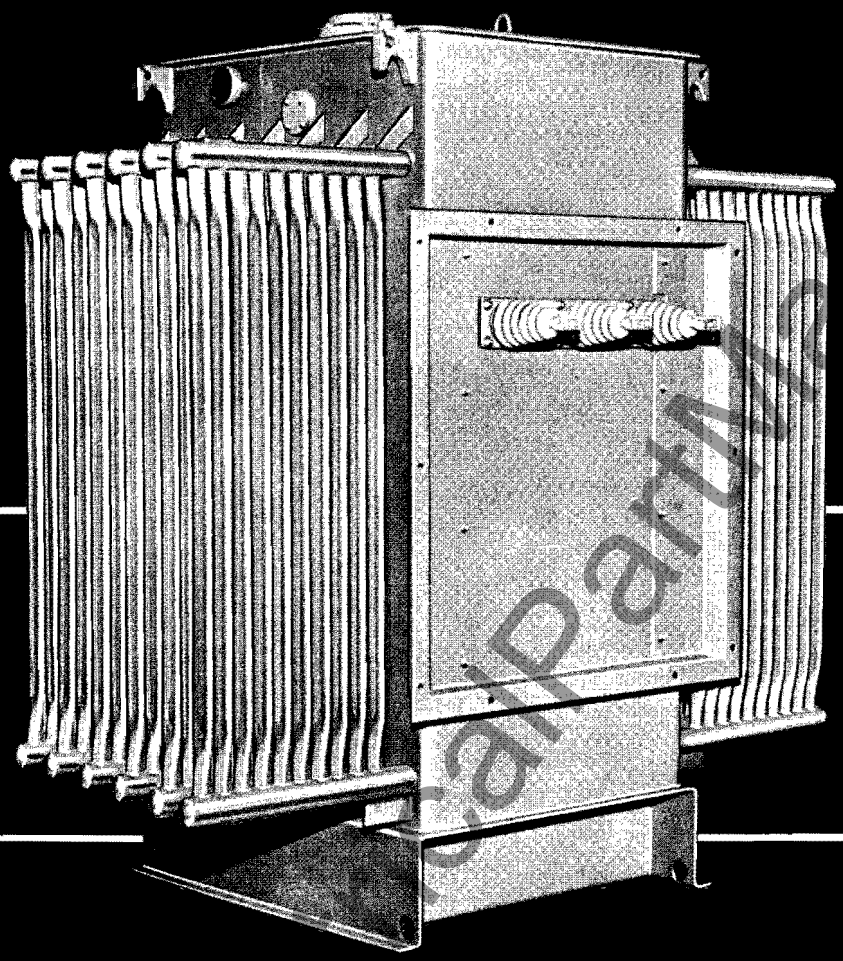
Westinghouse

Secondary Unit Substation Transformers (Power Centers)

Liquid Filled, Self-Contained
112½ – 2500 Kva



Application

Westinghouse liquid filled power centers provide utilization voltages to any commercial or industrial application and can be installed indoor or outdoor. Various combinations with primary switches, air terminal chambers, etc., and low voltage connections to terminal chambers, switchboards, bus duct, etc., can be used. High voltage and low voltage line-ups can be flange or throat connected.

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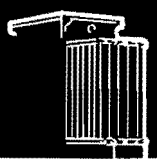
Petrochemical



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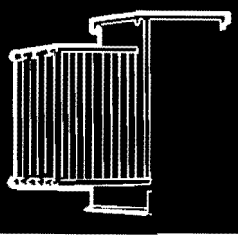

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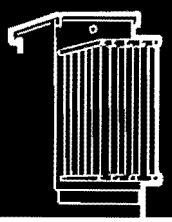

June, 1974
Supersedes DB 47-350, dated August, 1972
E. D. C/2082/DB

Westinghouse

Advantages

Self-contained power centers require less installation space than separate units because they are flange or throat connected to primary and secondary equipment.

Standardized bushing height of 55 inches for all ratings allows subsequent uprating at minimum cost.

A proven rectangular core and coil design, pioneered by Westinghouse in 1954, is used in conjunction with a computer program to provide rugged, dependable service and an optimized design.

Insuldur system of thermally stabilized insulating material – allows user 12% additional Kva capacity of 55/65° rated units or full Kva capacity at 40°C ambient.

An automated plant, designed specifically for the production of rectangular core form transformers, assures uniform quality and shipping expediency.

General Design Features

These transformers are designed for indoor or outdoor use – oil or Inerteen immersed – with a standard temperature rise of 65°C. Either a flange or throat can be furnished on the high and low voltage side for connections to primary and secondary equipment.

High and low voltage terminals are located on opposite sides of the unit for a "straight-thru" line-up. Bushing height is standardized at 55 inches to permit ease of coordination with other equipment and later uprating at minimum costs.

Cooling is accomplished through flat, tubular coolers welded to the tank wall. A welded on tank cover/handhole provides sealed tank oil preservation. Standard tank pressure is 5 psi.

Lifting hooks are provided for lifting the entire unit and lifting loops for lifting the tank cover. The base is designed for skidding in any direction.

Standard finish is ANSI No. 24 Dark Gray for outdoor installations and ANSI No. 61 Light Gray for indoor units.

High Voltage Side Equipment and Connections Available:

Terminal Chamber – Air, oil or Inerteen filled
Load Break Air Switch
Oil Switch
Oil Fused Cutouts
Fuses
Lightning Arresters
Throat
Z-Bar Flange

Low Voltage Side Connections:

Terminal Chambers – air or oil
Bus Duct Connection
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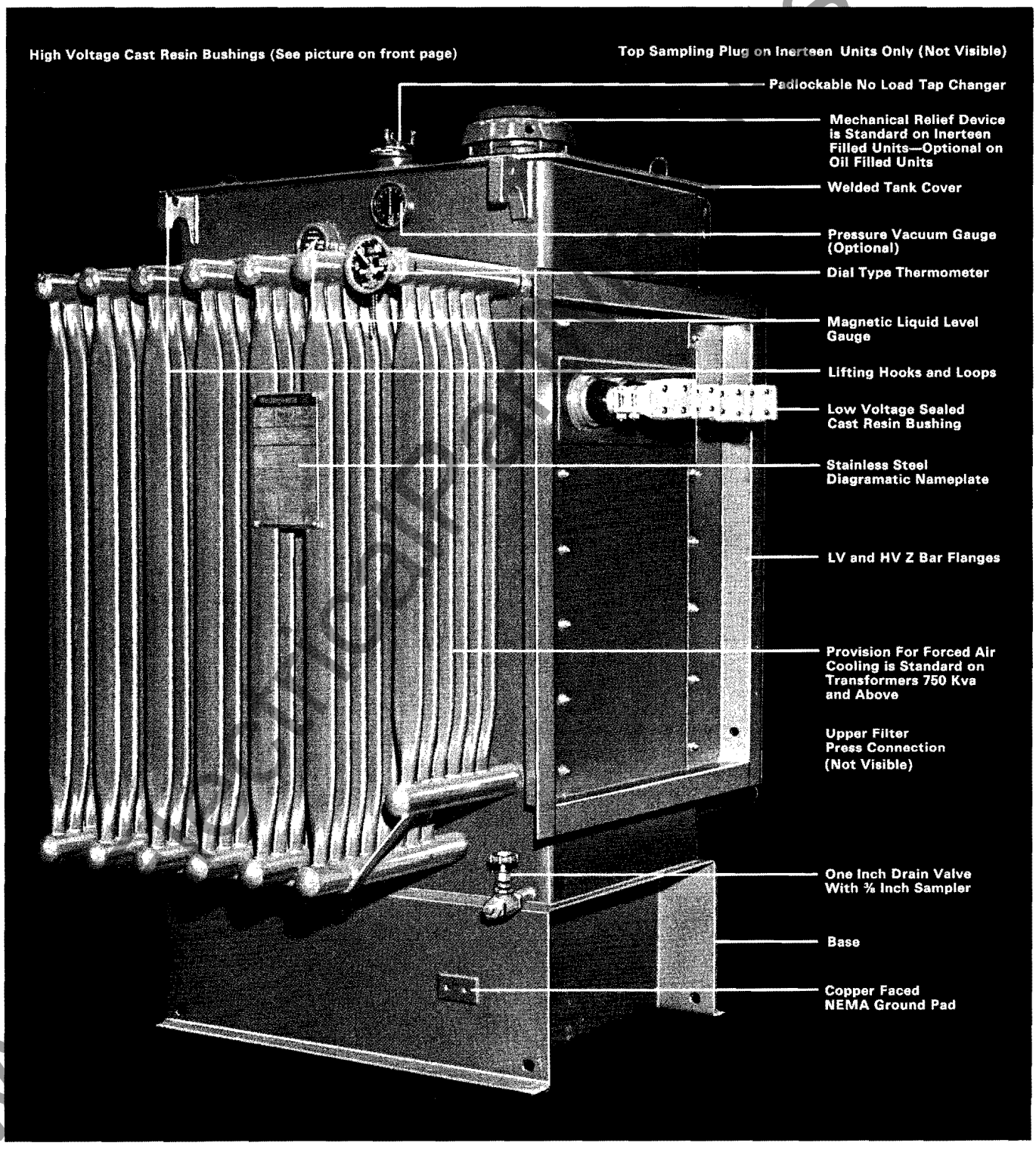

Westinghouse

Rectangular Core and Coils
WSS Tap Changer

The Westinghouse externally operated WSS tap changer provides positive sequence line voltage changes under no-load conditions. An in-line assembly, the WSS features through-type stationary contact studs rigidly supported by a molded plastic channel. Moving contacts are spring loaded, silver plated copper which move along the stationary line by means of a rack and pinion.

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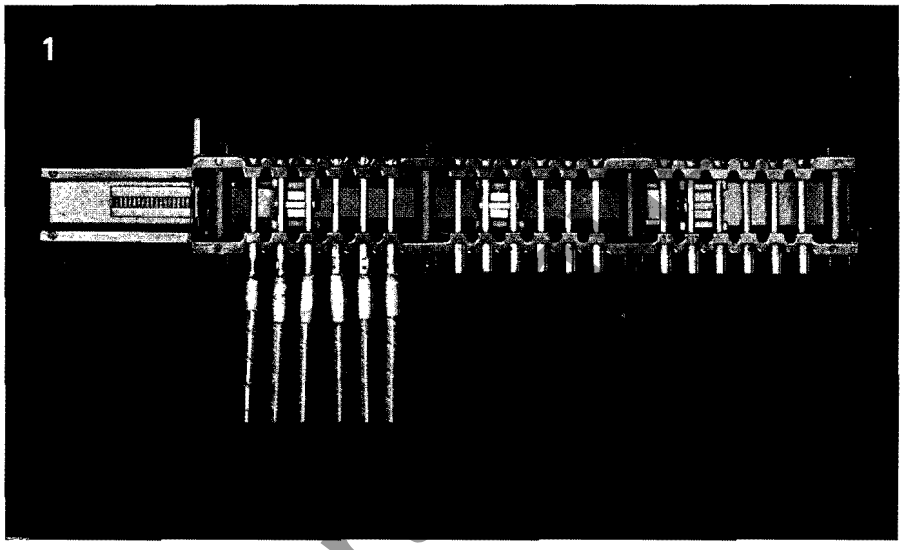
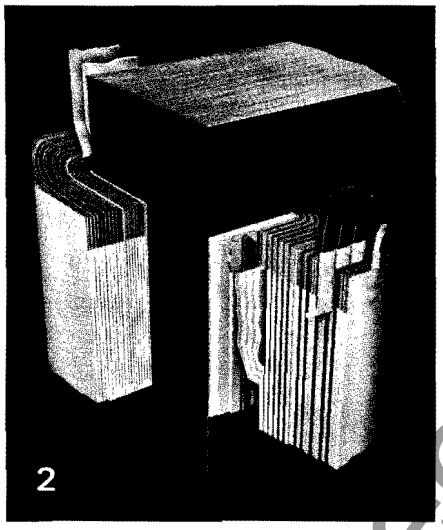
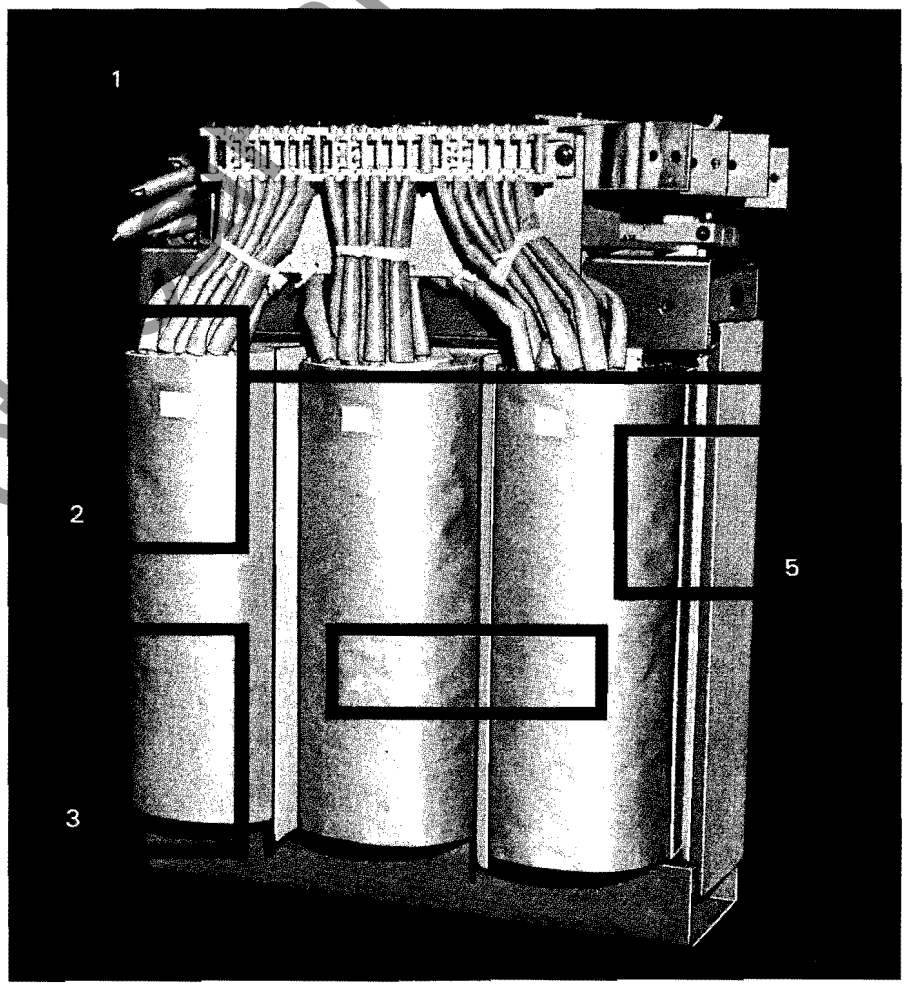




Rectangular Aluminum Wound Coils

The Westinghouse rectangular wound coil features aluminum conductor in both high and low voltage windings. The low voltage winding is accomplished on a constant tension machine and consists of full width sheet aluminum extending the full height of the coil. High voltage strap aluminum is wound directly over the low voltage winding on a constant tension traversing machine. Layer to layer and high to low insulation is diamond epoxy paper which when heat treated bonds the complete coil into a solid configuration.

The advantage of low voltage sheet aluminum is a continuous cross section of conductor that allows the electrical centers of



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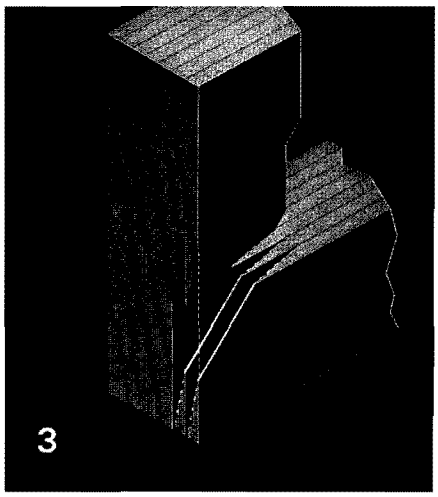
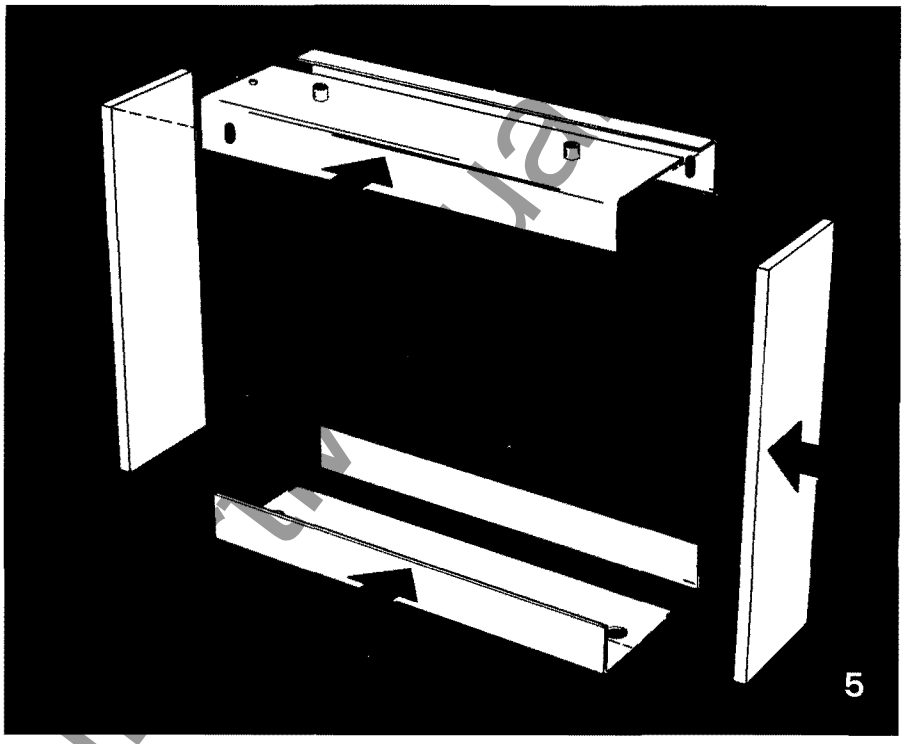
high and low voltage windings to easily align themselves, virtually eliminating the vertical component of short circuit force.

The benefit is a coil so uniform and compact, the chance of windings overlapping during short circuit is minimized, reducing failure rate, repair and/or replacement cost.





Step-Lap Core
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The user can benefit through reduced sound levels, lowered iron and total losses, and decreased exciting current to lower total operating cost.

On wye-wye units a fourth leg is added to provide a path for circulating third harmonic flux during unbalance condition.

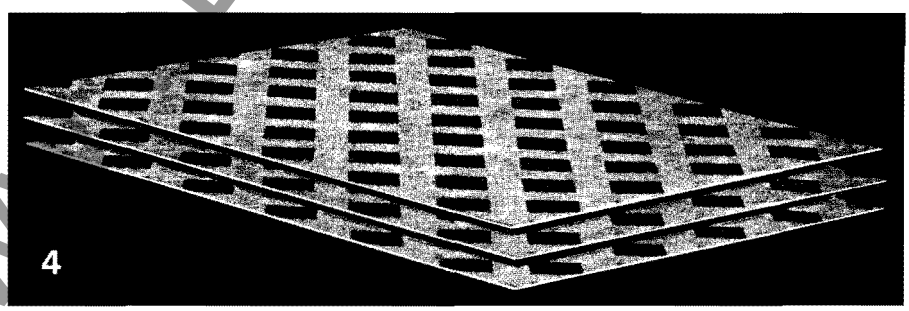
Super Insuldur Insulation
The Westinghouse Super Insuldur insulation effectively upgrades cellulose insulating materials thermally for increased load and overload capability. Retarding insulation breakdown under severe temperature conditions, the chemical stabilizers in the insuldur process minimize dimensional changes in the insulating materials insuring a tighter structure, contributing to greater strength and coil integrity throughout the life of the transformer.

The user benefit is a coil that better withstands short circuit and allows an operation at 10°C higher temperature on a 55°C rated unit with a 12% increase in KVA capacity.

Welded Frame
The Westinghouse exclusive welded frame provides a superior six piece supporting structure for the core and coils. End plates are thick steel slabs that are assembled in a mechanical and pressure jig around the core and coils, then welded to top and bottom plates to form a rigid structure that will not loosen during assembly, shipment, or in service. To determine the thickness of members used (even the thickness of welds), a short circuit calculation is made for each unit to determine the forces of short circuit.

The result is an assembly that restrains more effectively vertical and horizontal components of force, decreasing the probability of failure during severe short circuits.

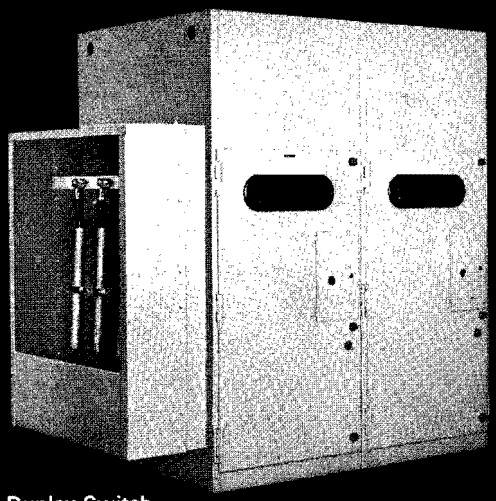
This benefits the user by a reduction in repair or replacement costs and a reduction in downtime that means loss of service or lost production.



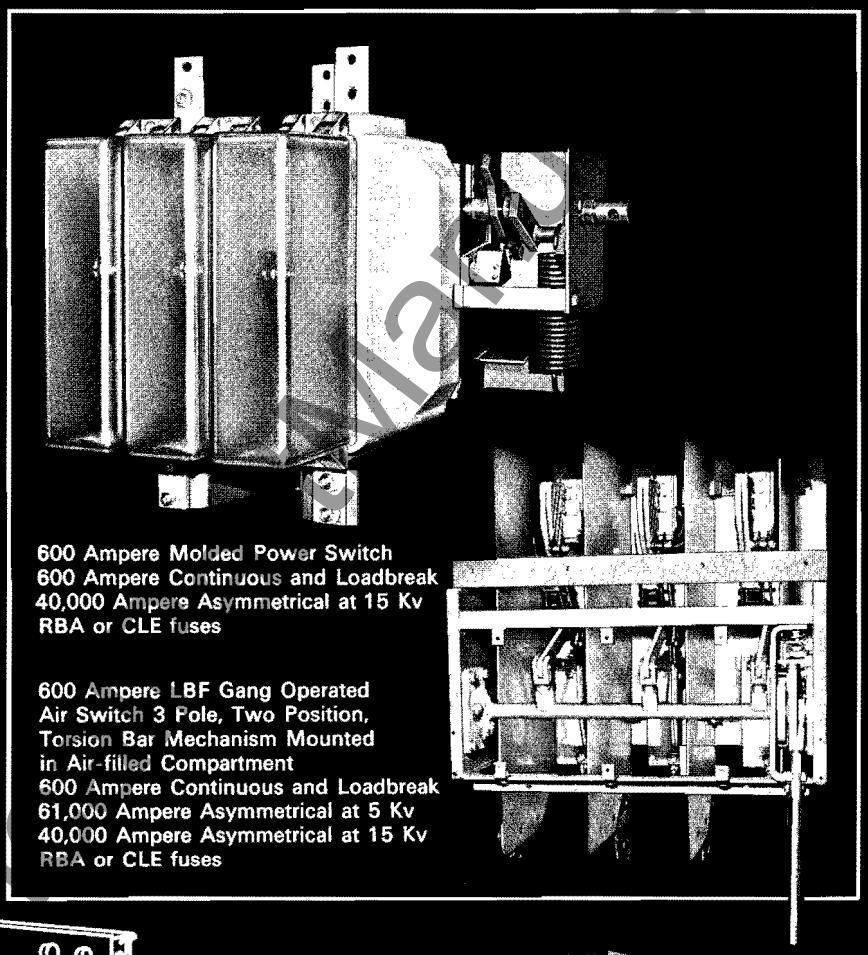
Westinghouse

High Voltage Equipment

High voltage bushings are wall mounted and enclosed by a "Z" bar flange or flanged throat. The "Z" bar flange is used for connection to air switches, oil cutouts or terminal chambers. Throats connect to liquid switches or bus ducts.



Duplex Switch—
Showing Transformer
Connection End



600 Ampere Molded Power Switch
600 Ampere Continuous and Loadbreak
40,000 Ampere Asymmetrical at 15 Kv
RBA or CLE fuses

600 Ampere LBF Gang Operated
Air Switch 3 Pole, Two Position,
Torsion Bar Mechanism Mounted
in Air-filled Compartment
600 Ampere Continuous and Loadbreak
61,000 Ampere Asymmetrical at 5 Kv
40,000 Ampere Asymmetrical at 15 Kv
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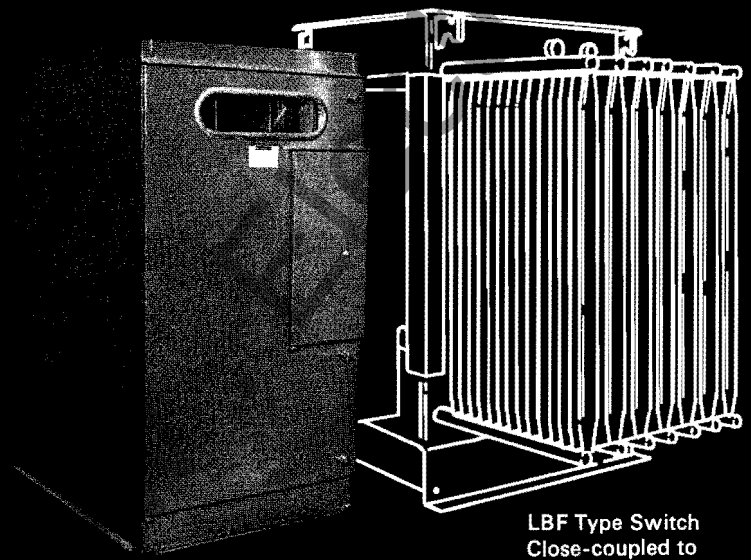
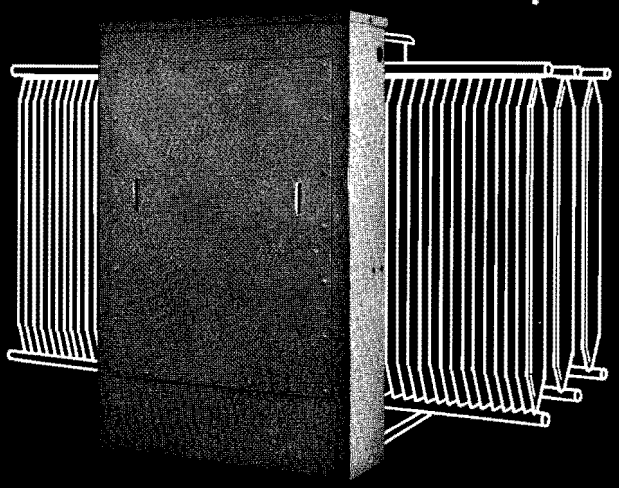


LBF Type Switch
Close-coupled to
Power Center Transformer



A full height air compartment can be furnished for terminating incoming cables.

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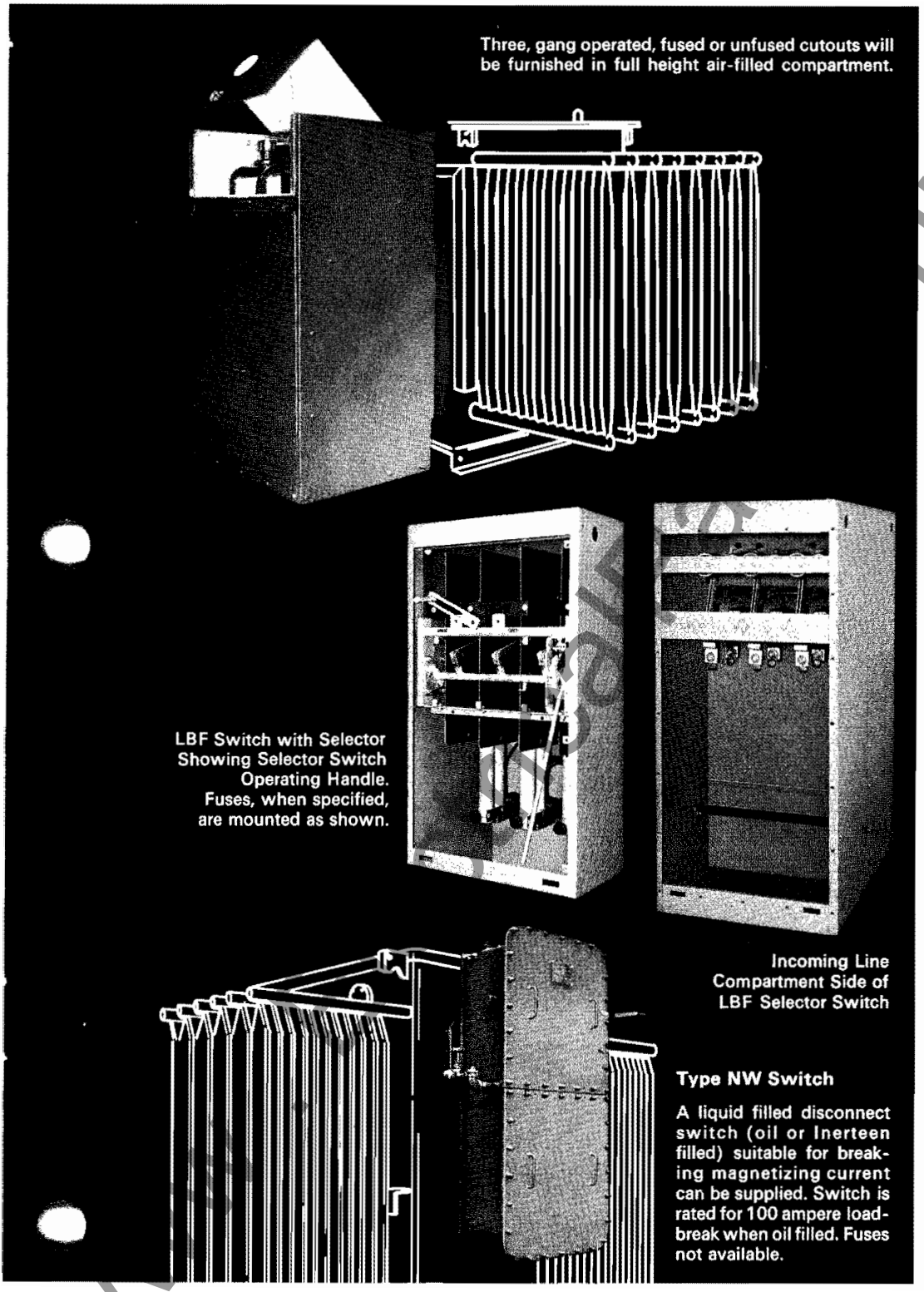


Three, gang operated, fused or unfused cutouts will be furnished in full height air-filled compartment.

LBF Switch with Selector Showing Selector Switch Operating Handle. Fuses, when specified, are mounted as shown.

Incoming Line Compartment Side of LBF Selector Switch

Type NW Switch

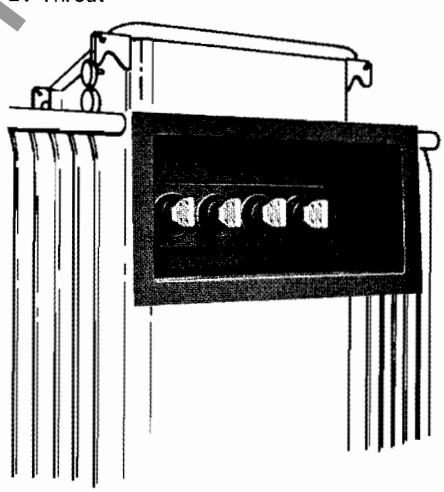
A liquid filled disconnect switch (oil or Inerteen filled) suitable for breaking magnetizing current can be supplied. Switch is rated for 100 ampere load-break when oil filled. Fuses not available.

Low Voltage Equipment

Low Voltage Compartment

A low voltage air compartment, similar to the high voltage compartment shown previously, can be furnished.

LV Throat



An LV throat for connection to bus duct can be furnished.

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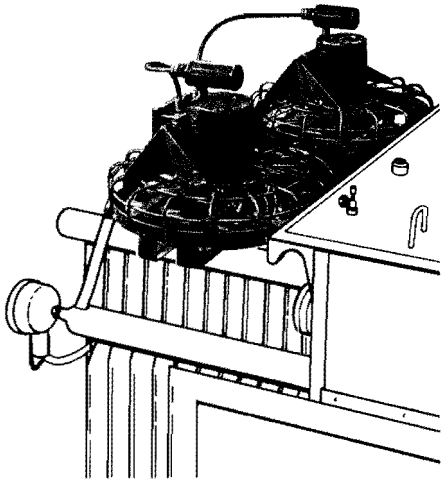
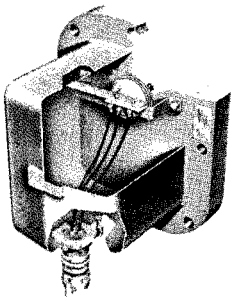
Optional Accessories
Forced Air Cooling



Provisions for fan cooling are included on transformers 750 Kva and larger. Complete fan cooling equipment is available and when in operation will give the following OA/FA ratings:

750 Kva OA	862 Kva FA
1000 Kva OA	1150 Kva FA
2000 Kva OA	2300 Kva FA
2500 Kva OA	3125 Kva FA

Sudden Pressure Relay



A Westinghouse sudden pressure relay for protection against excessive damage due to internal faults may be specified.

Dial Hot Spot

Dial hot spot winding temperature equipment including a current transformer may be specified.

Lightning Arresters
Surge protection may be specified, and arresters will be mounted in the compartment connected to the high voltage flanged opening.

Alarm Contacts
Alarm contacts may be added to the thermometer, liquid level gauge and pressure relief device.

Insulation Levels

KV	Induced Test-120 Hertz	Applied Test-60 Hertz	BIL
1.2		10	30
2.5	Twice	15	45
5.0	Times	19	60
8.6	Normal	26	75
15.0		34	95

Impedance: 500 Kva and below – 5.00%
750 Kva – 2500 Kva – 5.75%

Both values subject to NEMA tolerance of plus or minus 7½%.

Cooling: Transformers may be cooled by WEMCO® "C" oil, or Inerteen.

Windings: Only two winding transformers without H.V. Delta-Wye board or series multiple in either winding.

Wye-Wye Connections: The H.V. and L.V. neutrals will be tied together internally by a removable link and brought out through a L.V. bushing and grounded to the tank wall.

NEMA Audible Sound Levels

Equivalent Two Winding KVA Self Cooled	Average Level in Decibels
101-300	55 DB
301-500	56 DB
501-700	57 DB
701-1000	58 DB
1001-1500	60 DB
1501-2000	61 DB
2001-2500	62 DB

Temperature Guarantees
(Altitudes not to exceed 1000 meters or 3300 feet)

	Ambient ①	Rise ②	Hotspot Rise
Standard	30°C	65°C	80°C
Optional	30°C	55°C	65°C

① 30°C average ambient temperature of cooling air not to exceed 40°C max. over any 24 hour period.

② Degree rise is the average winding temperature rise by resistance.

Further Information
Prices: Price List 47-150

Dimensions: Technical Certification Section 47-376

High Voltage Fuses: Descriptive Bulletin 36-654

Dry Type Power Centers: Descriptive Bulletins 47-351, 47-352 and 47-353

Rectangular Coil Core Form Transformers: SA-10099

Westinghouse Insuldur: SA-9025B

Why Westinghouse Rectangular Coil Core Form Transformers Withstand Short Circuits: M-7205

The South Boston Value Story: MA-375.

Or Contact your nearest Westinghouse Sales Office

The Westinghouse policy of continuous improvement of its products may result in changes in these specifications without notice.

Westinghouse Electric Corporation
Small Power Transformer Division, South Boston, Virginia 24592
Printed in USA

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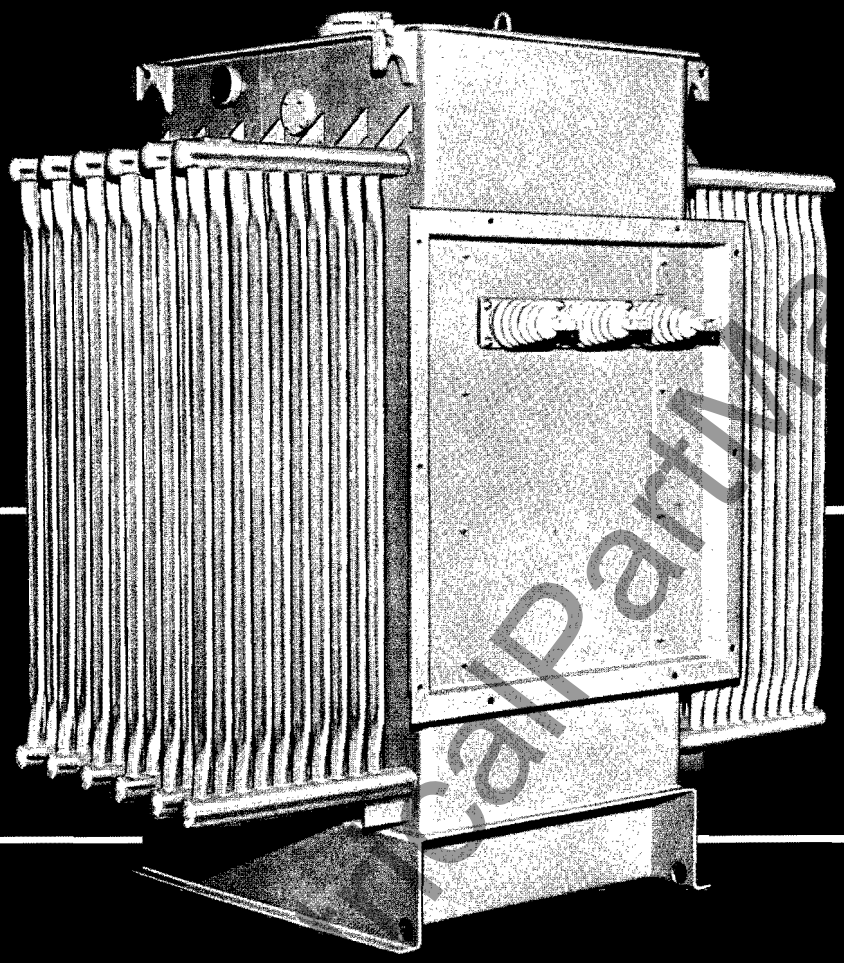

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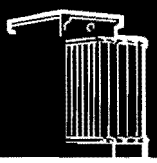

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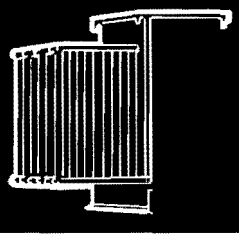

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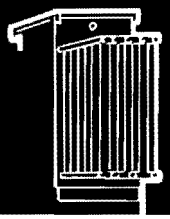

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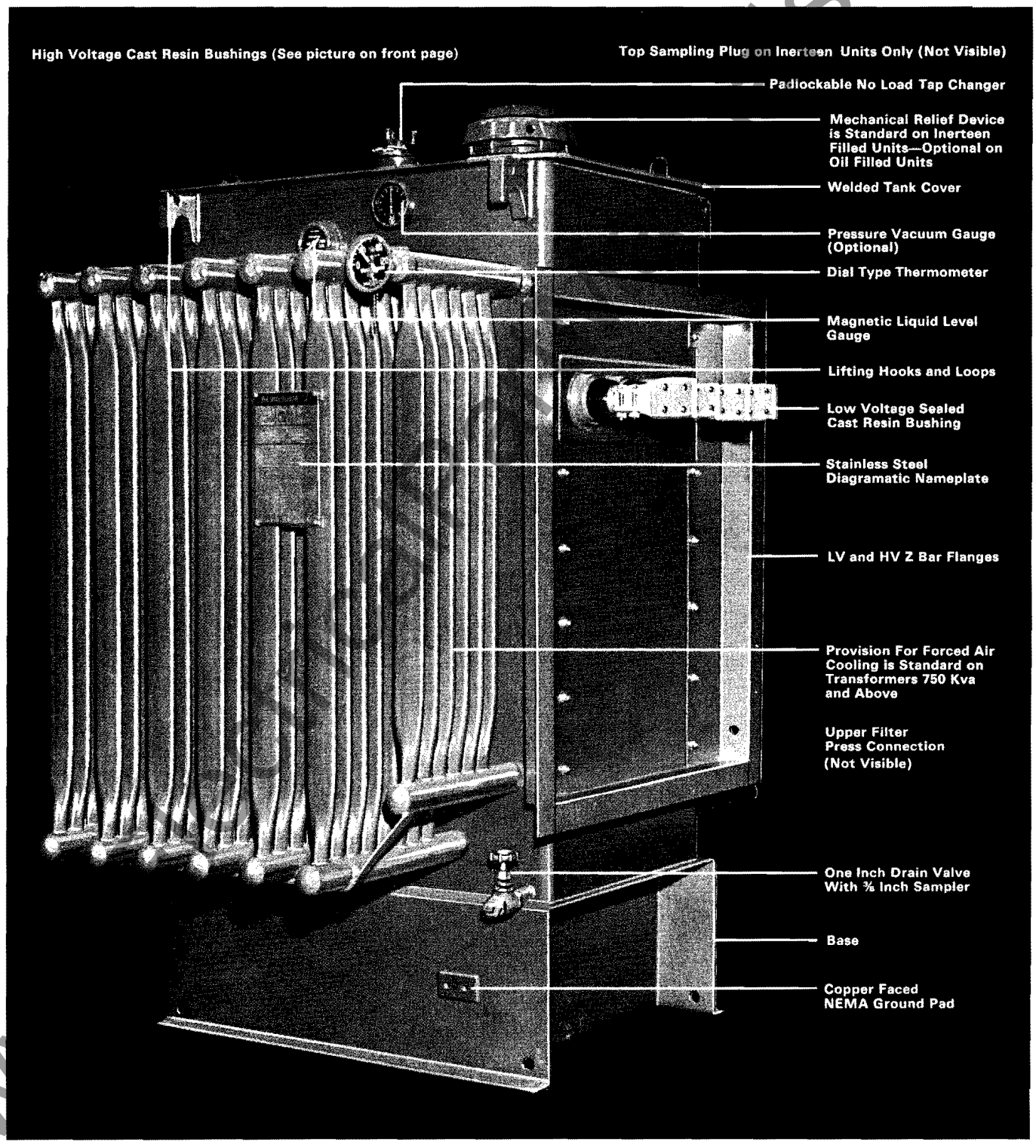

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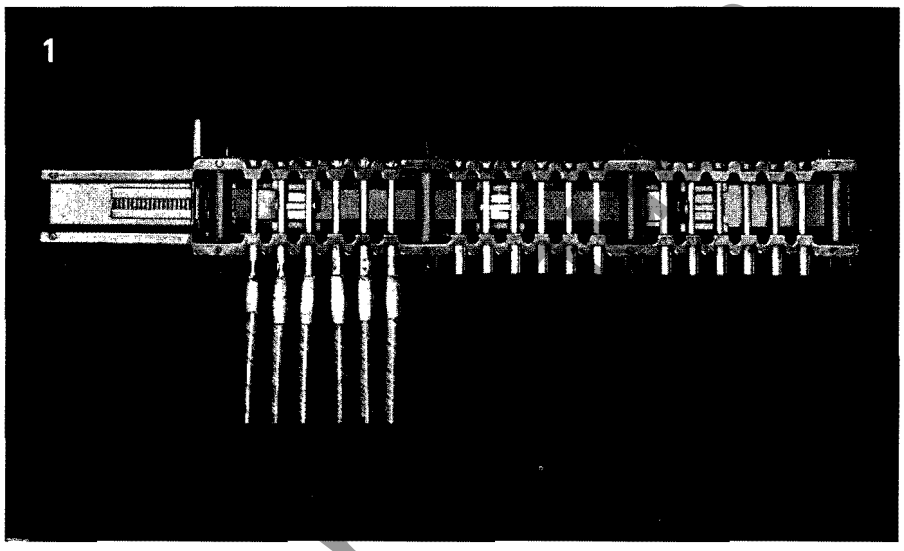

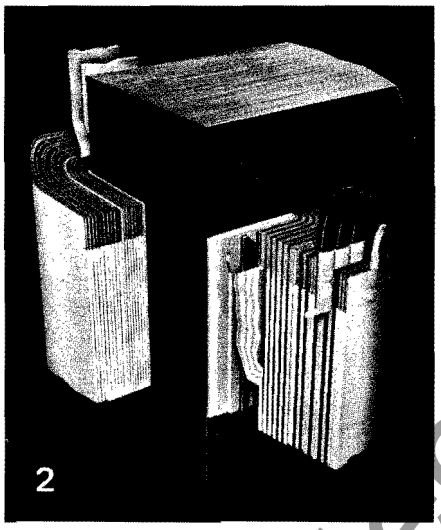

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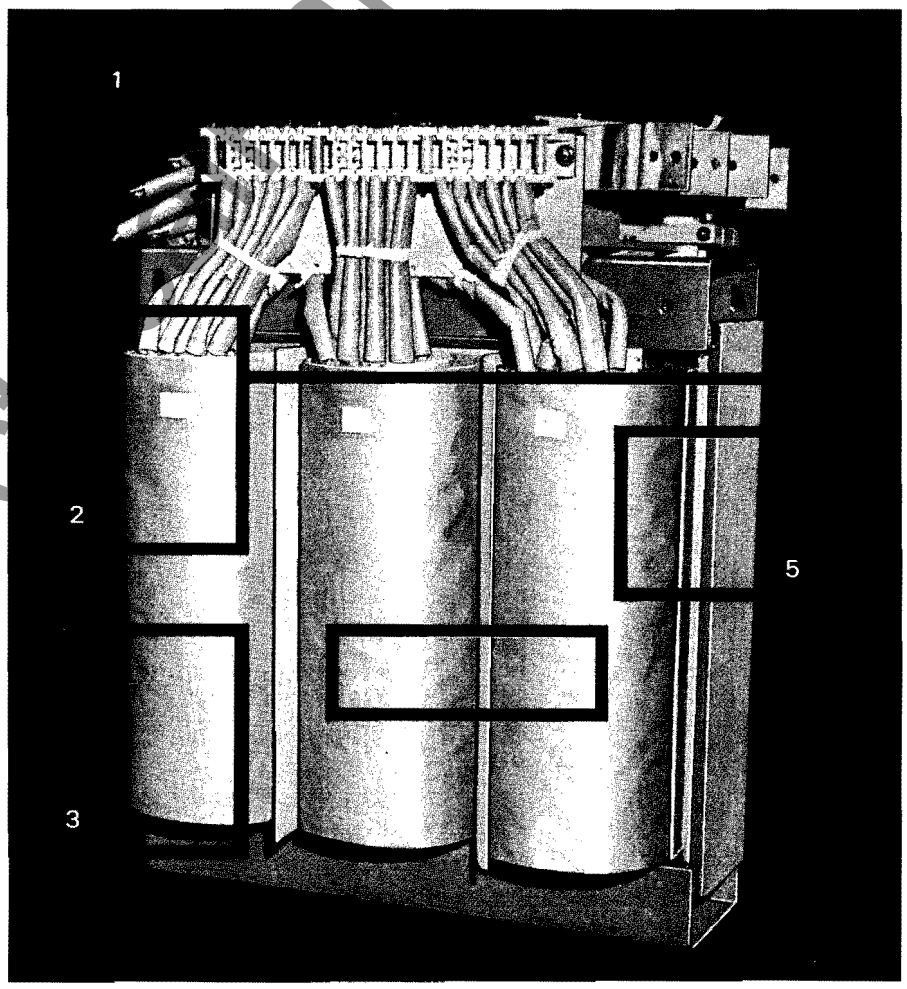

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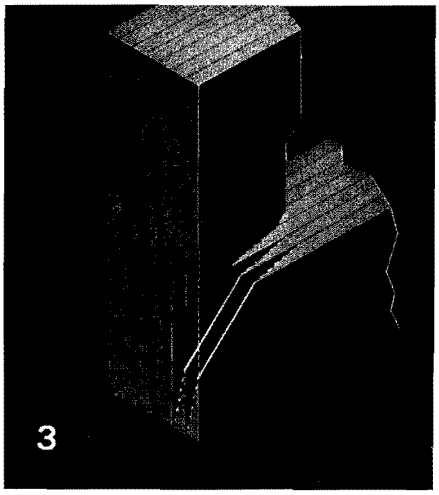

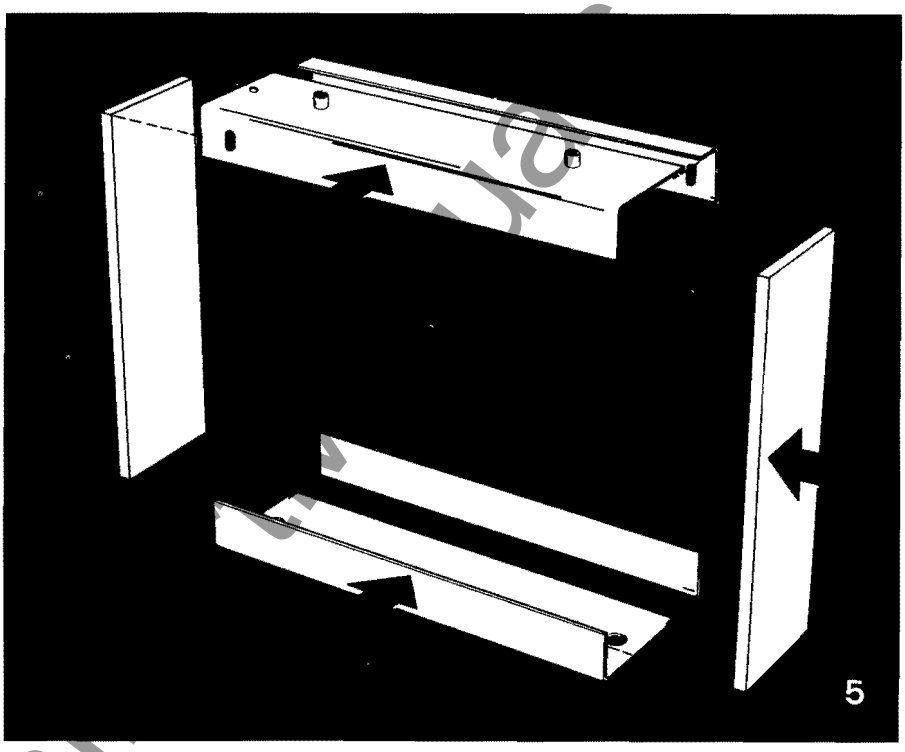

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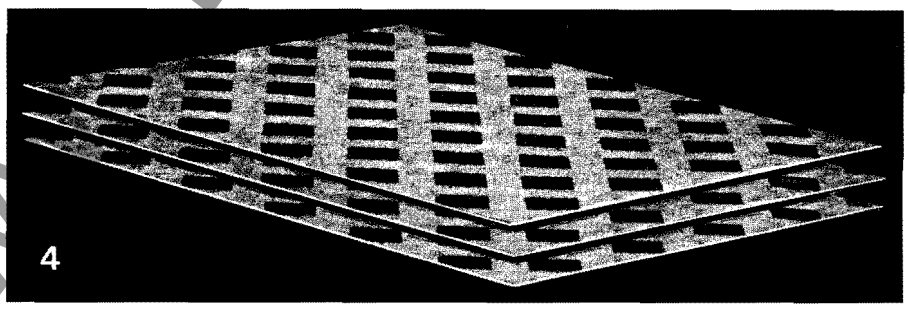
The user benefit is a coil that better withstands short circuit and allows an operation at 10°C higher temperature on a 55°C rated unit with a 12% increase in KVA capacity.

Welded Frame
The Westinghouse exclusive welded frame provides a superior six piece supporting structure for the core and coils. End plates are thick steel slabs that are assembled in a mechanical and pressure jig around the core and coils, then welded to top and bottom plates to form a rigid structure that will not loosen during assembly, shipment, or in service. To determine the thickness of members used (even the thickness of welds), a short circuit calculation is made for each unit to determine the forces of short circuit.

The result is an assembly that restrains more effectively vertical and horizontal components of force, decreasing the probability of failure during severe short circuits.

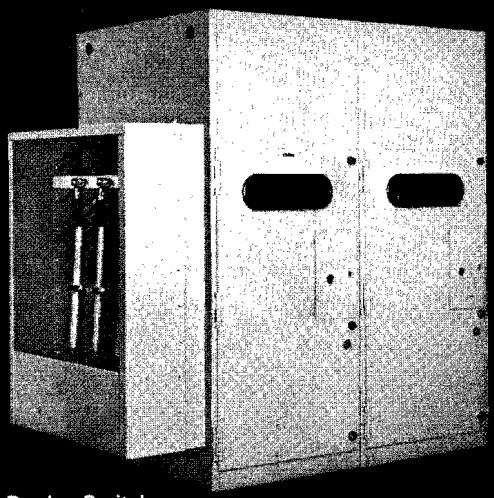
This benefits the user by a reduction in repair or replacement costs and a reduction in downtime that means loss of service or lost production.



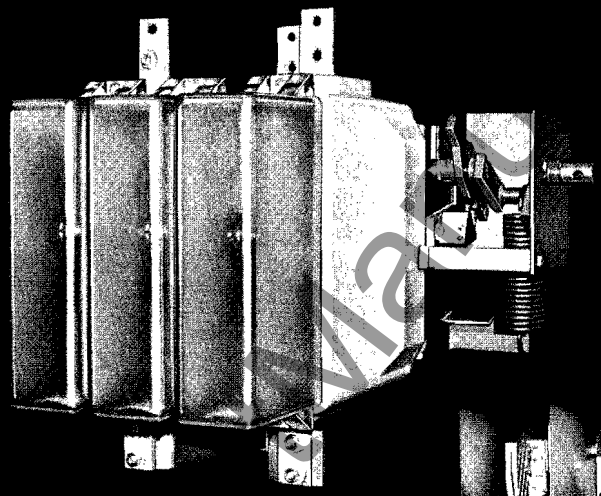
Westinghouse

High Voltage Equipment

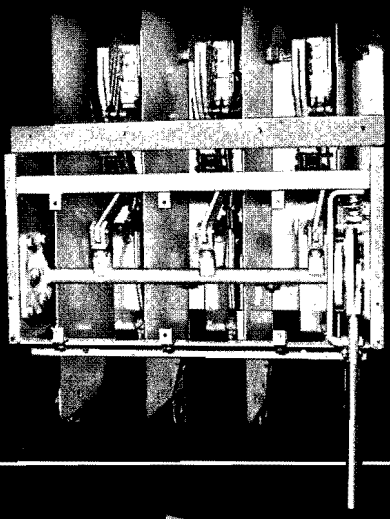
High voltage bushings are wall mounted and enclosed by a "Z" bar flange or flanged throat. The "Z" bar flange is used for connection to air switches, oil cutouts or terminal chambers. Throats connect to liquid switches or bus ducts.



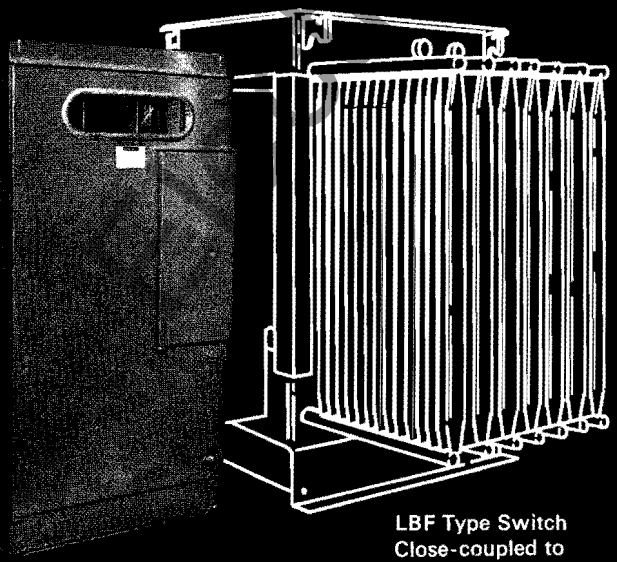
Duplex Switch—
Showing Transformer
Connection End



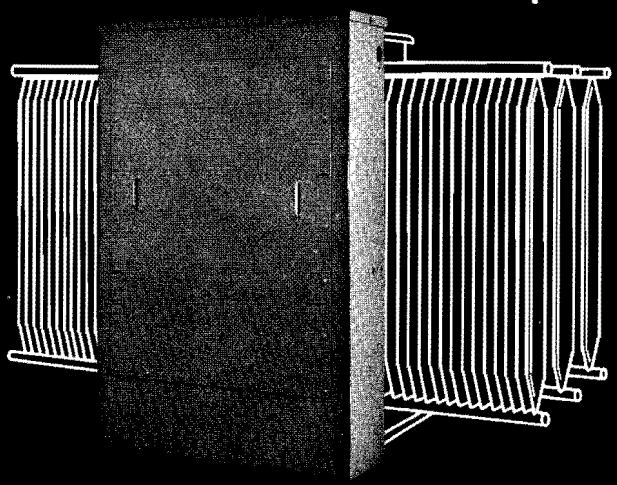
600 Ampere Molded Power Switch
600 Ampere Continuous and Loadbreak
40,000 Ampere Asymmetrical at 15 Kv
RBA or CLE fuses



600 Ampere LBF Gang Operated
Air Switch 3 Pole, Two Position,
Torsion Bar Mechanism Mounted
in Air-filled Compartment
600 Ampere Continuous and Loadbreak
61,000 Ampere Asymmetrical at 5 Kv
40,000 Ampere Asymmetrical at 15 Kv
RBA or CLE fuses



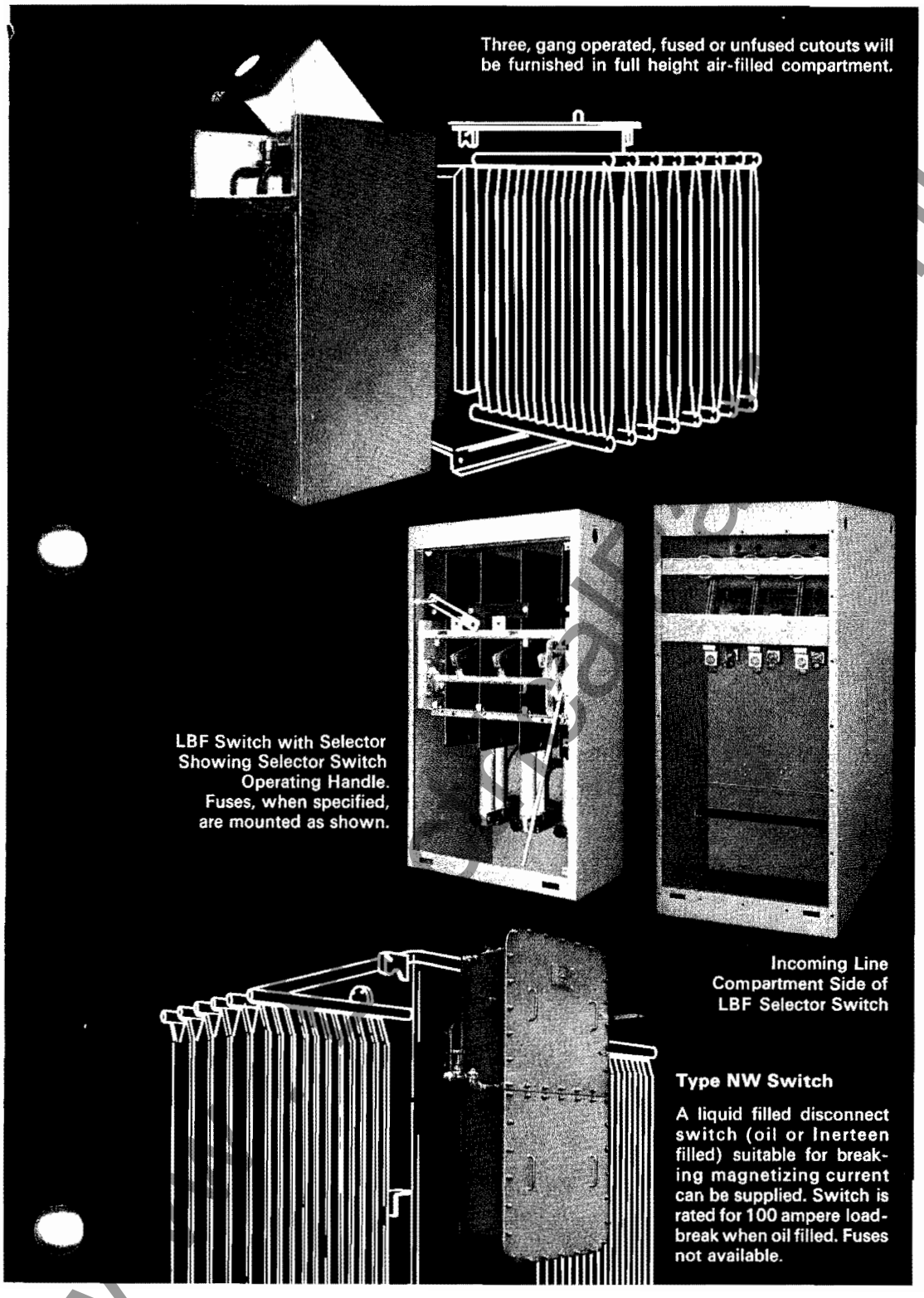
LBF Type Switch
Close-coupled to
Power Center Transformer



A full height air compartment can be furnished for terminating incoming cables.

Secondary Unit Substation Transformers (Power Centers)

Liquid Filled, Self-Contained
112½ – 2500 Kva



Three, gang operated, fused or unfused cutouts will be furnished in full height air-filled compartment.

LBF Switch with Selector Showing Selector Switch Operating Handle. Fuses, when specified, are mounted as shown.

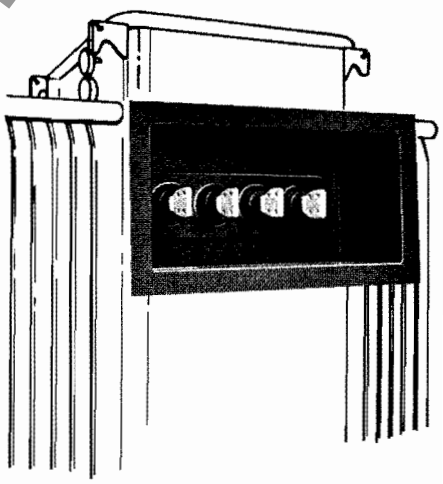
Incoming Line Compartment Side of LBF Selector Switch

Type NW Switch

A liquid filled disconnect switch (oil or Inerteen filled) suitable for breaking magnetizing current can be supplied. Switch is rated for 100 ampere load-break when oil filled. Fuses not available.

Low Voltage Equipment
Low Voltage Compartment
A low voltage air compartment, similar to the high voltage compartment shown previously, can be furnished.

LV Throat



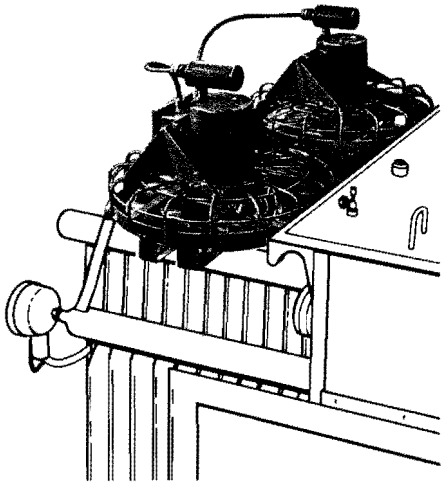
An LV throat for connection to bus duct can be furnished.

Secondary Unit Substation Transformers (Power Centers)

Liquid Filled, Self-Contained
112½ – 2500 Kva

Optional Accessories

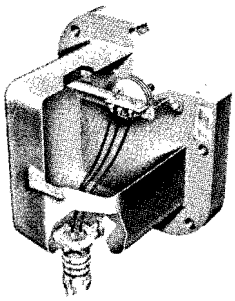
Forced Air Cooling



Provisions for fan cooling are included on transformers 750 Kva and larger. Complete fan cooling equipment is available and when in operation will give the following OA/FA ratings:

750 Kva OA	862 Kva FA
1000 Kva OA	1150 Kva FA
2000 Kva OA	2300 Kva FA
2500 Kva OA	3125 Kva FA

Sudden Pressure Relay



A Westinghouse sudden pressure relay for protection against excessive damage due to internal faults may be specified.

Dial Hot Spot

Dial hot spot winding temperature equipment including a current transformer may be specified.

Lightning Arresters

Surge protection may be specified, and arresters will be mounted in the compartment connected to the high voltage flanged opening.

Alarm Contacts

Alarm contacts may be added to the thermometer, liquid level gauge and pressure relief device.

Insulation Levels

KV	Induced Test-120 Hertz	Applied Test-60 Hertz	BIL
1.2		10	30
2.5	Twice	15	45
5.0	Times	19	60
8.6	Normal	26	75
15.0		34	95

Impedance: 500 Kva and below – 5.00%
750 Kva – 2500 Kva – 5.75%

Both values subject to NEMA tolerance of plus or minus 7½%.

Cooling: Transformers may be cooled by WEMCO® "C" oil, or Inerteen.

Windings: Only two winding transformers without H.V. Delta-Wye board or series multiple in either winding.

Wye-Wye Connections: The H.V. and L.V. neutrals will be tied together internally by a removable link and brought out through a L.V. bushing and grounded to the tank wall.

NEMA Audible Sound Levels

Equivalent Two Winding KVA Self Cooled	Average Level in Decibels
101-300	55 DB
301-500	56 DB
501-700	57 DB
701-1000	58 DB
1001-1500	60 DB
1501-2000	61 DB
2001-2500	62 DB

Temperature Guarantees

(Altitudes not to exceed 1000 meters or 3300 feet)

	Ambient ①	Rise ②	Hotspot Rise
Standard	30°C	65°C	80°C
Optional	30°C	55°C	65°C

① 30°C average ambient temperature of cooling air not to exceed 40°C max. over any 24 hour period.

② Degree rise is the average winding temperature rise by resistance.

Further Information

Prices: Price List 47-150

Dimensions: Technical Certification Section 47-376

High Voltage Fuses: Descriptive Bulletin 36-654

Dry Type Power Centers: Descriptive Bulletins 47-351, 47-352 and 47-353

Rectangular Coil Core Form Transformers: SA-10099

Westinghouse Insuldur: SA-9025B

Why Westinghouse Rectangular Coil Core Form Transformers Withstand Short Circuits: M-7205

The South Boston Value Story: MA-375.

Or Contact your nearest Westinghouse Sales Office

The Westinghouse policy of continuous improvement of its products may result in changes in these specifications without notice.

Westinghouse Electric Corporation
Small Power Transformer Division, South Boston, Virginia 24592
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