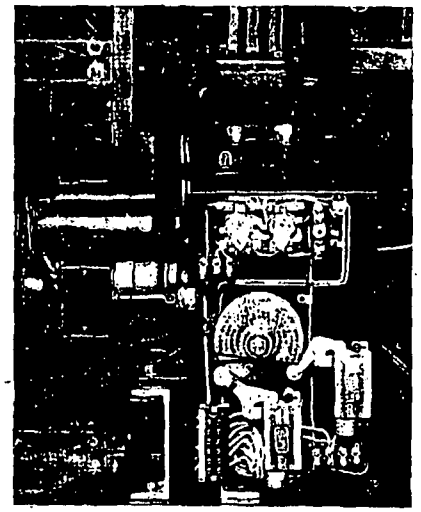
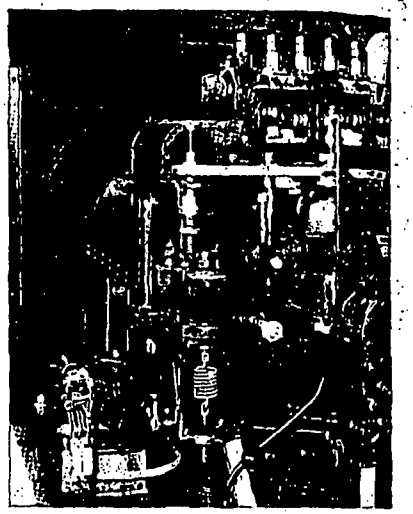


1 Automatic governor control, responsive to both purchased or primary power and plant demands, is shown without cover



2 Control varies unit output within range from no-load to full-load setting of regular governor but not beyond it

Purchased Power Held Under Control Aids Process Plant

To prevent purchased power becoming the tail that wags the dog, here is a working control. It keeps power demand within limits, avoids generating excess energy, maintains process pressure

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▶ AN INDUSTRIAL PLANT that requires steam for process the year round often finds it advantageous to buy some power and generate the remainder. Savings can be substantial when such a plant uses a turbine or engine in place of a reducing valve to bring boiler pressure down to required process levels, and—in the expansion to lower pressures—to generate electrical energy for power-plant needs. It takes only a fairly simple engineering study to determine whether a turbine-generator installation is feasible.

Principal shortcoming of such an arrangement has been that plant demands for process and power seldom if ever vary concurrently. As a result costly peak demands on purchased power occur that seriously affect the over-all savings.

Successful Experience. Ohio Leather Co, of Girard, Ohio, met this situation by installing a turbine that is provided with an automatic governor control, Fig. 1 and 2, responsive to both purchased or primary power and plant demands for process steam. And the saving effected indicates a complete return of investment in less than three years after deducting interest, depreciation and taxes, despite operating only ten hours per day, five days a week.

The unit, a 750-kw straight noncondensing type, designed for 250 and 5 psig exhaust, operates in parallel with the purchased source of power. The automatic governor control varies the output of the unit within the range from no-load to full-load setting of the regular governor, but not in excess of this setting. Thus all safety features of the standard governor are in control.

Fig. 5 and table on p 84 show how automatic governor control provids for the following conditions:

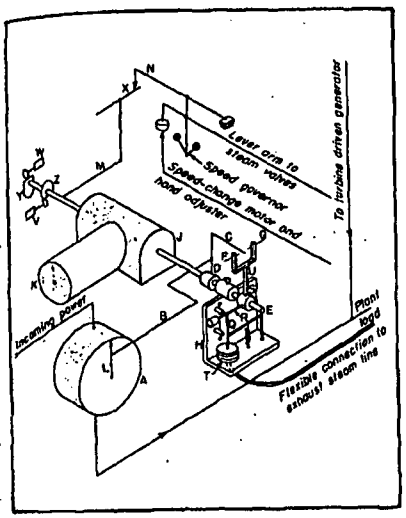
(1) Limits maximum demands on the primary purchased source to a predetermined top level regardless of plant-process steam demands.

(2) Limits minimum demands at a fixed level so as to prevent return flow of power to primary source when plant steam demands may be high and electric-power demands low.

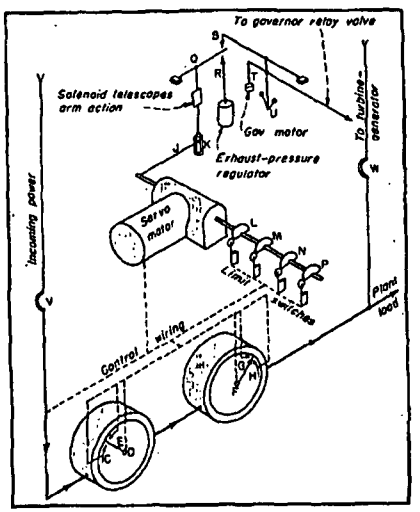
(3) With the minimum demand set at a fixed point, the maximum demands are automatically varied in the range from the top fixed position to the minimum one, depending on steam demands.

The control is provided with means to alter easily and accurately the maximum top fixed-limit while the unit is in operation. Thus advantage can be taken of power rates that permit higher peaks without penalty during certain periods.

Control Design. The standard design of control uses one wattmeter element relay with the pressure element a compo-



3 Standard governor control uses one wattmeter element as a relay with the pressure element a part of the control



4 Turbines already equipped with backpressure regulators tie into the control unit through two wattmeter relays

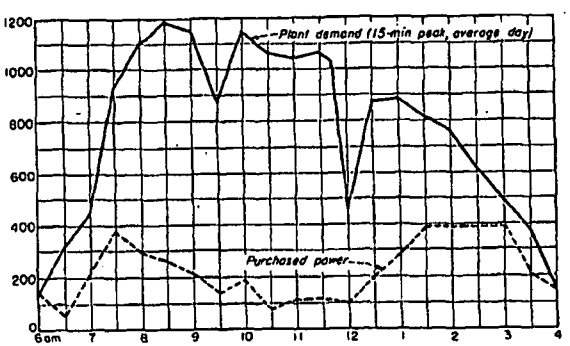
terpart of the unit, Fig. 3. In the Ohio Leather Co's installation the turbine was equipped with a backpressure regulator built into the governor. The control, therefore, has two wattmeter element relays, one set for maximum, the other for minimum, as in Fig. 4.

The relays have contact points *C, E,* and *G, H,* between which float indicator arms *D* and *F*. These relays are identical except contacts *C, E* are on the lower range of the scale, while *G, H* are on the upper range.

Deflection from *C* to *E* and *G* to *H* is about 5% of full scale, and is adjustable. Settings here are (1) 400-kw maximum purchased-power peak demand (2) 50-kw minimum demand on purchased power. To meet these conditions contacts *C* and *D* close when incoming power is 50 kw or less—*D* and *E* when 100 kw or more—*F* and *G* when 350 kw or less—*F* and *H* when 400 kw or more.

When incoming power load is between 100 and 350 kw arm *J* stops at halfway point with clevis *K* in position to permit exhaust-pressure regulator to function through its full range of control.

Arm *R* is spring loaded so the servomotor can take over control at any time regardless of position of the exhaust-pressure regulator. This permits the all-important "peak demand" to supersede other factors. If excess exhaust pressure develops beyond the desired



5 Comparison between purchased-power peak demands, before and after governor control went to work leveling off purchased power peaks, shows in these charts