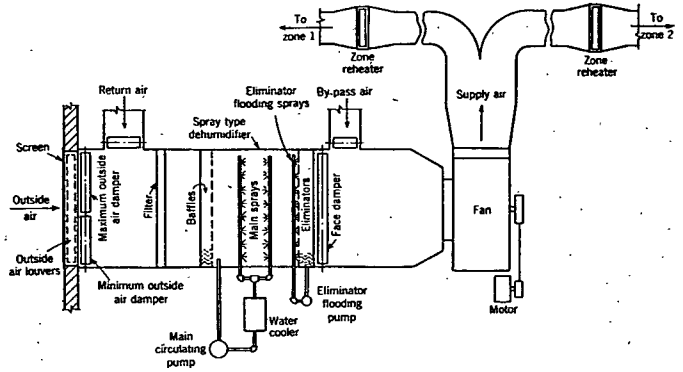


FIG. 4. CENTRAL SYSTEM WITH ZONING BY REHEATING

thermal effects of the system is one item to be considered in studying the comparative effectiveness, particularly where adequate zoning is to be provided. Full advantage of diversity and non-simultaneous peak load requirements can be taken in determining the dehumidified air quantity where adequate zoning is provided.

The characteristics and requirements of the load frequently are the deciding factors. Wide, non-simultaneous variations in load between spaces or parts of the same space indicate the necessity of zoning. Isolated spaces having a short time occupancy or brief load duration may be handled by units advantageously at times. The occurrence of simultaneous heating and cooling requirements in spaces having the same exposure or on the same zone presents a problem to be studied. Ability to maintain conditions during the intermediate seasons without the use of refrigeration must be considered at all times, particularly in those applications where a high internal load exists.

The matter of space requirements may rule out one type of system or another. The avoidance of the use of rentable and usable space for equipment and ductwork, in office buildings, stores, etc., is most im-

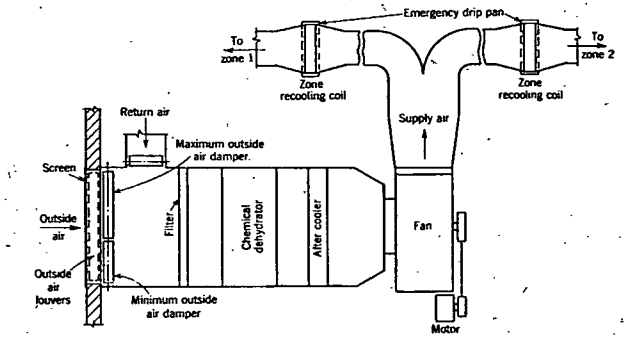


FIG. 5. SUMMER CENTRAL SYSTEM WITH ZONING BY RECOOLING

portant since the loss of revenue is directly chargeable to the operating cost of the system. Consideration of the spaces available with respect to the type of system and method of distribution used and their effect on over-all cost is essential.

Initial cost is given first consideration all too frequently. While elaborately designed installations are seldom justifiable, proper consideration must be given to operating costs and maintenance, performance required, and the life of the system. The increase in cost incurred by suitable zoning can be offset partially by reduced quantities of dehumidified air, and partially by reduced refrigeration requirements. In the end it may prove less expensive than an unsatisfactory single zone system. A small increase in initial cost to provide better access to equipment, better airflow and distribution, and better zoning, usually will pay for itself.

Operating costs often receive too little attention. Proper relationship between equipment selected and the load to be carried must be obtained.

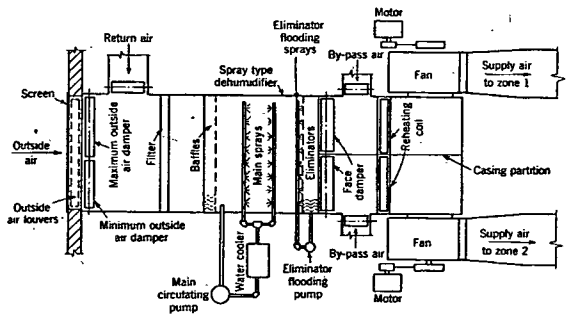


FIG. 6. CENTRAL SYSTEM USING MULTIPLE FANS WITH BY-PASSES AND REHEATING FOR ZONING

Cooling systems in general operate at maximum capacity less than 20 per cent of the time and heating systems operate under design conditions but a few days in the year. Good partial load performance is essential for low operation costs. Proper zoning, good arrangement and selection of equipment and type of system all tend to reduce operation costs. Central systems having the bulk of equipment in a central location properly arranged, and having only the equipment required for zoning distributed through the conditioned space or spaces, will have relatively low maintenance costs. Care must be used to provide ease of access to important equipment and those items requiring servicing.

DESIGN OF SYSTEMS

Various factors are to be considered in the design of a central system, some of which have been touched upon in the foregoing as a modification or economic factor, while others are a part of the normal design procedure. These, in the order of usual occurrence are discussed herewith. For practical purposes these factors cover *Year 'Round Air Conditioning Systems*. Those directly applicable to summer only or winter only systems are to be viewed accordingly.