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IMPLEMENTATION OF XBEE BASED TRANSFORMER MONITORING

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ABSTRACT:

With developments in the countries like India, the electrical energy is used widely. With wide increase in the electrical load, the performance monitoring has become a crucial parameters. The transformer being the heart of any electrical system must be monitored for better performance. The performance of any electrical system may deteriorate due to the harmonics. As we know, the harmonics are generally generated due to the nonlinear inductive loads. Authors have presented the monitoring system for the transformer in this paper. The implementation of the monitoring system is elaborated and the performance is studied by the authors. Voltage, oil level, temperature and current are the major factors to be monitored. The on-line montoring is key facility for improvement of any system.

KEYWORDS: XBEE, Transformer, Tranformer monitoring, etc.

INTRODUCTION:

Performance monitoring of any electrical system gives wide benefits. As the performanc when monitored can help for identification of the maintenance requirement of the system. The failure of the power has to be avoided in any condition. The transformer if fails to work it creates a considerable loss in terms of money of industries. The main causes of failure of transformer are high temperature, oil level and the quality of the cables used. The overloading of the transformer can be the other reason for failure. If the performance is monitored continuously, it helps in avoiding any conditions which affects the performance of the transformer.

The faults associated with the transformer will be severe if the proper condition of the transformer is not maintained. Hence it is really important to monitor the various parameters related to the transformer. The data collected from the monitoring can also be utilised for the furthur analysis and understanding. Preventing the problems is the best way for electrical systems to work better. The monitoring plays a very vital role in keeping and improving the power quality.

SYSTEM DEVELOPED FOR THE TRANSFORMER MONITORING:

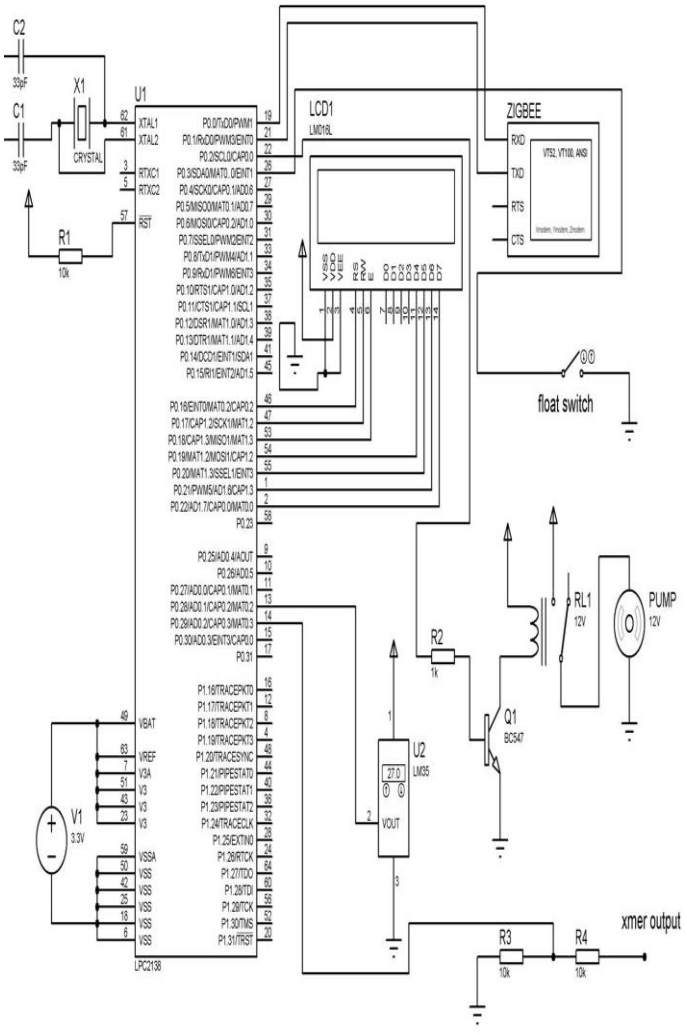

Figure 1: Main Circuit Diagram

The diagram above shows the circuit diagram to be implemeted for achiving the goals of monitoring. A bridge rectifier converts the supply to dc. The transducers are used as a sensors for changing parameters. The micro controller takes the control actions. The XBEE transmitter is connected on port D. A pull up resistor network is required for port C. The data is sent to the computer with the help of XBEE. The system improves the reliability of the transformer. It helps in initiative any corrective action whenever a change in the monitored

parametes is beyond certain limit. Following various configurations of the circuits and devices are used for the system development.

a. POWER SUPPLY:

The power conversion from 230V ac to 15V dc is achived with current rating of 2 A.

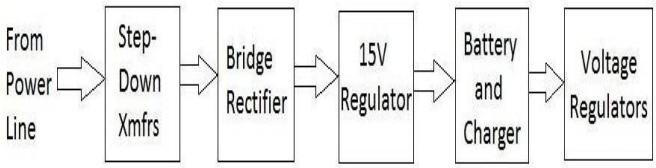

Figure 2: Power Supply

Table 1: Details of power supply

Sr. No.	Particulars	Details
1	Diodes used	KBP201G
2	Forward Voltage drop	1.1V
3	Current	2A
4	Output volatge ripple	10%
5	Capacitor	7645 µF, 50V
6	IC	KBP2501
7	Temperature range	-65 to 150 ◦ C
8	Peak inverse voltage	100V

The achieved dc supply with low voltage spikes will helps in better performance of the system.

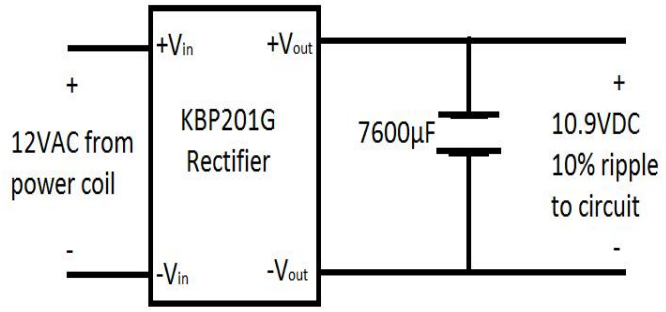

Figure 3 :Schematic of KBP201G Rectifier Circuit

b. BACKUP BATTERY POWER:

A simple configuration for the battery charger is shown in figure below. The

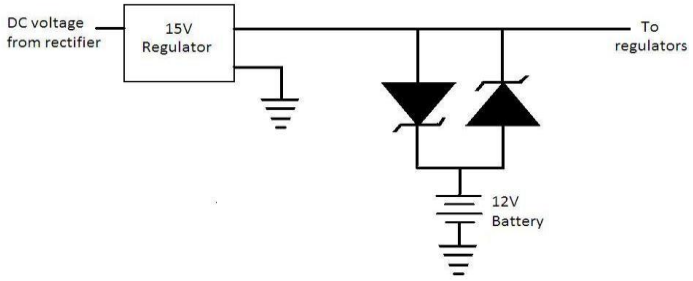

Figure 4 :Schematic of battery charger circuit

Battery is charged from the circuit in order to provide the backup supply. The two way diode circuit helps in bidirectional flow of the power in order to provide the charging and discharging facility to the battery.

c. VOLTAGE REGULATORS:

3.3 V voltage seperator or generator is used to provide the supply to the logic board.

LM3940 with input and output smoothing capacitors. Since the LM3940 requires an input voltage no greater than 5 volts, a 5V LM7805 regulator had to be used before the LM3840. The voltage used to supply the DC offset was a LM317T adjustable regulator with a 1.5kΩ trim pot.

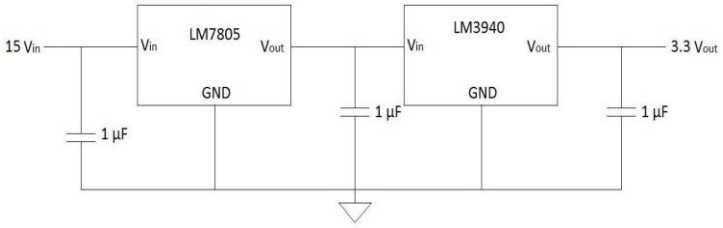

Figure 5: Schematic of 3.3V Regulator Circuit

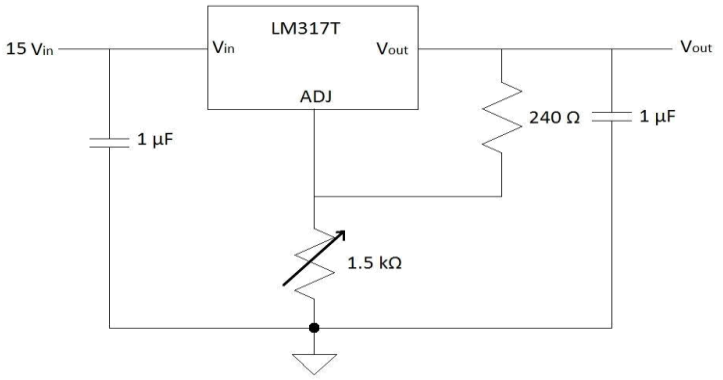

Figure 6: Schematic of Adjustable Regulator circuit

d. SENSOR DEVELOPMENT:

i. Implementation of Voltage Sensor:

It is a voltage divider with 5.1 MΩ and 10 MΩ. The power consumption is optimized here.

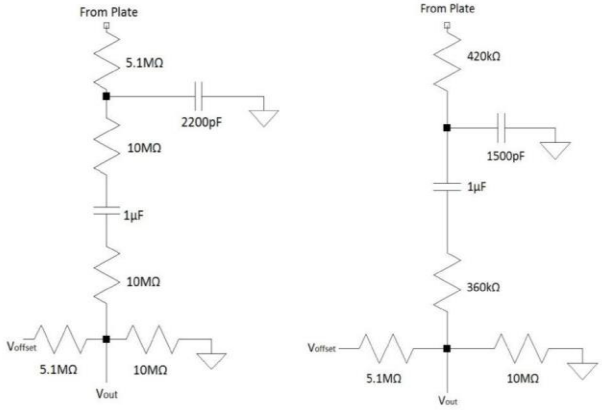

Figure 7: Schematics of 7200 and 120 volt sensors

ii. Implementation of Current Sensor:

Transdusers are used to measure the high value of current of the order 50A to 250A.

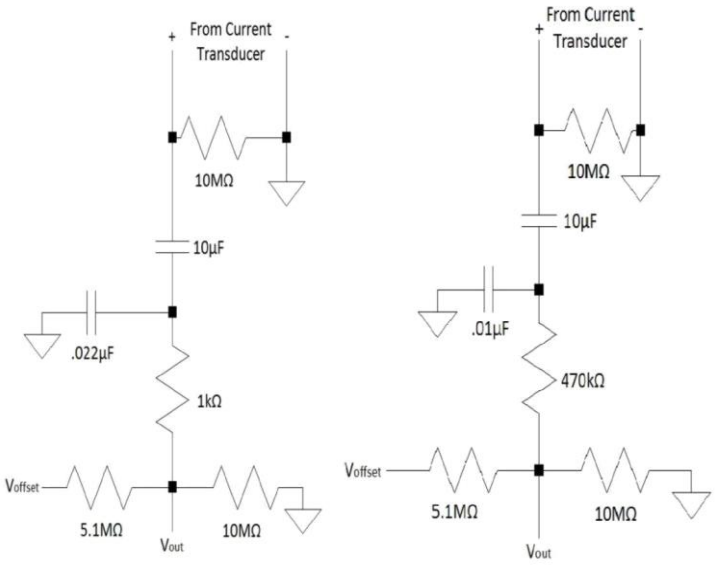

Figure 8: 5A and 2.5A Current Sensor Schematics

CONCLUSION:

The XBEE monitoring of the system gives added advantage avoiding damage to the pilot wire. It is one of the effective methods for data transmission from the transformer to the monitoring station. The monitoring of the transformer helps in avoiding the faults and improves the performance of the system. The sensors helps in identification of the abnormal conditions. The system monitors the overall performance of the transformer installed at any remote place and helps in improving the performance of the power system.

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