

**Where showed in the one line diagram the Automatic Transfer Scheme (ATS) should be based on ABB's Relion Microprocessor Protective relays and provide the following features:**

The ATS Scheme shall take advantage of IEC-61850 GOOSE messages by limiting the number of cross unit wiring between cubicles.

The ATS Scheme shall be based on three relays to provide another level of selectivity for MTM schemes, one relay for each incoming breaker, and one relay for the tie breaker

It shall be possible to operate all breakers via its respective control switch when ATS scheme is in manual mode.

An external lockout relay shall be used to indicate if there is a fault in the bus and to prevent automatic transfer operation

It shall be possible to adjust timers and under voltage settings through the Human Machine Interface (HMI) of the relay.

It shall be possible to adjust timers and under voltage settings through the Web HMI without the need of any external software other than a web browser

To increase the reliability of the GOOSE communications between the devices the Microprocessor relays shall support either HSR or PRP redundancy communications

The ATS shall have a 43 M/A selector switch as indicated in the sequence of operations

**The sequence of operations for the ATS scheme would be as follows**

### **Selector Switches**

*43 M/A Manual/Auto Switch*

Describes manual or automatic operation for the transfer scheme

### **Normal Mode of Operation**

The normal mode of operation would be with device 43 in "Automatic" mode, both incoming lines will be normally closed and tie breaker will be open.

### **Electrical interlock**

The two incoming lines are electrically interlocked such that all three breakers cannot be closed at the same time, and incoming line breakers cannot be paralleled, except during re-transfer when operating under automatic mode.

In event of the protective relay trip via lockout relay (dev 86), the opened main and tie cannot be closed until the fault is removed, and lockout relay is reset.

**Manual mode - (selector switch (DEV 43) in 'manual')**

Each main and tie breaker can be closed by their respective breaker control switch (DEV CS) subject to electrical interlock above.

**Automatic mode - (selector switch (DEV 43) in 'automatic')**

(a)

Loss of voltage (UV or NEG SEQ) on either incoming line will after a time delay cause its main breaker to open and then the tie breaker will close, provided that voltage is present on the other incoming line. When the voltage is restored, the main breaker would after a time delay automatically close and then the tie breaker will open.

(b)

However, if the voltage is subsequently lost on the second line after the transfer has occurred as described in (a) above, the second line will after a time delay open and then the tie would open. Return of voltage on either line will after a time delay cause its main breaker to close, and then the tie would close. When voltage returns to the other line, the main breaker will after a time delay close, and then the tie breaker will open, restoring the system to normal.

(c)

Simultaneous loss (or restoration) of both sources will after a time delay cause both main breakers to open (or close), leaving the tie breaker open.

**Bill of Material**

43 M/A Manual/Auto switch

(3) Lockout Relays

(2) REF615 Ordering Code: HAFDDADAFHE5BBN12E for the Mains

(1) REF615 Ordering Code: HAFFFAFAFHE5BBN12E for the Tie

(1) Ethernet Switch\*