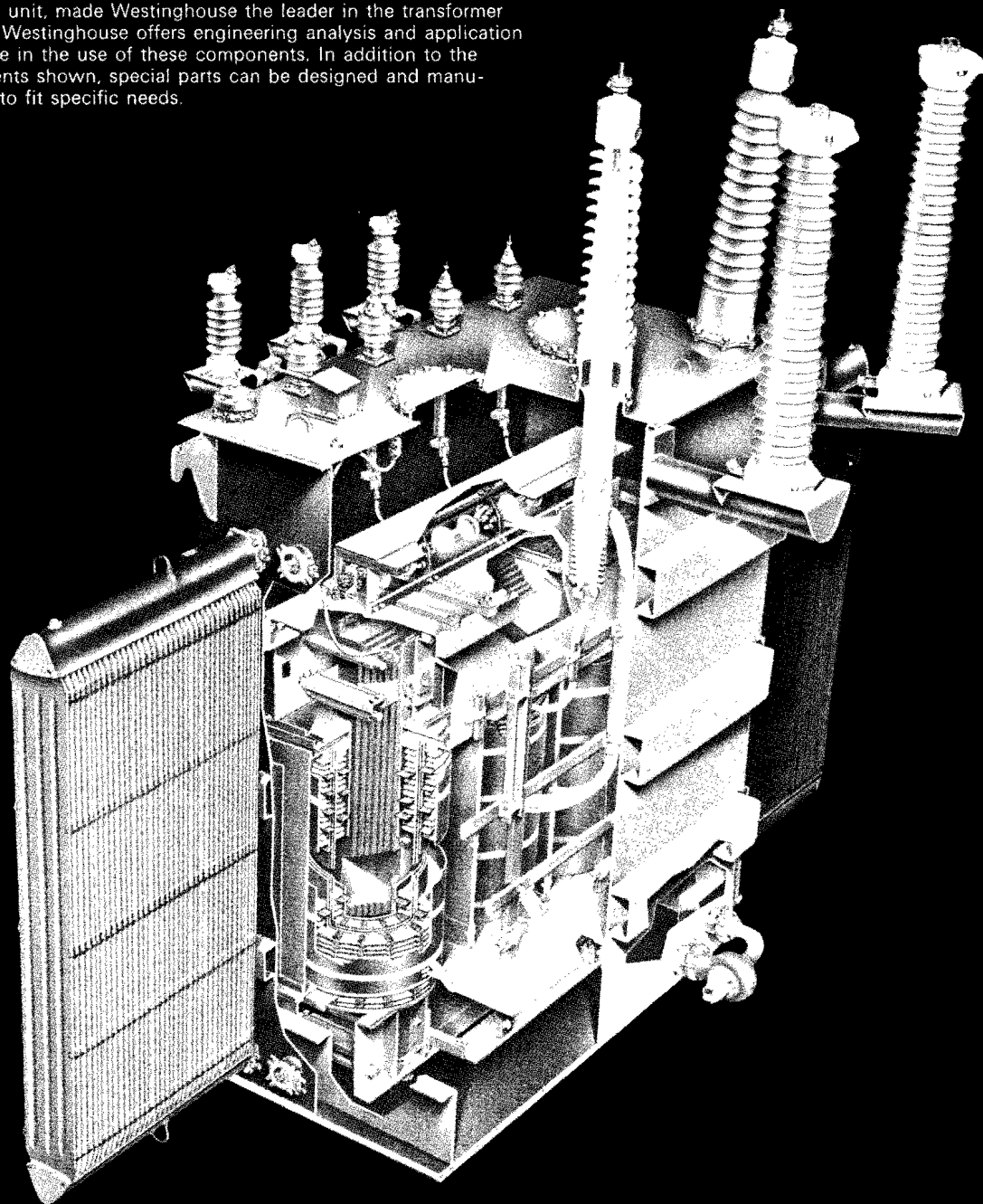


Westinghouse**Power Transformer
Components**

This publication depicts the major transformer components that are available to the original equipment manufacturer. These components are the same field proven devices that, when assembled into a complete unit, made Westinghouse the leader in the transformer industry. Westinghouse offers engineering analysis and application assistance in the use of these components. In addition to the components shown, special parts can be designed and manufactured to fit specific needs.

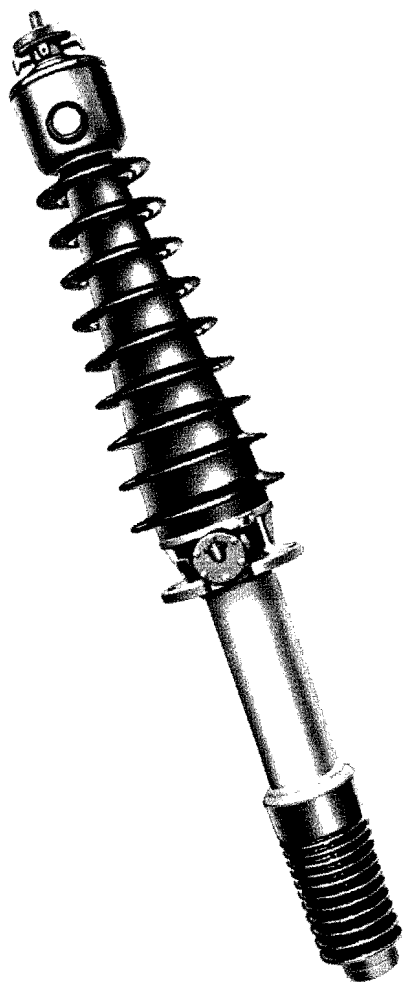


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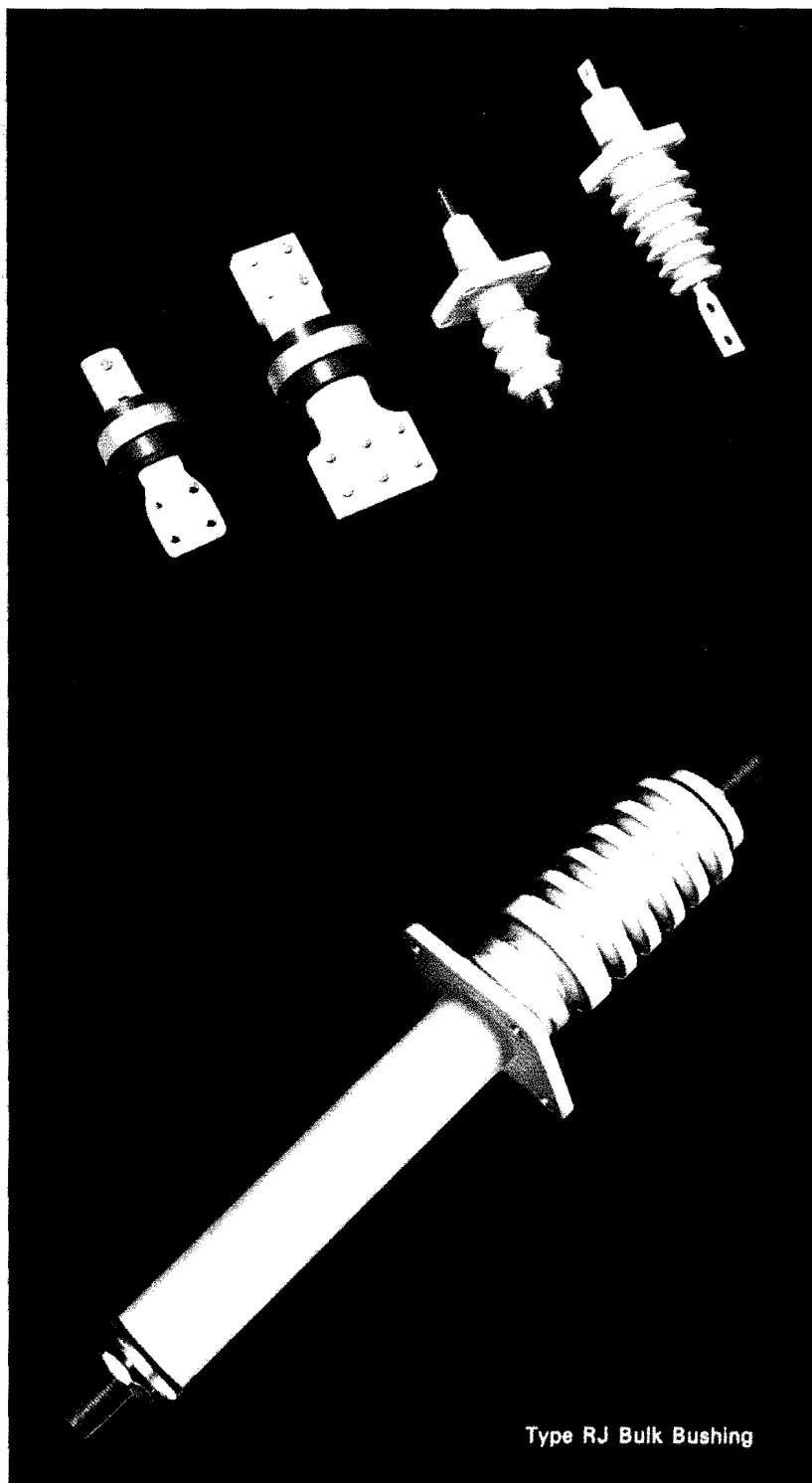


Bushings:

Westinghouse offers a complete line of porcelain and cast resin power transformer bushings. The two basic constructions are bulk type and condenser type, and both are available as gray or chocolate. In addition to complying with ANSI Standards pertaining to electrical and mechanical characteristics, Westinghouse bushings are designed and constructed to give maximum reliability with minimum maintenance.

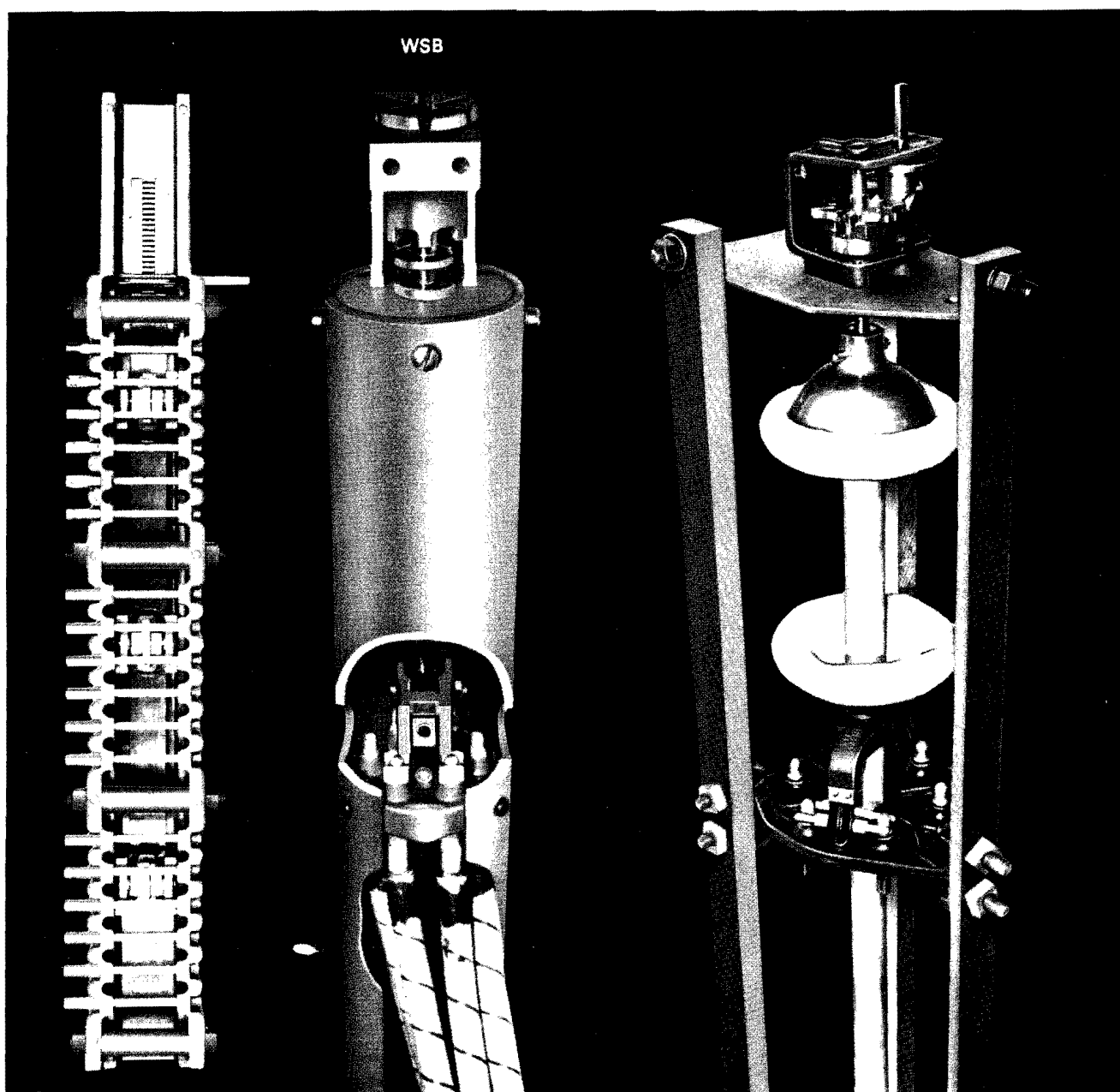


Type O Condenser Bushing



Type RJ Bulk Bushing

Power Transformer Components



De-energized Tap Changers:

Three basic styles (WSS, WSB and WHV) of de-energized manual tap changers feature self-cleaning, self-aligning, positive-positioning, silver plated copper contacts.

These rugged designs have virtually eliminated tap changer failures and outages, due to misalignment and contact maintenance.

The operating handle, with padlock provision, the position indicator, and the rod for connection through the tank wall are included.

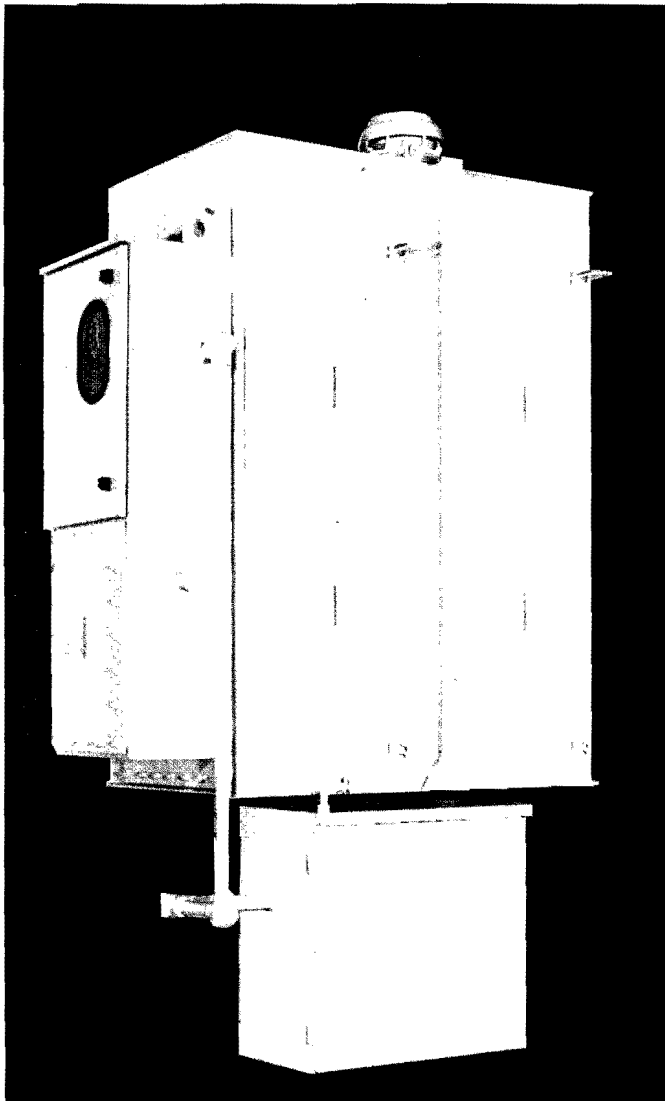
Motor operated de-energized tap changers for changing voltage taps or winding connections, can also be supplied.

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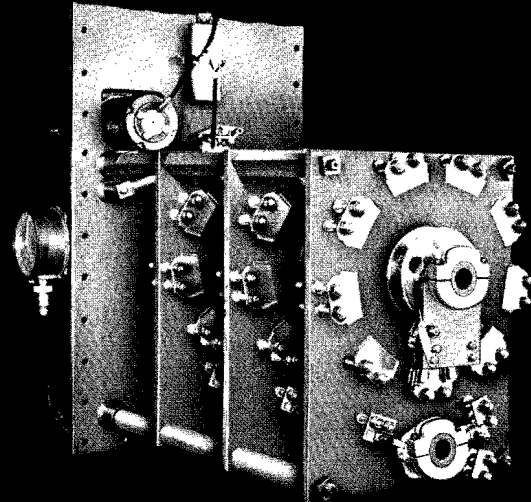
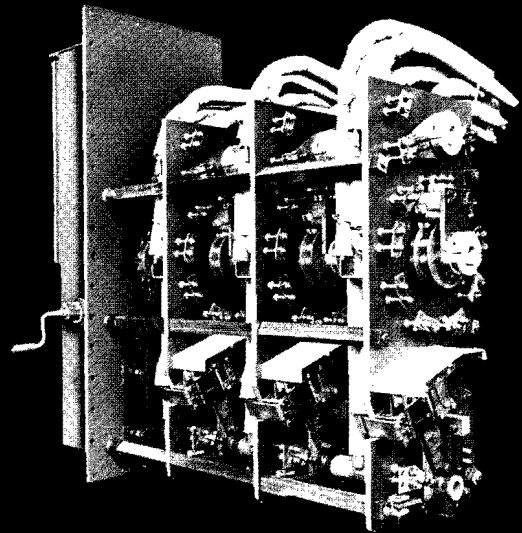


Load Tap Changers:

Load tap changers are used with power transformers and regulators to change voltage taps under load. Westinghouse load tap changers use the reactor switching principle, which allows continuous operation even in a transition between positions, and are located in their own separate compartment. This eliminates the mixing of oil between the main transformer tank and the tap changer compartment and allows tap changer maintenance without entering the main tank. The standard load tap changers are divided into two groups; those that have the arcing contacts in oil (type UTS and type UTT) and those that utilize vacuum interrupters (type UVT). In addition Westinghouse offers UTH load tap changers for extra high voltage application.



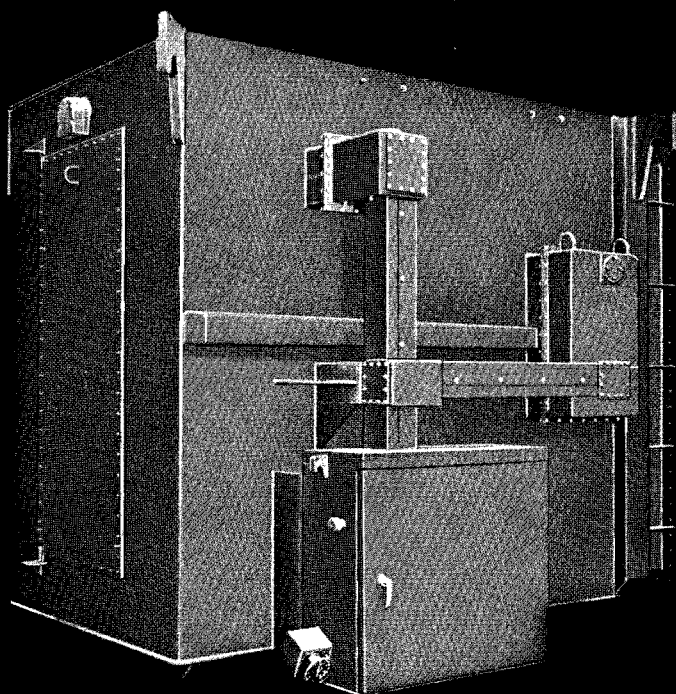
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1 UTS and UTT Load Tap Changers:

The UTS and UTT load tap changers offer initial economy through a compact design, long-life load-break contacts fabricated of copper tungsten arc resistant material, and unit drawout construction which allows interchangeability and ease of maintenance. Westinghouse offers a 20 year prorated warranty on the contacts of the UTS load tap changer regardless of the number of operations and a 150,000 operation warranty on the transfer switch contacts of the UTT load tap changer.

Power Transformer Components



2 High Voltage Load Tap Changers:

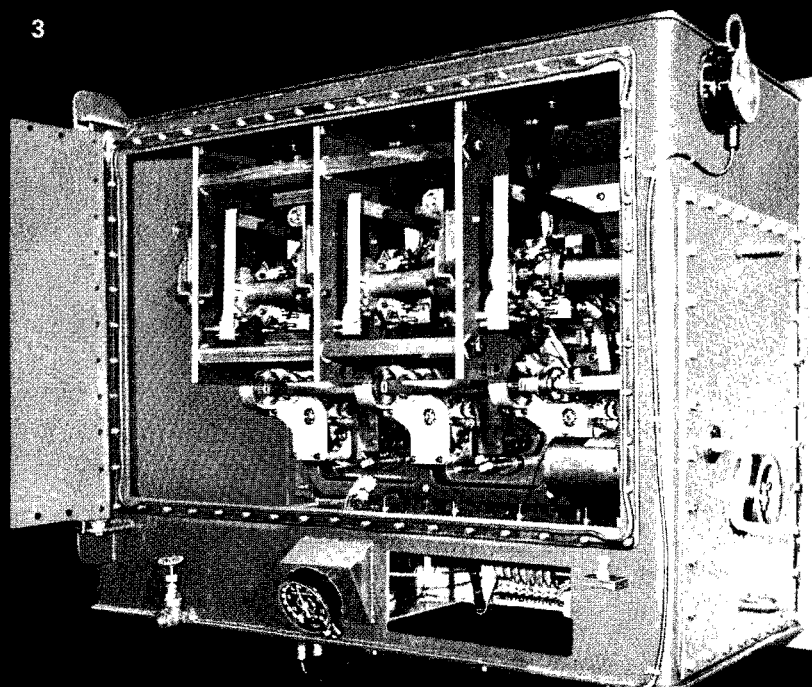
The UTH load tap changer is designed in single or three phase assemblies for reliable, efficient regulation of extra high voltage. The UTH tap changer utilizes the resistance switching principle and can be used for line voltage operation eliminating the series transformer and significantly reducing operating losses.

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3 Vacutap Load Tap Changers:

The Vacutap (UVT) load tap changers utilize vacuum interrupters, in place of the arcing contacts, to change the voltage taps under load. The vacuum interrupters open the circuit within $\frac{1}{2}$ cycle. This rapid extinguishing of the arc in an oil free environment increases the contact life by about 20 times and greatly reduces oil maintenance, as compared to a conventional load tap changer. The tap changer mechanism is similar in operation to a conventional one, but has been designed for maximum mechanical life. Westinghouse Vacutap load tap changers have a warranty of 500,000 operations on the vacuum interrupters and prototypes have been tested in excess of 2 million operations. Another important feature of the Vacutap is the patented current transformer monitoring circuit, which protects the transformer and tap changer in the event of a mechanical malfunction of the tap changer or a failure of the vacuum interrupter.

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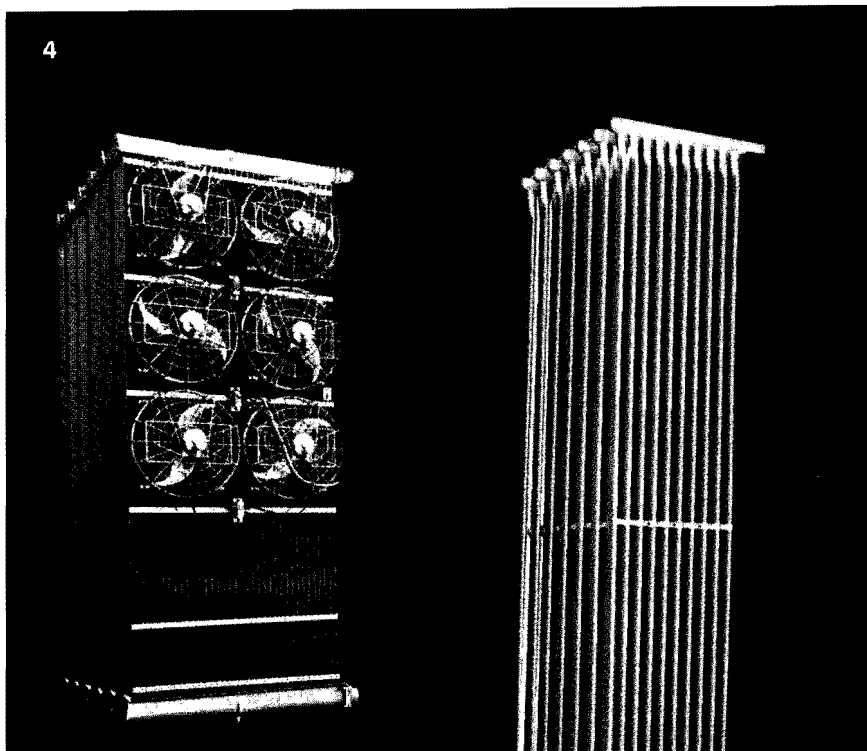


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Cooling Equipment:

Westinghouse has a full line of transformer cooling apparatus to meet the specific application.

4 Removable Radiators:

The radiator has all welded sheet metal construction with vertical cooling sections through which the oil circulates. A formed metal header is welded to each end of the vertical fin sections and provides the fittings to attach the radiator to the transformer tank.

5 FOA Heat Exchangers:

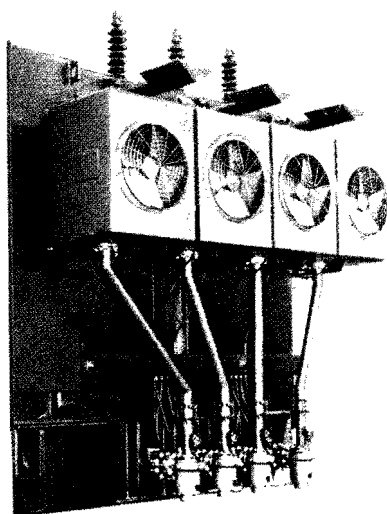
The FOA heat exchanger is an assembly of tube bundles with extruded fins for increased radiation surface, and a fan or fans mounted in a steel housing. Efficient heat dissipation occurs as the oil is pumped through the tube bundles and the fan draws air across the finned tubes.

6 Tubular Coolers:

Flattened steel vertical tubes are welded into horizontal headers for direct welding to the tank wall.

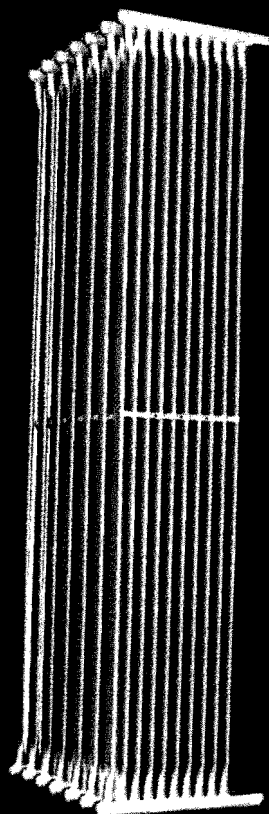
7 Water Coolers:

Westinghouse has both OW and FOW type water coolers which feature double wall finned tubes encased in a steel shell. The outer (oil) side of the cooler tubes is copper with extruded copper fins. The internal (water) side of the tubes is cupronickel alloy and the double wall construction prevents possible contamination of the transformer oil.

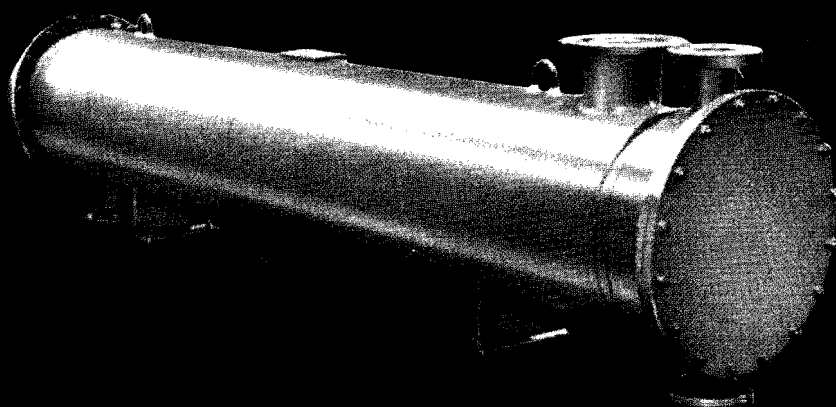


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Power Transformer Components

8 Fans:

Fans can be used to provide forced cooled ratings with tubular coolers and removable radiators. The fan assembly consists of a fractional horsepower motor and a glass-reinforced polyester, birdwing shape blade and is mounted on a steel wire-formed bracket which also serves as a guard. The motor is capacitor start, capacitor run, with sleeve bearings, and is protected with an automatic reset thermoguard.

9 Pumps:

Pumps are used to increase the KVA capacity by forcing the oil through the transformer. The centrifugal pump, close-coupled with its squirrel cage induction motor, is enclosed in a cast iron housing which eliminates maintenance-prone dynamic seals and utilizes the transformer oil for lubrication and cooling. The pump is suitable for multiple mounting positions and is equipped with an oil flow indicator to provide visual indication as well as electrical alarm.

10 Valves:

Butterfly type shut-off valves are offered for connection of removable rads and/or pumps to the transformer tank wall. The valves have provision to be welded to the tank wall to eliminate one gasketed surface and have a reusable, recessed nitrile gasket on the sealing face. On transformers that have pumps with a self-cooled rating, a Westinghouse patented static by-pass valve system can be supplied which insures efficient oil circulation when pumps are not in operation.

A complete set of valves for upper filter press and combination drain, lower filter press and sampling are available. These are globe type valves with maintenance-free Teflon asbestos stem packing.

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**Accessories:****11 Standard Devices:**

Westinghouse has a group of standard devices which include; a magnetic liquid level gauge, a dial type thermometer, a pressure vacuum gauge, and a mechanical pressure relief device, with alarm contacts furnished when requested. All gauges have faces with large yellow lettering on dark background for ease of reading, are protected with tempered glass and have static oil seals.

12 Sudden Pressure Relay:

The hermetically sealed sudden pressure relay will minimize transformer damage by detecting a small abnormal rate of pressure rise generated by an internal fault and operate by tripping the primary breaker on an inverse-time basis. The sudden pressure relay is designed to permit normal transformer pressure changes from system short circuits, magnetizing inrush currents, seismic forces, and impulse voltages unless the transformer is damaged.

13 Combustible Limit Relay:

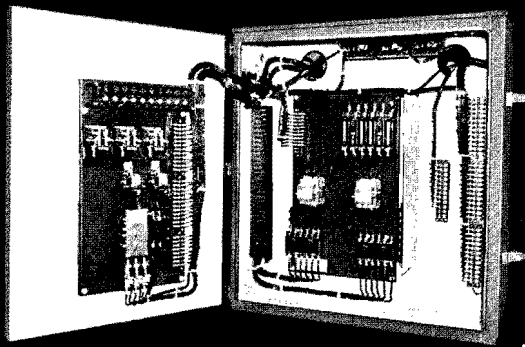
The combustible limit relay automatically tests the gas in a transformer equipped with Inertaire oil preservation. Low-grade faults produce combustible gasses as breakdown products of oil and organic insulating materials in the transformer. Periodic testing of the nitrogen atmosphere will reveal the presence of combustible gasses and serve as a warning of impending problems.

14 Winding Temperature Indicator:

Westinghouse winding temperature indicators use a thermal element to simulate winding hot spot, which is heated in part by the top oil and in part by a heater coil carrying current proportional to the load in the main transformer winding. The instrument indicates winding hot spot temperature in degrees Centigrade on the remote hot spot or in percent thermal load on the TRO indicator. The data furnished by either instrument can be used as a guide for loading or overloading the transformer. The remote hot spot can be used for the control of the auxiliary cooling equipment.



Power Transformer Components



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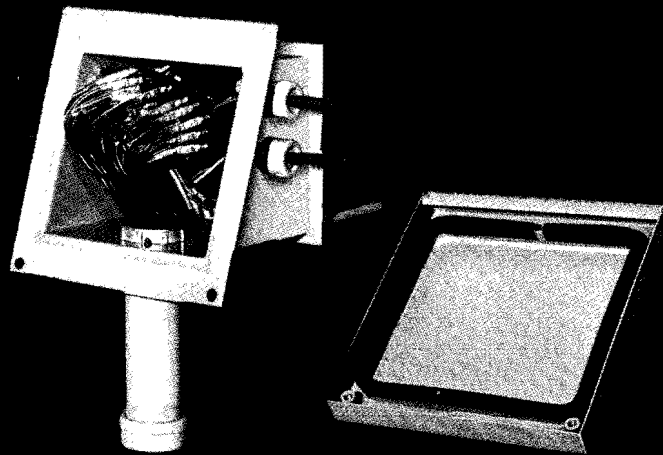
15 Control Cabinets:

Power transformers weatherproof control cabinets for the termination of auxiliary equipment have a gasketed, hinged door with provision for padlocking.

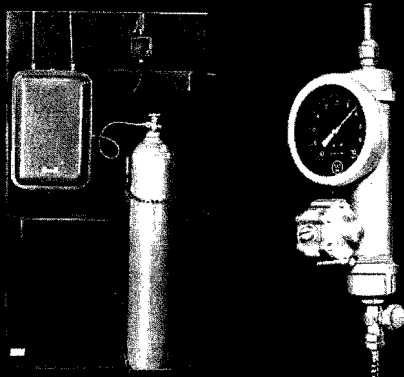
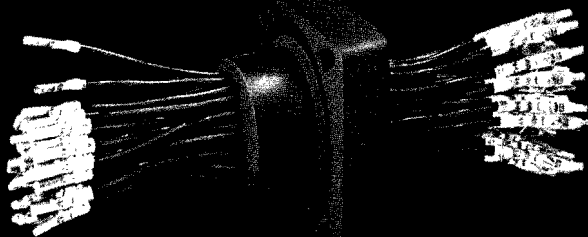
16 Junction Block and Housing:

Control leads can be brought outside the tank through a cast resin junction block. Each individual wire is bonded to its insulation and then encapsulated in the resin flange. This single piece junction block eliminates oil contamination and leaks. Captive lead identification markers on each end of the wires make it unnecessary to ring-out the wiring before making connections.

The slanted front design of the junction block housing provides extra working space, and the unique gasketed cover has completely protected locking hardware. This housing has passed the ASTM waterproof test and can be mounted on either the tank wall or cover.



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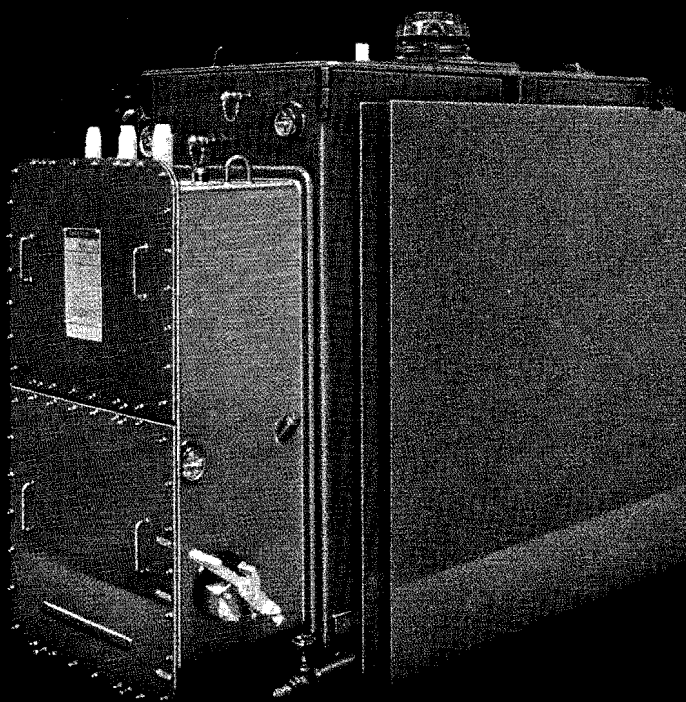
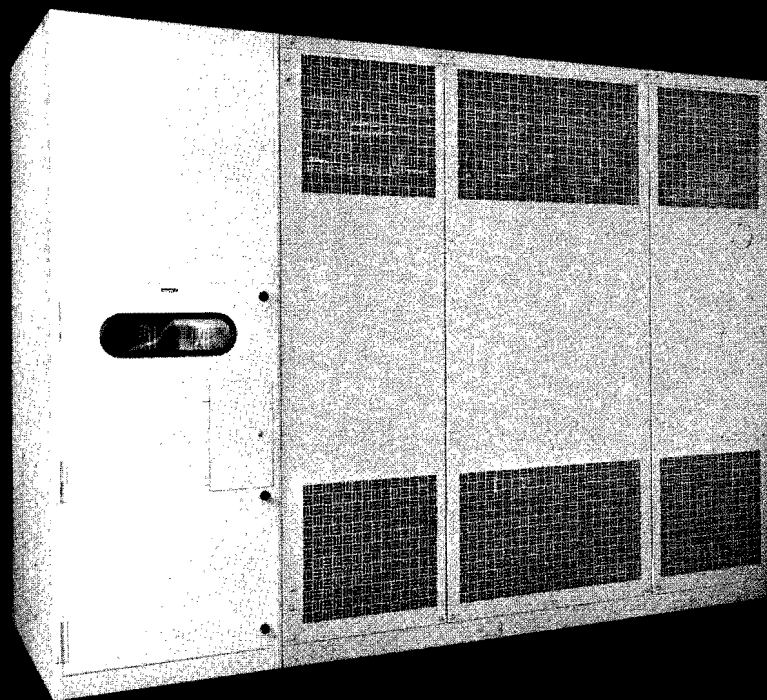
17 Oil Preservation Systems:

Inertaire System eliminates oil deterioration by maintaining a positive cushion of dry nitrogen above the transformer oil. It consists of a cylinder of dry nitrogen, reducing valve and breathing regulator either totally enclosed in a cabinet or with the bottle externally mounted and only the controls enclosed.

Sealedaire System is used on completely sealed transformers with sufficient gas space for normal oil expansion. A pressure-vacuum limiting valve is set to operate at plus or minus 6½ psi, making this the only preservation system that completely seals the transformer under normal operations.

In addition to the above two main oil preservation systems, Westinghouse can supply the equipment necessary for other systems such as — expansion tank, dehydrating breather, constant oil pressure, etc.

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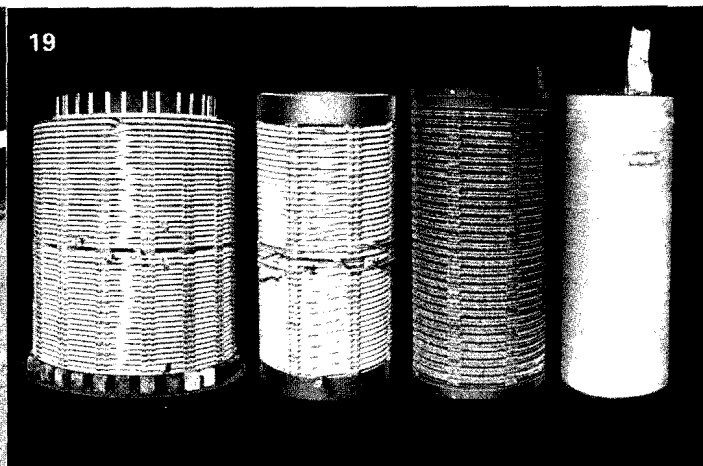
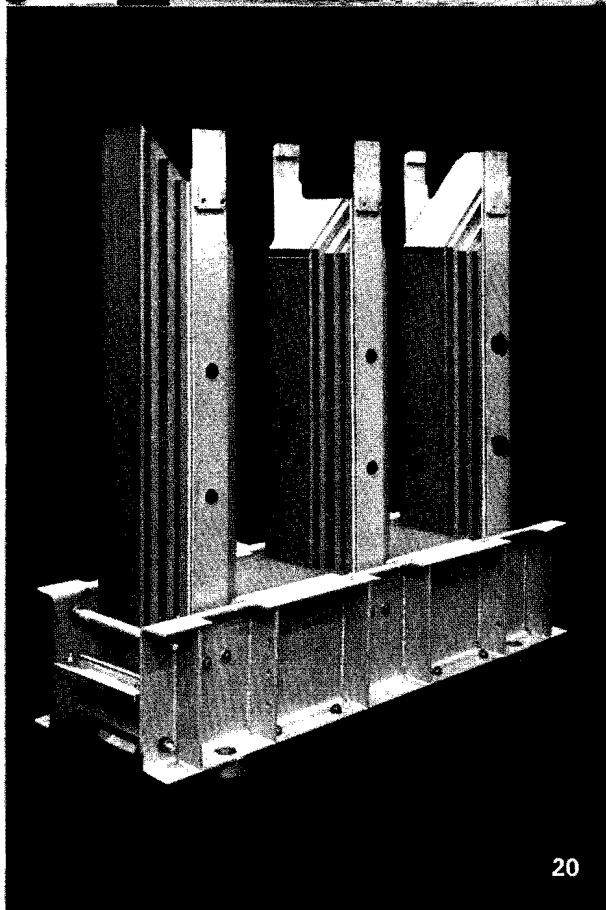
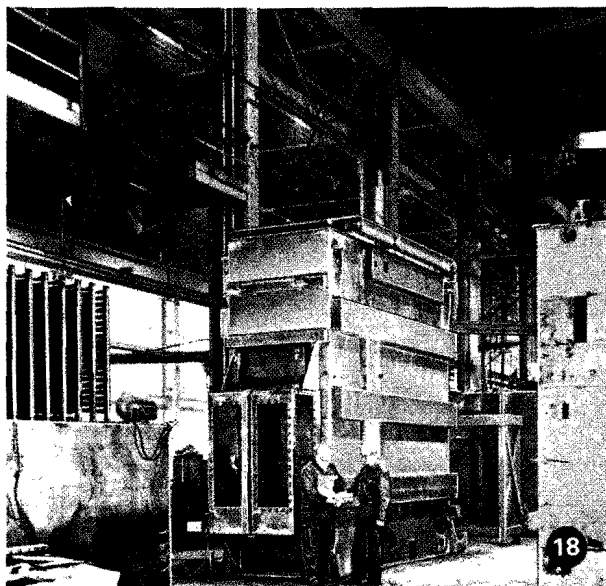


**Mag-Break and Load
Break Transformer
Switches:**

The liquid filled mag-break disconnect switch is available as three pole, two position or three pole, three position and is used with power center, network and unit sub-station transformers.

The air insulated load break, three pole, two or three position switch can be applied, with or without fuses, for indoor or outdoor service, as a means of isolating a transformer.

Power Transformer Components



Fabricated Products:

18 Steel:

Tanks, containers, cabinets, brackets, bosses, etc. can be tailored to meet specific needs.

19 Copper and Aluminum:

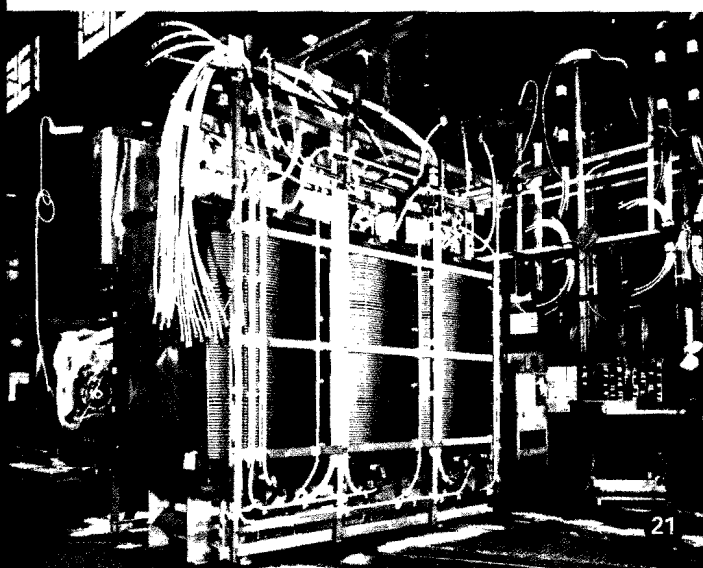
Four coil constructions – cylindrical, helitran, continuous and hisercap, plus bus bar and flexible leads are available to fit the particular application.

20 Electrical Steel:

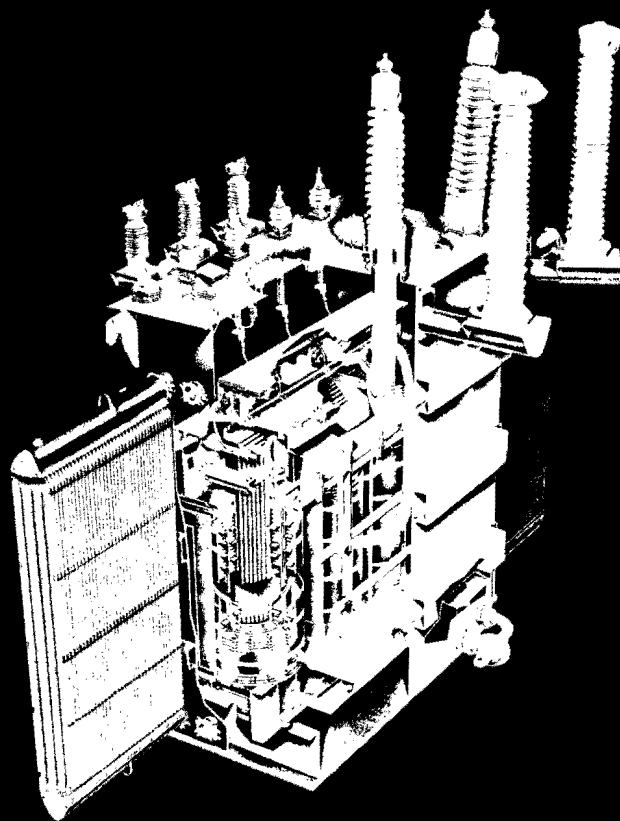
Grain-oriented hipersil steel offers the best magnetic circuit for transformer and reactor cores and can be purchased as laminations or as completed cores.

21 Insulation:

All types of insulation such as winding tubes, vertical and radial spacers, insulators, cast resin cleats can be supplied.



Power Transformer Components



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Contact your Westinghouse Sales Representative or Westinghouse, Sharon, Pa., for your power transformer component needs.