Demand Based Operating System of Power Compensating Controller

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Abstract— **This paper is to provide a power distribution control system which can provide the solution of 1 or 2 hours power cutting that distribution side. The system controls the current level electrical loads to maintain the total electrical power demand during a demand interval within certain predetermined limits. The demand forecaster makes periodic projections of the metered demand to the end of the demand interval based upon the current rate of energy consumption (instantaneous demand) and the accumulated energy consumption during the demand interval. If the projected value indicates that a demand peak will occur, the system signal interrupting the load to prevent the occurrence of the peak. Conversely, if the system detects a projected low value of the demand, a "restore" condition exists whereby the load is turned on to take advantage of the available electrical capacity.**

***Index Terms*— Buzzer, Comparator Unit, Current limiter, Relay, Timer Device.**

I. Introduction

Power demand is defined as the ratio of the required power to actual or generated power.

Traditionally, this problem of power demand has been solved by weighted least square method, by taking the derivative of demand with respect to price. But it is found that, it is more difficult to calculate in case of transmission congestion.

Also, stochastic controller model has been designed at the receiving. Keeping flexibility and cost as constrains which is economic but not timeoriented or safety in nature.

This paper invention relates to a system for controlling the operation of electrical loads. The purpose ofthe demand controller model in this paper is to maintain the total electrical power demand of the load at or below a predetermined peak demand. The concepts of this invention may be used for controlling a single electrical load but are preferably employed in controlling a plurality of electrical loads on a priority basis.

An electrical power demand is metered[2] usually on the basis of a predetermined demand interval which may be, for example, a 15 minute, 30 minute or 60 minute demand interval. During this demand interval the consumption of electrical energy is accumulated and averaged. In addition to kilowatt-hour usage the customer can access a substantial additional charge based on the maximum value of this average during one or more billing periods. Thus the past systems have been devised for maintaining the demand below a predetermined peak value during the demand interval thereby limiting this peak demand charge. Accordingly, one objective of this model is to provide a demand controller having an improved forecasting technique. Another this model is to provide a demand control technique that can be implemented relatively and simply without the need for excessive complex data processing and logic circuitry.

A demand control apparatus connected to a group of loads which is adapted to shut off the power supply in accordance with their set priority levels. Thus the total quantity of working current in the group of loads will be equal to or lower than a set quantity of current.

II. METHOD TO REDUCE DEMAND FOR USING POWER COMPENSATING CONTROLLER

This model provides a demand controller or demand forecaster which makes periodic projections of the metered demand to the end of the demand interval based upon the current rate of energy consumption (instantaneous demand) and the accumulated energy consumption during the demand interval. If the projected value indicates that a demand peak will occur, the system signals a "shed" condition for the load. The load may then be turned off to prevent the occurrence of the peak. Conversely, if the system detects a projected low value of the demand, it signals a "restore" condition for the load.[5] The load may then be turned on to take advantage of the available electrical capacity. A preset target value in the demand controller determines the value of the threshold for "restore" and "shed" conditions. The "shed" condition occurs when the projection exceeds the target value, while the "restore" condition occurs when the projection is below the target value by a certain percentage such as 75% below the target value. Thus, there is a dead band of 25% in which no action is taken one way or the other. The target, of course, is an adjustable parameter of the system.

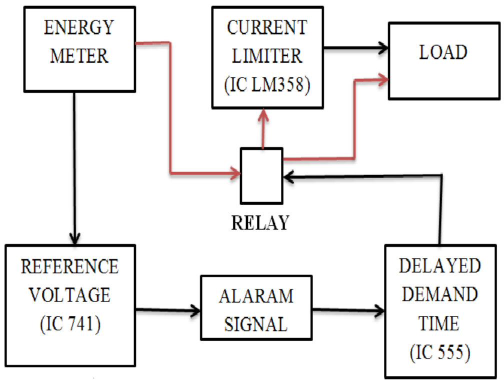

Fig 1.Power Compensation Controller

A.Voltage Comparator

An electronic circuit[4] that produces an output voltage or current whenever two input levels simultaneously satisfy predetermined amplitude requirements. A comparator circuit may be designed to respond to continuously varying (analog) or discrete (digital) signals, and its output may be in the form of signaling pulses which occur at the comparison point or in the form of discrete direct-current (dc) levels.

B.Current Limiter

The inverting input of the comparator LM358 i.e., pin 2 is given to the fixed voltage i.e., in the ratio 47k: 10k and the non-inverting input of the comparator is pulled down and is given to sensing terminal[4]. When the resistance between the positive supply and the non-inverting input is high then resulting is the non-inverting input less than the inverting input making comparator output as logic low at pin1. And when the resistance falls making available a voltage to the non-inverting input higher than inverting input, so that the output of comparator is logic high.

C.Timer Unit

In this circuit, the 555 timer is configured as a one shot multivibrator that is triggered by the comparator. In this monostable mode, the timer generates a fixed pulse of about 4 seconds whenever the2 hours trigger voltage falls below Vcc/3. When the trigger pulse voltage applied to pin2 falls below Vcc/3 while the timer output is low, the timer's internal flip-flop turns the discharging Tr. off and causes the timer output to become high by charging the external capacitor C2 and setting the flip-flop output at the same time.

D,Relay

Relays are simple switches which are operated both electrically and mechanically. Relays consist of a n electromagnet and also a set of contacts. The switching mechanism is carried out with the help of the electromagnet.

III. SCENARIO OF DEMAND STATUS

From the table 1, we can analyse power satage is rapidly incresing,because the required power is greater than the generated power.In moder life all the equipment are manufactured by automation[1].So we can operate only by an electrical supply. But power generation is less,thus load compensation is needed in this situation.

YEAR	GENERATER POWER (MW)	REQUIRED POWER(MW)
2005	47570	47872
2006	53853	54194
2007	60445	61499
2008	63954	65780
2009	64208	69668
2010	71568	76293
2011	75101	80314
2012	76705	85685

Table 1.Power satage status

We can use of another terminology to connect one controller near by the energymeter. It can monitoring the supply voltage operate peak load time. In government howmuch demand identify to shutdown duration is alloted,instead of controller unit is fixed that time particular amount of current passing through the consumer house.

In that particular duration, consumer can decide to choose the load.when the load exceedes, it will automatically trip the controller,then desired valuecan be choosed to turn on supply.

In another case study,[7] most of the domestic consumer using uninterrupted power supply, which act as load unit, and is directly connected by main line itself. This impact of demand rate rise to shown in table 2[3].

We can use this controller to operate as a similar function of uninterrupted power supply. So that unused power is gained that time and corresponding energy loss is reduced.

YEAR	PEAK DEMAND(MW)	PEAK MET(MW)
2005	7647	7555
2006	9375	8207
2007	8860	8624
2008	10334	8690
2009	9700	9211
2010	11125	9813
2011	11728	10438
2012	12813	10668

Table 2.Year wise Demand Status

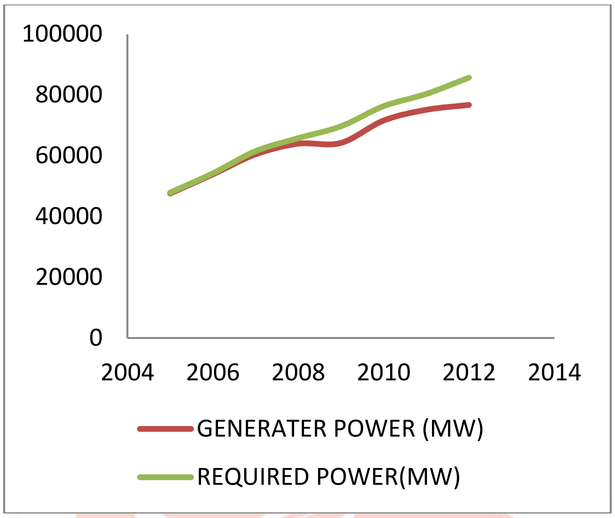

Fig 2.Power Satage Status

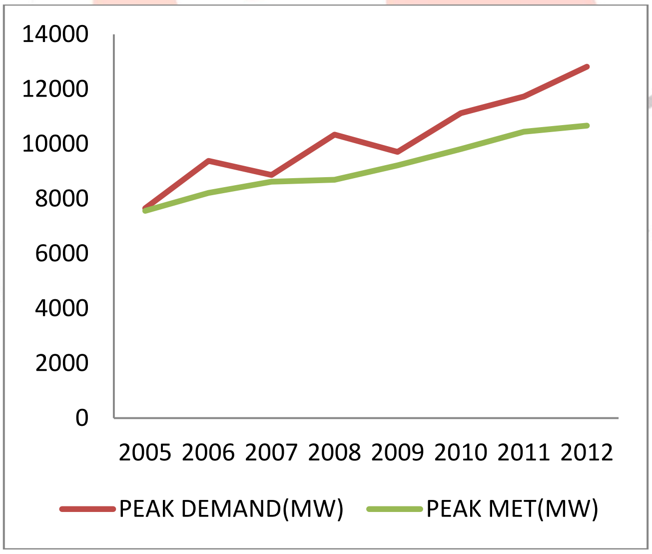

Fig 3.Year wise Demand Status

IV. APPENTIX FOR CONTROLLER DIAGRAM

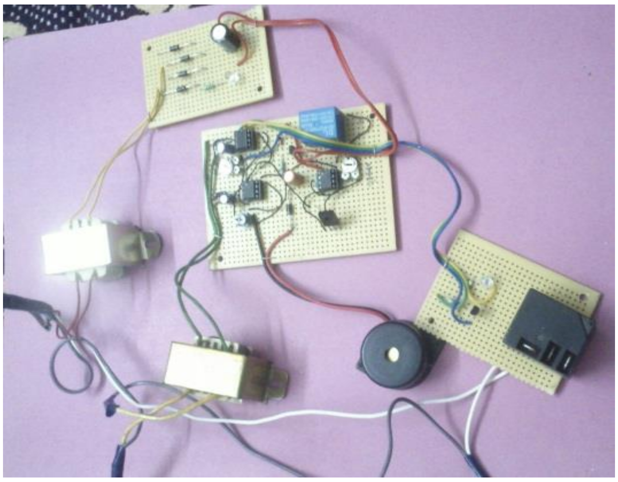

Fig 3.Entire Appentix of Controller

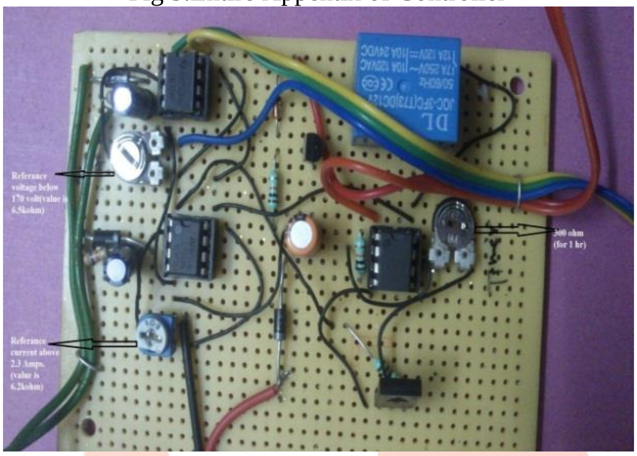

Fig 5.Power Compensation control unit

V. CONCLUSION

The demand control apparatus is adapted to compute the quantity of working current in each of the loads from a difference between the total quantities of working current before and after shut-off in that load and to re-start the load within a range defined by a difference between a set quantity of current and the total quantity of working current after shut-off in the load in accordance with its priority level. The power distribution control system provide reliability by absents of 2 hour power cut, also it includes a center communication terminal and a plurality of customer's communication terminals operatively connected to the center communication terminal through transmission lines.

In future, the controller can be used in all area which replaces inverter units or uninterrupted power supply.

REFERENCES

[1] Rob J.Hyndman et al,"Density Forecasting for Long-Term Peak Electricity Demand", IEEE Transaction on Power system, 2010, Vol.25, No.2.

[2] Iordanis Koutsopoulos et al,"Optimal Control Policies for Power Demand Scheduling in the Smart Grid", IEEE Journal on Selected Areas in Communications, 2012, Vol.30, No.6.

[3] Lin Xu et al,"Transmission-Constrained Residual Demand Derivative in Electricity Markets", IEEE Transaction on Power System, 2007, Vol.22, No.4.

[4] M.N.Marwali and A.Keyhani,"Control of Distributed Generation System:Part I: Voltage and Current control IEEE Transaction on Power electronics Vol.19 2004.

[5] S.Anand and B.G.Fernandes"Steady State Performance analysis for load Sharing in DC Distributed system, "in Proc.10th Int.Conf.Environ.Electr.Eng.,May 2011,pp. 1-4.

[6] L.Zhang,T.Wu, Y.Xing, K.Sun, and J.M Gurrero,"Power Control of DC micro grid using DC bus signaling, "in Proc,26th Annu,IEEE Appl.Power Elecron,Conf,Expo.,March 2011.

[7] B.Maurhoff and G.Wood,"Dispersed Generation to Reduce Power costs and improve service Reliability, "in Proc.Rural Electric Power Conf.,2000.

[8] S.V.Iyer,M.N.Belur, and M.C.Chandorkar,"A Generalized Computational method to Determine Stability of a Multi inverter microgrid," IEEE Transaction on Power Electron.,Vol.25 No.9,pp.2420-2432,Sep. 2010.