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Automains Failure System Control for Power Plant Applications Using PLC

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Abstract— It is imperative that the power to unit auxiliaries (to light up boiler and associated auxiliaries) is highly required. The unit bus scheme normally split up into two categories. The details regarding 0.4 KV Unit/Emergency bus schemes with Circuit breakers and Protections will be there in Unit auxiliary scheme shown as in diagram. The supply in Emergency bus scheme should be kept 'ON' at all times. In case of interruption it has to be recovered as early as possible. If recovery time going beyond 17 seconds, the main generation will be reduced gradually- causes major revenue loss. That's why both the emergency bus loads were tie-up with private DG system called AMF system.

Keywords— circuit breakers, Emergency bus, DG, AMF.

I. INTRODUCTION

A programmable logic controller (PLC), or programmable controller is an industrial digital computer which has been ruggedized and adapted for the control of manufacturing processes, such as assembly lines, or robotic devices, or any activity that requires high reliability control and ease of programming and process fault diagnosis. They were first developed in the automobile industry to provide flexible, ruggedized and easily programmable controllers to replace hard-wired relays and timers. Since then they have been widely adopted as high-reliability automation controllers suitable for harsh environments. A PLC is an example of a "hard" real-time system since output results must be produced in response to input conditions within a limited time, otherwise unintended operation will result.

PLCs can range from small "building brick" devices with tens of I/O in a housing integral with the processor, to large rack-mounted modular devices with a count of thousands of I/O, and which are often networked to other PLC and SCADA systems.

They can be designed for multiple arrangements of digital and analog inputs and outputs (I/O), extended temperature ranges, immunity to electrical noise, and resistance to vibration and impact. Programs to control machine operation are typically stored in battery-backed-up or non-volatile memory.

It was from the automotive industry in the USA that the PLC was born. Before the PLC, control, sequencing, and safety interlock logic for manufacturing automobiles was mainly composed of relays, cam timers, drum sequencers, and dedicated closed-loop controllers. Since these could number in the hundreds or even thousands, the process for updating such facilities for the yearly model change-over was very time consuming and expensive, as electricians needed to individually rewire the relays to change their operational characteristics.

When digital computers became available, being general-purpose programmable devices, they were soon applied to control sequential and combinatorial logic in industrial processes. However these early computers required specialist programmers and stringent operating environmental control for temperature, cleanliness, and power quality. To meet these challenges the PLC was developed with several key attributes. It would tolerate the shop-floor environment, it would support discrete (bit-form) input and output in an easily extensible manner, it would not require years of training to use, and it would permit its operation to be monitored. Since many industrial processes have timescales easily addressed by millisecond response times, modern (fast, small, reliable) electronics greatly facilitate building reliable controllers, and performance could be traded off for reliability

An emergency power system or Auto Mains Failure System is a standby generator to provide backup power resources in a crisis or when regular systems fail. They find uses in a wide variety from hospitals, scientific laboratories, data centers, telecommunication equipment and modern equipment and modern naval ships, Airports, small and large scale Industries. In recent years, large **units of power stations** are usually designed on a unit system basis.

A unit is the Steam Boiler (B) supplies steam to a Steam Turbine (T) which in turn connected with a Generator (G). To start a station Generator Boiler has to supply required steam for Steam turbine. Thus for starting the unit, the auxiliaries are supplied with power by station auxiliary transformer- which is powered from Grid. aval ships, Airports, small and Large scale Industries.

II. EXISTING SYSTEM

In our existing system there is the concept of implement relays and timers design for the AMF system to do its service in a Auto Mains Failure system is one, which has a Diesel engine connected with an Alternator (0.4 KV).Upon normal power interruption, will Start automatically to make up power requirements. In our existing process the connection process of circuit is done by wires. This may let expensive of cost and connections can be confused to perform wiring.

Existing System Block Diagram

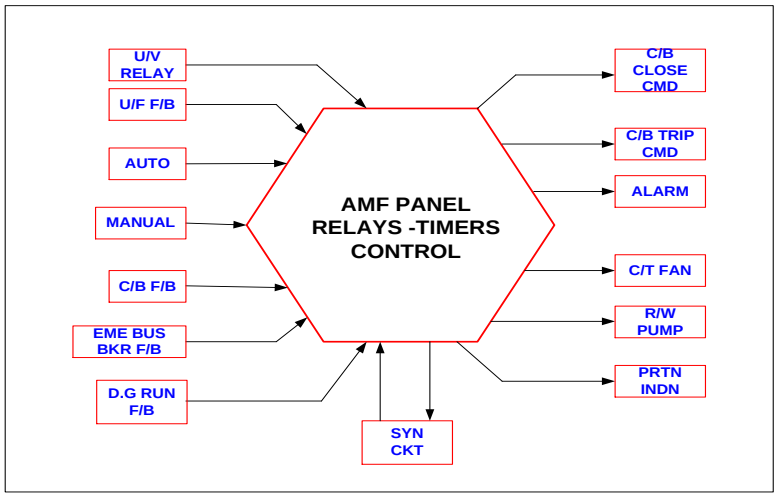

Fig. 1 block diagram

Disadvantages

It is not much efficient on supplying the power supply
Wiring connection is complex.
Automatic process of turn on the cooling system is failed

III. PROPOSED SYSTEM

Our proposed system is to implement PLC design for the AMF system to do its service in a highly structured and User-friendly approach. Auto Mains Failure system is one, which has a Diesel engine connected with an Alternator (0.4 KV). Upon normal power interruption, will Start automatically to make up power requirements. Interruption may cause severe problems (in Main Generation), hence it has to be restored by some means as quick as possible. This task is being managed by AMF system effectively.

Basic Amf System

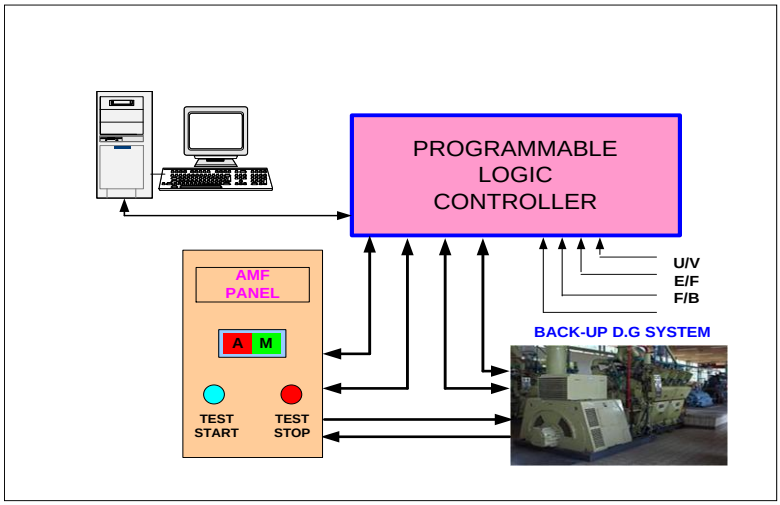

Fig. 2 basic AMF system

Auto mains failure (AMF) Panels is meant for controlling DG START / STOP sequence in accordance to the availability of utility power supply. We design & manufacture the AMF panels for various capacity & different make of Diesel EA set.

Circuit Diagram

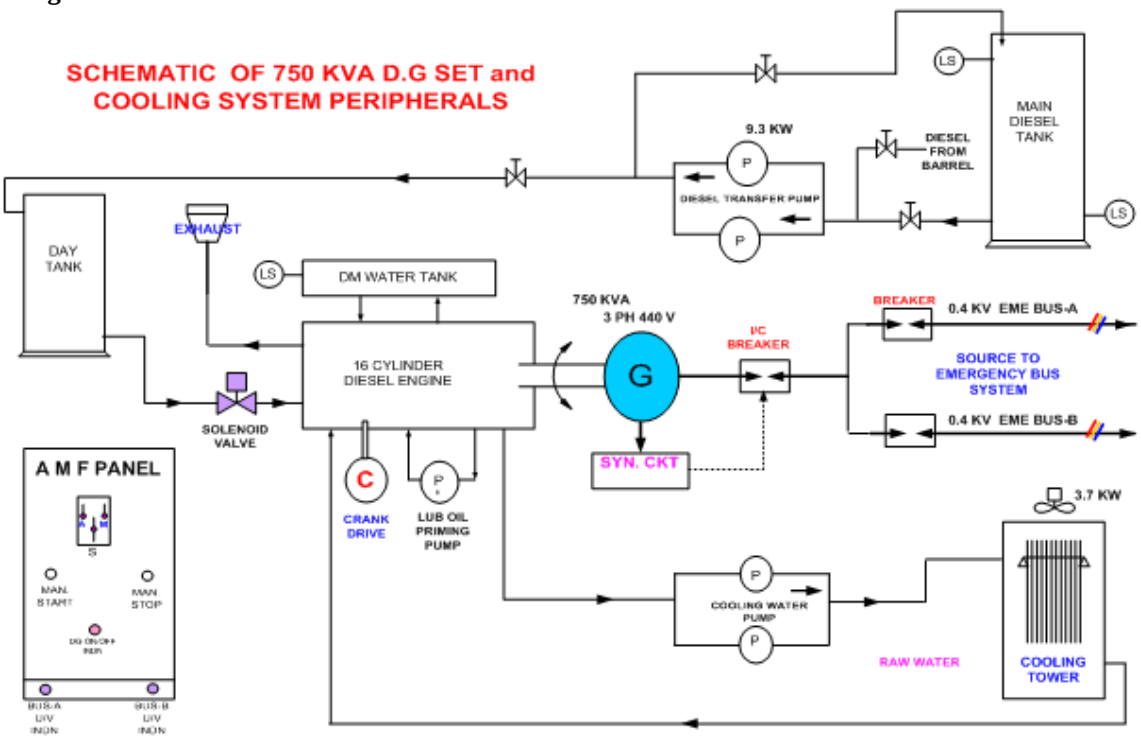

Fig. 3 Example of an unacceptable low-resolution image

Functions of Circuit Drives

AMF PANNEL: To monitor & control the system
DG SET: To give 0.4kv power supply to the emergency bus during fault condition.
CRANK DRIVE: To give crank (initial motion) command to the DG set.
DAY TANK: To give diesel to the diesel generator set.

Connection Diagram of Unit 0.4kv Bus and Back-Up D.G Set

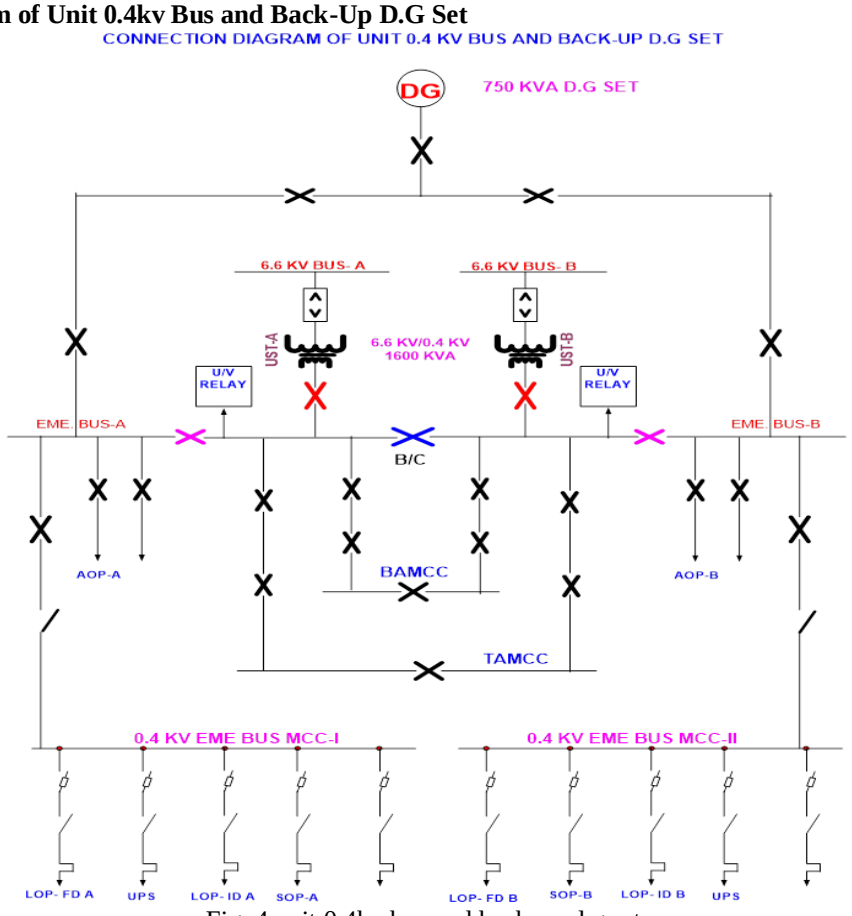

Fig. 4 unit 0.4kv bus and back-up d.g set

Advantages

We can avoid the damage due to overheating by providing proper lubrication.
It will check rated voltage gives to the generator
It will automatically turn on the cooling system

IV. CONCLUSIONS

Hence, our project deals how PLC may be introduced to monitor and control 3 phase machine and its own protections with cooling system equipment. Auto Mains Failure system is one, which has a Diesel engine connected with an Alternator (0.4 KV). Upon normal power interruption, will Start automatically to make up power requirements. Interruption may cause severe problems (in Main Generation), hence it has to be restored by some means as quick as possible. This task is being managed by AMF system effectively.

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