CHAPTER 5

DISCUSSION

5.1 Discussion of Some of the Assumptions Made

The method used in the calculation of load shedding scheme assumes that:

1) No loss in Transmission Lines.
2) Load has no inertia.
3) The shedding of each load block is affected by simultaneously disconnecting small elements of load which are uniformly distributed over the isolated system.
4) Governor response is absent.

For the first assumption, since only a part of the system is under consideration it is possible to assume that the loads are close together electrically, the impedance drops between the machines will be small, and all the machines on the isolated system can be assumed to slow down at the same rate.

For the second assumption, since the effect of inertias of rotating loads on the system is small and cannot readily be determined, its effects are not included in the calculation.

It is important that the conditions defined in the third assumption be closely satisfied since these will prevent additional system fragmentation resulting from the load shedding.

The implementation of a scheme which exactly satisfies the conditions of assumption 3 is very difficult, if not impossible. Although it is possible, but expensive, to select small load elements which are uniformly distributed, it is only by chance that these may be disconnected simultaneously. The reason is that the load elements are tripped by breakers which do not necessarily have equal operating times.

The difficulty created by the lack of time co-ordination can be partially obviated by dividing each of the load blocks into a number of elements so small that its effect on system stability is minimal when shed alone. The optimal size of these elements could be determined by digital computer transient stability studies.

Governor action for increasing unit input power during the emergency has not been included in the calculation since it is difficult to generalize as to overall effect it will produce. The assumption of governor response absence will hold in practice only when an isolated area is devoid of governor responsive spinning reserve. Otherwise, the assumption is valid only for approximately the first two seconds following a disturbance.[1]

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[1]B. Porretta and R. D. Brown, "Underfrequency Protection of Electrical Power System," (presented to Power System Planning and Operating Section at Spring Meeting Canadian Electrical Association, Toronto, Ontario, April, 1968), p. 11.

For Region II of EGAT system, since the generations were programmed to supply only a minimum permissible load and the rest of generations were imported from EdL and Region I, there will be a little spinning reserve available in case of seperating Region I and Region II. Also, the governor response of the units in Region II were about five seconds and only about 20 percent of the total spinning reserve could be obtained in the first five to ten seconds following the disturbance.[2] In addition, the result of the studies show also that the underfrequency relay used in Region II requires less than 2 seconds to decide that load needs to be shed. Therefore, it is reasonable to omit governor action in developing a load shedding program for Region II of EGAT. system.

5.2 Discussion of the Result from the Studies

In developing an optimum load shedding program, one critical system parameter that greatly affect the development is the rate of load reduction per one percent frequency reduction, for the final level-off frequency is very much dependent upon its value. For Region II of EGAT system, the value of 0.79 % is suggested from only one experiment and at only one power station. It is possible that the experiment performed was not accurately enough due to instrumental

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[2]H.E. Lokay and V. Burtnyk, "Application of Underfrequency Relays for Automatic Load Shedding," IEEE Transactions, Vol. PAS-87, No. 3, March, 1968, 780.

and personal error, for all readings were made from the recorder of the power station and substation. Until the value of D is studied more completely and accurately, the optimum load shedding program can be obtained.

Also, the effect of load reduction due to voltage reduction during emergency condition is not included in the calculation since it is difficult to know how voltage will change on a generalized basis.

From the result shown in Table 4.2, the frequency setting is beyond the frequency range of 47.0 - 50.5 Hz of the FTG relay. It is now apparent that the FTG relay is not suitable for initiate load shedding in the Region II.

By comparing the load shed at each step in Table 4.2 with the load required to be shed when outage occurred in Table 3.2 and 3.3, a good agreement will be achieved. This shows that the load shedding scheme developed is suitable for the Region II.