Review Article for Various Methodologies for Motor Bus Transfer System

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***Abstract*—The Main aim of power system protection & design to continuity of power supply to end user. For maintaining continuous operation motor when the primary source of electricity experiences an interruption and the operating transfers the motor load to an power source of electricity the alternative source, the load bus and the normal source. The bus transfer is complicated by the fact that each bus will unique voltage and phase characteristics during a transfer. These characteristics will depend on the type of loads connected to the bus. The main objective of this article is to compare the data of different methods and check the bus voltage and phase angle characteristics during each method. Also after comparing the values, most suitable transfer method will finally concludes the result**

***Index Terms*—BTS-Bus Transfer System, MBTS-Motor Bus Transfer System , O&M-Operation and Maintenance , UAT-Unit Auxiliary Transformer , SST-Station Service Transformer, GTB-Generator Transformer Breaker**

I. INTRODUCTION

During the normal operation of an electrical power station, a network of auxiliary electrical systems is powered by the the largest electrical loads in the plant are induction motors which serve various pumps, fans, and valves. In the case of a nuclear power station for instance, many of these induction motors drive cooling water pumps that are critical to the safe operation of the plant. Continuous operation these pumps are required and service cannot be interrupted for any significant period generator trip, all of the plant's induction motors are disconnected from their normal source of power, the station generator. In order to keep the disruption as short as possible and ensure the continuous operation of the critical loads, control relays are used to initiate a fast bus transfer in which the motors are reconnected to a secondary source. The loss of electrical power could result in damage to the equipment. he cost to replace the equipment and total revenue loss in production due to interruption in service of motor possibly justifies bus transfer system Motivation.

II. MOTOR BUS TRANSFER SYSTEM (MBTS)

There are many industrial applications that demand a continuous supply of electrical power. Industries use a large number of induction motors, to have two or more available power sources for their auxiliary systems. Typical Schematic Diagram As Shown In Figure 1.When one power source is lost because of an emergency condition such as a fault on the source bus, or when the source is intentionally removed such as when maintenance is required, there must be a way of transferring the de-energized auxiliary systems to one of the alternate power source buses It is for this reason that power distribution systems frequently include equipment to perform a power source bus transfer

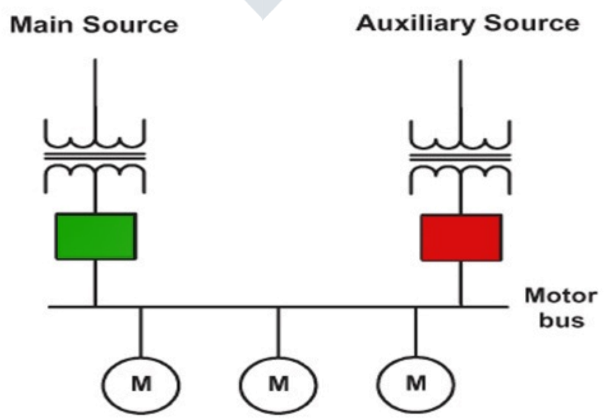

Figure.1 Typical single-line diagram of a two-breaker motor bus transfer scheme.

Under normal operation, the motor would be supplied by the normal power source. If for some reason the normal source breaker is opened, then the power for M must be supplied by the alternate power source. This is accomplished by closing the alternate source breaker. Transferring load from one power source bus to another is ordinarily referred to as a bus transfer The transfer may be initiated manually or automatically by a protective relay.

III. MBTS CONFIGURATION

1 Two Breaker scheme
2 Three Breaker Scheme

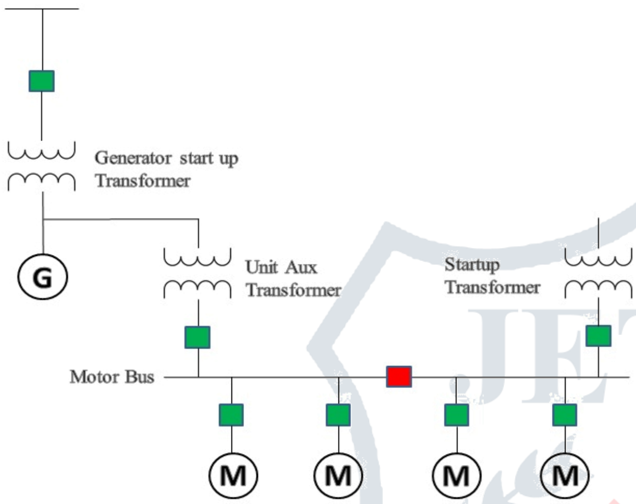

Figure.2 Two Breaker Configuration

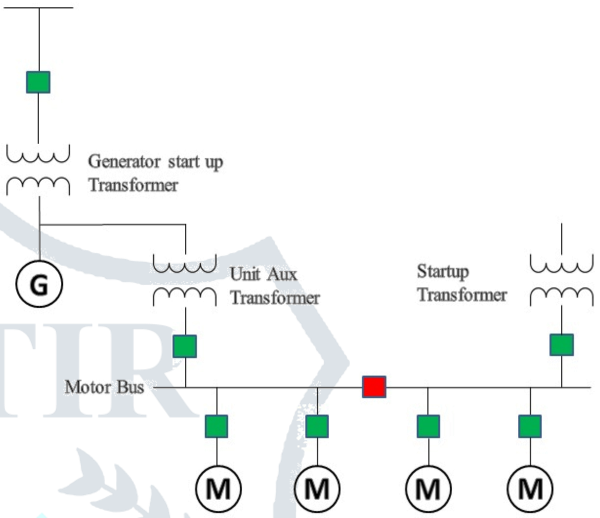

Figure.3 Three Breaker Configuration

Generating plants have at least two sources of power Figure 2 show a typical unit connected motor generator bus system. While the generating plant is in normal operation, the power needed by the auxiliary systems associated with the generator would be supplied by the Unit Auxiliary Transformer (UAT) connected to the bus between the generator terminals and the step up transformer (if available). In this plant layout, the plant auxiliaries must be supported with an alternate power source during normal unit start up and shut down sequences, as well when the UAT has to take out for maintenance or need to be disconnected because of system or generator faults. During these instances, the Station Service Transformer (SST) which is connected to the grid should cater to the power requirements of the auxiliaries. This is commonly called a two breaker scheme

In case of a combined cycle power plant or a typical process industry, there could be two separate sources from the utility supply system grid. As can be seen in Figure 4.2, The Incomer-1 is connected to Bus-1 and Incomer-2 is connected to Bus-2. Bus-1 and are interconnected through a Tie breaker, which could normally be open. This is typically called a Three Breaker configuration there is several bus transfer possibilities depending upon the choice of the Incoming feed to the motor buses. In case of a normally closed Tie breaker, the complete load including motor bus 1 and 2 is transferred between Incomer Sources 1 and 2. If the Tie breaker Source 1 and 2 supplies power to its own motor buses independently. If any one of the sources fail or trip, the motor bus connected to tripped source is transferred to the other source by closing the Tie breaker

IV. MBTS METHODS

1. Closed Transition
    - Parallel Transfer Method
2. Open Transition
    - Fast Transfer Method
    - In- Phase Transfer Method
    - Residual Voltage Transfer Method,

1. Closed Transition

The closed transition involves brief paralleling of the sources. The closed transition transfer is commonly referred to as a parallel transfer Parallel Transfer In this method, bus transfer is the parallel bus transfer scheme in which the start-up and the station service source are connected in parallel for a short time during the transfer of the motor bus between sources.

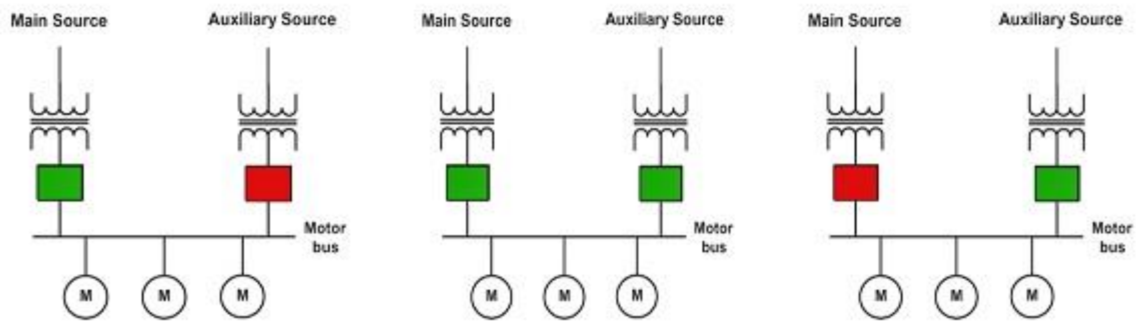

Figure 3.4 Sequence of opening and closing of circuit breaker for parallel transfer

2. Open Transition

The open transition involves the main source breaker is opened then closing of alternate source breaker is done while avoiding without paralleling of both the sources.

Fast Transfer Method, The main aim of the Fast Transfer is to minimize the dead time of the motor bus, when the main source breaker is opened. This minimizes the motor bus voltage and phase decay before the alternate source breaker is closed. The alternate source breaker will be closed by the Fast Transfer method if the phase angle between the motor bus and the alternate source is within or moves into the phase angle limit during the Fast Transfer Enable (Time) Window

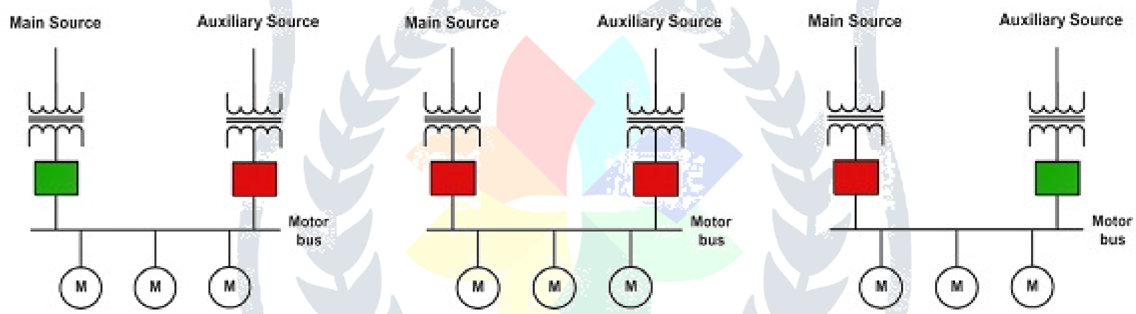

Figure 3.5 Sequence of opening and closing of circuit breaker for open transition

In-phase Transfer Method , The alternate source breaker will be closed using the In-Phase Transfer Method by predicting movement through zero phase coincidence between the motor bus and the alternate source during the In-Phase Transfer Enable Window. Closing shall also be supervised by an Upper and Lower Voltage Limit check on the new source and a Slip Frequency limit

Residual Voltage Transfer Method, in a residual voltage transfer, the motor bus is connected to the alternate source after the coasting down voltage on the motor bus falls to less than 0.33 pu. In this manner no matter what the phase angle is, the resultant V/Hz will not exceed 1.33 pu. The residual voltage transfer is slowest one and is not fast enough to maintain process continuity, as certain motor loads that cause rapid stalling may necessitate a restart of the motors on the bus.

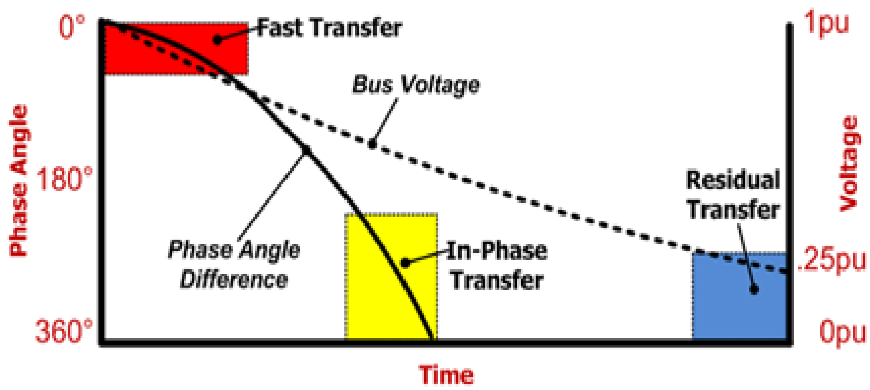

Figure 3.6 Bus Transfer Zone

V. CONCLUSION

From the literature survey it has been conclude that motor bus transfer system is efficient way to continuity of power supply in critical process industries.

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