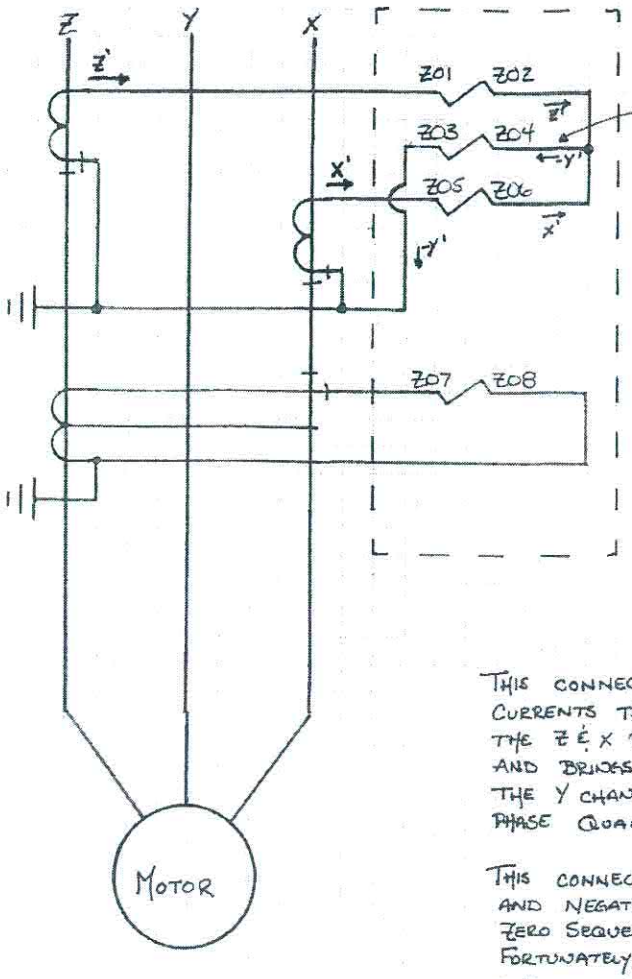
Subject	Reviewed By	Reviewed Date	Page
710 & 751 w/ 2 CT's & Neutral			1 of 1

Item

Check



BY DEF. OF SYMMETRICAL COMPONENTS

$I_0 = I_A + I_B + I_C$ ASSUME $I_0 = 0$ TO ANALYZE ALL EVENTS OTHER THAN GROUND FAULT.

THE SUMMED CURRENT = $-Y'$ BASED ON KIRCHHOFF'S CURRENT LAW.

$Z + Y + X = 0$ ← ASSUMPTION THAT GROUND FAULT DOES NOT EXIST.

$-Y \quad -Y$

$Z + X = -Y$

$Z \propto Z'$ & $X \propto X'$

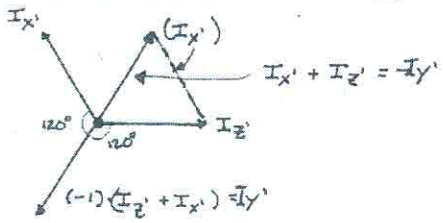
$\therefore \boxed{Z' + X' = -Y'}$

ABOVE, WE ASSUMED NO GROUND FAULT EXISTED. IF A GROUND FAULT DOES OCCUR, THE ZERO SEQUENCE C.T. WILL SENSE IT, & THE RELAY WILL OPERATE AS DESIRED.

THIS CONNECTION BRINGS THE Z-PHASE & X-PHASE CURRENTS THROUGH THE RELAY UNALTERED, SUMS THE Z & X PHASES TOGETHER, RECREATING (-)Y-PHASE, AND BRINGS THE RESULTANT BACKWARDS THROUGH THE Y CHANNEL, GIVING THE RELAY 3 ACCURATE PHASE QUANTITIES.

THIS CONNECTION ACCURATELY RECREATES POSITIVE AND NEGATIVE SEQUENCE CURRENTS, HOWEVER, ZERO SEQUENCE (GROUND) CURRENTS ARE LOST. FORTUNATELY, THE PROTECTED ZONE IS UNGROUNDED AND A DEDICATED GROUND CT EXISTS TO DETECT ANY GROUND FAULTS IN THE PROTECTED ZONE.

EXAMPLE CASE: BALANCED PRIMARY

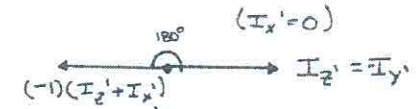


$I_{Y'}$ RECREATED CORRECTLY

EXAMPLE CASE: UNBALANCED PRIMARY

(X PHASE IS OPEN)

[EXPECTED: MOTOR WILL "SINGLE-PHASE" ($I_Z = -I_Y$)]



$= (-1)(I_{Z'} + 0)$

$= -I_{Z'} = I_{Y'}$

$I_{Y'}$ RECREATED AS EXPECTED