/AL - Deiar Co.	3-Phase	0.400	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T89/AL - Aroos 1	3-Phase	0.400	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T90/AL - Aroos 2	3-Phase	0.250	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T91/AL - Aroos 3	3-Phase	0.250	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T92/Marj AL - Doodah	3-Phase	0.250	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T93/Zeef	3-Phase	0.250	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T94/AL - Heela 1	3-Phase	0.250	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T95/AL - Heela 2	3-Phase	0.250	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T96/AL - Waseem	3-Phase	0.250	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T97/AL - Shaloodi	3-Phase	0.250	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T98/Abu - Turki	3-Phase	0.400	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T99/Abd - Gaith	3-Phase	0.400	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T100/Mazra'at AL- Nama'	3-Phase	0.400	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T101/Fayez Abu-Snaineh	3-Phase	0.400	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T102/Moustafa Rajab	3-Phase	0.250	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000
T103/AL - Haddad 1	3-Phase	1.600	33.000	0.400	6.00	7.10	0	0	0	0	0	6.0000	Dyn	0.000
T104/AL - Haddad 2	3-Phase	1.600	33.000	0.400	6.00	7.10	0	0	0	0	0	6.0000	Dyn	0.000
T105/AL - Haddad 3	3-Phase	1.250	33.000	0.400	6.00	7.10	0	0	0	0	0	6.0000	Dyn	0.000
T106/AL - Haddad 4	3-Phase	0.630	33.000	0.400	4.50	3.96	0	0	0	0	0	4.5000	Dyn	0.000

Transformer		Rating					Z Variation			% Tap Setting		Adjusted	Phase Shift	
ID	Phase	MVA	Prim. kV	Sec. kV	% Z1	X1/R1	+ 5%	- 5%	% Tol.	Prim.	Sec.	% Z	Type	Angle
T107/AL - Sa'ad 1	3-Phase	0.630	33.000	0.400	4.50	3.96	0	0	0	0	0	4.5000	Dyn	0.000
T108/AL - Sa'ad 2	3-Phase	0.630	33.000	0.400	4.50	3.96	0	0	0	0	0	4.5000	Dyn	0.000
T109/AL - Sa'ad 3	3-Phase	0.400	33.000	0.400	4.50	3.09	0	0	0	0	0	4.5000	Dyn	0.000

Branch Connections

CKT/Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVA Base			
ID	Type	From Bus	To Bus	R	X	Z	Y
T1/Taiseer Obidat	2W XFMR	Bus3	Bus139	346.39	1070.35	1125.00	
T2/Al-Dear	2W XFMR	Bus2	Bus138	554.22	1712.55	1800.00	
T3/Mousa Arbad	2W XFMR	Bus4	Bus140	346.39	1070.35	1125.00	
T4/Abu Al-Fool	2W XFMR	Bus7	Bus141	554.22	1712.55	1800.00	
T5/AL- Shawaheen	2W XFMR	Bus8	Bus142	346.39	1070.35	1125.00	
T6/AL- Metiana	2W XFMR	Bus8	Bus143	346.39	1070.35	1125.00	
T7/AL- Ghowita	2W XFMR	Bus9	Bus144	554.22	1712.55	1800.00	
T8/Haroon AL - Rasheed	2W XFMR	Bus10	Bus145	346.39	1070.35	1125.00	
T9/Majd AL- Ba3	2W XFMR	Bus53	Bus147	865.98	2675.86	2812.50	
T10/Mahmoud Rasheed	2W XFMR	Bus12	Bus148	346.39	1070.35	1125.00	
T11/Ahmad Rasheed	2W XFMR	Bus13	Bus154	346.39	1070.35	1125.00	
T12/Ali Hassan Nassar	2W XFMR	Bus15	Bus155	346.39	1070.35	1125.00	
T13/AL - Tatweer	2W XFMR	Bus16	Bus156	865.98	2675.86	2812.50	
T14/Salah Mousa Nassar	2W XFMR	Bus19	Bus242	346.39	1070.35	1125.00	
T15/Mousa Nassar	2W XFMR	Bus22	Bus168	174.89	692.55	714.29	
T16/Khaled Nassar	2W XFMR	Bus22	Bus167	174.89	692.55	714.29	
T17/Ali Mousa Nassar	2W XFMR	Bus21	Bus169	66.96	475.31	480.00	
T18/Nafez Nassar	2W XFMR	Bus23	Bus170	174.89	692.55	714.29	
T19/Ahmad H. Nassar	2W XFMR	Bus18	Bus172	865.98	2675.86	2812.50	
T20/Rasmi Abu - Qubita	2W XFMR	Bus24	Bus171	346.39	1070.35	1125.00	
T21/Bet- Emra 1	2W XFMR	Bus26	Bus173	554.22	1712.55	1800.00	
T22/Mousa Rasheed	2W XFMR	Bus28	Bus175	346.39	1070.35	1125.00	
T23/Um AL - Ammad	2W XFMR	Bus29	Bus174	554.22	1712.55	1800.00	
T24/Ber - Emra 2	2W XFMR	Bus31	Bus176	554.22	1712.55	1800.00	
T25/Bet - Emra 3	2W XFMR	Bus32	Bus177	554.22	1712.55	1800.00	
T26/Khalet Arabi	2W XFMR	Bus34	Bus178	865.98	2675.86	2812.50	
T27/AL - Nukhba	2W XFMR	Bus35	Bus179	554.22	1712.55	1800.00	
T28/AL - Hadab 1	2W XFMR	Bus36	Bus180	554.22	1712.55	1800.00	
T29/AL - Hadab 2	2W XFMR	Bus37	Bus181	554.22	1712.55	1800.00	
T30/AL - Bhesat	2W XFMR	Bus40	Bus146	346.39	1070.35	1125.00	
T31/AL - Sawakna	2W XFMR	Bus42	Bus149	554.22	1712.55	1800.00	
T32/Abu Ali	2W XFMR	Bus41	Bus150	174.89	692.55	714.29	
T33/Ma'asaret Rasheed	2W XFMR	Bus43	Bus152	865.98	2675.86	2812.50	
T34/AL - Kaziea	2W XFMR	Bus44	Bus153	554.22	1712.55	1800.00	
T35/AL - Mostashfa	2W XFMR	Bus47	Bus160	346.39	1070.35	1125.00	
T36/E3zeez	2W XFMR	Bus48	Bus161	346.39	1070.35	1125.00	
T37/Hajar AL - Sakhainah	2W XFMR	Bus50	Bus162	346.39	1070.35	1125.00	

CKT/Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVA Base			
ID	Type	From Bus	To Bus	R	X	Z	Y
T38/Marah Jaber	2W XFMR	Bus51	Bus165	865.98	2675.86	2812.50	
T39/AL - Mentar	2W XFMR	Bus52	Bus166	554.22	1712.55	1800.00	
T40/Da'erat AL - Sair	2W XFMR	Bus55	Bus163	865.98	2675.86	2812.50	
T41/Beer E3zeez	2W XFMR	Bus56	Bus164	554.22	1712.55	1800.00	
T42/Wad AL- Baqee3	2W XFMR	Bus57	Bus151	174.89	692.55	714.29	
T43/AL - Mosalla	2W XFMR	Bus58	Bus157	346.39	1070.35	1125.00	
T44/Um AL - Satar 1	2W XFMR	Bus59	Bus158	174.89	692.55	714.29	
T45/Um AL- Satar 2	2W XFMR	Bus60	Bus159	554.22	1712.55	1800.00	
T46/AL - Karag	2W XFMR	Bus61	Bus182	346.39	1070.35	1125.00	
T47/Basal	2W XFMR	Bus62	Bus183	174.89	692.55	714.29	
T48/AL - Baladeia	2W XFMR	Bus63	Bus184	346.39	1070.35	1125.00	
T49/Saleet	2W XFMR	Bus67	Bus185	346.39	1070.35	1125.00	
T50/Abu - Aziza	2W XFMR	Bus68	Bus186	174.89	692.55	714.29	
T51/AL - Emria	2W XFMR	Bus70	Bus187	346.39	1070.35	1125.00	
T52/Swedan	2W XFMR	Bus71	Bus188	346.39	1070.35	1125.00	
T53/Yasser Abu - Samra	2W XFMR	Bus73	Bus189	554.22	1712.55	1800.00	
T54/Khalet Saleh	2W XFMR	Bus74	Bus191	346.39	1070.35	1125.00	
T55/Talet AL - Somood 1	2W XFMR	Bus76	Bus192	554.22	1712.55	1800.00	
T56/AL - Rahnneia	2W XFMR	Bus77	Bus194	865.98	2675.86	2812.50	
T57/Talet AL - Somood 2	2W XFMR	Bus78	Bus193	554.22	1712.55	1800.00	
T58/AL - Arqoob 1	2W XFMR	Bus79	Bus190	554.22	1712.55	1800.00	
T59/AL - Arqoob 2	2W XFMR	Bus80	Bus241	554.22	1712.55	1800.00	
T60/AL - Karmel	2W XFMR	Bus81	Bus243	346.39	1070.35	1125.00	
T61/Raheela	2W XFMR	Bus82	Bus244	346.39	1070.35	1125.00	
T62/Ma'aeen	2W XFMR	Bus83	Bus245	554.22	1712.55	1800.00	
T63/AL- Tewani	2W XFMR	Bus84	Bus246	865.98	2675.86	2812.50	
T64/Deer AL - Hawa	2W XFMR	Bus85	Bus195	174.89	692.55	714.29	
T65/AL - Qafeer	2W XFMR	Bus86	Bus196	554.22	1712.55	1800.00	
T66/Abu - Hmaid	2W XFMR	Bus88	Bus203	346.39	1070.35	1125.00	
T67/AL - Farhania	2W XFMR	Bus89	Bus240	554.22	1712.55	1800.00	
T68/AL - Mazra3a	2W XFMR	Bus90	Bus197	174.89	692.55	714.29	
T69/Fatooh	2W XFMR	Bus92	Bus198	346.39	1070.35	1125.00	
T70/AL - Mahkama	2W XFMR	Bus93	Bus200	554.22	1712.55	1800.00	
T71/AL - Waha	2W XFMR	Bus94	Bus201	554.22	1712.55	1800.00	
T72/Islamic Bank	2W XFMR	Bus95	Bus199	346.39	1070.35	1125.00	
T73/AL - Eskan Bank	2W XFMR	Bus96	Bus202	174.89	692.55	714.29	
T74/Mouhammad Nassar	2W XFMR	Bus98	Bus204	174.89	692.55	714.29	
T75/Markez AL - Da3wa	2W XFMR	Bus99	Bus205	346.39	1070.35	1125.00	
T76/AL - Marmalah	2W XFMR	Bus101	Bus207	865.98	2675.86	2812.50	

CKT/Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVA Base			
ID	Type	From Bus	To Bus	R	X	Z	Y
T77/Kaziet Basal	2W XFMR	Bus102	Bus206	554.22	1712.55	1800.00	
T78/Raq3a	2W XFMR	Bus103	Bus208	346.39	1070.35	1125.00	
T79/Raq3a New	2W XFMR	Bus107	Bus209	865.98	2675.86	2812.50	
T80/Kreesa (Shawaheen)	2W XFMR	Bus108	Bus210	554.22	1712.55	1800.00	
T81/Nader Rasheed	2W XFMR	Bus109	Bus211	554.22	1712.55	1800.00	
T82/Kreesa (AL- Kherba)	2W XFMR	Bus110	Bus212	554.22	1712.55	1800.00	
T83/Wad ELma	2W XFMR	Bus112	Bus220	346.39	1070.35	1125.00	
T84/AL - Hadedia	2W XFMR	Bus114	Bus219	554.22	1712.55	1800.00	
T85/AL - Junaidi	2W XFMR	Bus113	Bus221	346.39	1070.35	1125.00	
T86/AL - Bowaib	2W XFMR	Bus116	Bus222	554.22	1712.55	1800.00	
T87/AL - Dowair	2W XFMR	Bus117	Bus223	865.98	2675.86	2812.50	
T88/AL - Deiar Co.	2W XFMR	Bus106	Bus218	346.39	1070.35	1125.00	
T89/AL - Aroos 1	2W XFMR	Bus118	Bus215	346.39	1070.35	1125.00	
T90/AL - Aroos 2	2W XFMR	Bus119	Bus216	554.22	1712.55	1800.00	
T91/AL - Aroos 3	2W XFMR	Bus121	Bus217	554.22	1712.55	1800.00	
T92/Marj AL - Doodah	2W XFMR	Bus122	Bus214	554.22	1712.55	1800.00	
T93/Zeef	2W XFMR	Bus123	Bus213	554.22	1712.55	1800.00	
T94/AL - Heela 1	2W XFMR	Bus124	Bus239	554.22	1712.55	1800.00	
T95/AL - Heela 2	2W XFMR	Bus125	Bus238	554.22	1712.55	1800.00	
T96/AL - Waseem	2W XFMR	Bus127	Bus228	554.22	1712.55	1800.00	
T97/AL - Shaloodi	2W XFMR	Bus129	Bus225	554.22	1712.55	1800.00	
T98/Abu - Turki	2W XFMR	Bus130	Bus224	346.39	1070.35	1125.00	
T99/Abd - Gaith	2W XFMR	Bus132	Bus226	346.39	1070.35	1125.00	
T100/Mazra'at AL- Nama'	2W XFMR	Bus133	Bus227	346.39	1070.35	1125.00	
T101/Fayez Abu-Snaineh	2W XFMR	Bus135	Bus230	346.39	1070.35	1125.00	
T102/Moustafa Rajab	2W XFMR	Bus134	Bus229	554.22	1712.55	1800.00	
T103/AL - Haddad 1	2W XFMR	Bus136	Bus234	52.32	371.33	375.00	
T104/AL - Haddad 2	2W XFMR	Bus136	Bus233	52.32	371.33	375.00	
T105/AL - Haddad 3	2W XFMR	Bus136	Bus232	66.96	475.31	480.00	
T106/AL - Haddad 4	2W XFMR	Bus136	Bus231	174.89	692.55	714.29	
T107/AL - Sa'ad 1	2W XFMR	Bus137	Bus235	174.89	692.55	714.29	
T108/AL - Sa'ad 2	2W XFMR	Bus137	Bus236	174.89	692.55	714.29	
T109/AL - Sa'ad 3	2W XFMR	Bus137	Bus237	346.39	1070.35	1125.00	
Cable1	Cable	Bus1	Bus2	0.58	0.21	0.61	0.0838966
Cable2	Cable	Bus2	Bus3	0.87	0.32	0.92	0.0139828
Cable3	Cable	Bus2	Bus4	1.38	0.50	1.47	0.0223724
Cable4	Cable	Bus4	Bus5	0.29	0.11	0.31	0.0419483
Cable5	Cable	Bus5	Bus6	0.95	0.35	1.01	0.0153810
Cable6	Cable	Bus5	Bus8	0.43	0.16	0.46	0.0629224

CKT/Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVA Base			
ID	Type	From Bus	To Bus	R	X	Z	Y
Cable7	Cable	Bus25	Bus26	0.87	0.32	0.92	0.0139828
Cable8	Cable	Bus26	Bus30	1.00	0.36	1.06	0.0160802
Cable9	Cable	Bus30	Bus31	0.91	0.33	0.97	0.0146819
Cable10	Cable	Bus30	Bus33	1.08	0.39	1.15	0.0174785
Cable11	Cable	Bus31	Bus32	3.03	1.10	3.22	0.0489397
Cable12	Cable	Bus8	Bus38	1.95	0.71	2.07	0.0314612
Cable13	Cable	Bus39	Bus40	0.74	0.27	0.78	0.0118853
Cable14	Cable	Bus40	Bus41	1.17	0.43	1.24	0.0188767
Cable15	Cable	Bus41	Bus42	2.60	0.95	2.76	0.0419483
Cable16	Cable	Bus41	Bus43	0.58	0.21	0.62	0.0094384
Cable17	Cable	Bus69	Bus57	0.48	0.17	0.51	0.0076905
Cable18	Cable	Bus45	Bus54	0.87	0.32	0.92	0.0139828
Cable19	Cable	Bus49	Bus52	2.81	1.02	2.99	0.0454440
Cable20	Cable	Bus49	Bus51	3.03	1.10	3.22	0.0489397
Cable22	Cable	Bus57	Bus58	3.03	1.10	3.22	0.0489397
Cable23	Cable	Bus57	Bus59	2.60	0.95	2.76	0.0419483
Cable24	Cable	Bus59	Bus60	1.73	0.63	1.84	0.0279655
Cable26	Cable	Bus40	Bus61	2.19	0.80	2.33	0.0354463
Cable27	Cable	Bus61	Bus62	0.45	0.17	0.48	0.0073409
Cable28	Cable	Bus62	Bus63	0.66	0.24	0.70	0.0106968
Cable29	Cable	Bus62	Bus85	1.77	0.65	1.89	0.0286647
Cable30	Cable	Bus63	Bus64	0.65	0.24	0.69	0.0104871
Cable31	Cable	Bus65	Bus66	0.48	0.17	0.51	0.0076905
Cable32	Cable	Bus66	Bus67	0.79	0.29	0.84	0.0127942
Cable33	Cable	Bus66	Bus70	2.38	0.87	2.53	0.0384526
Cable34	Cable	Bus67	Bus68	3.50	1.28	3.73	0.0566302
Cable35	Cable	Bus41	Bus69	1.76	0.64	1.87	0.0284549
Cable37	Cable	Bus70	Bus71	3.98	1.45	4.24	0.0643906
Cable38	Cable	Bus75	Bus76	1.31	0.48	1.40	0.0211839
Cable39	Cable	Bus76	Bus78	3.24	1.18	3.45	0.0524353
Cable40	Cable	Bus85	Bus86	1.54	0.56	1.63	0.0248194
Cable41	Cable	Bus86	Bus90	0.66	0.24	0.70	0.0106269
Cable42	Cable	Bus86	Bus87	1.64	0.60	1.75	0.0265672
Cable43	Cable	Bus87	Bus88	1.17	0.43	1.24	0.0188767
Cable44	Cable	Bus87	Bus89	1.73	0.63	1.84	0.0279655
Cable45	Cable	Bus90	Bus95	1.64	0.60	1.75	0.0265672
Cable46	Cable	Bus90	Bus91	0.69	0.25	0.74	0.0111862
Cable47	Cable	Bus92	Bus93	1.60	0.58	1.70	0.0258681
Cable48	Cable	Bus92	Bus94	3.52	1.28	3.74	0.0568399

CKT/Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVA Base			
ID	Type	From Bus	To Bus	R	X	Z	Y
Cable49	Cable	Bus95	Bus96	1.30	0.47	1.38	0.0209741
Cable50	Cable	Bus96	Bus97	0.43	0.16	0.46	0.0069914
Cable51	Cable	Bus97	Bus99	2.57	0.94	2.74	0.0415987
Cable52	Cable	Bus97	Bus100	1.44	0.52	1.53	0.0232813
Cable53	Cable	Bus100	Bus102	1.60	0.58	1.70	0.0258681
Cable54	Cable	Bus102	Bus103	1.35	0.49	1.44	0.0218131
Cable55	Cable	Bus103	Bus104	0.96	0.35	1.02	0.0154510
Cable56	Cable	Bus104	Bus106	1.69	0.61	1.80	0.0272664
Cable57	Cable	Bus105	Bus107	1.30	0.47	1.39	0.0210440
Cable58	Cable	Bus108	Bus109	2.35	0.86	2.50	0.0379632
Cable59	Cable	Bus106	Bus118	1.25	0.46	1.34	0.0202750
Cable60	Cable	Bus118	Bus119	1.30	0.47	1.38	0.0209741
Cable61	Cable	Bus118	Bus122	2.62	0.95	2.79	0.0422978
Cable62	Cable	Bus119	Bus120	1.21	0.44	1.29	0.0195759
Cable63	Cable	Bus122	Bus123	2.60	0.95	2.76	0.0419483
Cable64	Cable	Bus2	Bus247	6.62	2.41	7.05	0.1069681
Line1	Line	Bus6	Bus7	5.77	2.73	6.39	0.0023136
Line2	Line	Bus8	Bus9	2.13	1.01	2.36	0.0008557
Line3	Line	Bus9	Bus10	5.85	2.77	6.47	0.0023453
Line4	Line	Bus10	Bus11	1.42	0.67	1.57	0.0005705
Line5	Line	Bus10	Bus12	1.42	0.67	1.57	0.0005705
Line6	Line	Bus12	Bus13	1.58	0.75	1.75	0.0006339
Line7	Line	Bus13	Bus14	3.16	1.50	3.50	0.0012677
Line8	Line	Bus14	Bus15	3.16	1.50	3.50	0.0012677
Line9	Line	Bus14	Bus16	0.95	0.45	1.05	0.0003803
Line10	Line	Bus16	Bus17	1.58	0.75	1.75	0.0006339
Line11	Line	Bus17	Bus18	0.83	0.39	0.92	0.0003328
Line12	Line	Bus17	Bus19	2.77	1.31	3.06	0.0011093
Line13	Line	Bus19	Bus20	3.16	1.50	3.50	0.0012677
Line14	Line	Bus20	Bus21	0.43	0.21	0.48	0.0001743
Line15	Line	Bus20	Bus22	0.51	0.24	0.57	0.0002060
Line16	Line	Bus21	Bus23	0.50	0.24	0.55	0.0001997
Line17	Line	Bus18	Bus25	1.07	0.51	1.18	0.0004279
Line18	Line	Bus18	Bus24	0.87	0.41	0.96	0.0003486
Line19	Line	Bus25	Bus27	3.64	1.72	4.02	0.0014579
Line20	Line	Bus27	Bus28	0.71	0.34	0.79	0.0002852
Line21	Line	Bus27	Bus29	0.63	0.30	0.70	0.0002535
Line22	Line	Bus33	Bus34	2.37	1.12	2.62	0.0009508
Line23	Line	Bus34	Bus35	2.45	1.16	2.71	0.0009825

CKT/Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVA Base			
ID	Type	From Bus	To Bus	R	X	Z	Y
Line24	Line	Bus35	Bus36	6.44	3.05	7.13	0.0025830
Line25	Line	Bus36	Bus37	3.20	1.52	3.54	0.0012836
Line26	Line	Bus43	Bus44	4.85	2.29	5.36	0.0019428
Line27	Line	Bus44	Bus45	2.43	1.15	2.69	0.0009730
Line28	Line	Bus45	Bus46	1.83	0.86	2.02	0.0007321
Line29	Line	Bus46	Bus47	2.45	1.16	2.71	0.0009825
Line30	Line	Bus46	Bus48	2.17	1.03	2.41	0.0008716
Line31	Line	Bus48	Bus49	2.37	1.12	2.62	0.0009508
Line32	Line	Bus48	Bus50	15.81	7.48	17.49	0.0063386
Line33	Line	Bus11	Bus53	9.09	4.30	10.06	0.0036447
Line34	Line	Bus54	Bus55	5.14	2.43	5.69	0.0020600
Line35	Line	Bus55	Bus56	3.16	1.50	3.50	0.0012677
Line36	Line	Bus71	Bus72	4.74	2.24	5.25	0.0019016
Line37	Line	Bus72	Bus73	3.16	1.50	3.50	0.0012677
Line38	Line	Bus72	Bus79	7.12	3.37	7.87	0.0028524
Line39	Line	Bus73	Bus74	7.12	3.37	7.87	0.0028524
Line40	Line	Bus74	Bus75	6.33	2.99	7.00	0.0025354
Line41	Line	Bus76	Bus77	5.15	2.44	5.70	0.0020664
Line42	Line	Bus79	Bus80	2.53	1.20	2.80	0.0010142
Line43	Line	Bus80	Bus81	5.53	2.62	6.12	0.0022185
Line44	Line	Bus81	Bus82	4.74	2.24	5.25	0.0019016
Line45	Line	Bus81	Bus84	15.02	7.11	16.62	0.0060216
Line46	Line	Bus82	Bus83	7.12	3.37	7.87	0.0028524
Line47	Line	Bus91	Bus92	4.74	2.24	5.25	0.0019016
Line48	Line	Bus97	Bus98	1.03	0.49	1.14	0.0004120
Line49	Line	Bus100	Bus101	5.77	2.73	6.39	0.0023136
Line50	Line	Bus103	Bus124	5.61	2.66	6.21	0.0022502
Line51	Line	Bus104	Bus105	1.03	0.49	1.14	0.0004120
Line52	Line	Bus105	Bus108	4.06	1.92	4.49	0.0016258
Line53	Line	Bus108	Bus110	4.76	2.25	5.27	0.0019079
Line54	Line	Bus110	Bus111	7.17	3.39	7.93	0.0028745
Line55	Line	Bus111	Bus112	4.84	2.29	5.35	0.0019396
Line56	Line	Bus111	Bus113	0.79	0.37	0.87	0.0003169
Line57	Line	Bus112	Bus114	8.70	4.12	9.62	0.0034862
Line58	Line	Bus113	Bus115	2.37	1.12	2.62	0.0009508
Line59	Line	Bus115	Bus117	2.21	1.05	2.45	0.0008874
Line60	Line	Bus115	Bus116	19.77	9.35	21.87	0.0079232
Line61	Line	Bus120	Bus121	3.98	1.89	4.41	0.0015973
Line62	Line	Bus124	Bus125	4.74	2.24	5.25	0.0019016

CKT/Branch		Connected Bus ID		% Impedance, Pos. Seq., 100 MVA Base			
ID	Type	From Bus	To Bus	R	X	Z	Y
Line63	Line	Bus125	Bus126	9.49	4.49	10.50	0.0038031
Line64	Line	Bus126	Bus128	3.72	1.76	4.11	0.0014896
Line65	Line	Bus126	Bus127	1.58	0.75	1.75	0.0006339
Line66	Line	Bus128	Bus129	1.82	0.86	2.01	0.0007289
Line67	Line	Bus128	Bus131	1.38	0.65	1.53	0.0005546
Line68	Line	Bus129	Bus130	0.95	0.45	1.05	0.0003803
Line69	Line	Bus131	Bus132	0.43	0.21	0.48	0.0001743
Line70	Line	Bus131	Bus133	2.93	1.39	3.25	0.0011758
Line71	Line	Bus133	Bus134	1.50	0.71	1.66	0.0006022
Line72	Line	Bus134	Bus136	3.56	1.68	3.94	0.0014262
Line73	Line	Bus134	Bus135	1.77	0.84	1.96	0.0007099
Line74	Line	Bus247	Bus135	29.29	13.86	32.41	0.0117422
Line75	Line	Bus136	Bus137	4.02	1.90	4.45	0.0016132
REC2	Tie Breakr	Bus38	Bus39				
REC3	Tie Breakr	Bus64	Bus65				

LOAD_FLOW_REPORT

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
* Bus1	33.000	100.000	0.0	30.213	17.373	0	0	Bus2	30.213	17.373	609.8	86.7	
Bus2	33.000	99.789	0.0	0	0	0	0	Bus1	-30.143	-17.432	610.5	86.6	
								Bus3	0.336	0.132	6.3	93.1	
								Bus4	24.188	12.864	480.3	88.3	
								Bus247	5.468	4.273	121.7	78.8	
								Bus138	0.150	0.163	3.9	67.7	
Bus3	33.000	99.786	0.0	0	0	0	0	Bus2	-0.336	-0.146	6.4	91.8	
								Bus139	0.336	0.146	6.4	91.8	
Bus4	33.000	99.388	0.1	0	0	0	0	Bus2	-24.084	-12.848	480.5	88.2	
								Bus5	23.821	12.568	474.1	88.4	
								Bus140	0.263	0.279	6.8	68.6	
Bus5	33.000	99.306	0.1	0	0	0	0	Bus4	-23.800	-12.602	474.4	88.4	
								Bus6	0.183	0.055	3.4	95.8	
								Bus8	23.617	12.547	471.1	88.3	
Bus6	33.000	99.304	0.1	0	0	0	0	Bus5	-0.183	-0.070	3.5	93.4	
								Bus7	0.183	0.070	3.5	93.4	
Bus7	33.000	99.291	0.1	0	0	0	0	Bus6	-0.183	-0.072	3.5	93.0	
								Bus141	0.183	0.072	3.5	93.0	
Bus8	33.000	99.183	0.1	0	0	0	0	Bus5	-23.585	-12.598	471.7	88.2	
								Bus38	17.153	7.610	331.0	91.4	
								Bus9	5.778	4.729	131.7	77.4	
								Bus142	0.341	0.125	6.4	93.9	
								Bus143	0.312	0.134	6.0	91.9	
Bus9	33.000	99.011	0.1	0	0	0	0	Bus8	-5.766	-4.724	131.7	77.4	
								Bus10	5.598	4.663	128.7	76.8	
								Bus144	0.168	0.060	3.2	94.1	
Bus10	33.000	98.550	0.2	0	0	0	0	Bus9	-5.566	-4.651	128.8	76.7	
								Bus11	0.117	0.034	2.2	96.1	
								Bus12	5.144	4.486	121.2	75.4	
								Bus145	0.305	0.131	5.9	91.9	
Bus11	33.000	98.548	0.2	0	0	0	0	Bus10	-0.117	-0.034	2.2	96.0	
								Bus53	0.117	0.034	2.2	96.0	
Bus12	33.000	98.445	0.2	0	0	0	0	Bus10	-5.137	-4.483	121.2	75.3	
								Bus13	4.903	4.236	115.1	75.7	
								Bus148	0.234	0.248	6.1	68.7	
Bus13	33.000	98.334	0.2	0	0	0	0	Bus12	-4.896	-4.233	115.2	75.6	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
								Bus14	4.636	3.964	108.5	76.0	
								Bus154	0.261	0.269	6.7	69.6	
Bus14	33.000	98.124	0.2	0	0	0	0	Bus13	-4.623	-3.959	108.5	76.0	
								Bus15	0.231	0.243	6.0	68.9	
								Bus16	4.392	3.716	102.6	76.3	
Bus15	33.000	98.113	0.2	0	0	0	0	Bus14	-0.231	-0.244	6.0	68.7	
								Bus155	0.231	0.244	6.0	68.7	
Bus16	33.000	98.065	0.2	0	0	0	0	Bus14	-4.389	-3.715	102.6	76.3	
								Bus17	4.286	3.597	99.8	76.6	
								Bus156	0.103	0.118	2.8	65.6	
Bus17	33.000	97.968	0.3	0	0	0	0	Bus16	-4.281	-3.595	99.8	76.6	
								Bus18	2.004	1.198	41.7	85.8	
								Bus19	2.277	2.397	59.0	68.9	
Bus18	33.000	97.946	0.3	0	0	0	0	Bus17	-2.003	-1.198	41.7	85.8	
								Bus25	1.638	0.827	32.8	89.3	
								Bus24	0.261	0.269	6.7	69.6	
								Bus172	0.104	0.102	2.6	71.6	
Bus19	33.000	97.872	0.3	0	0	0	0	Bus17	-2.274	-2.397	59.1	68.8	
								Bus20	2.005	2.133	52.3	68.5	
								Bus242	0.269	0.263	6.7	71.5	
Bus20	33.000	97.774	0.3	0	0	0	0	Bus19	-2.002	-2.133	52.4	68.4	
								Bus21	1.197	1.311	31.8	67.4	
								Bus22	0.805	0.823	20.6	69.9	
Bus21	33.000	97.766	0.3	0	0	0	0	Bus20	-1.197	-1.311	31.8	67.4	
								Bus23	0.402	0.440	10.7	67.4	
								Bus169	0.796	0.871	21.1	67.4	
Bus22	33.000	97.768	0.3	0	0	0	0	Bus20	-0.805	-0.823	20.6	69.9	
								Bus168	0.410	0.414	10.4	70.4	
								Bus167	0.395	0.409	10.2	69.4	
Bus23	33.000	97.763	0.3	0	0	0	0	Bus21	-0.402	-0.440	10.7	67.4	
								Bus170	0.402	0.440	10.7	67.4	
Bus24	33.000	97.943	0.3	0	0	0	0	Bus18	-0.261	-0.269	6.7	69.6	
								Bus171	0.261	0.269	6.7	69.6	
Bus25	33.000	97.924	0.3	0	0	0	0	Bus26	1.221	0.437	23.2	94.2	
								Bus18	-1.638	-0.827	32.8	89.3	
								Bus27	0.417	0.391	10.2	73.0	
Bus26	33.000	97.912	0.3	0	0	0	0	Bus25	-1.221	-0.450	23.3	93.8	
								Bus30	1.023	0.385	19.5	93.6	
								Bus173	0.198	0.065	3.7	95.0	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus27	33.000	97.902	0.3	0	0	0	0	Bus25	-0.417	-0.392	10.2	72.8	
								Bus28	0.258	0.289	6.9	66.6	
								Bus29	0.158	0.103	3.4	83.8	
Bus28	33.000	97.899	0.3	0	0	0	0	Bus27	-0.258	-0.289	6.9	66.6	
								Bus175	0.258	0.289	6.9	66.6	
Bus29	33.000	97.901	0.3	0	0	0	0	Bus27	-0.158	-0.103	3.4	83.8	
								Bus174	0.158	0.103	3.4	83.8	
Bus30	33.000	97.900	0.3	0	0	0	0	Bus26	-1.023	-0.401	19.6	93.1	
								Bus31	0.391	0.081	7.1	97.9	
								Bus33	0.633	0.320	12.7	89.2	
Bus31	33.000	97.896	0.3	0	0	0	0	Bus30	-0.390	-0.095	7.2	97.2	
								Bus32	0.193	0.016	3.5	99.7	
								Bus176	0.197	0.079	3.8	92.9	
Bus32	33.000	97.890	0.3	0	0	0	0	Bus31	-0.193	-0.063	3.6	95.1	
								Bus177	0.193	0.063	3.6	95.1	
Bus33	33.000	97.892	0.3	0	0	0	0	Bus30	-0.633	-0.337	12.8	88.3	
								Bus34	0.633	0.337	12.8	88.3	
Bus34	33.000	97.873	0.3	0	0	0	0	Bus33	-0.632	-0.338	12.8	88.2	
								Bus35	0.514	0.295	10.6	86.8	
								Bus178	0.118	0.043	2.2	94.0	
Bus35	33.000	97.856	0.3	0	0	0	0	Bus34	-0.514	-0.296	10.6	86.7	
								Bus36	0.360	0.133	6.9	93.8	
								Bus179	0.154	0.163	4.0	68.6	
Bus36	33.000	97.828	0.3	0	0	0	0	Bus35	-0.360	-0.135	6.9	93.6	
								Bus37	0.182	0.071	3.5	93.2	
								Bus180	0.178	0.064	3.4	94.1	
Bus37	33.000	97.821	0.3	0	0	0	0	Bus36	-0.182	-0.072	3.5	93.0	
								Bus181	0.182	0.072	3.5	93.0	
Bus38	33.000	98.792	0.1	0	0	0	0	Bus8	-17.084	-7.615	331.2	91.3	
								Bus39	17.084	7.615	331.2	91.3	
Bus39	33.000	98.792	0.1	0	0	0	0	Bus40	17.084	7.615	331.2	91.3	
								Bus38	-17.084	-7.615	331.2	91.3	
Bus40	33.000	98.644	0.1	0	0	0	0	Bus39	-17.057	-7.617	331.3	91.3	
								Bus41	3.842	1.285	71.9	94.8	
								Bus61	12.899	6.217	254.0	90.1	
								Bus146	0.317	0.115	6.0	94.0	
Bus41	33.000	98.593	0.1	0	0	0	0	Bus40	-3.840	-1.303	72.0	94.7	
								Bus42	0.203	0.026	3.6	99.2	
								Bus43	1.669	0.690	32.1	92.4	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
								Bus69	1.502	0.402	27.6	96.6	
								Bus150	0.466	0.185	8.9	92.9	
Bus42	33.000	98.587	0.1	0	0	0	0	Bus41	-0.203	-0.066	3.8	95.0	
								Bus149	0.203	0.066	3.8	95.0	
Bus43	33.000	98.582	0.1	0	0	0	0	Bus41	-1.669	-0.699	32.1	92.2	
								Bus44	1.578	0.598	29.9	93.5	
								Bus152	0.091	0.102	2.4	66.8	
Bus44	33.000	98.490	0.1	0	0	0	0	Bus43	-1.576	-0.599	30.0	93.5	
								Bus45	1.374	0.541	26.2	93.0	
								Bus153	0.202	0.058	3.7	96.1	
Bus45	33.000	98.450	0.1	0	0	0	0	Bus54	0.284	0.099	5.3	94.4	
								Bus44	-1.373	-0.542	26.2	93.0	
								Bus46	1.090	0.443	20.9	92.6	
Bus46	33.000	98.426	0.1	0	0	0	0	Bus45	-1.090	-0.443	20.9	92.6	
								Bus47	0.271	0.176	5.7	83.8	
								Bus48	0.818	0.267	15.3	95.1	
Bus47	33.000	98.417	0.1	0	0	0	0	Bus46	-0.271	-0.177	5.8	83.7	
								Bus160	0.271	0.177	5.8	83.7	
Bus48	33.000	98.405	0.1	0	0	0	0	Bus46	-0.818	-0.268	15.3	95.0	
								Bus49	0.294	0.024	5.2	99.7	
								Bus50	0.277	0.175	5.8	84.5	
								Bus161	0.248	0.069	4.6	96.4	
Bus49	33.000	98.398	0.1	0	0	0	0	Bus52	0.182	0.028	3.3	98.8	
								Bus51	0.112	-0.003	2.0	-100.0	
								Bus48	-0.294	-0.025	5.2	99.6	
Bus50	33.000	98.347	0.1	0	0	0	0	Bus48	-0.277	-0.181	5.9	83.7	
								Bus162	0.277	0.181	5.9	83.7	
Bus51	33.000	98.394	0.1	0	0	0	0	Bus49	-0.112	-0.044	2.1	93.0	
								Bus165	0.112	0.044	2.1	93.0	
Bus52	33.000	98.392	0.1	0	0	0	0	Bus49	-0.182	-0.072	3.5	93.0	
								Bus166	0.182	0.072	3.5	93.0	
Bus53	33.000	98.535	0.2	0	0	0	0	Bus11	-0.117	-0.038	2.2	95.1	
								Bus147	0.117	0.038	2.2	95.1	
Bus54	33.000	98.447	0.1	0	0	0	0	Bus45	-0.284	-0.113	5.4	92.9	
								Bus55	0.284	0.113	5.4	92.9	
Bus55	33.000	98.430	0.1	0	0	0	0	Bus54	-0.283	-0.115	5.4	92.7	
								Bus56	0.187	0.052	3.4	96.4	
								Bus163	0.097	0.063	2.0	83.8	
Bus56	33.000	98.423	0.1	0	0	0	0	Bus55	-0.187	-0.053	3.5	96.2	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
								Bus164	0.187	0.053	3.5	96.2	
Bus57	33.000	98.555	0.1	0	0	0	0	Bus69	-1.502	-0.437	27.8	96.0	
								Bus58	0.323	0.081	5.9	97.0	
								Bus59	0.696	0.179	12.8	96.8	
								Bus151	0.483	0.176	9.1	94.0	
Bus58	33.000	98.544	0.1	0	0	0	0	Bus57	-0.323	-0.129	6.2	92.9	
								Bus157	0.323	0.129	6.2	92.9	
Bus59	33.000	98.535	0.1	0	0	0	0	Bus57	-0.696	-0.220	13.0	95.3	
								Bus60	0.187	0.033	3.4	98.4	
								Bus158	0.509	0.187	9.6	93.9	
Bus60	33.000	98.532	0.1	0	0	0	0	Bus59	-0.187	-0.061	3.5	95.1	
								Bus159	0.187	0.061	3.5	95.1	
Bus61	33.000	98.307	0.1	0	0	0	0	Bus40	-12.853	-6.234	254.2	90.0	
								Bus62	12.532	6.086	247.9	90.0	
								Bus182	0.320	0.148	6.3	90.7	
Bus62	33.000	98.239	0.1	0	0	0	0	Bus61	-12.523	-6.089	248.0	89.9	
								Bus63	3.752	1.260	70.5	94.8	
								Bus85	8.277	4.615	168.8	87.3	
								Bus183	0.494	0.214	9.6	91.8	
Bus63	33.000	98.210	0.1	0	0	0	0	Bus62	-3.751	-1.270	70.5	94.7	
								Bus64	3.454	1.153	64.9	94.9	
								Bus184	0.297	0.118	5.7	93.0	
Bus64	33.000	98.185	0.1	0	0	0	0	Bus63	-3.453	-1.163	64.9	94.8	
								Bus65	3.453	1.163	64.9	94.8	
Bus65	33.000	98.185	0.1	0	0	0	0	Bus66	3.453	1.163	64.9	94.8	
								Bus64	-3.453	-1.163	64.9	94.8	
Bus66	33.000	98.166	0.1	0	0	0	0	Bus65	-3.453	-1.170	65.0	94.7	
								Bus67	0.745	0.350	14.7	90.5	
								Bus70	2.708	0.820	50.4	95.7	
Bus67	33.000	98.159	0.1	0	0	0	0	Bus66	-0.745	-0.362	14.8	89.9	
								Bus68	0.425	0.224	8.6	88.4	
								Bus185	0.320	0.138	6.2	91.8	
Bus68	33.000	98.140	0.1	0	0	0	0	Bus67	-0.425	-0.279	9.1	83.6	
								Bus186	0.425	0.279	9.1	83.6	
Bus69	33.000	98.563	0.1	0	0	0	0	Bus57	1.502	0.429	27.7	96.1	
								Bus41	-1.502	-0.429	27.7	96.1	
Bus70	33.000	98.093	0.1	0	0	0	0	Bus66	-2.706	-0.856	50.6	95.3	
								Bus71	2.417	0.732	45.0	95.7	
								Bus187	0.289	0.124	5.6	91.9	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus71	33.000	97.983	0.1	0	0	0	0	Bus70	-2.414	-0.793	45.4	95.0	
								Bus72	2.112	0.683	39.6	95.1	
								Bus188	0.303	0.110	5.7	94.0	
Bus72	33.000	97.865	0.1	0	0	0	0	Bus71	-2.109	-0.684	39.6	95.1	
								Bus73	0.935	0.239	17.3	96.9	
								Bus79	1.174	0.445	22.4	93.5	
Bus73	33.000	97.832	0.1	0	0	0	0	Bus72	-0.935	-0.240	17.3	96.9	
								Bus74	0.753	0.168	13.8	97.6	
								Bus189	0.183	0.072	3.5	93.0	
Bus74	33.000	97.771	0.1	0	0	0	0	Bus73	-0.752	-0.170	13.8	97.5	
								Bus75	0.472	0.080	8.6	98.6	
								Bus191	0.281	0.091	5.3	95.2	
Bus75	33.000	97.738	0.1	0	0	0	0	Bus76	0.471	0.082	8.6	98.5	
								Bus74	-0.471	-0.082	8.6	98.5	
Bus76	33.000	97.731	0.1	0	0	0	0	Bus75	-0.471	-0.102	8.6	97.7	
								Bus78	0.163	0.008	2.9	99.9	
								Bus77	0.127	0.028	2.3	97.6	
								Bus192	0.182	0.066	3.5	94.0	
Bus77	33.000	97.724	0.1	0	0	0	0	Bus76	-0.127	-0.030	2.3	97.3	
								Bus194	0.127	0.030	2.3	97.3	
Bus78	33.000	97.725	0.1	0	0	0	0	Bus76	-0.163	-0.058	3.1	94.1	
								Bus193	0.163	0.058	3.1	94.1	
Bus79	33.000	97.765	0.1	0	0	0	0	Bus72	-1.172	-0.447	22.5	93.4	
								Bus80	0.988	0.380	18.9	93.3	
								Bus190	0.184	0.067	3.5	94.0	
Bus80	33.000	97.735	0.1	0	0	0	0	Bus79	-0.988	-0.381	18.9	93.3	
								Bus81	0.814	0.312	15.6	93.4	
								Bus241	0.174	0.069	3.3	93.0	
Bus81	33.000	97.680	0.1	0	0	0	0	Bus80	-0.814	-0.314	15.6	93.3	
								Bus82	0.429	0.191	8.4	91.3	
								Bus84	0.125	0.040	2.4	95.3	
								Bus243	0.259	0.083	4.9	95.2	
Bus82	33.000	97.655	0.1	0	0	0	0	Bus81	-0.429	-0.193	8.4	91.2	
								Bus83	0.142	0.089	3.0	84.6	
								Bus244	0.287	0.104	5.5	94.1	
Bus83	33.000	97.641	0.1	0	0	0	0	Bus82	-0.142	-0.092	3.0	83.9	
								Bus245	0.142	0.092	3.0	83.9	
Bus84	33.000	97.658	0.1	0	0	0	0	Bus81	-0.125	-0.046	2.4	94.0	
								Bus246	0.125	0.046	2.4	94.0	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus85	33.000	98.059	0.1	0	0	0	0	Bus62	-8.260	-4.636	169.0	87.2	
								Bus86	7.793	4.435	160.0	86.9	
								Bus195	0.467	0.201	9.1	91.8	
Bus86	33.000	97.911	0.1	0	0	0	0	Bus85	-7.781	-4.454	160.2	86.8	
								Bus90	7.133	4.285	148.7	85.7	
								Bus87	0.469	0.099	8.6	97.8	
								Bus196	0.179	0.071	3.4	93.0	
Bus87	33.000	97.903	0.1	0	0	0	0	Bus86	-0.469	-0.125	8.7	96.6	
								Bus88	0.278	0.082	5.2	95.9	
								Bus89	0.191	0.043	3.5	97.6	
Bus88	33.000	97.899	0.1	0	0	0	0	Bus87	-0.278	-0.100	5.3	94.1	
								Bus203	0.278	0.100	5.3	94.1	
Bus89	33.000	97.899	0.1	0	0	0	0	Bus87	-0.191	-0.069	3.6	94.0	
								Bus240	0.191	0.069	3.6	94.0	
Bus90	33.000	97.853	0.2	0	0	0	0	Bus86	-7.128	-4.293	148.8	85.7	
								Bus95	6.024	3.916	128.5	83.8	
								Bus91	0.645	0.165	11.9	96.9	
								Bus197	0.459	0.212	9.0	90.8	
Bus91	33.000	97.848	0.2	0	0	0	0	Bus90	-0.645	-0.176	11.9	96.5	
								Bus92	0.645	0.176	11.9	96.5	
Bus92	33.000	97.813	0.2	0	0	0	0	Bus93	0.155	0.051	2.9	95.1	
								Bus94	0.184	0.005	3.3	100.0	
								Bus91	-0.645	-0.177	12.0	96.4	
								Bus198	0.305	0.121	5.9	92.9	
Bus93	33.000	97.810	0.2	0	0	0	0	Bus92	-0.155	-0.075	3.1	90.0	
								Bus200	0.155	0.075	3.1	90.0	
Bus94	33.000	97.806	0.1	0	0	0	0	Bus92	-0.184	-0.060	3.5	95.1	
								Bus201	0.184	0.060	3.5	95.1	
Bus95	33.000	97.728	0.2	0	0	0	0	Bus90	-6.015	-3.938	128.7	83.7	
								Bus96	5.718	3.801	122.9	83.3	
								Bus199	0.297	0.137	5.9	90.8	
Bus96	33.000	97.633	0.2	0	0	0	0	Bus95	-5.712	-3.819	123.1	83.1	
								Bus97	5.233	3.597	113.8	82.4	
								Bus202	0.478	0.222	9.4	90.7	
Bus97	33.000	97.604	0.2	0	0	0	0	Bus96	-5.232	-3.603	113.9	82.4	
								Bus99	0.300	0.080	5.6	96.7	
								Bus100	4.550	3.083	98.5	82.8	
								Bus98	0.382	0.440	10.4	65.5	
Bus98	33.000	97.598	0.2	0	0	0	0	Bus97	-0.382	-0.441	10.4	65.5	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
								Bus204	0.382	0.441	10.4	65.5	
Bus99	33.000	97.595	0.2	0	0	0	0	Bus97	-0.300	-0.119	5.8	92.9	
								Bus205	0.300	0.119	5.8	92.9	
Bus100	33.000	97.520	0.2	0	0	0	0	Bus97	-4.545	-3.104	98.7	82.6	
								Bus102	4.421	3.061	96.5	82.2	
								Bus101	0.124	0.043	2.4	94.5	
Bus101	33.000	97.512	0.2	0	0	0	0	Bus100	-0.124	-0.045	2.4	94.0	
								Bus207	0.124	0.045	2.4	94.0	
Bus102	33.000	97.430	0.2	0	0	0	0	Bus100	-4.416	-3.084	96.7	82.0	
								Bus103	4.227	3.002	93.1	81.5	
								Bus206	0.189	0.081	3.7	91.9	
Bus103	33.000	97.356	0.2	0	0	0	0	Bus102	-4.223	-3.021	93.3	81.3	
								Bus104	2.909	1.201	56.6	92.4	
								Bus124	1.015	1.712	35.8	51.0	
								Bus208	0.299	0.109	5.7	94.0	
Bus104	33.000	97.323	0.2	0	0	0	0	Bus103	-2.908	-1.215	56.7	92.3	
								Bus106	1.248	0.492	24.1	93.0	
								Bus105	1.660	0.723	32.5	91.7	
Bus105	33.000	97.302	0.2	0	0	0	0	Bus107	0.126	0.026	2.3	97.9	
								Bus104	-1.659	-0.723	32.5	91.7	
								Bus108	1.533	0.697	30.3	91.0	
Bus106	33.000	97.298	0.2	0	0	0	0	Bus104	-1.248	-0.518	24.3	92.4	
								Bus118	0.996	0.235	18.4	97.3	
								Bus218	0.252	0.283	6.8	66.6	
Bus107	33.000	97.300	0.2	0	0	0	0	Bus105	-0.126	-0.046	2.4	93.9	
								Bus209	0.126	0.046	2.4	93.9	
Bus108	33.000	97.224	0.2	0	0	0	0	Bus109	0.154	0.127	3.6	77.1	
								Bus105	-1.532	-0.698	30.3	91.0	
								Bus110	1.202	0.514	23.5	91.9	
								Bus210	0.176	0.057	3.3	95.1	
Bus109	33.000	97.219	0.2	0	0	0	0	Bus108	-0.154	-0.163	4.0	68.6	
								Bus211	0.154	0.163	4.0	68.6	
Bus110	33.000	97.153	0.2	0	0	0	0	Bus108	-1.201	-0.516	23.5	91.9	
								Bus111	1.019	0.464	20.2	91.0	
								Bus212	0.183	0.052	3.4	96.2	
Bus111	33.000	97.062	0.2	0	0	0	0	Bus110	-1.018	-0.466	20.2	90.9	
								Bus112	0.427	0.132	8.0	95.5	
								Bus113	0.591	0.334	12.2	87.1	
Bus112	33.000	97.037	0.2	0	0	0	0	Bus111	-0.426	-0.134	8.1	95.4	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
								Bus114	0.167	0.050	3.1	95.7	
								Bus220	0.260	0.083	4.9	95.2	
Bus113	33.000	97.056	0.2	0	0	0	0	Bus111	-0.591	-0.334	12.2	87.0	
								Bus115	0.303	0.091	5.7	95.7	
								Bus221	0.288	0.243	6.8	76.4	
Bus114	33.000	97.020	0.2	0	0	0	0	Bus112	-0.167	-0.054	3.2	95.2	
								Bus219	0.167	0.054	3.2	95.2	
Bus115	33.000	97.047	0.2	0	0	0	0	Bus113	-0.303	-0.092	5.7	95.7	
								Bus117	0.119	0.033	2.2	96.4	
								Bus116	0.184	0.059	3.5	95.2	
Bus116	33.000	97.004	0.2	0	0	0	0	Bus115	-0.184	-0.067	3.5	94.0	
								Bus222	0.184	0.067	3.5	94.0	
Bus117	33.000	97.044	0.2	0	0	0	0	Bus115	-0.119	-0.034	2.2	96.2	
								Bus223	0.119	0.034	2.2	96.2	
Bus118	33.000	97.284	0.2	0	0	0	0	Bus106	-0.996	-0.254	18.5	96.9	
								Bus119	0.353	0.092	6.6	96.7	
								Bus122	0.355	0.047	6.4	99.1	
								Bus215	0.288	0.114	5.6	93.0	
Bus119	33.000	97.279	0.2	0	0	0	0	Bus118	-0.353	-0.112	6.7	95.3	
								Bus120	0.178	0.038	3.3	97.8	
								Bus216	0.174	0.075	3.4	91.9	
Bus120	33.000	97.276	0.2	0	0	0	0	Bus119	-0.178	-0.056	3.4	95.4	
								Bus121	0.178	0.056	3.4	95.4	
Bus121	33.000	97.268	0.2	0	0	0	0	Bus120	-0.178	-0.058	3.4	95.1	
								Bus217	0.178	0.058	3.4	95.1	
Bus122	33.000	97.274	0.2	0	0	0	0	Bus118	-0.355	-0.087	6.6	97.1	
								Bus123	0.185	0.020	3.3	99.4	
								Bus214	0.170	0.067	3.3	93.0	
Bus123	33.000	97.269	0.2	0	0	0	0	Bus122	-0.185	-0.060	3.5	95.1	
								Bus213	0.185	0.060	3.5	95.1	
Bus124	33.000	97.251	0.3	0	0	0	0	Bus103	-1.012	-1.713	35.8	50.9	
								Bus125	0.824	1.645	33.1	44.8	
								Bus239	0.189	0.069	3.6	94.0	
Bus125	33.000	97.172	0.3	0	0	0	0	Bus124	-0.822	-1.646	33.1	44.7	
								Bus126	0.637	1.586	30.8	37.3	
								Bus238	0.185	0.060	3.5	95.1	
Bus126	33.000	97.037	0.4	0	0	0	0	Bus125	-0.634	-1.588	30.8	37.1	
								Bus128	0.461	1.475	27.9	29.8	
								Bus127	0.173	0.113	3.7	83.8	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus127	33.000	97.033	0.4	0	0	0	0	Bus126	-0.173	-0.114	3.7	83.6	
								Bus228	0.173	0.114	3.7	83.6	
Bus128	33.000	96.993	0.4	0	0	0	0	Bus126	-0.460	-1.476	27.9	29.8	
								Bus129	0.438	0.390	10.6	74.6	
								Bus131	0.023	1.085	19.6	2.1	
Bus129	33.000	96.981	0.4	0	0	0	0	Bus128	-0.438	-0.391	10.6	74.6	
								Bus130	0.257	0.272	6.7	68.6	
								Bus225	0.181	0.119	3.9	83.6	
Bus130	33.000	96.977	0.4	0	0	0	0	Bus129	-0.257	-0.272	6.8	68.6	
								Bus224	0.257	0.272	6.8	68.6	
Bus131	33.000	96.985	0.4	0	0	0	0	Bus128	-0.022	-1.086	19.6	2.1	
								Bus132	0.245	0.266	6.5	67.7	
								Bus133	-0.222	0.820	15.3	-26.2	
Bus132	33.000	96.983	0.4	0	0	0	0	Bus131	-0.244	-0.266	6.5	67.6	
								Bus226	0.244	0.266	6.5	67.6	
Bus133	33.000	96.980	0.4	0	0	0	0	Bus131	0.222	-0.821	15.3	-26.2	
								Bus134	-0.501	0.593	14.0	-64.6	
								Bus227	0.279	0.228	6.5	77.5	
Bus134	33.000	96.983	0.4	0	0	0	0	Bus133	0.501	-0.594	14.0	-64.5	
								Bus136	4.357	4.454	112.4	69.9	
								Bus135	-5.021	-4.029	116.1	78.0	
								Bus229	0.163	0.168	4.2	69.5	
Bus135	33.000	97.110	0.4	0	0	0	0	Bus134	5.029	4.032	116.1	78.0	
								Bus247	-5.292	-4.311	123.0	77.5	
								Bus230	0.262	0.279	6.9	68.5	
Bus136	33.000	96.746	0.5	0	0	0	0	Bus134	-4.342	-4.449	112.4	69.9	
								Bus137	1.138	1.032	27.8	74.1	
								Bus234	0.994	1.088	26.6	67.5	
								Bus233	0.958	1.075	26.0	66.5	
								Bus232	0.831	0.815	21.1	71.4	
								Bus231	0.422	0.439	11.0	69.3	
Bus137	33.000	96.679	0.5	0	0	0	0	Bus136	-1.137	-1.033	27.8	74.0	
								Bus235	0.452	0.396	10.9	75.2	
								Bus236	0.407	0.388	10.2	72.4	
								Bus237	0.278	0.249	6.8	74.5	
Bus138	0.400	96.175	-1.0	0	0	0.147	0.154	Bus2	-0.147	-0.154	320.2	69.0	
Bus139	0.400	97.106	-1.8	0	0	0.332	0.131	Bus3	-0.332	-0.131	530.2	93.0	
Bus140	0.400	95.481	-1.1	0	0	0.258	0.263	Bus4	-0.258	-0.263	557.4	70.0	
Bus141	0.400	97.060	-1.6	0	0	0.181	0.066	Bus7	-0.181	-0.066	286.1	94.0	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus142	0.400	96.699	-1.9	0	0	0.336	0.111	Bus8	-0.336	-0.111	528.4	95.0	
Bus143	0.400	96.686	-1.6	0	0	0.308	0.122	Bus8	-0.308	-0.122	494.7	93.0	
Bus144	0.400	97.059	-1.4	0	0	0.167	0.055	Bus9	-0.167	-0.055	260.8	95.0	
Bus145	0.400	96.093	-1.5	0	0	0.301	0.119	Bus10	-0.301	-0.119	486.7	93.0	
Bus146	0.400	96.329	-1.7	0	0	0.313	0.103	Bus40	-0.313	-0.103	493.2	95.0	
Bus147	0.400	96.526	-1.5	0	0	0.115	0.034	Bus53	-0.115	-0.034	179.6	96.0	
Bus148	0.400	94.943	-0.8	0	0	0.230	0.235	Bus12	-0.230	-0.235	499.7	70.0	
Bus149	0.400	96.344	-1.8	0	0	0.200	0.058	Bus42	-0.200	-0.058	312.5	96.0	
Bus150	0.400	96.510	-1.7	0	0	0.461	0.167	Bus41	-0.461	-0.167	733.9	94.0	
Bus151	0.400	96.513	-1.7	0	0	0.478	0.157	Bus57	-0.478	-0.157	752.2	95.0	
Bus152	0.400	95.033	-0.9	0	0	0.090	0.097	Bus43	-0.090	-0.097	200.0	68.0	
Bus153	0.400	96.398	-1.8	0	0	0.200	0.050	Bus44	-0.200	-0.050	308.4	97.0	
Bus154	0.400	94.505	-0.9	0	0	0.256	0.254	Bus13	-0.256	-0.254	550.0	71.0	
Bus155	0.400	94.645	-0.8	0	0	0.227	0.232	Bus15	-0.227	-0.232	495.0	70.0	
Bus156	0.400	93.943	-0.8	0	0	0.101	0.112	Bus16	-0.101	-0.112	230.8	67.0	
Bus157	0.400	96.059	-1.7	0	0	0.318	0.116	Bus58	-0.318	-0.116	508.9	94.0	
Bus158	0.400	96.374	-1.8	0	0	0.504	0.166	Bus59	-0.504	-0.166	794.8	95.0	
Bus159	0.400	96.472	-1.6	0	0	0.185	0.054	Bus60	-0.185	-0.054	287.6	96.0	
Bus160	0.400	95.564	-1.3	0	0	0.267	0.166	Bus47	-0.267	-0.166	474.9	85.0	
Bus161	0.400	96.816	-1.4	0	0	0.245	0.061	Bus48	-0.245	-0.061	377.0	97.0	
Bus162	0.400	95.430	-1.3	0	0	0.273	0.169	Bus50	-0.273	-0.169	485.5	85.0	
Bus163	0.400	95.894	-1.2	0	0	0.095	0.059	Bus55	-0.095	-0.059	169.0	85.0	
Bus164	0.400	96.494	-1.7	0	0	0.185	0.046	Bus56	-0.185	-0.046	284.8	97.0	
Bus165	0.400	96.246	-1.5	0	0	0.111	0.040	Bus51	-0.111	-0.040	176.4	94.0	
Bus166	0.400	96.155	-1.6	0	0	0.180	0.065	Bus52	-0.180	-0.065	286.8	94.0	
Bus167	0.400	94.186	-1.0	0	0	0.389	0.386	Bus22	-0.389	-0.386	839.4	71.0	
Bus168	0.400	94.131	-1.0	0	0	0.404	0.389	Bus22	-0.404	-0.389	859.5	72.0	
Bus169	0.400	93.045	-1.7	0	0	0.786	0.802	Bus21	-0.786	-0.802	1741.6	70.0	
Bus170	0.400	93.950	-1.0	0	0	0.395	0.414	Bus23	-0.395	-0.414	879.6	69.0	
Bus171	0.400	94.100	-0.9	0	0	0.255	0.253	Bus24	-0.255	-0.253	551.9	71.0	
Bus172	0.400	94.259	-0.9	0	0	0.103	0.096	Bus18	-0.103	-0.096	215.0	73.0	
Bus173	0.400	95.711	-1.6	0	0	0.195	0.057	Bus26	-0.195	-0.057	306.7	96.0	
Bus174	0.400	95.221	-1.1	0	0	0.156	0.097	Bus29	-0.156	-0.097	278.9	85.0	
Bus175	0.400	93.842	-0.8	0	0	0.253	0.272	Bus28	-0.253	-0.272	571.4	68.0	
Bus176	0.400	95.451	-1.5	0	0	0.195	0.071	Bus31	-0.195	-0.071	313.0	94.0	
Bus177	0.400	95.740	-1.6	0	0	0.191	0.056	Bus32	-0.191	-0.056	299.8	96.0	
Bus178	0.400	95.699	-1.4	0	0	0.117	0.038	Bus34	-0.117	-0.038	185.4	95.0	
Bus179	0.400	94.151	-0.8	0	0	0.151	0.154	Bus35	-0.151	-0.154	330.4	70.0	
Bus180	0.400	95.738	-1.4	0	0	0.176	0.058	Bus36	-0.176	-0.058	278.9	95.0	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus181	0.400	95.562	-1.4	0	0	0.180	0.065	Bus37	-0.180	-0.065	289.6	94.0	
Bus182	0.400	95.609	-1.7	0	0	0.316	0.135	Bus61	-0.316	-0.135	518.2	92.0	
Bus183	0.400	95.899	-1.7	0	0	0.489	0.193	Bus62	-0.489	-0.193	791.7	93.0	
Bus184	0.400	95.922	-1.6	0	0	0.293	0.106	Bus63	-0.293	-0.106	469.2	94.0	
Bus185	0.400	95.570	-1.7	0	0	0.316	0.125	Bus67	-0.316	-0.125	512.4	93.0	
Bus186	0.400	95.449	-1.4	0	0	0.420	0.260	Bus68	-0.420	-0.260	747.0	85.0	
Bus187	0.400	95.758	-1.5	0	0	0.286	0.113	Bus70	-0.286	-0.113	463.0	93.0	
Bus188	0.400	95.759	-1.6	0	0	0.299	0.098	Bus71	-0.299	-0.098	474.2	95.0	
Bus189	0.400	95.572	-1.6	0	0	0.180	0.065	Bus73	-0.180	-0.065	289.6	94.0	
Bus190	0.400	95.591	-1.6	0	0	0.182	0.060	Bus79	-0.182	-0.060	289.7	95.0	
Bus191	0.400	95.824	-1.6	0	0	0.277	0.081	Bus74	-0.277	-0.081	435.4	96.0	
Bus192	0.400	95.590	-1.6	0	0	0.180	0.059	Bus76	-0.180	-0.059	285.5	95.0	
Bus193	0.400	95.814	-1.4	0	0	0.161	0.053	Bus78	-0.161	-0.053	255.3	95.0	
Bus194	0.400	95.826	-1.8	0	0	0.125	0.025	Bus77	-0.125	-0.025	192.6	98.0	
Bus195	0.400	95.850	-1.6	0	0	0.462	0.183	Bus85	-0.462	-0.183	748.1	93.0	
Bus196	0.400	95.705	-1.5	0	0	0.176	0.064	Bus86	-0.176	-0.064	283.0	94.0	
Bus197	0.400	95.573	-1.6	0	0	0.455	0.194	Bus90	-0.455	-0.194	746.4	92.0	
Bus198	0.400	95.450	-1.6	0	0	0.301	0.109	Bus92	-0.301	-0.109	484.1	94.0	
Bus199	0.400	95.215	-1.5	0	0	0.293	0.125	Bus95	-0.293	-0.125	483.2	92.0	
Bus200	0.400	95.636	-1.2	0	0	0.154	0.070	Bus93	-0.154	-0.070	255.0	91.0	
Bus201	0.400	95.757	-1.6	0	0	0.182	0.053	Bus94	-0.182	-0.053	285.9	96.0	
Bus202	0.400	95.251	-1.6	0	0	0.473	0.202	Bus96	-0.473	-0.202	779.2	92.0	
Bus203	0.400	95.859	-1.5	0	0	0.275	0.090	Bus88	-0.275	-0.090	435.5	95.0	
Bus204	0.400	93.808	-1.0	0	0	0.375	0.416	Bus98	-0.375	-0.416	861.9	67.0	
Bus205	0.400	95.264	-1.5	0	0	0.296	0.108	Bus99	-0.296	-0.108	477.8	94.0	
Bus206	0.400	94.967	-1.5	0	0	0.187	0.074	Bus102	-0.187	-0.074	304.8	93.0	
Bus207	0.400	95.214	-1.6	0	0	0.123	0.040	Bus101	-0.123	-0.040	195.8	95.0	
Bus208	0.400	95.142	-1.5	0	0	0.295	0.097	Bus103	-0.295	-0.097	471.8	95.0	
Bus209	0.400	94.957	-1.6	0	0	0.125	0.041	Bus107	-0.125	-0.041	199.5	95.0	
Bus210	0.400	95.255	-1.4	0	0	0.174	0.051	Bus108	-0.174	-0.051	275.0	96.0	
Bus211	0.400	93.492	-0.9	0	0	0.151	0.154	Bus109	-0.151	-0.154	332.3	70.0	
Bus212	0.400	95.244	-1.5	0	0	0.180	0.045	Bus110	-0.180	-0.045	281.9	97.0	
Bus213	0.400	95.199	-1.5	0	0	0.183	0.053	Bus123	-0.183	-0.053	288.8	96.0	
Bus214	0.400	95.165	-1.3	0	0	0.168	0.061	Bus122	-0.168	-0.061	270.6	94.0	
Bus215	0.400	95.040	-1.4	0	0	0.285	0.103	Bus118	-0.285	-0.103	460.3	94.0	
Bus216	0.400	95.009	-1.4	0	0	0.172	0.068	Bus119	-0.172	-0.068	281.4	93.0	
Bus217	0.400	95.279	-1.5	0	0	0.176	0.051	Bus121	-0.176	-0.051	277.8	96.0	
Bus218	0.400	93.309	-0.9	0	0	0.247	0.266	Bus106	-0.247	-0.266	561.9	68.0	
Bus219	0.400	95.154	-1.4	0	0	0.165	0.048	Bus114	-0.165	-0.048	260.9	96.0	

Bus		Voltage		Generation		Load		Load Flow					XFMR
ID	kV	% Mag.	Ang.	MW	Mvar	MW	Mvar	ID	MW	Mvar	Amp	%PF	%Tap
Bus220	0.400	95.226	-1.3	0	0	0.257	0.075	Bus112	-0.257	-0.075	405.5	96.0	
Bus221	0.400	93.377	-1.2	0	0	0.283	0.227	Bus113	-0.283	-0.227	560.3	78.0	
Bus222	0.400	94.823	-1.5	0	0	0.181	0.060	Bus116	-0.181	-0.060	290.6	95.0	
Bus223	0.400	95.091	-1.6	0	0	0.118	0.030	Bus117	-0.118	-0.030	184.5	97.0	
Bus224	0.400	93.073	-0.7	0	0	0.251	0.256	Bus130	-0.251	-0.256	556.9	70.0	
Bus225	0.400	93.878	-1.1	0	0	0.178	0.111	Bus129	-0.178	-0.111	322.5	85.0	
Bus226	0.400	93.187	-0.7	0	0	0.240	0.251	Bus132	-0.240	-0.251	538.0	69.0	
Bus227	0.400	93.500	-1.0	0	0	0.274	0.213	Bus133	-0.274	-0.213	535.7	79.0	
Bus228	0.400	94.071	-1.1	0	0	0.171	0.106	Bus127	-0.171	-0.106	308.0	85.0	
Bus229	0.400	93.098	-0.7	0	0	0.160	0.158	Bus134	-0.160	-0.158	348.8	71.0	
Bus230	0.400	93.121	-0.7	0	0	0.257	0.262	Bus135	-0.257	-0.262	568.9	70.0	
Bus231	0.400	92.865	-0.9	0	0	0.415	0.412	Bus136	-0.415	-0.412	909.0	71.0	
Bus232	0.400	92.232	-1.7	0	0	0.821	0.747	Bus136	-0.821	-0.747	1736.9	74.0	
Bus233	0.400	92.156	-1.4	0	0	0.946	0.992	Bus136	-0.946	-0.992	2147.3	69.0	
Bus234	0.400	92.091	-1.5	0	0	0.982	1.001	Bus136	-0.982	-1.001	2198.0	70.0	
Bus235	0.400	93.061	-1.0	0	0	0.445	0.369	Bus137	-0.445	-0.369	896.7	77.0	
Bus236	0.400	93.191	-0.9	0	0	0.401	0.364	Bus137	-0.401	-0.364	839.1	74.0	
Bus237	0.400	92.948	-0.8	0	0	0.273	0.233	Bus137	-0.273	-0.233	557.6	76.0	
Bus238	0.400	95.105	-1.4	0	0	0.183	0.053	Bus125	-0.183	-0.053	288.5	96.0	
Bus239	0.400	95.013	-1.5	0	0	0.186	0.061	Bus124	-0.186	-0.061	298.0	95.0	
Bus240	0.400	95.650	-1.6	0	0	0.189	0.062	Bus89	-0.189	-0.062	299.6	95.0	
Bus241	0.400	95.585	-1.5	0	0	0.172	0.062	Bus80	-0.172	-0.062	275.8	94.0	
Bus242	0.400	94.063	-0.9	0	0	0.264	0.247	Bus19	-0.264	-0.247	555.1	73.0	
Bus243	0.400	95.884	-1.4	0	0	0.256	0.075	Bus81	-0.256	-0.075	402.1	96.0	
Bus244	0.400	95.541	-1.6	0	0	0.284	0.093	Bus82	-0.284	-0.093	451.1	95.0	
Bus245	0.400	95.244	-1.1	0	0	0.140	0.087	Bus83	-0.140	-0.087	249.8	85.0	
Bus246	0.400	95.341	-1.7	0	0	0.124	0.041	Bus84	-0.124	-0.041	197.4	95.0	
Bus247	33.000	99.322	0.1	0	0	0	0	Bus2	-5.436	-4.368	122.8	78.0	
								Bus135	5.436	4.368	122.8	78.0	

* Indicates a voltage regulated bus (voltage controlled or swing type machine connected to it)

# Indicates a bus with a load mismatch of more than 0.1 MVA

Bus Loading Summary Report

Bus			Directly Connected Load								Total Bus Load			
			Constant kVA		Constant Z		Constant I		Generic					
ID	kV	Rated Amp	MW	Mvar	MW	Mvar	MW	Mvar	MW	Mvar	MVA	% PF	Amp	Percent Loading
Bus1	33.000		0	0	0	0	0	0	0	0	34.852	86.7	609.8	
Bus2	33.000		0	0	0	0	0	0	0	0	34.821	86.6	610.5	
Bus3	33.000		0	0	0	0	0	0	0	0	0.367	91.8	6.4	
Bus4	33.000		0	0	0	0	0	0	0	0	27.297	88.2	480.5	
Bus5	33.000		0	0	0	0	0	0	0	0	26.930	88.4	474.4	
Bus6	33.000		0	0	0	0	0	0	0	0	0.196	93.4	3.5	
Bus7	33.000		0	0	0	0	0	0	0	0	0.197	93.0	3.5	
Bus8	33.000		0	0	0	0	0	0	0	0	26.739	88.2	471.7	
Bus9	33.000		0	0	0	0	0	0	0	0	7.454	77.4	131.7	
Bus10	33.000		0	0	0	0	0	0	0	0	7.253	76.7	128.8	
Bus11	33.000		0	0	0	0	0	0	0	0	0.122	96.0	2.2	
Bus12	33.000		0	0	0	0	0	0	0	0	6.819	75.3	121.2	
Bus13	33.000		0	0	0	0	0	0	0	0	6.472	75.6	115.2	
Bus14	33.000		0	0	0	0	0	0	0	0	6.087	76.0	108.5	
Bus15	33.000		0	0	0	0	0	0	0	0	0.336	68.7	6.0	
Bus16	33.000		0	0	0	0	0	0	0	0	5.750	76.3	102.6	
Bus17	33.000		0	0	0	0	0	0	0	0	5.590	76.6	99.8	
Bus18	33.000		0	0	0	0	0	0	0	0	2.334	85.8	41.7	
Bus19	33.000		0	0	0	0	0	0	0	0	3.304	68.8	59.1	
Bus20	33.000		0	0	0	0	0	0	0	0	2.926	68.4	52.4	
Bus21	33.000		0	0	0	0	0	0	0	0	1.775	67.4	31.8	
Bus22	33.000		0	0	0	0	0	0	0	0	1.151	69.9	20.6	
Bus23	33.000		0	0	0	0	0	0	0	0	0.596	67.4	10.7	
Bus24	33.000		0	0	0	0	0	0	0	0	0.375	69.6	6.7	
Bus25	33.000		0	0	0	0	0	0	0	0	1.835	89.3	32.8	
Bus26	33.000		0	0	0	0	0	0	0	0	1.301	93.8	23.3	
Bus27	33.000		0	0	0	0	0	0	0	0	0.572	72.8	10.2	
Bus28	33.000		0	0	0	0	0	0	0	0	0.388	66.6	6.9	
Bus29	33.000		0	0	0	0	0	0	0	0	0.189	83.8	3.4	
Bus30	33.000		0	0	0	0	0	0	0	0	1.099	93.1	19.6	
Bus31	33.000		0	0	0	0	0	0	0	0	0.402	97.2	7.2	
Bus32	33.000		0	0	0	0	0	0	0	0	0.203	95.1	3.6	
Bus33	33.000		0	0	0	0	0	0	0	0	0.717	88.3	12.8	
Bus34	33.000		0	0	0	0	0	0	0	0	0.717	88.2	12.8	
Bus35	33.000		0	0	0	0	0	0	0	0	0.593	86.7	10.6	
Bus36	33.000		0	0	0	0	0	0	0	0	0.385	93.6	6.9	

Bus			Directly Connected Load								Total Bus Load			
			Constant kVA		Constant Z		Constant I		Generic					
ID	kV	Rated Amp	MW	Mvar	MW	Mvar	MW	Mvar	MW	Mvar	MVA	% PF	Amp	Percent Loading
Bus37	33.000		0	0	0	0	0	0	0	0	0.196	93.0	3.5	
Bus38	33.000		0	0	0	0	0	0	0	0	18.704	91.3	331.2	
Bus39	33.000		0	0	0	0	0	0	0	0	18.704	91.3	331.2	
Bus40	33.000		0	0	0	0	0	0	0	0	18.681	91.3	331.3	
Bus41	33.000		0	0	0	0	0	0	0	0	4.055	94.7	72.0	
Bus42	33.000		0	0	0	0	0	0	0	0	0.213	95.0	3.8	
Bus43	33.000		0	0	0	0	0	0	0	0	1.810	92.2	32.1	
Bus44	33.000		0	0	0	0	0	0	0	0	1.686	93.5	30.0	
Bus45	33.000		0	0	0	0	0	0	0	0	1.476	93.0	26.2	
Bus46	33.000		0	0	0	0	0	0	0	0	1.176	92.6	20.9	
Bus47	33.000		0	0	0	0	0	0	0	0	0.324	83.7	5.8	
Bus48	33.000		0	0	0	0	0	0	0	0	0.861	95.0	15.3	
Bus49	33.000		0	0	0	0	0	0	0	0	0.295	99.5	5.2	
Bus50	33.000		0	0	0	0	0	0	0	0	0.331	83.7	5.9	
Bus51	33.000		0	0	0	0	0	0	0	0	0.120	93.0	2.1	
Bus52	33.000		0	0	0	0	0	0	0	0	0.196	93.0	3.5	
Bus53	33.000		0	0	0	0	0	0	0	0	0.123	95.1	2.2	
Bus54	33.000		0	0	0	0	0	0	0	0	0.305	92.9	5.4	
Bus55	33.000		0	0	0	0	0	0	0	0	0.306	92.7	5.4	
Bus56	33.000		0	0	0	0	0	0	0	0	0.194	96.2	3.5	
Bus57	33.000		0	0	0	0	0	0	0	0	1.564	96.0	27.8	
Bus58	33.000		0	0	0	0	0	0	0	0	0.347	92.9	6.2	
Bus59	33.000		0	0	0	0	0	0	0	0	0.730	95.3	13.0	
Bus60	33.000		0	0	0	0	0	0	0	0	0.196	95.1	3.5	
Bus61	33.000		0	0	0	0	0	0	0	0	14.285	90.0	254.2	
Bus62	33.000		0	0	0	0	0	0	0	0	13.925	89.9	248.0	
Bus63	33.000		0	0	0	0	0	0	0	0	3.960	94.7	70.5	
Bus64	33.000		0	0	0	0	0	0	0	0	3.644	94.8	64.9	
Bus65	33.000		0	0	0	0	0	0	0	0	3.644	94.8	64.9	
Bus66	33.000		0	0	0	0	0	0	0	0	3.645	94.7	65.0	
Bus67	33.000		0	0	0	0	0	0	0	0	0.828	89.9	14.8	
Bus68	33.000		0	0	0	0	0	0	0	0	0.508	83.6	9.1	
Bus69	33.000		0	0	0	0	0	0	0	0	1.562	96.1	27.7	
Bus70	33.000		0	0	0	0	0	0	0	0	2.838	95.3	50.6	
Bus71	33.000		0	0	0	0	0	0	0	0	2.541	95.0	45.4	
Bus72	33.000		0	0	0	0	0	0	0	0	2.217	95.1	39.6	
Bus73	33.000		0	0	0	0	0	0	0	0	0.966	96.9	17.3	
Bus74	33.000		0	0	0	0	0	0	0	0	0.771	97.5	13.8	

Bus			Directly Connected Load								Total Bus Load			
			Constant kVA		Constant Z		Constant I		Generic					
ID	kV	Rated Amp	MW	Mvar	MW	Mvar	MW	Mvar	MW	Mvar	MVA	% PF	Amp	Percent Loading
Bus75	33.000		0	0	0	0	0	0	0	0	0.479	98.5	8.6	
Bus76	33.000		0	0	0	0	0	0	0	0	0.482	97.7	8.6	
Bus77	33.000		0	0	0	0	0	0	0	0	0.130	97.3	2.3	
Bus78	33.000		0	0	0	0	0	0	0	0	0.173	94.1	3.1	
Bus79	33.000		0	0	0	0	0	0	0	0	1.255	93.4	22.5	
Bus80	33.000		0	0	0	0	0	0	0	0	1.059	93.3	18.9	
Bus81	33.000		0	0	0	0	0	0	0	0	0.872	93.3	15.6	
Bus82	33.000		0	0	0	0	0	0	0	0	0.470	91.2	8.4	
Bus83	33.000		0	0	0	0	0	0	0	0	0.169	83.9	3.0	
Bus84	33.000		0	0	0	0	0	0	0	0	0.134	94.0	2.4	
Bus85	33.000		0	0	0	0	0	0	0	0	9.472	87.2	169.0	
Bus86	33.000		0	0	0	0	0	0	0	0	8.965	86.8	160.2	
Bus87	33.000		0	0	0	0	0	0	0	0	0.485	96.6	8.7	
Bus88	33.000		0	0	0	0	0	0	0	0	0.295	94.1	5.3	
Bus89	33.000		0	0	0	0	0	0	0	0	0.203	94.0	3.6	
Bus90	33.000		0	0	0	0	0	0	0	0	8.321	85.7	148.8	
Bus91	33.000		0	0	0	0	0	0	0	0	0.668	96.5	11.9	
Bus92	33.000		0	0	0	0	0	0	0	0	0.669	96.4	12.0	
Bus93	33.000		0	0	0	0	0	0	0	0	0.173	90.0	3.1	
Bus94	33.000		0	0	0	0	0	0	0	0	0.194	95.1	3.5	
Bus95	33.000		0	0	0	0	0	0	0	0	7.190	83.7	128.7	
Bus96	33.000		0	0	0	0	0	0	0	0	6.871	83.1	123.1	
Bus97	33.000		0	0	0	0	0	0	0	0	6.352	82.4	113.9	
Bus98	33.000		0	0	0	0	0	0	0	0	0.583	65.5	10.4	
Bus99	33.000		0	0	0	0	0	0	0	0	0.323	92.9	5.8	
Bus100	33.000		0	0	0	0	0	0	0	0	5.504	82.6	98.7	
Bus101	33.000		0	0	0	0	0	0	0	0	0.132	94.0	2.4	
Bus102	33.000		0	0	0	0	0	0	0	0	5.386	82.0	96.7	
Bus103	33.000		0	0	0	0	0	0	0	0	5.193	81.3	93.3	
Bus104	33.000		0	0	0	0	0	0	0	0	3.152	92.3	56.7	
Bus105	33.000		0	0	0	0	0	0	0	0	1.810	91.7	32.5	
Bus106	33.000		0	0	0	0	0	0	0	0	1.351	92.4	24.3	
Bus107	33.000		0	0	0	0	0	0	0	0	0.134	93.9	2.4	
Bus108	33.000		0	0	0	0	0	0	0	0	1.683	91.0	30.3	
Bus109	33.000		0	0	0	0	0	0	0	0	0.224	68.6	4.0	
Bus110	33.000		0	0	0	0	0	0	0	0	1.307	91.9	23.5	
Bus111	33.000		0	0	0	0	0	0	0	0	1.119	90.9	20.2	
Bus112	33.000		0	0	0	0	0	0	0	0	0.447	95.4	8.1	

Bus			Directly Connected Load								Total Bus Load			
			Constant kVA		Constant Z		Constant I		Generic					
ID	kV	Rated Amp	MW	Mvar	MW	Mvar	MW	Mvar	MW	Mvar	MVA	% PF	Amp	Percent Loading
Bus113	33.000		0	0	0	0	0	0	0	0	0.679	87.0	12.2	
Bus114	33.000		0	0	0	0	0	0	0	0	0.175	95.2	3.2	
Bus115	33.000		0	0	0	0	0	0	0	0	0.317	95.7	5.7	
Bus116	33.000		0	0	0	0	0	0	0	0	0.195	94.0	3.5	
Bus117	33.000		0	0	0	0	0	0	0	0	0.124	96.2	2.2	
Bus118	33.000		0	0	0	0	0	0	0	0	1.028	96.9	18.5	
Bus119	33.000		0	0	0	0	0	0	0	0	0.370	95.3	6.7	
Bus120	33.000		0	0	0	0	0	0	0	0	0.187	95.4	3.4	
Bus121	33.000		0	0	0	0	0	0	0	0	0.187	95.1	3.4	
Bus122	33.000		0	0	0	0	0	0	0	0	0.365	97.1	6.6	
Bus123	33.000		0	0	0	0	0	0	0	0	0.195	95.1	3.5	
Bus124	33.000		0	0	0	0	0	0	0	0	1.990	50.9	35.8	
Bus125	33.000		0	0	0	0	0	0	0	0	1.840	44.7	33.1	
Bus126	33.000		0	0	0	0	0	0	0	0	1.710	37.1	30.8	
Bus127	33.000		0	0	0	0	0	0	0	0	0.207	83.6	3.7	
Bus128	33.000		0	0	0	0	0	0	0	0	1.546	29.8	27.9	
Bus129	33.000		0	0	0	0	0	0	0	0	0.587	74.6	10.6	
Bus130	33.000		0	0	0	0	0	0	0	0	0.374	68.6	6.8	
Bus131	33.000		0	0	0	0	0	0	0	0	1.113	22.0	20.1	
Bus132	33.000		0	0	0	0	0	0	0	0	0.362	67.6	6.5	
Bus133	33.000		0	0	0	0	0	0	0	0	0.962	52.1	17.3	
Bus134	33.000		0	0	0	0	0	0	0	0	6.825	73.6	123.1	
Bus135	33.000		0	0	0	0	0	0	0	0	6.825	77.5	123.0	
Bus136	33.000		0	0	0	0	0	0	0	0	6.217	69.9	112.4	
Bus137	33.000		0	0	0	0	0	0	0	0	1.536	74.0	27.8	
Bus138	0.400		0.134	0.140	0.014	0.014	0	0	0	0	0.213	69.0	320.2	
Bus139	0.400		0.035	0.014	0.297	0.117	0	0	0	0	0.357	93.0	530.2	
Bus140	0.400		0.234	0.239	0.024	0.024	0	0	0	0	0.369	70.0	557.4	
Bus141	0.400		0.019	0.007	0.162	0.059	0	0	0	0	0.192	94.0	286.1	
Bus142	0.400		0.036	0.012	0.301	0.099	0	0	0	0	0.354	95.0	528.4	
Bus143	0.400		0.033	0.013	0.275	0.109	0	0	0	0	0.331	93.0	494.7	
Bus144	0.400		0.018	0.006	0.149	0.049	0	0	0	0	0.175	95.0	260.8	
Bus145	0.400		0.032	0.013	0.269	0.106	0	0	0	0	0.324	93.0	486.7	
Bus146	0.400		0.033	0.011	0.279	0.092	0	0	0	0	0.329	95.0	493.2	
Bus147	0.400		0.012	0.004	0.103	0.030	0	0	0	0	0.120	96.0	179.6	
Bus148	0.400		0.209	0.213	0.021	0.021	0	0	0	0	0.329	70.0	499.7	
Bus149	0.400		0.021	0.006	0.179	0.052	0	0	0	0	0.209	96.0	312.5	
Bus150	0.400		0.049	0.018	0.412	0.150	0	0	0	0	0.491	94.0	733.9	

Bus			Directly Connected Load								Total Bus Load			
			Constant kVA		Constant Z		Constant I		Generic					
ID	kV	Rated Amp	MW	Mvar	MW	Mvar	MW	Mvar	MW	Mvar	MVA	% PF	Amp	Percent Loading
Bus151	0.400		0.051	0.017	0.427	0.140	0	0	0	0	0.503	95.0	752.2	
Bus152	0.400		0.081	0.088	0.008	0.009	0	0	0	0	0.132	68.0	200.0	
Bus153	0.400		0.021	0.005	0.178	0.045	0	0	0	0	0.206	97.0	308.4	
Bus154	0.400		0.233	0.231	0.023	0.023	0	0	0	0	0.360	71.0	550.0	
Bus155	0.400		0.207	0.211	0.021	0.021	0	0	0	0	0.325	70.0	495.0	
Bus156	0.400		0.092	0.102	0.009	0.010	0	0	0	0	0.150	67.0	230.8	
Bus157	0.400		0.034	0.012	0.284	0.103	0	0	0	0	0.339	94.0	508.9	
Bus158	0.400		0.054	0.018	0.450	0.148	0	0	0	0	0.531	95.0	794.8	
Bus159	0.400		0.020	0.006	0.165	0.048	0	0	0	0	0.192	96.0	287.6	
Bus160	0.400		0.218	0.135	0.050	0.031	0	0	0	0	0.314	85.0	474.9	
Bus161	0.400		0.026	0.007	0.219	0.055	0	0	0	0	0.253	97.0	377.0	
Bus162	0.400		0.143	0.088	0.130	0.081	0	0	0	0	0.321	85.0	485.5	
Bus163	0.400		0.020	0.013	0.075	0.047	0	0	0	0	0.112	85.0	169.0	
Bus164	0.400		0.020	0.005	0.165	0.041	0	0	0	0	0.190	97.0	284.8	
Bus165	0.400		0.012	0.004	0.099	0.036	0	0	0	0	0.118	94.0	176.4	
Bus166	0.400		0.019	0.007	0.160	0.058	0	0	0	0	0.191	94.0	286.8	
Bus167	0.400		0.354	0.351	0.035	0.035	0	0	0	0	0.548	71.0	839.4	
Bus168	0.400		0.367	0.354	0.036	0.035	0	0	0	0	0.561	72.0	859.5	
Bus169	0.400		0.717	0.731	0.069	0.070	0	0	0	0	1.123	70.0	1741.6	
Bus170	0.400		0.356	0.374	0.039	0.041	0	0	0	0	0.573	69.0	879.6	
Bus171	0.400		0.233	0.231	0.023	0.023	0	0	0	0	0.360	71.0	551.9	
Bus172	0.400		0.093	0.087	0.009	0.009	0	0	0	0	0.140	73.0	215.0	
Bus173	0.400		0.021	0.006	0.174	0.051	0	0	0	0	0.203	96.0	306.7	
Bus174	0.400		0.082	0.051	0.074	0.046	0	0	0	0	0.184	85.0	278.9	
Bus175	0.400		0.230	0.248	0.023	0.024	0	0	0	0	0.372	68.0	571.4	
Bus176	0.400		0.021	0.008	0.173	0.063	0	0	0	0	0.207	94.0	313.0	
Bus177	0.400		0.021	0.006	0.170	0.050	0	0	0	0	0.199	96.0	299.8	
Bus178	0.400		0.013	0.004	0.104	0.034	0	0	0	0	0.123	95.0	185.4	
Bus179	0.400		0.137	0.140	0.014	0.014	0	0	0	0	0.216	70.0	330.4	
Bus180	0.400		0.019	0.006	0.157	0.052	0	0	0	0	0.185	95.0	278.9	
Bus181	0.400		0.020	0.007	0.161	0.058	0	0	0	0	0.192	94.0	289.6	
Bus182	0.400		0.034	0.015	0.282	0.120	0	0	0	0	0.343	92.0	518.2	
Bus183	0.400		0.053	0.021	0.436	0.172	0	0	0	0	0.526	93.0	791.7	
Bus184	0.400		0.032	0.011	0.262	0.095	0	0	0	0	0.312	94.0	469.2	
Bus185	0.400		0.034	0.014	0.281	0.111	0	0	0	0	0.339	93.0	512.4	
Bus186	0.400		0.220	0.136	0.200	0.124	0	0	0	0	0.494	85.0	747.0	
Bus187	0.400		0.031	0.012	0.255	0.101	0	0	0	0	0.307	93.0	463.0	
Bus188	0.400		0.032	0.011	0.267	0.088	0	0	0	0	0.315	95.0	474.2	

Bus			Directly Connected Load								Total Bus Load			
			Constant kVA		Constant Z		Constant I		Generic					
ID	kV	Rated Amp	MW	Mvar	MW	Mvar	MW	Mvar	MW	Mvar	MVA	% PF	Amp	Percent Loading
Bus189	0.400		0.020	0.007	0.161	0.058	0	0	0	0	0.192	94.0	289.6	
Bus190	0.400		0.020	0.006	0.163	0.053	0	0	0	0	0.192	95.0	289.7	
Bus191	0.400		0.030	0.009	0.248	0.072	0	0	0	0	0.289	96.0	435.4	
Bus192	0.400		0.019	0.006	0.160	0.053	0	0	0	0	0.189	95.0	285.5	
Bus193	0.400		0.017	0.006	0.144	0.047	0	0	0	0	0.170	95.0	255.3	
Bus194	0.400		0.014	0.003	0.112	0.023	0	0	0	0	0.128	98.0	192.6	
Bus195	0.400		0.050	0.020	0.412	0.163	0	0	0	0	0.497	93.0	748.1	
Bus196	0.400		0.019	0.007	0.157	0.057	0	0	0	0	0.188	94.0	283.0	
Bus197	0.400		0.049	0.021	0.405	0.173	0	0	0	0	0.494	92.0	746.4	
Bus198	0.400		0.033	0.012	0.268	0.097	0	0	0	0	0.320	94.0	484.1	
Bus199	0.400		0.032	0.014	0.261	0.111	0	0	0	0	0.319	92.0	483.2	
Bus200	0.400		0.017	0.008	0.137	0.062	0	0	0	0	0.169	91.0	255.0	
Bus201	0.400		0.020	0.006	0.162	0.047	0	0	0	0	0.190	96.0	285.9	
Bus202	0.400		0.052	0.022	0.421	0.180	0	0	0	0	0.514	92.0	779.2	
Bus203	0.400		0.030	0.010	0.245	0.081	0	0	0	0	0.289	95.0	435.5	
Bus204	0.400		0.342	0.379	0.033	0.037	0	0	0	0	0.560	67.0	861.9	
Bus205	0.400		0.032	0.012	0.264	0.096	0	0	0	0	0.315	94.0	477.8	
Bus206	0.400		0.020	0.008	0.166	0.066	0	0	0	0	0.201	93.0	304.8	
Bus207	0.400		0.013	0.004	0.109	0.036	0	0	0	0	0.129	95.0	195.8	
Bus208	0.400		0.032	0.011	0.263	0.086	0	0	0	0	0.311	95.0	471.8	
Bus209	0.400		0.014	0.004	0.111	0.036	0	0	0	0	0.131	95.0	199.5	
Bus210	0.400		0.019	0.006	0.155	0.045	0	0	0	0	0.181	96.0	275.0	
Bus211	0.400		0.137	0.140	0.013	0.014	0	0	0	0	0.215	70.0	332.3	
Bus212	0.400		0.020	0.005	0.161	0.040	0	0	0	0	0.186	97.0	281.9	
Bus213	0.400		0.020	0.006	0.163	0.048	0	0	0	0	0.190	96.0	288.8	
Bus214	0.400		0.018	0.007	0.149	0.054	0	0	0	0	0.178	94.0	270.6	
Bus215	0.400		0.031	0.011	0.254	0.092	0	0	0	0	0.303	94.0	460.3	
Bus216	0.400		0.019	0.007	0.153	0.061	0	0	0	0	0.185	93.0	281.4	
Bus217	0.400		0.019	0.006	0.157	0.046	0	0	0	0	0.183	96.0	277.8	
Bus218	0.400		0.225	0.243	0.022	0.023	0	0	0	0	0.363	68.0	561.9	
Bus219	0.400		0.018	0.005	0.147	0.043	0	0	0	0	0.172	96.0	260.9	
Bus220	0.400		0.028	0.008	0.229	0.067	0	0	0	0	0.268	96.0	405.5	
Bus221	0.400		0.232	0.186	0.051	0.041	0	0	0	0	0.362	78.0	560.3	
Bus222	0.400		0.020	0.007	0.161	0.053	0	0	0	0	0.191	95.0	290.6	
Bus223	0.400		0.013	0.003	0.105	0.026	0	0	0	0	0.122	97.0	184.5	
Bus224	0.400		0.229	0.234	0.022	0.023	0	0	0	0	0.359	70.0	556.9	
Bus225	0.400		0.095	0.059	0.084	0.052	0	0	0	0	0.210	85.0	322.5	
Bus226	0.400		0.219	0.229	0.021	0.022	0	0	0	0	0.347	69.0	538.0	

Bus			Directly Connected Load								Total Bus Load			
			Constant kVA		Constant Z		Constant I		Generic					
ID	kV	Rated Amp	MW	Mvar	MW	Mvar	MW	Mvar	MW	Mvar	MVA	% PF	Amp	Percent Loading
Bus227	0.400		0.225	0.175	0.049	0.038	0	0	0	0	0.347	79.0	535.7	
Bus228	0.400		0.091	0.056	0.080	0.050	0	0	0	0	0.201	85.0	308.0	
Bus229	0.400		0.146	0.145	0.014	0.014	0	0	0	0	0.225	71.0	348.8	
Bus230	0.400		0.234	0.239	0.023	0.023	0	0	0	0	0.367	70.0	568.9	
Bus231	0.400		0.379	0.376	0.036	0.036	0	0	0	0	0.585	71.0	909.0	
Bus232	0.400		0.758	0.689	0.064	0.058	0	0	0	0	1.110	74.0	1736.9	
Bus233	0.400		0.864	0.907	0.082	0.086	0	0	0	0	1.371	69.0	2147.3	
Bus234	0.400		0.897	0.915	0.085	0.086	0	0	0	0	1.402	70.0	2198.0	
Bus235	0.400		0.406	0.337	0.039	0.032	0	0	0	0	0.578	77.0	896.7	
Bus236	0.400		0.366	0.332	0.035	0.032	0	0	0	0	0.542	74.0	839.1	
Bus237	0.400		0.249	0.213	0.024	0.020	0	0	0	0	0.359	76.0	557.6	
Bus238	0.400		0.020	0.006	0.163	0.047	0	0	0	0	0.190	96.0	288.5	
Bus239	0.400		0.020	0.007	0.166	0.055	0	0	0	0	0.196	95.0	298.0	
Bus240	0.400		0.020	0.007	0.168	0.055	0	0	0	0	0.199	95.0	299.6	
Bus241	0.400		0.019	0.007	0.153	0.056	0	0	0	0	0.183	94.0	275.8	
Bus242	0.400		0.240	0.225	0.024	0.022	0	0	0	0	0.362	73.0	555.1	
Bus243	0.400		0.028	0.008	0.229	0.067	0	0	0	0	0.267	96.0	402.1	
Bus244	0.400		0.031	0.010	0.253	0.083	0	0	0	0	0.299	95.0	451.1	
Bus245	0.400		0.072	0.045	0.068	0.042	0	0	0	0	0.165	85.0	249.8	
Bus246	0.400		0.013	0.004	0.110	0.036	0	0	0	0	0.130	95.0	197.4	
Bus247	33.000		0	0	0	0	0	0	0	0	6.973	78.0	122.8	

* Indicates operating load of a bus exceeds the bus critical limit (100.0% of the Continuous Ampere rating).

# Indicates operating load of a bus exceeds the bus marginal limit (95.0% of the Continuous Ampere rating).

Branch Loading Summary Report

CKT / Branch		Cable & Reactor			Transformer				
		Ampacity (Amp)	Loading Amp		Capability (MVA)	Loading (input)		Loading (output)	
ID	Type			%		MVA	%	MVA	%
T1/Taiseer Obidat	Transformer				0.400	0.367	91.6	0.357	89.2
T2/Al-Dear	Transformer				0.250	0.221	88.6	0.213	85.4
T3/Mousa Arbad	Transformer				0.400	0.384	96.0	0.369	92.2
T4/Abu Al-Fool	Transformer				0.400	0.197	49.2	0.192	48.1
T5/AL- Shawaheen	Transformer				0.400	0.363	90.8	0.354	88.5
T6/AL- Metiana	Transformer				0.400	0.340	85.0	0.331	82.8
T7/AL- Ghowita	Transformer				0.250	0.179	71.6	0.175	70.1
T8/Haroon AL - Rasheed	Transformer				0.400	0.332	83.1	0.324	81.0
T9/Majd AL- Ba3	Transformer				0.160	0.123	76.6	0.120	75.1
T10/Mahmoud Rasheed	Transformer				0.400	0.341	85.2	0.329	82.2
T11/Ahmad Rasheed	Transformer				0.400	0.375	93.7	0.360	90.0
T12/Ali Hassan Nassar	Transformer				0.400	0.336	84.1	0.325	81.1
T13/AL - Tatweer	Transformer				0.160	0.157	98.0	0.150	93.9
T14/Salah Mousa Nassar	Transformer				0.400	0.376	94.1	0.362	90.4
T15/Mousa Nassar	Transformer				0.630	0.582	92.4	0.561	89.0
T16/Khaled Nassar	Transformer				0.630	0.569	90.3	0.548	86.9
T17/Ali Mousa Nassar	Transformer				1.250	1.180	94.4	1.123	89.8
T18/Nafez Nassar	Transformer				0.630	0.596	94.6	0.573	90.9
T19/Ahmad H. Nassar	Transformer				0.160	0.146	91.2	0.140	87.8
T20/Rasmi Abu - Qubita	Transformer				0.400	0.375	93.6	0.360	90.0
T21/Bet- Emra 1	Transformer				0.250	0.208	83.2	0.203	81.4
T22/Mousa Rasheed	Transformer				0.400	0.388	96.9	0.372	92.9
T23/Um AL - Ammad	Transformer				0.250	0.189	75.7	0.184	73.6
T24/Ber - Emra 2	Transformer				0.250	0.212	84.9	0.207	82.8
T25/Bet - Emra 3	Transformer				0.250	0.203	81.3	0.199	79.5
T26/Khalet Arabi	Transformer				0.160	0.126	78.6	0.123	76.8
T27/AL - Nukhba	Transformer				0.250	0.224	89.6	0.216	86.2
T28/AL - Hadab 1	Transformer				0.250	0.189	75.6	0.185	74.0
T29/AL - Hadab 2	Transformer				0.250	0.196	78.5	0.192	76.7
T30/AL - Bhesat	Transformer				0.400	0.337	84.3	0.329	82.3
T31/AL - Sawakna	Transformer				0.250	0.213	85.4	0.209	83.4
T32/Abu Ali	Transformer				0.630	0.501	79.6	0.491	77.9
T33/Ma'asaret Rasheed	Transformer				0.160	0.137	85.4	0.132	82.3

CKT / Branch		Cable & Reactor			Transformer				
		Ampacity (Amp)	Loading Amp		Capability (MVA)	Loading (input)		Loading (output)	
ID	Type			%		MVA	%	MVA	%
T34/AL - Kaziea	Transformer				0.250	0.210	84.2	0.206	82.4
T35/AL - Mostashfa	Transformer				0.400	0.324	81.0	0.314	78.6
T36/E3zeez	Transformer				0.400	0.257	64.3	0.253	63.2
T37/Hajar AL - Sakhainah	Transformer				0.400	0.331	82.7	0.321	80.2
T38/Marah Jaber	Transformer				0.160	0.120	75.2	0.118	73.5
T39/AL - Mentar	Transformer				0.250	0.196	78.2	0.191	76.4
T40/Da'erat AL - Sair	Transformer				0.160	0.115	72.0	0.112	70.2
T41/Beer E3zeez	Transformer				0.250	0.194	77.7	0.190	76.2
T42/Wad AL- Baqee3	Transformer				0.630	0.514	81.5	0.503	79.8
T43/AL - Mosalla	Transformer				0.400	0.347	86.9	0.339	84.7
T44/Um AL - Satar 1	Transformer				0.630	0.543	86.1	0.531	84.2
T45/Um AL- Satar 2	Transformer				0.250	0.196	78.5	0.192	76.9
T46/AL - Karag	Transformer				0.400	0.353	88.2	0.343	85.8
T47/Basal	Transformer				0.630	0.539	85.5	0.526	83.5
T48/AL - Baladeia	Transformer				0.400	0.319	79.8	0.312	78.0
T49/Saleet	Transformer				0.400	0.348	87.1	0.339	84.8
T50/Abu - Aziza	Transformer				0.630	0.508	80.6	0.494	78.4
T51/AL - Emria	Transformer				0.400	0.315	78.7	0.307	76.8
T52/Swedan	Transformer				0.400	0.322	80.5	0.315	78.6
T53/Yasser Abu - Samra	Transformer				0.250	0.196	78.5	0.192	76.7
T54/Khalet Saleh	Transformer				0.400	0.295	73.7	0.289	72.3
T55/Talet AL - Somood 1	Transformer				0.250	0.193	77.3	0.189	75.6
T56/AL - Rahnneia	Transformer				0.160	0.130	81.5	0.128	79.9
T57/Talet AL - Somood 2	Transformer				0.250	0.173	69.2	0.170	67.8
T58/AL - Arqoob 1	Transformer				0.250	0.196	78.5	0.192	76.7
T59/AL - Arqoob 2	Transformer				0.250	0.187	74.7	0.183	73.0
T60/AL - Karmel	Transformer				0.400	0.272	68.0	0.267	66.8
T61/Raheela	Transformer				0.400	0.305	76.3	0.299	74.6
T62/Ma'aeen	Transformer				0.250	0.169	67.6	0.165	65.9
T63/AL- Tewani	Transformer				0.160	0.134	83.5	0.130	81.5
T64/Deer AL - Hawa	Transformer				0.630	0.508	80.7	0.497	78.9
T65/AL - Qafeer	Transformer				0.250	0.192	76.8	0.188	75.1
T66/Abu - Hmaid	Transformer				0.400	0.295	73.8	0.289	72.3
T67/AL - Farhania	Transformer				0.250	0.203	81.3	0.199	79.4
T68/AL - Mazra3a	Transformer				0.630	0.506	80.3	0.494	78.4

CKT / Branch		Cable & Reactor			Transformer				
		Ampacity (Amp)	Loading Amp		Capability (MVA)	Loading (input)		Loading (output)	
ID	Type			%		MVA	%	MVA	%
T69/Fatooh	Transformer				0.400	0.328	82.0	0.320	80.0
T70/AL - Mahkama	Transformer				0.250	0.173	69.1	0.169	67.6
T71/AL - Waha	Transformer				0.250	0.194	77.5	0.190	75.9
T72/Islamic Bank	Transformer				0.400	0.327	81.8	0.319	79.7
T73/AL - Eskan Bank	Transformer				0.630	0.527	83.7	0.514	81.6
T74/Mouhammad Nassar	Transformer				0.630	0.583	92.5	0.560	88.9
T75/Markez AL - Da3wa	Transformer				0.400	0.323	80.8	0.315	78.8
T76/AL - Marmalah	Transformer				0.160	0.132	82.7	0.129	80.7
T77/Kaziet Basal	Transformer				0.250	0.206	82.3	0.201	80.2
T78/Raq3a	Transformer				0.400	0.318	79.6	0.311	77.7
T79/Raq3a New	Transformer				0.160	0.134	84.1	0.131	82.0
T80/Kreesa (Shawaheen)	Transformer				0.250	0.185	74.1	0.181	72.6
T81/Nader Rasheed	Transformer				0.250	0.224	89.5	0.215	86.1
T82/Kreesa (AL- Kherba)	Transformer				0.250	0.190	75.9	0.186	74.4
T83/Wad ELma	Transformer				0.400	0.273	68.1	0.268	66.9
T84/AL - Hadedia	Transformer				0.250	0.175	70.1	0.172	68.8
T85/AL - Junaidi	Transformer				0.400	0.377	94.2	0.362	90.6
T86/AL - Bowaib	Transformer				0.250	0.195	78.1	0.191	76.4
T87/AL - Dowair	Transformer				0.160	0.124	77.5	0.122	76.0
T88/AL - Deiar Co.	Transformer				0.400	0.379	94.7	0.363	90.8
T89/AL - Aroos 1	Transformer				0.400	0.310	77.6	0.303	75.8
T90/AL - Aroos 2	Transformer				0.250	0.190	75.9	0.185	74.1
T91/AL - Aroos 3	Transformer				0.250	0.187	74.9	0.183	73.4
T92/Marj AL - Doodah	Transformer				0.250	0.182	73.0	0.178	71.4
T93/Zeef	Transformer				0.250	0.195	77.8	0.190	76.2
T94/AL - Heela 1	Transformer				0.250	0.201	80.3	0.196	78.5
T95/AL - Heela 2	Transformer				0.250	0.194	77.7	0.190	76.0
T96/AL - Waseem	Transformer				0.250	0.207	82.8	0.201	80.3
T97/AL - Shaloodi	Transformer				0.250	0.217	86.7	0.210	83.9
T98/Abu - Turki	Transformer				0.400	0.374	93.5	0.359	89.8
T99/Abd - Gaith	Transformer				0.400	0.362	90.4	0.347	86.8
T100/Mazra'at AL- Nama'	Transformer				0.400	0.360	90.0	0.347	86.8
T101/Fayez Abu-Snaineh	Transformer				0.400	0.383	95.7	0.367	91.8
T102/Moustafa Rajab	Transformer				0.250	0.234	93.7	0.225	90.0
T103/AL - Haddad 1	Transformer				1.600	1.473	92.1	1.402	87.6

CKT / Branch		Cable & Reactor			Transformer				
		Ampacity (Amp)	Loading Amp		Capability (MVA)	Loading (input)		Loading (output)	
ID	Type			%		MVA	%	MVA	%
T104/AL - Haddad 2	Transformer				1.600	1.439	90.0	1.371	85.7
T105/AL - Haddad 3	Transformer				1.250	1.164	93.1	1.110	88.8
T106/AL - Haddad 4	Transformer				0.630	0.609	96.7	0.585	92.8
T107/AL - Sa'ad 1	Transformer				0.630	0.601	95.3	0.578	91.8
T108/AL - Sa'ad 2	Transformer				0.630	0.562	89.2	0.542	86.0
T109/AL - Sa'ad 3	Transformer				0.400	0.373	93.4	0.359	89.8

* Indicates a branch with operating load exceeding the branch capability.

Branch Losses Summary Report

CKT / Branch	From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd % Drop in Vmag
ID	MW	Mvar	MW	Mvar	kW	kvar	From	To	
Cable1	30.213	17.373	-30.143	-17.432	70.2	-58.2	100.0	99.8	0.21
Cable2	0.336	0.132	-0.336	-0.146	0.0	-13.9	99.8	99.8	0.00
Cable3	24.188	12.864	-24.084	-12.848	104.4	15.8	99.8	99.4	0.40
Cable64	5.468	4.273	-5.436	-4.368	32.3	-94.2	99.8	99.3	0.47
T2/Al-Dear	0.150	0.163	-0.147	-0.154	2.7	8.4	99.8	96.2	3.61
T1/Taiseer Obidat	0.336	0.146	-0.332	-0.131	4.7	14.4	99.8	97.1	2.68
Cable4	23.821	12.568	-23.800	-12.602	21.2	-33.7	99.4	99.3	0.08
T3/Mousa Arbad	0.263	0.279	-0.258	-0.263	5.2	16.0	99.4	95.5	3.91
Cable5	0.183	0.055	-0.183	-0.070	0.0	-15.2	99.3	99.3	0.00
Cable6	23.617	12.547	-23.585	-12.598	31.4	-50.5	99.3	99.2	0.12
Line1	0.183	0.070	-0.183	-0.072	0.0	-2.3	99.3	99.3	0.01
T4/Abu Al-Fool	0.183	0.072	-0.181	-0.066	2.2	6.7	99.3	97.1	2.23
Cable12	17.153	7.610	-17.084	-7.615	69.7	-5.4	99.2	98.8	0.39
Line2	5.778	4.729	-5.766	-4.724	12.1	4.9	99.2	99.0	0.17
T5/AL- Shawaheen	0.341	0.125	-0.336	-0.111	4.6	14.3	99.2	96.7	2.48
T6/AL- Metiana	0.312	0.134	-0.308	-0.122	4.1	12.6	99.2	96.7	2.50
Line3	5.598	4.663	-5.566	-4.651	31.7	12.7	99.0	98.5	0.46
T7/AL- Ghowita	0.168	0.060	-0.167	-0.055	1.8	5.6	99.0	97.1	1.95
Line4	0.117	0.034	-0.117	-0.034	0.0	-0.6	98.5	98.5	0.00
Line5	5.144	4.486	-5.137	-4.483	6.8	2.7	98.5	98.4	0.10
T8/Haroon AL - Rasheed	0.305	0.131	-0.301	-0.119	3.9	12.2	98.5	96.1	2.46
Line33	0.117	0.034	-0.117	-0.038	0.0	-3.5	98.5	98.5	0.01
Line6	4.903	4.236	-4.896	-4.233	6.9	2.6	98.4	98.3	0.11
T10/Mahmoud Rasheed	0.234	0.248	-0.230	-0.235	4.2	12.8	98.4	94.9	3.50
Line7	4.636	3.964	-4.623	-3.959	12.2	4.5	98.3	98.1	0.21
T11/Ahmad Rasheed	0.261	0.269	-0.256	-0.254	5.0	15.5	98.3	94.5	3.83
Line8	0.231	0.243	-0.231	-0.244	0.0	-1.2	98.1	98.1	0.01
Line9	4.392	3.716	-4.389	-3.715	3.3	1.2	98.1	98.1	0.06
T12/Ali Hassan Nassar	0.231	0.244	-0.227	-0.232	4.1	12.6	98.1	94.6	3.47
Line10	4.286	3.597	-4.281	-3.595	5.1	1.8	98.1	98.0	0.10
T13/AL - Tatweer	0.103	0.118	-0.101	-0.112	2.2	6.8	98.1	93.9	4.12
Line11	2.004	1.198	-2.003	-1.198	0.5	-0.1	98.0	97.9	0.02
Line12	2.277	2.397	-2.274	-2.397	3.2	0.4	98.0	97.9	0.10
Line17	1.638	0.827	-1.638	-0.827	0.4	-0.2	97.9	97.9	0.02
Line18	0.261	0.269	-0.261	-0.269	0.0	-0.3	97.9	97.9	0.00

CKT / Branch	From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd % Drop in Vmag
ID	MW	Mvar	MW	Mvar	kW	kvar	From	To	
T19/Ahmad H. Nassar	0.104	0.102	-0.103	-0.096	1.9	5.9	97.9	94.3	3.69
Line13	2.005	2.133	-2.002	-2.133	2.8	0.1	97.9	97.8	0.10
T14/Salah Mousa Nassar	0.269	0.263	-0.264	-0.247	5.1	15.8	97.9	94.1	3.81
Line14	1.197	1.311	-1.197	-1.311	0.1	-0.1	97.8	97.8	0.01
Line15	0.805	0.823	-0.805	-0.823	0.1	-0.2	97.8	97.8	0.01
Line16	0.402	0.440	-0.402	-0.440	0.0	-0.2	97.8	97.8	0.00
T17/Ali Mousa Nassar	0.796	0.871	-0.786	-0.802	9.7	69.2	97.8	93.0	4.72
T15/Mousa Nassar	0.410	0.414	-0.404	-0.389	6.2	24.6	97.8	94.1	3.64
T16/Khaled Nassar	0.395	0.409	-0.389	-0.386	5.9	23.4	97.8	94.2	3.58
T18/Nafez Nassar	0.402	0.440	-0.395	-0.414	6.5	25.7	97.8	93.9	3.81
T20/Rasmi Abu - Qubita	0.261	0.269	-0.255	-0.253	5.1	15.7	97.9	94.1	3.84
Cable7	1.221	0.437	-1.221	-0.450	0.2	-13.4	97.9	97.9	0.01
Line19	0.417	0.391	-0.417	-0.392	0.1	-1.3	97.9	97.9	0.02
Cable8	1.023	0.385	-1.023	-0.401	0.1	-15.4	97.9	97.9	0.01
T21/Bet- Emra 1	0.198	0.065	-0.195	-0.057	2.5	7.7	97.9	95.7	2.20
Line20	0.258	0.289	-0.258	-0.289	0.0	-0.3	97.9	97.9	0.00
Line21	0.158	0.103	-0.158	-0.103	0.0	-0.2	97.9	97.9	0.00
T22/Mousa Rasheed	0.258	0.289	-0.253	-0.272	5.4	16.8	97.9	93.8	4.06
T23/Um AL - Ammad	0.158	0.103	-0.156	-0.097	2.1	6.4	97.9	95.2	2.68
Cable9	0.391	0.081	-0.390	-0.095	0.0	-14.1	97.9	97.9	0.00
Cable10	0.633	0.320	-0.633	-0.337	0.1	-16.7	97.9	97.9	0.01
Cable11	0.193	0.016	-0.193	-0.063	0.0	-46.9	97.9	97.9	0.01
T24/Ber - Emra 2	0.197	0.079	-0.195	-0.071	2.6	8.1	97.9	95.5	2.45
T25/Bet - Emra 3	0.193	0.063	-0.191	-0.056	2.4	7.4	97.9	95.7	2.15
Line22	0.633	0.337	-0.632	-0.338	0.1	-0.9	97.9	97.9	0.02
Line23	0.514	0.295	-0.514	-0.296	0.1	-0.9	97.9	97.9	0.02
T26/Khalet Arabi	0.118	0.043	-0.117	-0.038	1.4	4.4	97.9	95.7	2.17
Line24	0.360	0.133	-0.360	-0.135	0.1	-2.4	97.9	97.8	0.03
T27/AL - Nukhba	0.154	0.163	-0.151	-0.154	2.9	9.0	97.9	94.2	3.70
Line25	0.182	0.071	-0.182	-0.072	0.0	-1.2	97.8	97.8	0.01
T28/AL - Hadab 1	0.178	0.064	-0.176	-0.058	2.1	6.4	97.8	95.7	2.09
T29/AL - Hadab 2	0.182	0.072	-0.180	-0.065	2.2	6.9	97.8	95.6	2.26
Cable13	17.084	7.615	-17.057	-7.617	26.4	-2.0	98.8	98.6	0.15
Cable14	3.842	1.285	-3.840	-1.303	2.0	-17.6	98.6	98.6	0.05
Cable26	12.899	6.217	-12.853	-6.234	46.3	-17.5	98.6	98.3	0.34
T30/AL - Bhesat	0.317	0.115	-0.313	-0.103	4.0	12.5	98.6	96.3	2.32
Cable15	0.203	0.026	-0.203	-0.066	0.0	-40.8	98.6	98.6	0.01

CKT / Branch	From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd % Drop
ID	MW	Mvar	MW	Mvar	kW	kvar	From	To	in Vmag
Cable16	1.669	0.690	-1.669	-0.699	0.2	-9.1	98.6	98.6	0.01
Cable35	1.502	0.402	-1.502	-0.429	0.4	-27.5	98.6	98.6	0.03
T32/Abu Ali	0.466	0.185	-0.461	-0.167	4.5	17.9	98.6	96.5	2.08
T31/AL - Sawakna	0.203	0.066	-0.200	-0.058	2.6	8.0	98.6	96.3	2.24
Line26	1.578	0.598	-1.576	-0.599	1.4	-1.2	98.6	98.5	0.09
T33/Ma'asaret Rasheed	0.091	0.102	-0.090	-0.097	1.7	5.1	98.6	95.0	3.55
Line27	1.374	0.541	-1.373	-0.542	0.5	-0.7	98.5	98.4	0.04
T34/AL - Kaziea	0.202	0.058	-0.200	-0.050	2.5	7.8	98.5	96.4	2.09
Cable18	0.284	0.099	-0.284	-0.113	0.0	-13.5	98.4	98.4	0.00
Line28	1.090	0.443	-1.090	-0.443	0.3	-0.6	98.4	98.4	0.02
Line29	0.271	0.176	-0.271	-0.177	0.0	-0.9	98.4	98.4	0.01
Line30	0.818	0.267	-0.818	-0.268	0.2	-0.8	98.4	98.4	0.02
T35/AL - Mostashfa	0.271	0.177	-0.267	-0.166	3.8	11.6	98.4	95.6	2.85
Line31	0.294	0.024	-0.294	-0.025	0.0	-0.9	98.4	98.4	0.01
Line32	0.277	0.175	-0.277	-0.181	0.2	-6.1	98.4	98.3	0.06
T36/E3zeez	0.248	0.069	-0.245	-0.061	2.4	7.3	98.4	96.8	1.59
Cable19	0.182	0.028	-0.182	-0.072	0.0	-44.0	98.4	98.4	0.01
Cable20	0.112	-0.003	-0.112	-0.044	0.0	-47.4	98.4	98.4	0.00
T37/Hajar AL - Sakhainah	0.277	0.181	-0.273	-0.169	3.9	12.1	98.3	95.4	2.92
T38/Marah Jaber	0.112	0.044	-0.111	-0.040	1.3	4.0	98.4	96.2	2.15
T39/AL - Mentar	0.182	0.072	-0.180	-0.065	2.2	6.8	98.4	96.2	2.24
T9/Majd AL- Ba3	0.117	0.038	-0.115	-0.034	1.3	4.1	98.5	96.5	2.01
Line34	0.284	0.113	-0.283	-0.115	0.0	-2.0	98.4	98.4	0.02
Line35	0.187	0.052	-0.187	-0.053	0.0	-1.2	98.4	98.4	0.01
T40/Da'erat AL - Sair	0.097	0.063	-0.095	-0.059	1.2	3.7	98.4	95.9	2.54
T41/Beer E3zeez	0.187	0.053	-0.185	-0.046	2.2	6.7	98.4	96.5	1.93
Cable17	-1.502	-0.437	1.502	0.429	0.1	-7.4	98.6	98.6	0.01
Cable22	0.323	0.081	-0.323	-0.129	0.0	-47.5	98.6	98.5	0.01
Cable23	0.696	0.179	-0.696	-0.220	0.1	-40.7	98.6	98.5	0.02
T42/Wad AL- Baqee3	0.483	0.176	-0.478	-0.157	4.7	18.8	98.6	96.5	2.04
T43/AL - Mosalla	0.323	0.129	-0.318	-0.116	4.3	13.3	98.5	96.1	2.49
Cable24	0.187	0.033	-0.187	-0.061	0.0	-27.1	98.5	98.5	0.00
T44/Um AL - Satar 1	0.509	0.187	-0.504	-0.166	5.3	21.0	98.5	96.4	2.16
T45/Um AL- Satar 2	0.187	0.061	-0.185	-0.054	2.2	6.8	98.5	96.5	2.06
Cable27	12.532	6.086	-12.523	-6.089	9.1	-3.8	98.3	98.2	0.07
T46/AL - Karag	0.320	0.148	-0.316	-0.135	4.5	13.8	98.3	95.6	2.70
Cable28	3.752	1.260	-3.751	-1.270	1.1	-9.9	98.2	98.2	0.03

CKT / Branch	From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd % Drop in Vmag
ID	MW	Mvar	MW	Mvar	kW	kvar	From	To	
Cable29	8.277	4.615	-8.260	-4.636	16.5	-21.6	98.2	98.1	0.18
T47/Basal	0.494	0.214	-0.489	-0.193	5.3	20.8	98.2	95.9	2.34
Cable30	3.454	1.153	-3.453	-1.163	0.9	-9.8	98.2	98.2	0.03
T48/AL - Baladeia	0.297	0.118	-0.293	-0.106	3.7	11.3	98.2	95.9	2.29
Cable31	3.453	1.163	-3.453	-1.170	0.7	-7.2	98.2	98.2	0.02
Cable32	0.745	0.350	-0.745	-0.362	0.1	-12.3	98.2	98.2	0.01
Cable33	2.708	0.820	-2.706	-0.856	2.0	-36.3	98.2	98.1	0.07
Cable34	0.425	0.224	-0.425	-0.279	0.1	-54.5	98.2	98.1	0.02
T49/Saleet	0.320	0.138	-0.316	-0.125	4.4	13.5	98.2	95.6	2.59
T50/Abu - Aziza	0.425	0.279	-0.420	-0.260	4.7	18.6	98.1	95.4	2.69
Cable37	2.417	0.732	-2.414	-0.793	2.7	-60.9	98.1	98.0	0.11
T51/AL - Emria	0.289	0.124	-0.286	-0.113	3.6	11.0	98.1	95.8	2.34
Line36	2.112	0.683	-2.109	-0.684	2.4	-0.7	98.0	97.9	0.12
T52/Swedan	0.303	0.110	-0.299	-0.098	3.7	11.6	98.0	95.8	2.22
Line37	0.935	0.239	-0.935	-0.240	0.3	-1.1	97.9	97.8	0.03
Line38	1.174	0.445	-1.172	-0.447	1.2	-2.2	97.9	97.8	0.10
Line39	0.753	0.168	-0.752	-0.170	0.4	-2.5	97.8	97.8	0.06
T53/Yasser Abu - Samra	0.183	0.072	-0.180	-0.065	2.2	6.9	97.8	95.6	2.26
Line40	0.472	0.080	-0.471	-0.082	0.2	-2.4	97.8	97.7	0.03
T54/Khalet Saleh	0.281	0.091	-0.277	-0.081	3.2	9.7	97.8	95.8	1.95
Cable38	0.471	0.082	-0.471	-0.102	0.0	-20.2	97.7	97.7	0.01
Cable39	0.163	0.008	-0.163	-0.058	0.0	-50.1	97.7	97.7	0.01
Line41	0.127	0.028	-0.127	-0.030	0.0	-2.0	97.7	97.7	0.01
T55/Talet AL - Somood 1	0.182	0.066	-0.180	-0.059	2.2	6.7	97.7	95.6	2.14
T56/AL - Rahnneia	0.127	0.030	-0.125	-0.025	1.5	4.8	97.7	95.8	1.90
T57/Talet AL - Somood 2	0.163	0.058	-0.161	-0.053	1.7	5.4	97.7	95.8	1.91
Line42	0.988	0.380	-0.988	-0.381	0.3	-0.8	97.8	97.7	0.03
T58/AL - Arqoob 1	0.184	0.067	-0.182	-0.060	2.2	6.9	97.8	95.6	2.17
Line43	0.814	0.312	-0.814	-0.314	0.4	-1.9	97.7	97.7	0.05
T59/AL - Arqoob 2	0.174	0.069	-0.172	-0.062	2.0	6.3	97.7	95.6	2.15
Line44	0.429	0.191	-0.429	-0.193	0.1	-1.8	97.7	97.7	0.03
Line45	0.125	0.040	-0.125	-0.046	0.0	-5.7	97.7	97.7	0.02
T60/AL - Karmel	0.259	0.083	-0.256	-0.075	2.7	8.3	97.7	95.9	1.80
Line46	0.142	0.089	-0.142	-0.092	0.0	-2.7	97.7	97.6	0.01
T61/Raheela	0.287	0.104	-0.284	-0.093	3.4	10.5	97.7	95.5	2.11
T62/Ma'aeen	0.142	0.092	-0.140	-0.087	1.7	5.1	97.6	95.2	2.40
T63/AL- Tewani	0.125	0.046	-0.124	-0.041	1.6	5.0	97.7	95.3	2.32

CKT / Branch	From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd % Drop
ID	MW	Mvar	MW	Mvar	kW	kvar	From	To	in Vmag
Cable40	7.793	4.435	-7.781	-4.454	12.9	-19.1	98.1	97.9	0.15
T64/Deer AL - Hawa	0.467	0.201	-0.462	-0.183	4.7	18.6	98.1	95.9	2.21
Cable41	7.133	4.285	-7.128	-4.293	4.8	-8.5	97.9	97.9	0.06
Cable42	0.469	0.099	-0.469	-0.125	0.0	-25.5	97.9	97.9	0.01
T65/AL - Qafeer	0.179	0.071	-0.176	-0.064	2.1	6.6	97.9	95.7	2.21
Cable43	0.278	0.082	-0.278	-0.100	0.0	-18.1	97.9	97.9	0.00
Cable44	0.191	0.043	-0.191	-0.069	0.0	-26.8	97.9	97.9	0.00
T66/Abu - Hmaid	0.278	0.100	-0.275	-0.090	3.2	9.7	97.9	95.9	2.04
T67/AL - Farhania	0.191	0.069	-0.189	-0.062	2.4	7.4	97.9	95.6	2.25
Cable45	6.024	3.916	-6.015	-3.938	8.9	-22.2	97.9	97.7	0.13
Cable46	0.645	0.165	-0.645	-0.176	0.0	-10.7	97.9	97.8	0.01
T68/AL - Mazra3a	0.459	0.212	-0.455	-0.194	4.7	18.5	97.9	95.6	2.28
Line47	0.645	0.176	-0.645	-0.177	0.2	-1.7	97.8	97.8	0.04
Cable47	0.155	0.051	-0.155	-0.075	0.0	-24.7	97.8	97.8	0.00
Cable48	0.184	0.005	-0.184	-0.060	0.0	-54.4	97.8	97.8	0.01
T69/Fatooh	0.305	0.121	-0.301	-0.109	3.9	12.0	97.8	95.5	2.36
T70/AL - Mahkama	0.155	0.075	-0.154	-0.070	1.7	5.3	97.8	95.6	2.17
T71/AL - Waha	0.184	0.060	-0.182	-0.053	2.2	6.7	97.8	95.8	2.05
Cable49	5.718	3.801	-5.712	-3.819	6.4	-17.7	97.7	97.6	0.09
T72/Islamic Bank	0.297	0.137	-0.293	-0.125	3.9	12.0	97.7	95.2	2.51
Cable50	5.233	3.597	-5.232	-3.603	1.8	-6.0	97.6	97.6	0.03
T73/AL - Eskan Bank	0.478	0.222	-0.473	-0.202	5.1	20.2	97.6	95.3	2.38
Cable51	0.300	0.080	-0.300	-0.119	0.0	-39.6	97.6	97.6	0.01
Cable52	4.550	3.083	-4.545	-3.104	4.6	-20.5	97.6	97.5	0.08
Line48	0.382	0.440	-0.382	-0.441	0.0	-0.4	97.6	97.6	0.01
T74/Mouhammad Nassar	0.382	0.441	-0.375	-0.416	6.2	24.7	97.6	93.8	3.79
T75/Markez AL - Da3wa	0.300	0.119	-0.296	-0.108	3.8	11.7	97.6	95.3	2.33
Cable53	4.421	3.061	-4.416	-3.084	4.9	-22.8	97.5	97.4	0.09
Line49	0.124	0.043	-0.124	-0.045	0.0	-2.2	97.5	97.5	0.01
T76/AL - Marmalah	0.124	0.045	-0.123	-0.040	1.6	4.9	97.5	95.2	2.30
Cable54	4.227	3.002	-4.223	-3.021	3.8	-19.3	97.4	97.4	0.07
T77/Kaziet Basal	0.189	0.081	-0.187	-0.074	2.5	7.6	97.4	95.0	2.46
Cable55	2.909	1.201	-2.908	-1.215	1.0	-14.3	97.4	97.3	0.03
Line50	1.015	1.712	-1.012	-1.713	2.3	-1.0	97.4	97.3	0.11
T78/Raq3a	0.299	0.109	-0.295	-0.097	3.7	11.4	97.4	95.1	2.21
Cable56	1.248	0.492	-1.248	-0.518	0.3	-25.7	97.3	97.3	0.02
Line51	1.660	0.723	-1.659	-0.723	0.4	-0.2	97.3	97.3	0.02

CKT / Branch	From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd % Drop
ID	MW	Mvar	MW	Mvar	kW	kvar	From	To	in Vmag
Cable57	0.126	0.026	-0.126	-0.046	0.0	-19.9	97.3	97.3	0.00
Line52	1.533	0.697	-1.532	-0.698	1.2	-1.0	97.3	97.2	0.08
Cable59	0.996	0.235	-0.996	-0.254	0.1	-19.1	97.3	97.3	0.01
T88/AL - Deiar Co.	0.252	0.283	-0.247	-0.266	5.2	16.2	97.3	93.3	3.99
T79/Raq3a New	0.126	0.046	-0.125	-0.041	1.7	5.1	97.3	95.0	2.34
Cable58	0.154	0.127	-0.154	-0.163	0.0	-35.9	97.2	97.2	0.00
Line53	1.202	0.514	-1.201	-0.516	0.9	-1.4	97.2	97.2	0.07
T80/Kreesa (Shawaheen)	0.176	0.057	-0.174	-0.051	2.0	6.2	97.2	95.3	1.97
T81/Nader Rasheed	0.154	0.163	-0.151	-0.154	2.9	9.1	97.2	93.5	3.73
Line54	1.019	0.464	-1.018	-0.466	1.0	-2.3	97.2	97.1	0.09
T82/Kreesa (AL- Kherba)	0.183	0.052	-0.180	-0.045	2.1	6.5	97.2	95.2	1.91
Line55	0.427	0.132	-0.426	-0.134	0.1	-1.8	97.1	97.0	0.02
Line56	0.591	0.334	-0.591	-0.334	0.0	-0.3	97.1	97.1	0.01
Line57	0.167	0.050	-0.167	-0.054	0.0	-3.3	97.0	97.0	0.02
T83/Wad ELma	0.260	0.083	-0.257	-0.075	2.7	8.4	97.0	95.2	1.81
Line58	0.303	0.091	-0.303	-0.092	0.0	-0.9	97.1	97.0	0.01
T85/AL - Junaidi	0.288	0.243	-0.283	-0.227	5.2	16.1	97.1	93.4	3.68
T84/AL - Hadedia	0.167	0.054	-0.165	-0.048	1.8	5.6	97.0	95.2	1.87
Line59	0.119	0.033	-0.119	-0.034	0.0	-0.8	97.0	97.0	0.00
Line60	0.184	0.059	-0.184	-0.067	0.1	-7.4	97.0	97.0	0.04
T86/AL - Bowaib	0.184	0.067	-0.181	-0.060	2.2	6.9	97.0	94.8	2.18
T87/AL - Dowair	0.119	0.034	-0.118	-0.030	1.4	4.4	97.0	95.1	1.95
Cable60	0.353	0.092	-0.353	-0.112	0.0	-19.8	97.3	97.3	0.01
Cable61	0.355	0.047	-0.355	-0.087	0.0	-40.0	97.3	97.3	0.01
T89/AL - Aroos 1	0.288	0.114	-0.285	-0.103	3.5	10.9	97.3	95.0	2.24
Cable62	0.178	0.038	-0.178	-0.056	0.0	-18.5	97.3	97.3	0.00
T90/AL - Aroos 2	0.174	0.075	-0.172	-0.068	2.1	6.5	97.3	95.0	2.27
Line61	0.178	0.056	-0.178	-0.058	0.0	-1.5	97.3	97.3	0.01
T91/AL - Aroos 3	0.178	0.058	-0.176	-0.051	2.1	6.3	97.3	95.3	1.99
Cable63	0.185	0.020	-0.185	-0.060	0.0	-39.7	97.3	97.3	0.01
T92/Marj AL - Doodah	0.170	0.067	-0.168	-0.061	1.9	6.0	97.3	95.2	2.11
T93/Zeef	0.185	0.060	-0.183	-0.053	2.2	6.9	97.3	95.2	2.07
Line62	0.824	1.645	-0.822	-1.646	1.7	-1.0	97.3	97.2	0.08
T94/AL - Heela 1	0.189	0.069	-0.186	-0.061	2.4	7.3	97.3	95.0	2.24
Line63	0.637	1.586	-0.634	-1.588	2.9	-2.2	97.2	97.0	0.14
T95/AL - Heela 2	0.185	0.060	-0.183	-0.053	2.2	6.8	97.2	95.1	2.07
Line64	0.461	1.475	-0.460	-1.476	0.9	-1.0	97.0	97.0	0.04

CKT / Branch	From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd % Drop
ID	MW	Mvar	MW	Mvar	kW	kvar	From	To	in Vmag
Line65	0.173	0.113	-0.173	-0.114	0.0	-0.6	97.0	97.0	0.00
T96/AL - Waseem	0.173	0.114	-0.171	-0.106	2.5	7.8	97.0	94.1	2.96
Line66	0.438	0.390	-0.438	-0.391	0.1	-0.7	97.0	97.0	0.01
Line67	0.023	1.085	-0.022	-1.086	0.2	-0.4	97.0	97.0	0.01
Line68	0.257	0.272	-0.257	-0.272	0.0	-0.4	97.0	97.0	0.00
T97/AL - Shaloodi	0.181	0.119	-0.178	-0.111	2.8	8.6	97.0	93.9	3.10
T98/Abu - Turki	0.257	0.272	-0.251	-0.256	5.2	15.9	97.0	93.1	3.90
Line69	0.245	0.266	-0.244	-0.266	0.0	-0.2	97.0	97.0	0.00
Line70	-0.222	0.820	0.222	-0.821	0.2	-1.0	97.0	97.0	0.01
T99/Abd - Gaith	0.244	0.266	-0.240	-0.251	4.8	14.9	97.0	93.2	3.80
Line71	-0.501	0.593	0.501	-0.594	0.1	-0.5	97.0	97.0	0.00
T100/Mazra'at AL- Nama'	0.279	0.228	-0.274	-0.213	4.8	14.7	97.0	93.5	3.48
Line72	4.357	4.454	-4.342	-4.449	14.7	5.6	97.0	96.7	0.24
Line73	-5.021	-4.029	5.029	4.032	7.8	3.0	97.0	97.1	0.13
T102/Moustafa Rajab	0.163	0.168	-0.160	-0.158	3.2	10.0	97.0	93.1	3.89
Line74	-5.292	-4.311	5.436	4.368	144.5	57.1	97.1	99.3	2.21
T101/Fayez Abu-Snaineh	0.262	0.279	-0.257	-0.262	5.4	16.6	97.1	93.1	3.99
Line75	1.138	1.032	-1.137	-1.033	1.0	-1.0	96.7	96.7	0.07
T103/AL - Haddad 1	0.994	1.088	-0.982	-1.001	12.1	86.1	96.7	92.1	4.66
T104/AL - Haddad 2	0.958	1.075	-0.946	-0.992	11.6	82.2	96.7	92.2	4.59
T105/AL - Haddad 3	0.831	0.815	-0.821	-0.747	9.7	68.8	96.7	92.2	4.51
T106/AL - Haddad 4	0.422	0.439	-0.415	-0.412	6.9	27.5	96.7	92.9	3.88
T107/AL - Sa'ad 1	0.452	0.396	-0.445	-0.369	6.7	26.7	96.7	93.1	3.62
T108/AL - Sa'ad 2	0.407	0.388	-0.401	-0.364	5.9	23.4	96.7	93.2	3.49
T109/AL - Sa'ad 3	0.278	0.249	-0.273	-0.233	5.2	16.0	96.7	92.9	3.73
					1157.6	-84.4			

Alert Summary Report

	% Alert Settings	
	Critical	Marginal
Loading		
Bus	100.0	95.0
Cable	100.0	95.0
Reactor	100.0	95.0
Line	100.0	95.0
Transformer	100.0	95.0
Panel	100.0	95.0
Protective Device	100.0	95.0
Generator	100.0	95.0
Inverter/Charger	100.0	95.0
Bus Voltage		
OverVoltage	105.0	102.0
UnderVoltage	95.0	98.0
Generator Excitation		
OverExcited (Q Max.)	100.0	95.0
UnderExcited (Q Min.)	100.0	

Critical Report

Device ID	Type	Condition	Rating/Limit	Unit	Operating	% Operating	Phase Type
Bus148	Bus	Under Voltage	0.40	kV	0.38	94.9	3-Phase
Bus154	Bus	Under Voltage	0.40	kV	0.38	94.5	3-Phase
Bus155	Bus	Under Voltage	0.40	kV	0.38	94.6	3-Phase
Bus156	Bus	Under Voltage	0.40	kV	0.38	93.9	3-Phase
Bus167	Bus	Under Voltage	0.40	kV	0.38	94.2	3-Phase
Bus168	Bus	Under Voltage	0.40	kV	0.38	94.1	3-Phase
Bus169	Bus	Under Voltage	0.40	kV	0.37	93.0	3-Phase
Bus170	Bus	Under Voltage	0.40	kV	0.38	93.9	3-Phase
Bus171	Bus	Under Voltage	0.40	kV	0.38	94.1	3-Phase
Bus172	Bus	Under Voltage	0.40	kV	0.38	94.3	3-Phase
Bus175	Bus	Under Voltage	0.40	kV	0.38	93.8	3-Phase
Bus179	Bus	Under Voltage	0.40	kV	0.38	94.2	3-Phase
Bus204	Bus	Under Voltage	0.40	kV	0.38	93.8	3-Phase
Bus206	Bus	Under Voltage	0.40	kV	0.38	95.0	3-Phase
Bus209	Bus	Under Voltage	0.40	kV	0.38	95.0	3-Phase

Critical Report

Device ID	Type	Condition	Rating/Limit	Unit	Operating	% Operating	Phase Type
Bus211	Bus	Under Voltage	0.40	kV	0.37	93.5	3-Phase
Bus218	Bus	Under Voltage	0.40	kV	0.37	93.3	3-Phase
Bus221	Bus	Under Voltage	0.40	kV	0.37	93.4	3-Phase
Bus222	Bus	Under Voltage	0.40	kV	0.38	94.8	3-Phase
Bus224	Bus	Under Voltage	0.40	kV	0.37	93.1	3-Phase
Bus225	Bus	Under Voltage	0.40	kV	0.38	93.9	3-Phase
Bus226	Bus	Under Voltage	0.40	kV	0.37	93.2	3-Phase
Bus227	Bus	Under Voltage	0.40	kV	0.37	93.5	3-Phase
Bus228	Bus	Under Voltage	0.40	kV	0.38	94.1	3-Phase
Bus229	Bus	Under Voltage	0.40	kV	0.37	93.1	3-Phase
Bus230	Bus	Under Voltage	0.40	kV	0.37	93.1	3-Phase
Bus231	Bus	Under Voltage	0.40	kV	0.37	92.9	3-Phase
Bus232	Bus	Under Voltage	0.40	kV	0.37	92.2	3-Phase
Bus233	Bus	Under Voltage	0.40	kV	0.37	92.2	3-Phase
Bus234	Bus	Under Voltage	0.40	kV	0.37	92.1	3-Phase
Bus235	Bus	Under Voltage	0.40	kV	0.37	93.1	3-Phase
Bus236	Bus	Under Voltage	0.40	kV	0.37	93.2	3-Phase
Bus237	Bus	Under Voltage	0.40	kV	0.37	92.9	3-Phase
Bus242	Bus	Under Voltage	0.40	kV	0.38	94.1	3-Phase

Marginal Report

Device ID	Type	Condition	Rating/Limit	Unit	Operating	% Operating	Phase Type
Bus100	Bus	Under Voltage	33.00	kV	32.18	97.5	3-Phase
Bus101	Bus	Under Voltage	33.00	kV	32.18	97.5	3-Phase
Bus102	Bus	Under Voltage	33.00	kV	32.15	97.4	3-Phase
Bus103	Bus	Under Voltage	33.00	kV	32.13	97.4	3-Phase
Bus104	Bus	Under Voltage	33.00	kV	32.12	97.3	3-Phase
Bus105	Bus	Under Voltage	33.00	kV	32.11	97.3	3-Phase
Bus106	Bus	Under Voltage	33.00	kV	32.11	97.3	3-Phase
Bus107	Bus	Under Voltage	33.00	kV	32.11	97.3	3-Phase
Bus108	Bus	Under Voltage	33.00	kV	32.08	97.2	3-Phase
Bus109	Bus	Under Voltage	33.00	kV	32.08	97.2	3-Phase
Bus110	Bus	Under Voltage	33.00	kV	32.06	97.2	3-Phase
Bus111	Bus	Under Voltage	33.00	kV	32.03	97.1	3-Phase
Bus112	Bus	Under Voltage	33.00	kV	32.02	97.0	3-Phase
Bus113	Bus	Under Voltage	33.00	kV	32.03	97.1	3-Phase

Marginal Report

Device ID	Type	Condition	Rating/Limit	Unit	Operating	% Operating	Phase Type
Bus114	Bus	Under Voltage	33.00	kV	32.02	97.0	3-Phase
Bus115	Bus	Under Voltage	33.00	kV	32.03	97.0	3-Phase
Bus116	Bus	Under Voltage	33.00	kV	32.01	97.0	3-Phase
Bus117	Bus	Under Voltage	33.00	kV	32.02	97.0	3-Phase
Bus118	Bus	Under Voltage	33.00	kV	32.10	97.3	3-Phase
Bus119	Bus	Under Voltage	33.00	kV	32.10	97.3	3-Phase
Bus120	Bus	Under Voltage	33.00	kV	32.10	97.3	3-Phase
Bus121	Bus	Under Voltage	33.00	kV	32.10	97.3	3-Phase
Bus122	Bus	Under Voltage	33.00	kV	32.10	97.3	3-Phase
Bus123	Bus	Under Voltage	33.00	kV	32.10	97.3	3-Phase
Bus124	Bus	Under Voltage	33.00	kV	32.09	97.3	3-Phase
Bus125	Bus	Under Voltage	33.00	kV	32.07	97.2	3-Phase
Bus126	Bus	Under Voltage	33.00	kV	32.02	97.0	3-Phase
Bus127	Bus	Under Voltage	33.00	kV	32.02	97.0	3-Phase
Bus128	Bus	Under Voltage	33.00	kV	32.01	97.0	3-Phase
Bus129	Bus	Under Voltage	33.00	kV	32.00	97.0	3-Phase
Bus130	Bus	Under Voltage	33.00	kV	32.00	97.0	3-Phase
Bus131	Bus	Under Voltage	33.00	kV	32.01	97.0	3-Phase
Bus132	Bus	Under Voltage	33.00	kV	32.00	97.0	3-Phase
Bus133	Bus	Under Voltage	33.00	kV	32.00	97.0	3-Phase
Bus134	Bus	Under Voltage	33.00	kV	32.00	97.0	3-Phase
Bus135	Bus	Under Voltage	33.00	kV	32.05	97.1	3-Phase
Bus136	Bus	Under Voltage	33.00	kV	31.93	96.7	3-Phase
Bus137	Bus	Under Voltage	33.00	kV	31.90	96.7	3-Phase
Bus138	Bus	Under Voltage	0.40	kV	0.38	96.2	3-Phase
Bus139	Bus	Under Voltage	0.40	kV	0.39	97.1	3-Phase
Bus140	Bus	Under Voltage	0.40	kV	0.38	95.5	3-Phase
Bus141	Bus	Under Voltage	0.40	kV	0.39	97.1	3-Phase
Bus142	Bus	Under Voltage	0.40	kV	0.39	96.7	3-Phase
Bus143	Bus	Under Voltage	0.40	kV	0.39	96.7	3-Phase
Bus144	Bus	Under Voltage	0.40	kV	0.39	97.1	3-Phase
Bus145	Bus	Under Voltage	0.40	kV	0.38	96.1	3-Phase
Bus146	Bus	Under Voltage	0.40	kV	0.39	96.3	3-Phase
Bus147	Bus	Under Voltage	0.40	kV	0.39	96.5	3-Phase
Bus149	Bus	Under Voltage	0.40	kV	0.39	96.3	3-Phase
Bus150	Bus	Under Voltage	0.40	kV	0.39	96.5	3-Phase

Marginal Report

Device ID	Type	Condition	Rating/Limit	Unit	Operating	% Operating	Phase Type
Bus151	Bus	Under Voltage	0.40	kV	0.39	96.5	3-Phase
Bus152	Bus	Under Voltage	0.40	kV	0.38	95.0	3-Phase
Bus153	Bus	Under Voltage	0.40	kV	0.39	96.4	3-Phase
Bus157	Bus	Under Voltage	0.40	kV	0.38	96.1	3-Phase
Bus158	Bus	Under Voltage	0.40	kV	0.39	96.4	3-Phase
Bus159	Bus	Under Voltage	0.40	kV	0.39	96.5	3-Phase
Bus160	Bus	Under Voltage	0.40	kV	0.38	95.6	3-Phase
Bus161	Bus	Under Voltage	0.40	kV	0.39	96.8	3-Phase
Bus162	Bus	Under Voltage	0.40	kV	0.38	95.4	3-Phase
Bus163	Bus	Under Voltage	0.40	kV	0.38	95.9	3-Phase
Bus164	Bus	Under Voltage	0.40	kV	0.39	96.5	3-Phase
Bus165	Bus	Under Voltage	0.40	kV	0.38	96.2	3-Phase
Bus166	Bus	Under Voltage	0.40	kV	0.38	96.2	3-Phase
Bus17	Bus	Under Voltage	33.00	kV	32.33	98.0	3-Phase
Bus173	Bus	Under Voltage	0.40	kV	0.38	95.7	3-Phase
Bus174	Bus	Under Voltage	0.40	kV	0.38	95.2	3-Phase
Bus176	Bus	Under Voltage	0.40	kV	0.38	95.5	3-Phase
Bus177	Bus	Under Voltage	0.40	kV	0.38	95.7	3-Phase
Bus178	Bus	Under Voltage	0.40	kV	0.38	95.7	3-Phase
Bus18	Bus	Under Voltage	33.00	kV	32.32	97.9	3-Phase
Bus180	Bus	Under Voltage	0.40	kV	0.38	95.7	3-Phase
Bus181	Bus	Under Voltage	0.40	kV	0.38	95.6	3-Phase
Bus182	Bus	Under Voltage	0.40	kV	0.38	95.6	3-Phase
Bus183	Bus	Under Voltage	0.40	kV	0.38	95.9	3-Phase
Bus184	Bus	Under Voltage	0.40	kV	0.38	95.9	3-Phase
Bus185	Bus	Under Voltage	0.40	kV	0.38	95.6	3-Phase
Bus186	Bus	Under Voltage	0.40	kV	0.38	95.4	3-Phase
Bus187	Bus	Under Voltage	0.40	kV	0.38	95.8	3-Phase
Bus188	Bus	Under Voltage	0.40	kV	0.38	95.8	3-Phase
Bus189	Bus	Under Voltage	0.40	kV	0.38	95.6	3-Phase
Bus19	Bus	Under Voltage	33.00	kV	32.30	97.9	3-Phase
Bus190	Bus	Under Voltage	0.40	kV	0.38	95.6	3-Phase
Bus191	Bus	Under Voltage	0.40	kV	0.38	95.8	3-Phase
Bus192	Bus	Under Voltage	0.40	kV	0.38	95.6	3-Phase
Bus193	Bus	Under Voltage	0.40	kV	0.38	95.8	3-Phase
Bus194	Bus	Under Voltage	0.40	kV	0.38	95.8	3-Phase

Marginal Report

Device ID	Type	Condition	Rating/Limit	Unit	Operating	% Operating	Phase Type
Bus195	Bus	Under Voltage	0.40	kV	0.38	95.9	3-Phase
Bus196	Bus	Under Voltage	0.40	kV	0.38	95.7	3-Phase
Bus197	Bus	Under Voltage	0.40	kV	0.38	95.6	3-Phase
Bus198	Bus	Under Voltage	0.40	kV	0.38	95.5	3-Phase
Bus199	Bus	Under Voltage	0.40	kV	0.38	95.2	3-Phase
Bus20	Bus	Under Voltage	33.00	kV	32.27	97.8	3-Phase
Bus200	Bus	Under Voltage	0.40	kV	0.38	95.6	3-Phase
Bus201	Bus	Under Voltage	0.40	kV	0.38	95.8	3-Phase
Bus202	Bus	Under Voltage	0.40	kV	0.38	95.3	3-Phase
Bus203	Bus	Under Voltage	0.40	kV	0.38	95.9	3-Phase
Bus205	Bus	Under Voltage	0.40	kV	0.38	95.3	3-Phase
Bus207	Bus	Under Voltage	0.40	kV	0.38	95.2	3-Phase
Bus208	Bus	Under Voltage	0.40	kV	0.38	95.1	3-Phase
Bus21	Bus	Under Voltage	33.00	kV	32.26	97.8	3-Phase
Bus210	Bus	Under Voltage	0.40	kV	0.38	95.3	3-Phase
Bus212	Bus	Under Voltage	0.40	kV	0.38	95.2	3-Phase
Bus213	Bus	Under Voltage	0.40	kV	0.38	95.2	3-Phase
Bus214	Bus	Under Voltage	0.40	kV	0.38	95.2	3-Phase
Bus215	Bus	Under Voltage	0.40	kV	0.38	95.0	3-Phase
Bus216	Bus	Under Voltage	0.40	kV	0.38	95.0	3-Phase
Bus217	Bus	Under Voltage	0.40	kV	0.38	95.3	3-Phase
Bus219	Bus	Under Voltage	0.40	kV	0.38	95.2	3-Phase
Bus22	Bus	Under Voltage	33.00	kV	32.26	97.8	3-Phase
Bus220	Bus	Under Voltage	0.40	kV	0.38	95.2	3-Phase
Bus223	Bus	Under Voltage	0.40	kV	0.38	95.1	3-Phase
Bus23	Bus	Under Voltage	33.00	kV	32.26	97.8	3-Phase
Bus238	Bus	Under Voltage	0.40	kV	0.38	95.1	3-Phase
Bus239	Bus	Under Voltage	0.40	kV	0.38	95.0	3-Phase
Bus24	Bus	Under Voltage	33.00	kV	32.32	97.9	3-Phase
Bus240	Bus	Under Voltage	0.40	kV	0.38	95.6	3-Phase
Bus241	Bus	Under Voltage	0.40	kV	0.38	95.6	3-Phase
Bus243	Bus	Under Voltage	0.40	kV	0.38	95.9	3-Phase
Bus244	Bus	Under Voltage	0.40	kV	0.38	95.5	3-Phase
Bus245	Bus	Under Voltage	0.40	kV	0.38	95.2	3-Phase
Bus246	Bus	Under Voltage	0.40	kV	0.38	95.3	3-Phase
Bus25	Bus	Under Voltage	33.00	kV	32.32	97.9	3-Phase

Marginal Report

Device ID	Type	Condition	Rating/Limit	Unit	Operating	% Operating	Phase Type
Bus26	Bus	Under Voltage	33.00	kV	32.31	97.9	3-Phase
Bus27	Bus	Under Voltage	33.00	kV	32.31	97.9	3-Phase
Bus28	Bus	Under Voltage	33.00	kV	32.31	97.9	3-Phase
Bus29	Bus	Under Voltage	33.00	kV	32.31	97.9	3-Phase
Bus30	Bus	Under Voltage	33.00	kV	32.31	97.9	3-Phase
Bus31	Bus	Under Voltage	33.00	kV	32.31	97.9	3-Phase
Bus32	Bus	Under Voltage	33.00	kV	32.30	97.9	3-Phase
Bus33	Bus	Under Voltage	33.00	kV	32.30	97.9	3-Phase
Bus34	Bus	Under Voltage	33.00	kV	32.30	97.9	3-Phase
Bus35	Bus	Under Voltage	33.00	kV	32.29	97.9	3-Phase
Bus36	Bus	Under Voltage	33.00	kV	32.28	97.8	3-Phase
Bus37	Bus	Under Voltage	33.00	kV	32.28	97.8	3-Phase
Bus71	Bus	Under Voltage	33.00	kV	32.33	98.0	3-Phase
Bus72	Bus	Under Voltage	33.00	kV	32.30	97.9	3-Phase
Bus73	Bus	Under Voltage	33.00	kV	32.28	97.8	3-Phase
Bus74	Bus	Under Voltage	33.00	kV	32.26	97.8	3-Phase
Bus75	Bus	Under Voltage	33.00	kV	32.25	97.7	3-Phase
Bus76	Bus	Under Voltage	33.00	kV	32.25	97.7	3-Phase
Bus77	Bus	Under Voltage	33.00	kV	32.25	97.7	3-Phase
Bus78	Bus	Under Voltage	33.00	kV	32.25	97.7	3-Phase
Bus79	Bus	Under Voltage	33.00	kV	32.26	97.8	3-Phase
Bus80	Bus	Under Voltage	33.00	kV	32.25	97.7	3-Phase
Bus81	Bus	Under Voltage	33.00	kV	32.23	97.7	3-Phase
Bus82	Bus	Under Voltage	33.00	kV	32.23	97.7	3-Phase
Bus83	Bus	Under Voltage	33.00	kV	32.22	97.6	3-Phase
Bus84	Bus	Under Voltage	33.00	kV	32.23	97.7	3-Phase
Bus86	Bus	Under Voltage	33.00	kV	32.31	97.9	3-Phase
Bus87	Bus	Under Voltage	33.00	kV	32.31	97.9	3-Phase
Bus88	Bus	Under Voltage	33.00	kV	32.31	97.9	3-Phase
Bus89	Bus	Under Voltage	33.00	kV	32.31	97.9	3-Phase
Bus90	Bus	Under Voltage	33.00	kV	32.29	97.9	3-Phase
Bus91	Bus	Under Voltage	33.00	kV	32.29	97.8	3-Phase
Bus92	Bus	Under Voltage	33.00	kV	32.28	97.8	3-Phase
Bus93	Bus	Under Voltage	33.00	kV	32.28	97.8	3-Phase
Bus94	Bus	Under Voltage	33.00	kV	32.28	97.8	3-Phase
Bus95	Bus	Under Voltage	33.00	kV	32.25	97.7	3-Phase

Marginal Report

Device ID	Type	Condition	Rating/Limit	Unit	Operating	% Operating	Phase Type
Bus96	Bus	Under Voltage	33.00	kV	32.22	97.6	3-Phase
Bus97	Bus	Under Voltage	33.00	kV	32.21	97.6	3-Phase
Bus98	Bus	Under Voltage	33.00	kV	32.21	97.6	3-Phase
Bus99	Bus	Under Voltage	33.00	kV	32.21	97.6	3-Phase

SUMMARY OF TOTAL GENERATION , LOADING & DEMAND

	MW	Mvar	MVA	% PF
Source (Swing Buses):	30.213	17.373	34.852	86.69 Lagging
Source (Non-Swing Buses):	0.000	0.000	0.000	
Total Demand:	30.213	17.373	34.852	86.69 Lagging
Total Motor Load:	12.550	10.903	16.625	75.49 Lagging
Total Static Load:	16.505	6.555	17.759	92.94 Lagging
Total Constant I Load:	0.000	0.000	0.000	
Total Generic Load:	0.000	0.000	0.000	
Apparent Losses:	1.158	-0.084		
System Mismatch:	0.000	0.000		

Number of Iterations: 3

Branch Losses Summary Report

CKT / Branch	From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd % Drop
ID	MW	Mvar	MW	Mvar	kW	kvar	From	To	in Vmag
Cable1	30.141	17.391	-30.071	-17.449	69.9	-58.2	100.0	99.8	0.21
Cable2	0.336	0.132	-0.336	-0.146	0.0	-13.9	99.8	99.8	0.00
Cable3	23.311	11.199	-23.218	-11.187	93.0	11.7	99.8	99.4	0.38
Cable64	6.274	5.955	-6.248	-6.051	25.2	-95.6	99.8	99.5	0.32
T2/Al-Dear	0.150	0.163	-0.147	-0.154	2.7	8.4	99.8	96.2	3.61
T1/Taiseer Obidat	0.336	0.146	-0.332	-0.131	4.7	14.4	99.8	97.1	2.68
Cable4	22.955	10.908	-22.936	-10.943	18.9	-34.6	99.4	99.3	0.08
T3/Mousa Arbad	0.263	0.279	-0.258	-0.263	5.2	16.0	99.4	95.5	3.91
Cable5	0.183	0.055	-0.183	-0.070	0.0	-15.2	99.3	99.3	0.00
Cable6	22.753	10.888	-22.725	-10.940	27.9	-51.8	99.3	99.2	0.12
Line1	0.183	0.070	-0.183	-0.072	0.0	-2.3	99.3	99.3	0.01
T4/Abu Al-Fool	0.183	0.072	-0.181	-0.066	2.2	6.7	99.3	97.1	2.23
Cable12	16.292	5.951	-16.232	-5.960	59.5	-9.2	99.2	98.9	0.36
Line2	5.780	4.729	-5.768	-4.724	12.1	4.9	99.2	99.0	0.17
T5/AL- Shawaheen	0.341	0.125	-0.337	-0.111	4.6	14.4	99.2	96.7	2.48
T6/AL- Metiana	0.312	0.134	-0.308	-0.122	4.1	12.6	99.2	96.7	2.50
Line3	5.599	4.664	-5.567	-4.651	31.7	12.7	99.0	98.6	0.46
T7/AL- Ghowita	0.168	0.060	-0.167	-0.055	1.8	5.6	99.0	97.1	1.95
Line4	0.117	0.034	-0.117	-0.034	0.0	-0.6	98.6	98.6	0.00
Line5	5.145	4.486	-5.138	-4.483	6.8	2.7	98.6	98.5	0.10
T8/Haroon AL - Rasheed	0.305	0.131	-0.302	-0.119	3.9	12.2	98.6	96.1	2.46
Line33	0.117	0.034	-0.117	-0.038	0.0	-3.5	98.6	98.6	0.01
Line6	4.904	4.236	-4.897	-4.233	6.8	2.6	98.5	98.4	0.11
T10/Mahmoud Rasheed	0.234	0.248	-0.230	-0.235	4.2	12.8	98.5	95.0	3.50
Line7	4.637	3.964	-4.624	-3.959	12.2	4.5	98.4	98.2	0.21
T11/Ahmad Rasheed	0.261	0.269	-0.256	-0.254	5.0	15.5	98.4	94.5	3.83
Line8	0.231	0.243	-0.231	-0.244	0.0	-1.2	98.2	98.1	0.01
Line9	4.393	3.716	-4.390	-3.715	3.3	1.2	98.2	98.1	0.06
T12/Ali Hassan Nassar	0.231	0.244	-0.227	-0.232	4.1	12.6	98.1	94.7	3.47
Line10	4.287	3.597	-4.282	-3.595	5.1	1.8	98.1	98.0	0.10
T13/AL - Tatweer	0.103	0.118	-0.101	-0.112	2.2	6.8	98.1	94.0	4.12
Line11	2.004	1.198	-2.004	-1.198	0.5	-0.1	98.0	98.0	0.02
Line12	2.277	2.397	-2.274	-2.397	3.2	0.4	98.0	97.9	0.10
Line17	1.639	0.827	-1.639	-0.827	0.4	-0.2	98.0	98.0	0.02
Line18	0.261	0.269	-0.261	-0.269	0.0	-0.3	98.0	98.0	0.00

CKT / Branch	From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd % Drop in Vmag
ID	MW	Mvar	MW	Mvar	kW	kvar	From	To	
T19/Ahmad H. Nassar	0.104	0.102	-0.103	-0.096	1.9	5.9	98.0	94.3	3.69
Line13	2.005	2.134	-2.002	-2.133	2.8	0.1	97.9	97.8	0.10
T14/Salah Mousa Nassar	0.269	0.263	-0.264	-0.247	5.1	15.8	97.9	94.1	3.81
Line14	1.197	1.311	-1.197	-1.311	0.1	-0.1	97.8	97.8	0.01
Line15	0.805	0.823	-0.805	-0.823	0.1	-0.2	97.8	97.8	0.01
Line16	0.402	0.440	-0.402	-0.440	0.0	-0.2	97.8	97.8	0.00
T17/Ali Mousa Nassar	0.796	0.871	-0.786	-0.802	9.7	69.2	97.8	93.1	4.72
T15/Mousa Nassar	0.410	0.414	-0.404	-0.389	6.2	24.5	97.8	94.2	3.64
T16/Khaled Nassar	0.395	0.409	-0.389	-0.386	5.9	23.4	97.8	94.2	3.58
T18/Nafez Nassar	0.402	0.440	-0.395	-0.414	6.5	25.7	97.8	94.0	3.81
T20/Rasmi Abu - Qubita	0.261	0.269	-0.255	-0.253	5.1	15.6	98.0	94.1	3.84
Cable7	1.222	0.437	-1.222	-0.450	0.2	-13.4	98.0	97.9	0.01
Line19	0.417	0.391	-0.417	-0.392	0.1	-1.3	98.0	97.9	0.02
Cable8	1.024	0.385	-1.024	-0.401	0.1	-15.4	97.9	97.9	0.01
T21/Bet- Emra 1	0.198	0.065	-0.195	-0.057	2.5	7.7	97.9	95.7	2.20
Line20	0.258	0.289	-0.258	-0.289	0.0	-0.3	97.9	97.9	0.00
Line21	0.159	0.103	-0.159	-0.103	0.0	-0.2	97.9	97.9	0.00
T22/Mousa Rasheed	0.258	0.289	-0.253	-0.272	5.4	16.8	97.9	93.9	4.06
T23/Um AL - Ammad	0.159	0.103	-0.156	-0.097	2.1	6.4	97.9	95.3	2.68
Cable9	0.391	0.081	-0.391	-0.095	0.0	-14.1	97.9	97.9	0.00
Cable10	0.633	0.320	-0.633	-0.337	0.1	-16.7	97.9	97.9	0.01
Cable11	0.193	0.016	-0.193	-0.063	0.0	-46.9	97.9	97.9	0.01
T24/Ber - Emra 2	0.197	0.079	-0.195	-0.071	2.6	8.1	97.9	95.5	2.45
T25/Bet - Emra 3	0.193	0.063	-0.191	-0.056	2.4	7.4	97.9	95.8	2.15
Line22	0.633	0.337	-0.633	-0.337	0.1	-0.9	97.9	97.9	0.02
Line23	0.515	0.295	-0.514	-0.296	0.1	-0.9	97.9	97.9	0.02
T26/Khalet Arabi	0.118	0.043	-0.117	-0.038	1.4	4.4	97.9	95.7	2.17
Line24	0.361	0.133	-0.361	-0.135	0.0	-2.6	97.9	97.9	0.01
T27/AL - Nukhba	0.154	0.163	-0.151	-0.154	2.9	9.0	97.9	94.2	3.70
Line25	0.183	0.071	-0.183	-0.072	0.0	-1.3	97.9	97.9	0.00
T28/AL - Hadab 1	0.178	0.064	-0.176	-0.058	2.1	6.4	97.9	95.8	2.09
T29/AL - Hadab 2	0.183	0.072	-0.180	-0.065	2.2	6.9	97.9	95.6	2.26
Cable13	16.232	5.960	-16.210	-5.964	22.5	-3.4	98.9	98.7	0.14
Cable14	3.846	1.287	-3.844	-1.304	2.0	-17.7	98.7	98.7	0.05
Cable26	12.046	4.562	-12.009	-4.583	37.4	-20.8	98.7	98.4	0.30
T30/AL - Bhesat	0.317	0.115	-0.313	-0.103	4.0	12.5	98.7	96.4	2.32
Cable15	0.203	0.026	-0.203	-0.067	0.0	-40.8	98.7	98.7	0.01

CKT / Branch	From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd % Drop in Vmag
ID	MW	Mvar	MW	Mvar	kW	kvar	From	To	
Cable16	1.671	0.691	-1.671	-0.700	0.2	-9.1	98.7	98.7	0.01
Cable35	1.504	0.402	-1.504	-0.430	0.4	-27.5	98.7	98.6	0.03
T32/Abu Ali	0.466	0.186	-0.462	-0.168	4.5	17.9	98.7	96.6	2.08
T31/AL - Sawakna	0.203	0.067	-0.201	-0.058	2.6	8.0	98.7	96.4	2.24
Line26	1.579	0.598	-1.578	-0.599	1.4	-1.2	98.7	98.6	0.09
T33/Ma'asaret Rasheed	0.091	0.102	-0.090	-0.097	1.7	5.1	98.7	95.1	3.55
Line27	1.375	0.541	-1.375	-0.542	0.5	-0.7	98.6	98.5	0.04
T34/AL - Kaziea	0.203	0.058	-0.200	-0.050	2.5	7.8	98.6	96.5	2.09
Cable18	0.284	0.099	-0.284	-0.113	0.0	-13.6	98.5	98.5	0.00
Line28	1.091	0.443	-1.091	-0.443	0.3	-0.6	98.5	98.5	0.02
Line29	0.271	0.176	-0.271	-0.177	0.0	-0.9	98.5	98.5	0.01
Line30	0.819	0.267	-0.819	-0.268	0.2	-0.8	98.5	98.5	0.02
T35/AL - Mostashfa	0.271	0.177	-0.267	-0.166	3.7	11.6	98.5	95.6	2.85
Line31	0.294	0.024	-0.294	-0.025	0.0	-1.0	98.5	98.5	0.00
Line32	0.277	0.175	-0.277	-0.181	0.2	-6.1	98.5	98.4	0.06
T36/E3zeez	0.248	0.069	-0.246	-0.062	2.4	7.3	98.5	96.9	1.59
Cable19	0.182	0.028	-0.182	-0.072	0.0	-44.1	98.5	98.5	0.01
Cable20	0.112	-0.003	-0.112	-0.044	0.0	-47.5	98.5	98.5	0.00
T37/Hajar AL - Sakhainah	0.277	0.181	-0.273	-0.169	3.9	12.1	98.4	95.5	2.92
T38/Marah Jaber	0.112	0.044	-0.111	-0.040	1.3	4.0	98.5	96.3	2.15
T39/AL - Mentar	0.182	0.072	-0.180	-0.065	2.2	6.8	98.5	96.2	2.24
T9/Majd AL- Ba3	0.117	0.038	-0.115	-0.034	1.3	4.1	98.6	96.6	2.01
Line34	0.284	0.113	-0.284	-0.115	0.0	-2.0	98.5	98.5	0.02
Line35	0.187	0.052	-0.187	-0.053	0.0	-1.2	98.5	98.5	0.01
T40/Da'erat AL - Sair	0.097	0.063	-0.096	-0.059	1.2	3.7	98.5	96.0	2.54
T41/Beer E3zeez	0.187	0.053	-0.185	-0.046	2.2	6.7	98.5	96.6	1.93
Cable17	-1.504	-0.437	1.504	0.430	0.1	-7.4	98.6	98.6	0.01
Cable22	0.323	0.081	-0.323	-0.129	0.0	-47.6	98.6	98.6	0.01
Cable23	0.697	0.180	-0.697	-0.220	0.1	-40.7	98.6	98.6	0.02
T42/Wad AL- Baqee3	0.483	0.176	-0.478	-0.157	4.8	18.8	98.6	96.6	2.04
T43/AL - Mosalla	0.323	0.129	-0.319	-0.116	4.3	13.3	98.6	96.1	2.49
Cable24	0.187	0.034	-0.187	-0.061	0.0	-27.2	98.6	98.6	0.00
T44/Um AL - Satar 1	0.510	0.187	-0.505	-0.166	5.3	21.0	98.6	96.4	2.16
T45/Um AL- Satar 2	0.187	0.061	-0.185	-0.054	2.2	6.8	98.6	96.5	2.06
Cable27	11.688	4.434	-11.681	-4.439	7.3	-4.4	98.4	98.3	0.06
T46/AL - Karag	0.321	0.149	-0.316	-0.135	4.5	13.8	98.4	95.7	2.70
Cable28	3.759	1.262	-3.758	-1.272	1.1	-10.0	98.3	98.3	0.03

CKT / Branch	From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd % Drop in Vmag
ID	MW	Mvar	MW	Mvar	kW	kvar	From	To	
Cable29	7.426	2.962	-7.414	-2.986	11.7	-23.4	98.3	98.2	0.15
T47/Basal	0.495	0.215	-0.490	-0.194	5.3	20.9	98.3	96.0	2.34
Cable30	3.461	1.154	-3.460	-1.164	0.9	-9.8	98.3	98.3	0.03
T48/AL - Baladeia	0.297	0.118	-0.294	-0.107	3.7	11.3	98.3	96.0	2.29
Cable31	3.460	1.164	-3.459	-1.171	0.7	-7.2	98.3	98.3	0.02
Cable32	0.746	0.351	-0.746	-0.363	0.1	-12.3	98.3	98.3	0.01
Cable33	2.713	0.820	-2.711	-0.857	2.0	-36.4	98.3	98.2	0.07
Cable34	0.425	0.224	-0.425	-0.279	0.1	-54.6	98.3	98.3	0.02
T49/Saleet	0.321	0.138	-0.316	-0.125	4.4	13.5	98.3	95.7	2.59
T50/Abu - Aziza	0.425	0.279	-0.420	-0.261	4.7	18.5	98.3	95.6	2.69
Cable37	2.422	0.732	-2.419	-0.793	2.7	-61.1	98.2	98.1	0.11
T51/AL - Emria	0.290	0.124	-0.286	-0.113	3.6	11.0	98.2	95.9	2.34
Line36	2.116	0.683	-2.113	-0.684	2.4	-0.7	98.1	98.0	0.12
T52/Swedan	0.303	0.110	-0.299	-0.098	3.7	11.6	98.1	95.9	2.23
Line37	0.937	0.239	-0.937	-0.241	0.3	-1.1	98.0	97.9	0.03
Line38	1.176	0.445	-1.175	-0.447	1.2	-2.2	98.0	97.9	0.10
Line39	0.754	0.168	-0.754	-0.171	0.4	-2.5	97.9	97.9	0.06
T53/Yasser Abu - Samra	0.183	0.072	-0.181	-0.066	2.2	6.9	97.9	95.7	2.26
Line40	0.473	0.080	-0.472	-0.082	0.2	-2.4	97.9	97.8	0.03
T54/Khalet Saleh	0.281	0.091	-0.278	-0.081	3.2	9.8	97.9	95.9	1.95
Cable38	0.472	0.082	-0.472	-0.102	0.0	-20.3	97.8	97.8	0.01
Cable39	0.163	0.008	-0.163	-0.058	0.0	-50.2	97.8	97.8	0.01
Line41	0.127	0.028	-0.127	-0.030	0.0	-2.0	97.8	97.8	0.01
T55/Talet AL - Somood 1	0.182	0.066	-0.180	-0.059	2.2	6.7	97.8	95.7	2.14
T56/AL - Rahnneia	0.127	0.030	-0.126	-0.025	1.5	4.8	97.8	95.9	1.90
T57/Talet AL - Somood 2	0.163	0.058	-0.161	-0.053	1.7	5.4	97.8	95.9	1.91
Line42	0.990	0.380	-0.990	-0.381	0.3	-0.8	97.9	97.8	0.03
T58/AL - Arqoob 1	0.185	0.067	-0.183	-0.060	2.2	6.9	97.9	95.7	2.18
Line43	0.815	0.312	-0.815	-0.314	0.4	-1.9	97.8	97.8	0.05
T59/AL - Arqoob 2	0.174	0.069	-0.172	-0.062	2.0	6.3	97.8	95.7	2.15
Line44	0.430	0.191	-0.430	-0.193	0.0	-1.9	97.8	97.8	0.01
Line45	0.126	0.040	-0.126	-0.046	0.0	-6.2	97.8	97.8	0.01
T60/AL - Karmel	0.260	0.083	-0.257	-0.075	2.7	8.3	97.8	96.0	1.80
Line46	0.142	0.089	-0.142	-0.092	0.0	-2.9	97.8	97.8	0.01
T61/Raheela	0.288	0.104	-0.284	-0.093	3.4	10.5	97.8	95.7	2.12
T62/Ma'aeen	0.142	0.092	-0.140	-0.087	1.7	5.1	97.8	95.4	2.40
T63/AL- Tewani	0.126	0.046	-0.124	-0.041	1.6	5.0	97.8	95.5	2.32

CKT / Branch	From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd % Drop
ID	MW	Mvar	MW	Mvar	kW	kvar	From	To	in Vmag
Cable40	6.946	2.784	-6.937	-2.805	8.9	-20.6	98.2	98.1	0.12
T64/Deer AL - Hawa	0.468	0.202	-0.463	-0.183	4.7	18.6	98.2	96.0	2.21
Cable41	6.288	2.634	-6.285	-2.644	3.2	-9.1	98.1	98.0	0.05
Cable42	0.470	0.099	-0.470	-0.125	0.0	-25.5	98.1	98.1	0.01
T65/AL - Qafeer	0.179	0.071	-0.177	-0.064	2.1	6.6	98.1	95.9	2.21
Cable43	0.279	0.082	-0.279	-0.100	0.0	-18.1	98.1	98.1	0.00
Cable44	0.192	0.043	-0.192	-0.070	0.0	-26.9	98.1	98.1	0.00
T66/Abu - Hmaid	0.279	0.100	-0.276	-0.091	3.2	9.8	98.1	96.0	2.04
T67/AL - Farhania	0.192	0.070	-0.189	-0.062	2.4	7.4	98.1	95.8	2.25
Cable45	5.177	2.266	-5.172	-2.289	5.5	-23.5	98.0	97.9	0.10
Cable46	0.647	0.165	-0.647	-0.176	0.0	-11.0	98.0	98.0	0.00
T68/AL - Mazra3a	0.461	0.213	-0.456	-0.194	4.7	18.6	98.0	95.7	2.28
Line47	0.647	0.176	-0.647	-0.178	0.1	-1.8	98.0	98.0	0.02
Cable47	0.156	0.051	-0.156	-0.076	0.0	-24.8	98.0	98.0	0.00
Cable48	0.185	0.005	-0.185	-0.060	0.0	-54.6	98.0	98.0	0.01
T69/Fatooh	0.306	0.122	-0.302	-0.110	3.9	12.1	98.0	95.6	2.37
T70/AL - Mahkama	0.156	0.076	-0.154	-0.070	1.7	5.4	98.0	95.8	2.18
T71/AL - Waha	0.185	0.060	-0.183	-0.053	2.2	6.7	98.0	95.9	2.05
Cable49	4.873	2.152	-4.870	-2.170	3.8	-18.7	97.9	97.8	0.08
T72/Islamic Bank	0.298	0.137	-0.294	-0.125	3.9	12.0	97.9	95.4	2.52
Cable50	4.390	1.948	-4.389	-1.954	1.0	-6.3	97.8	97.8	0.02
T73/AL - Eskan Bank	0.480	0.223	-0.475	-0.202	5.1	20.3	97.8	95.5	2.39
Cable51	0.301	0.080	-0.301	-0.120	0.0	-39.8	97.8	97.8	0.01
Cable52	3.705	1.434	-3.703	-1.455	2.4	-21.4	97.8	97.8	0.06
Line48	0.382	0.440	-0.382	-0.441	0.0	-0.4	97.8	97.8	0.01
T74/Mouhammad Nassar	0.382	0.441	-0.375	-0.416	6.2	24.6	97.8	94.0	3.78
T75/Markez AL - Da3wa	0.301	0.120	-0.298	-0.108	3.8	11.8	97.8	95.5	2.34
Cable53	3.578	1.412	-3.576	-1.436	2.5	-23.8	97.8	97.7	0.07
Line49	0.125	0.043	-0.125	-0.045	0.0	-2.2	97.8	97.8	0.01
T76/AL - Marmalah	0.125	0.045	-0.123	-0.041	1.6	4.9	97.8	95.5	2.30
Cable54	3.386	1.354	-3.384	-1.374	1.9	-20.1	97.7	97.6	0.05
T77/Kaziet Basal	0.190	0.082	-0.187	-0.074	2.5	7.7	97.7	95.2	2.47
Cable55	2.921	1.203	-2.920	-1.218	1.0	-14.4	97.6	97.6	0.03
Line50	0.162	0.062	-0.162	-0.064	0.0	-2.1	97.6	97.6	0.01
T78/Raq3a	0.301	0.109	-0.297	-0.098	3.7	11.5	97.6	95.4	2.22
Cable56	1.254	0.493	-1.253	-0.519	0.3	-25.9	97.6	97.6	0.02
Line51	1.667	0.725	-1.666	-0.725	0.4	-0.2	97.6	97.6	0.02

CKT / Branch	From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd % Drop
ID	MW	Mvar	MW	Mvar	kW	kvar	From	To	in Vmag
Cable57	0.127	0.026	-0.127	-0.046	0.0	-20.0	97.6	97.6	0.00
Line52	1.539	0.699	-1.538	-0.700	1.2	-1.0	97.6	97.5	0.08
Cable59	1.001	0.236	-1.001	-0.255	0.1	-19.3	97.6	97.6	0.01
T88/AL - Deiar Co.	0.252	0.283	-0.247	-0.266	5.2	16.1	97.6	93.6	3.98
T79/Raq3a New	0.127	0.046	-0.125	-0.041	1.7	5.1	97.6	95.2	2.35
Cable58	0.154	0.127	-0.154	-0.163	0.0	-36.1	97.5	97.5	0.00
Line53	1.207	0.516	-1.206	-0.517	0.9	-1.4	97.5	97.4	0.07
T80/Kreesa (Shawaheen)	0.177	0.057	-0.175	-0.051	2.0	6.2	97.5	95.5	1.97
T81/Nader Rasheed	0.154	0.163	-0.151	-0.154	2.9	9.0	97.5	93.8	3.72
Line54	1.023	0.465	-1.022	-0.467	1.0	-2.3	97.4	97.3	0.09
T82/Kreesa (AL- Kherba)	0.184	0.052	-0.181	-0.045	2.1	6.6	97.4	95.5	1.91
Line55	0.429	0.133	-0.429	-0.135	0.1	-1.8	97.3	97.3	0.02
Line56	0.593	0.335	-0.593	-0.335	0.0	-0.3	97.3	97.3	0.01
Line57	0.168	0.051	-0.168	-0.054	0.0	-3.3	97.3	97.3	0.02
T83/Wad ELma	0.261	0.084	-0.258	-0.075	2.7	8.5	97.3	95.5	1.82
Line58	0.305	0.092	-0.305	-0.093	0.0	-0.9	97.3	97.3	0.01
T85/AL - Junaidi	0.288	0.243	-0.283	-0.227	5.2	16.1	97.3	93.7	3.67
T84/AL - Hadedia	0.168	0.054	-0.166	-0.048	1.8	5.6	97.3	95.4	1.87
Line59	0.120	0.033	-0.120	-0.034	0.0	-0.8	97.3	97.3	0.00
Line60	0.185	0.059	-0.185	-0.067	0.1	-7.5	97.3	97.3	0.04
T86/AL - Bowaib	0.185	0.067	-0.182	-0.060	2.3	7.0	97.3	95.1	2.19
T87/AL - Dowair	0.120	0.034	-0.119	-0.030	1.4	4.4	97.3	95.4	1.96
Cable60	0.354	0.093	-0.354	-0.113	0.0	-20.0	97.6	97.6	0.01
Cable61	0.357	0.048	-0.357	-0.088	0.0	-40.2	97.6	97.6	0.01
T89/AL - Aroos 1	0.290	0.115	-0.286	-0.104	3.5	10.9	97.6	95.3	2.25
Cable62	0.179	0.038	-0.179	-0.056	0.0	-18.6	97.6	97.6	0.00
T90/AL - Aroos 2	0.175	0.075	-0.173	-0.068	2.1	6.5	97.6	95.3	2.27
Line61	0.179	0.056	-0.179	-0.058	0.0	-1.5	97.6	97.6	0.01
T91/AL - Aroos 3	0.179	0.058	-0.177	-0.052	2.1	6.4	97.6	95.6	1.99
Cable63	0.186	0.021	-0.186	-0.060	0.0	-39.9	97.6	97.6	0.01
T92/Marj AL - Doodah	0.171	0.067	-0.169	-0.061	2.0	6.0	97.6	95.4	2.11
T93/Zeef	0.186	0.060	-0.184	-0.054	2.2	6.9	97.6	95.5	2.07
Line62	-0.028	-0.005	0.028	0.003	0.0	-1.8	97.6	97.6	0.00
T94/AL - Heela 1	0.190	0.069	-0.188	-0.062	2.4	7.3	97.6	95.4	2.24
Line63	-0.215	-0.064	0.215	0.060	0.0	-3.6	97.6	97.7	0.02
T95/AL - Heela 2	0.186	0.061	-0.184	-0.054	2.2	6.9	97.6	95.6	2.08
Line64	-0.389	-0.174	0.389	0.173	0.1	-1.4	97.7	97.7	0.02

CKT / Branch	From-To Bus Flow		To-From Bus Flow		Losses		% Bus Voltage		Vd % Drop
ID	MW	Mvar	MW	Mvar	kW	kvar	From	To	in Vmag
Line65	0.174	0.114	-0.174	-0.114	0.0	-0.6	97.7	97.7	0.00
T96/AL - Waseem	0.174	0.114	-0.172	-0.106	2.5	7.8	97.7	94.7	2.96
Line66	0.439	0.391	-0.439	-0.392	0.1	-0.7	97.7	97.7	0.01
Line67	-0.828	-0.564	0.828	0.564	0.1	-0.5	97.7	97.7	0.02
Line68	0.257	0.272	-0.257	-0.273	0.0	-0.4	97.7	97.7	0.00
T97/AL - Shaloodi	0.182	0.120	-0.180	-0.111	2.8	8.5	97.7	94.6	3.10
T98/Abu - Turki	0.257	0.273	-0.252	-0.257	5.1	15.7	97.7	93.8	3.88
Line69	0.245	0.266	-0.245	-0.266	0.0	-0.2	97.7	97.7	0.00
Line70	-1.073	-0.830	1.074	0.829	0.6	-0.9	97.7	97.7	0.04
T99/Abd - Gaith	0.245	0.266	-0.240	-0.252	4.8	14.7	97.7	93.9	3.77
Line71	-1.353	-1.057	1.354	1.057	0.5	-0.4	97.7	97.8	0.03
T100/Mazra'at AL- Nama'	0.280	0.228	-0.275	-0.213	4.7	14.6	97.7	94.3	3.46
Line72	4.362	4.455	-4.348	-4.450	14.5	5.5	97.8	97.5	0.24
Line73	-5.879	-5.681	5.892	5.686	12.4	5.2	97.8	97.9	0.16
T102/Moustafa Rajab	0.163	0.169	-0.160	-0.159	3.2	9.9	97.8	93.9	3.86
Line74	-6.154	-5.965	6.248	6.051	94.0	86.3	97.9	99.5	1.56
T101/Fayez Abu-Snaineh	0.263	0.279	-0.257	-0.263	5.3	16.4	97.9	94.0	3.96
Line75	1.139	1.032	-1.138	-1.033	1.0	-1.1	97.5	97.5	0.07
T103/AL - Haddad 1	0.995	1.088	-0.983	-1.003	12.0	84.9	97.5	92.9	4.62
T104/AL - Haddad 2	0.959	1.075	-0.947	-0.994	11.4	81.0	97.5	93.0	4.56
T105/AL - Haddad 3	0.832	0.815	-0.822	-0.748	9.6	67.8	97.5	93.0	4.48
T106/AL - Haddad 4	0.423	0.440	-0.416	-0.412	6.8	27.1	97.5	93.7	3.85
T107/AL - Sa'ad 1	0.453	0.396	-0.446	-0.369	6.7	26.4	97.5	93.9	3.59
T108/AL - Sa'ad 2	0.407	0.388	-0.402	-0.365	5.8	23.1	97.5	94.0	3.46
T109/AL - Sa'ad 3	0.278	0.249	-0.273	-0.234	5.1	15.7	97.5	93.8	3.70
					1030.4	-92.9			