BACKUP PROTECTION

THE PRINCIPLE OF BACKUP PROTECTION WITH OVERCURRENT RELAYS FOR ANY RELAY X, BACKING UP THE NEXT DOWNSTREAM RELAY Y IS THAT X MUST PICK UP;

A) FOR ONE THIRD OF THE MINIMUM CURRENT SEEN BY Y AND

B) FOR THE MAXIMUM CURRENT SEEN BY Y BUT NO SOONER THAN 0.3S AFTER Y SHOULD HAVE PICKED UP FOR THAT CURRENT.

PRIMARY AND BACK UP PROTECTION

PRIMARY AND BACK UP PROTECTION SCHEMES

PRIMARY PROTECTION SCHEME

PRIMARY PROTECTION SCHEME IS RESPONSIBLE FOR THE REMOVAL OF THE FAULT AS SOON AS POSSIBLE WHILE DEENERGISING AS LITTLE OF THE SYSTEM AS REQUIRED TO ACHIEVE THIS.

PROBLEM: SOME PRIMARY AND BACK UP PROTECTION SCHEMES

COMPONENTS MAY FAIL HENCE THE NEED FOR BACK UP.

WHEN A SYSTEM IS ADEQUATELY PROTECTED, THERE IS ENHANCED ELECTRICAL POWER SYSTEM SECURITY. SOMETIMES, THE PROTECTION SCHEME COMPONENTS FAIL. THIS AFFECTS THE SYSTEM PERFORMANCE AND SYSTEM INTEGRITY.

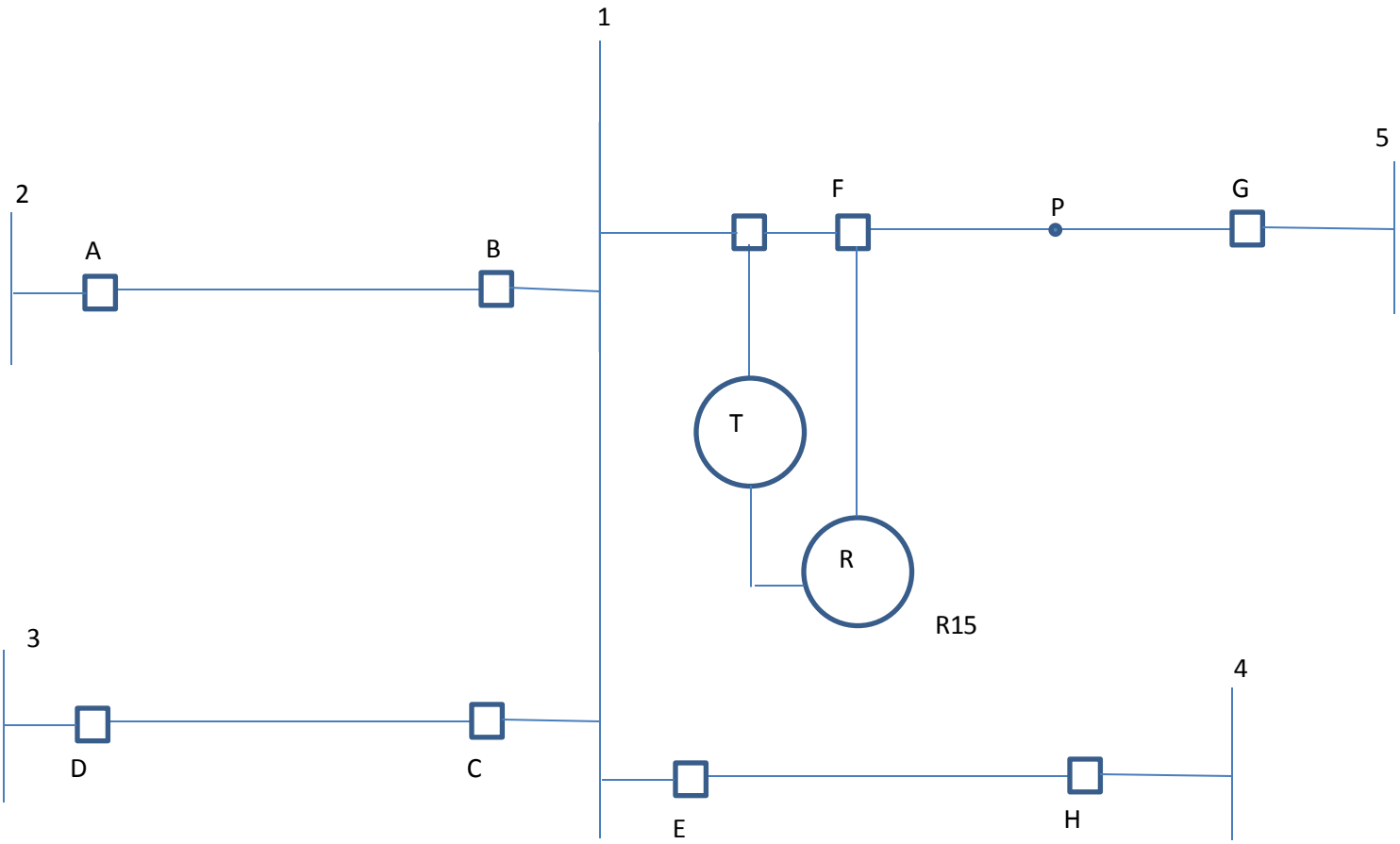

DIAGRAM SHOWING BACKUP PROTECTION IN A POWER SYSTEM

CONSIDER THE POWER SYSTEM SHOWN IN THE DRAWING

FOR A FAULT AT P

PRIMARY PROTECTION SCHEME WILL OPEN BREAKER F AND BREAKER G

BACK UP OPTIONS

DUPLICATE PRIMARY

IT IS EFFECTIVE BUT EXPENSIVE

PROBLEMS ASSOCIATED WITH DUPLICATE PRIMARY PROTECTION SCHEMES

(THE DUPLICATE PRIMARY PROTECTION SCHEME SHARE COMPONENTS EG. CB, BATTERIES WHICH OPERATE BREAKER TRIP COIL, CTS AND VTS)

BOTH PRIMARIES COULD BE EFFECTED BY THE FAILURE OF ONE OF THESE COMMON COMPONENTS.

{THE DUPLICATE PRIMARY PROTECTION SCHEME HAS THE PROBLEM OF COMMON MODE FAILURE.}

HENCE

REMOTE BACKUP PROTECTION SYSTEM

REMOTE BACKUP PROTECTION SYSTEM

THE POSSIBILITY OF A COMMON MODE OF FAILURE WITH THE PRIMARY PROTECTION SYSTEM IS SLIGHT.

IT IS INCOPORATED TO THE PRIMARY PROTECTION SYSTEM; AT THE REMOTE END.

PROBLEMS ASSOCIATED WITH THE REMOTE BACKUP PROTECTION SYSTEM

IT ISOLATES A LARGER PART OF THE SYSTEM IN THE EVENT OF A FAULT OR DUE TO FALSE TRIPPING.

AN EXAMPLE TO ILLUSTRATE PRIMARY AND REMOTE PROTECTION SYSTEMS

EG.

IF PRIMARY PROTECTION AT BUS 1 FAILED TO CLEAR FAULT AT P (IF WE ASSUME THAT THE BUS 5 END OPERATES CORRECTLY,)

THE PRIMARY PROTECTION SYSTEM AT 2,3,4, CAN BE MADE OR ARRANGED TO TRIP A,D,H.

THIS MEANS THAT

PROTECTION SYSTEMS AT 2,3 & 4

CAN BE CONSIDERED TO BE PRIMARY PROTECTION SHEMES FOR FAULS ON LINES 2-1, 3-1 AND 4-1 AND

REMOTE BACKUP FOR THE PRIMARY PROTECTION AT BUS 1 FOR LINE 1-5

THERE SHOULD BE A DELAY TO REDUCE THE NEUSANCE VALUE ASSOCIATED WITH BACKUP PROTECTION ESPECIALLY REMOTE BACKUP PROTECTION.

HENCE THE BACKUP IS MADE SLOWER IN ACTING.

THE DELAY IS CALLED COORDINATION TIME DELAY.

THIS HELPS TO CORDINATE THE OPERATION OF THE PRIMARY AND THE BACKUP PROTECTION SYSTEM.

AN ALTERNATIVE BACKUP COULD BE TO TRIP B,C,E LOCATED AT BUS 1 CALLED LOCAL BACKUP PROTECTION.

THIS LOCAL BACKUP PROTECTION IS USED TO BACKUP THE FAILURE OF CB RESPONSIBLE FOR FAILT CLEARING (IN THIS CASE F)

ALSO CALLED BREAKER- FAILURE PROTECTION

NOTE THAT PRIMARY AND LOCAL PROTECTIONSYSTEMS SHARE CERTAIN SUBSYSTEM AND SUBSTATION COMPONENTS AND DEVICES

EG. STATION BATTERY

CERTAIN MODES OF FAILURE ARE COMMON TO THE TWO SYSTEMS

HENCE A WELL DESIGNED PROTECTION SYTEM WOULD HAVE SOME REMOTE BACKUP PROTECTION.