6.3.2. Series d-c generator

As shown in fig. (6.9), the field winding of this type is connected in series with the armature, so , such a winding will be constructed from low number of turns and high cross- sectional area wire.

The c/c's of this type is quite different compared to others, that, the terminal voltage of this generator will be very low and equal

 $E_R = Ke \ \Phi_R \ n$, at no-load and it start to increase with I_L until the saturation, then it starts to decrease as in fig. (6.10) and reaches zero when $I_L = I_{s.c.}$ (the short circuit current) this c/c's obey the relation $V_t = E - I_L (R_a + R_f)$



Fig.(6-9) Equivalent circuit of series

To control this voltage a diverting resistance R_D will be connected in parallel with field winding in order to divert the field current (Current Divider) and reduce or increase the effect of the field winding.



Fig.(6-10) O.C.C and External c/c's of series generator $I_{s.c}$

This generator used in special application. It is used as a heavy current supply in welding machines, and as a compensator or booster in long d-c voltage feeders, due to its reversed external c/c's before saturation.

6.3.3 Compound d-c generators:

This type of generator designed to get ideal external c/c's by compensation the drop in terminal voltage in shunt generator due to loading, by the increase in terminal voltage of the series generator during load increase. Hence, by regulating series and field currents in compound gen. a group of different external c/c's can be achieved as shown in fig. (6.12). Three different external c/c's of commutative compound generator, these are, Over compound, flat compound, & under comp. These c/c's furnishes suitable power supply for different loads. The differential compound gen. used in special control circuit.





(B) Long compound

Fig.(6-11)



Fig.(6-12) External c/c's of different self-excited d-c generators