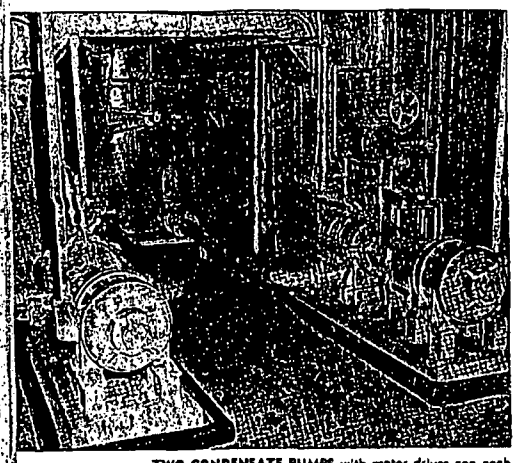
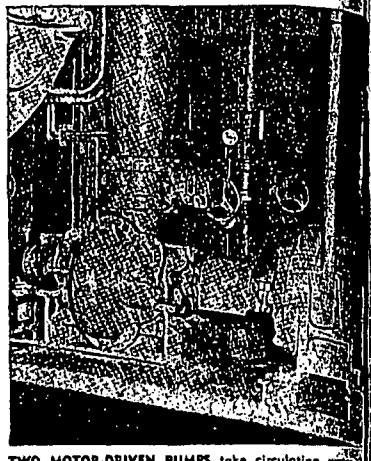


TWO CONDENSATE PUMPS with motor drives can each handle 130 gpm, the maximum-load station water flow

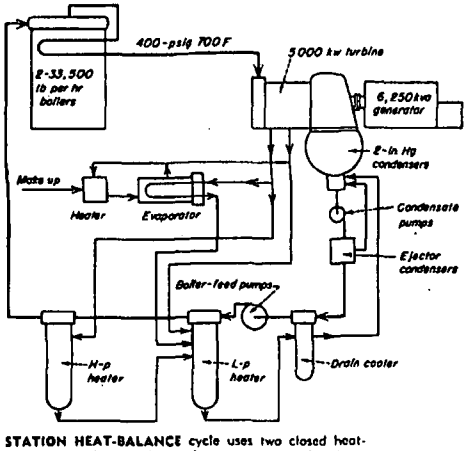


TWO MOTOR-DRIVEN PUMPS take circulating water from cooling tower, force it through two-pass condenser

days to check bearings and worm gears and another time for two hours to repack the primary steam valves.

The plant has operated since *starting* at an average capacity factor of 96% with a heat rate of 15,670 Btu per net kwhr. Auxiliaries take 5.7% of gross generation. Two separate groups of gas wells, within three miles of the plant, supply the plant fuel. Well pressure of 365 psig delivers the fuel through 4-in. lines. Three sets of regulators control flow to burners. No provisions have been made to burn other fuel types at this plant.

Plant water supply comes directly from the city supply *adjacent* to the plant. The cooling tower uses raw water after acid treatment, the alkalinity being held between 40 and 70 ppm. Total solids are carried between 1500 and 1900 ppm and the pH held at about 8.0. Some chlorine is used to prevent algae growth. All makeup water to the boiler feed system is supplied through the 2500-lb-per-hr evaporator.



STATION HEAT-BALANCE cycle uses two closed heaters, drain cooler, tubular air heater, evaporated makeup

Principal Plant Equipment
Guymon Station, Oklahoma

Turbine-generator, 1.....General Electric
5000 kw, 400 psig, 700 F, throttle steam 2-in. Hg back pressure, 15 stages, 2 bleed points, 3600-rpm 13,800-v 6250 kva 60-cycle air-cooled. Shaft exciter

Boilers, 2.....Babcock & Wilcox
33,500 lb per hr each, 450-psig working pressure, 750 F, fired, waterwalls, tubular air heater

Main condenser, 1.....Allis-Chalmers Manufacturing
6500 sq ft heat transfer surface, two-pass

Circulating pumps, 2.....Allis-Chalmers Manufacturing
5250 gpm each, 100-hp motor drive

Cooling tower, 1.....J F Pritchard
10,000 gpm, two 17-ft fans, two 40-hp motor drives

Condensate pumps, 2.....Allis-Chalmers Manufacturing
2 stage, 130 gpm, 10-hp motor drive

Boiler feed pumps, 2.....Ingersoll-Rand
135 gpm each, 3500 rpm, 1420-ft total head, 1 motor driven, 1 turbine driven

Feedwater regulators, 2.....Bailey Meter

Evaporator and heaters.....Struthers-Wells

Miscellaneous pumps.....Ingersoll-Rand

Air: gas ratio meters.....Cochrane

Air Compressor, 1.....Ingersoll-Rand

Automatic Combustion Control.....Leeds & Northrup

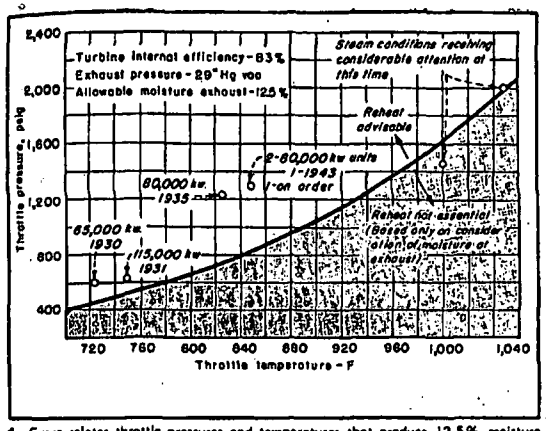
Switchboard, 1.....Allis-Chalmers Manufacturing
Air-blast metal-enclosed breakers

Station-power transformer...Allis-Chalmers Manufacturing
500-kva 13,800/460-v dry type

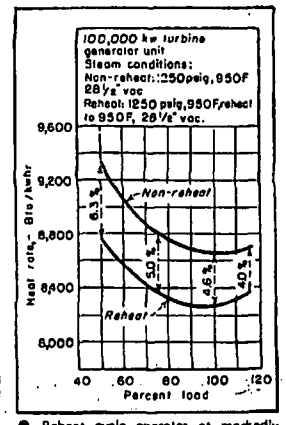
Carrier-current set, 1.....General Electric

Station construction.....Bechtel Bros. McC

Design and Engineering
M E Strom, Southwestern Public Service Co



1 Curve relates throttle pressures and temperatures that produce 12.5% moisture at turbine exhaust, points above curve have higher moisture, below curve less

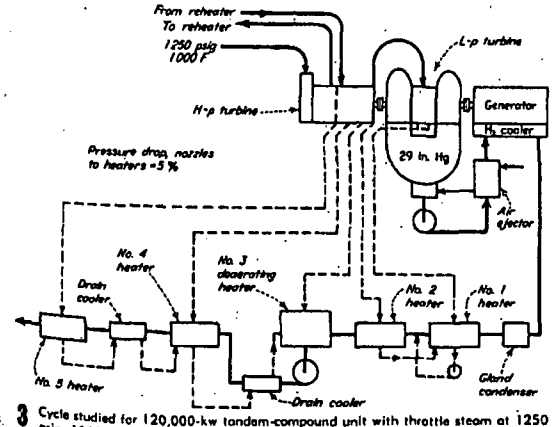


2 Reheat cycle operates at markedly lower heat rates over entire load range

High Fuel Costs Revive Reheating

Originally applied to reduce turbine exhaust moisture with limited throttle temperatures at high pressures, the reheating cycle is now being exploited for its increased efficiencies

By C W BLOEDORN
Steam Turbine Department
Allis-Chalmers Manufacturing Co.



3 Cycle studied for 120,000-kw tandem-compound unit with throttle steam at 1250 psig, 1000 F to determine optimum pressure for reheating to 950-F temperature

► THE REHEAT CYCLE is once more receiving serious consideration for new steam-turbine installations. Revived interest comes from the great increase in fuel costs with consequent attempts to improve operating efficiencies above that attainable with straight regenerative cycles and today's steam limits. While the possible gain in thermal efficiency is usually the prime objective in considering reheat now, it was not originally regarded as a direct means to this goal.

Early Applications. About 20 years ago, reheat was used to reduce the moisture content at turbine exhaust to minimize blade erosion. This in turn permitted higher throttle pressures, at the maximum steam temperatures then allowable, with resulting gain in thermal economy. A curve like Fig. 1 was often a guide to determine if reheat was advisable to reduce moisture content of steam in low-pressure stages. If throttle-steam conditions selected resulted