



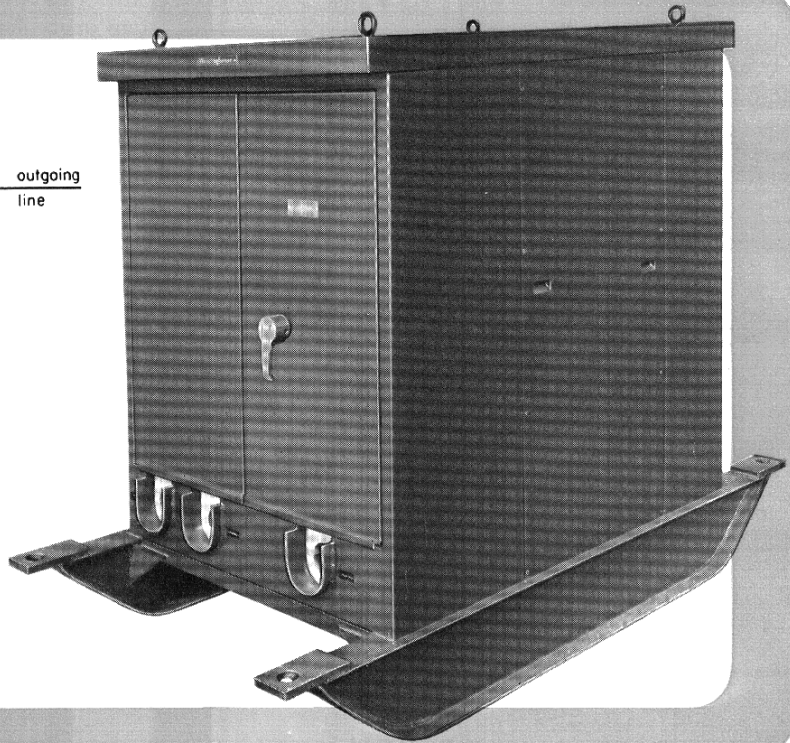
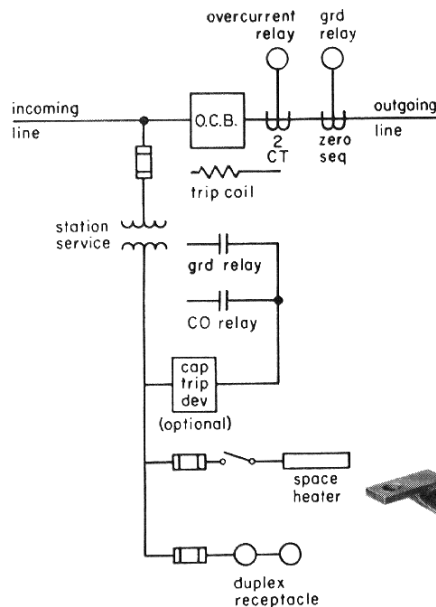
outdoor portable switchhouses for open-pit or underground mining[▲]

descriptive
bulletin

31-955

3 phase, 60 cycle, 5, 7.5, 15 kv service
interrupting rating 50, 100, 250, 500 mva

page 1



application

Westinghouse switchhouses provide a portable means of power distribution for all types of open-pit mining. Mounted on skid bases with towing hooks, they are easily dragged by the shovels, drag lines, or other equipment for which they provide electrical power. With connecting power cable, they serve as the electrical link between the power substation and mining machinery of all kinds.

Standard equipment in the switchhouse includes circuit protection (one or more oil circuit breakers), control transformers, relays for overcurrent and ground protection, and cable terminations for incoming and outgoing lines. Additional facilities that can be provided are: main-line disconnects and couplers for incoming and outgoing lines; instrumentation and/or metering; and interior illumination.

[▲]Equipment described in this bulletin is for open-pit mining service. However, low-height equipment can be provided for underground operation either on skids or on mine tracks.

advantages

portable: The unit is easily dragged to a new location. The sled type base is comprised of I-beam skids with bent up flanges and towing hooks.

weatherproof: All welded construction of switchhouse with form flange doors assures a completely weatherproof unit.

safety for personnel: Safety of personnel on mining machinery is assured by the ground fault protection provided by a zero sequence current transformer and a ground relay. In addition, ground wire monitoring can be provided.

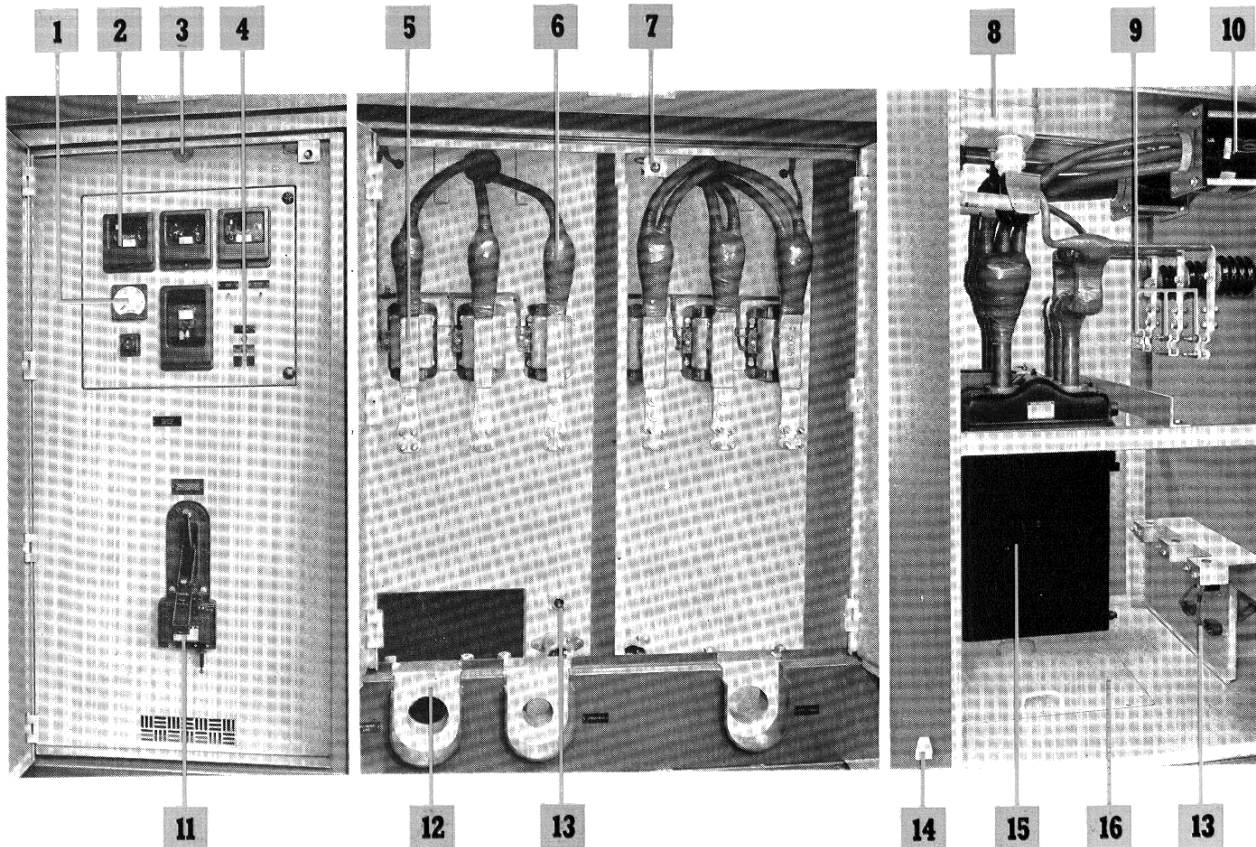
safety for operators: Safety of operating personnel is assured by interlocks which trip the circuit breaker whenever a door (providing access to high voltage circuits) is opened.

December, 1965

supersedes descriptive bulletin 32-257, pages 1-4, dated December, 1963
mailed to: E/1138/DB; C/322, 414/DB



construction



Front of switchhouse with door open to show relay panel and breaker operating mechanism.

Rear of switchhouse (arranged for two outgoing cables) with door open to show instrument transformers and outgoing leads.

Side of switchhouse with panel removed to show circuit breaker.

1 voltmeter

Instruments and metering can be provided in switchhouses if desired.

2 relays

Westinghouse type CO relays give instantaneous and time delay protection against short circuits and overloads respectively.

3 interior lighting

Lighting for switchhouses is available. Switch at right automatically turns lights on when door is opened.

4 indicating lamps

Lamps indicate whether circuit breaker is in open or closed position.

5 current transformers

Normally two current transformers per circuit are provided to give overload or short circuit indication to operating relays, or to transformer trip coils of the oil circuit breaker.

6 taped connections

All buses and connections are hand-taped with varnished cambric.

7 interlock

All doors that provide access to high voltage compartments are interlocked to trip breaker when door is opened.

8 transformer

Power supply for the switchhouse (for lighting, etc.) is provided by one or more transformers.

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9 incoming terminals

Cable is normally brought into the switchhouse and terminated at the incoming terminals. However, plug-in connectors can be provided if desired. See item 12.

10 zero sequence current transformer

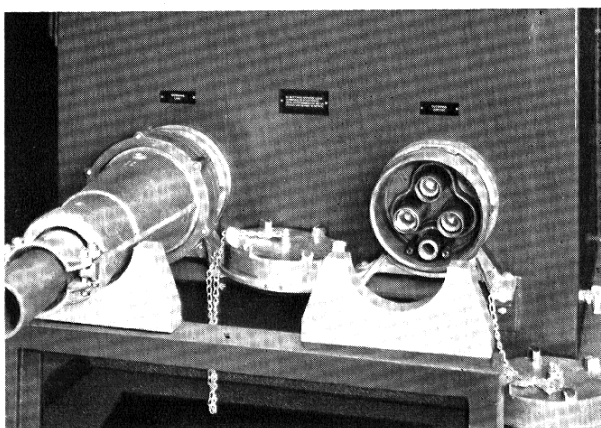
This current transformer, together with the CO-11 ground relay (provided with an instantaneous trip unit), trips the circuit breaker and protects against inadvertent grounding of a phase wire.

11 circuit breaker mechanism

Circuit breakers are normally manually operated, but electrical operation of breakers can be provided.

12 Micarta blocks

Incoming and outgoing cables are held in position by clamping between Micarta blocks.



Where desired, plug-in connectors can be provided for incoming and outgoing lines, with saddles to support the plug and make it possible for one man to handle the plug and heavy trailing cable. Note that either shorting or non-shorting covers are provided for the connector sockets when they are not in use.

13 ground bus

A ground bus, connected to the outside grounding lug, is provided for grounding the cable sheath.

14 grounding connection

A lug is provided on the outside of the switchhouse for connection to a solid ground to complete the ground-fault protection.

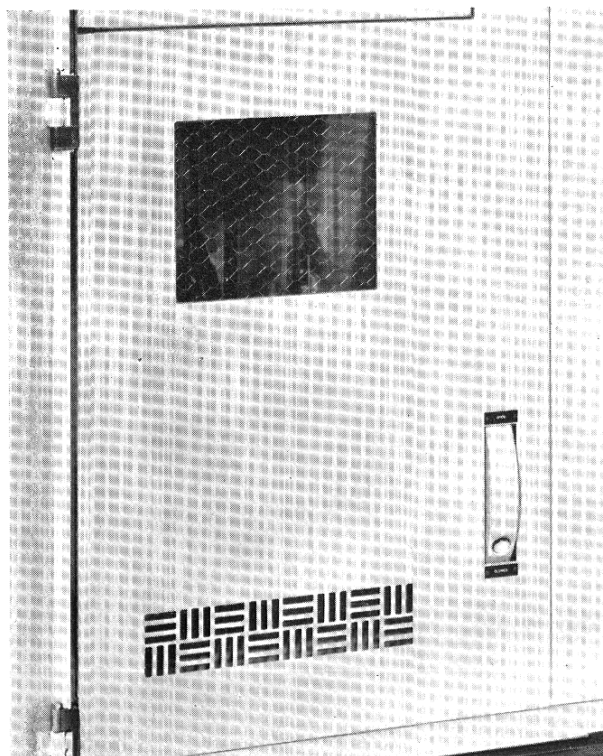
15 oil circuit breaker

Westinghouse type F and type B oil circuit breakers are used in switchhouses, depending on ratings. For voltage, current and interrupting ratings, see tabulation on page 4. Information on breaker construction and operation is available in descriptive bulletins 33-150 and 33-152.

16 removable floor plate

Removable cover in the floor of the unit provides space to lower the breaker tank for contact maintenance.

disconnect switches



Where isolation of circuits is desired, disconnect switches can be provided in a separate compartment mechanically interlocked with the circuit breaker. A wire glass window allows visual indication of switch position. Switch may be gang operated as shown, or individually hook-stick operated.



outdoor portable substations
for open-pit or underground mining

standard equipment

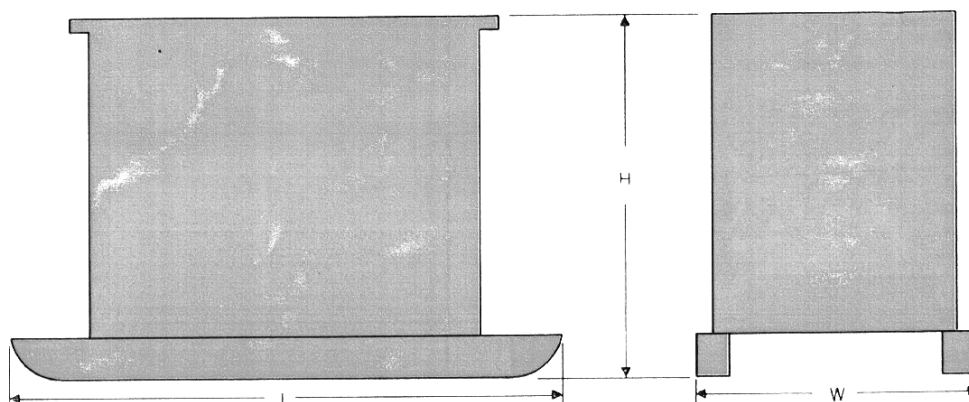
One oil circuit breaker complete with shunt trip, transformer trip coils, and auxiliary switch.
One Westinghouse type FR through-type current transformer.
One Westinghouse type CO-11 zero sequence relay.
One potential transformer for switchhouse auxiliaries.
Two Westinghouse type SM current transformers.
One set of insulated bus.
One neutral bus.
One 250-watt space heater, complete with cut-off switch and fuse.
Four incoming line terminals.
Four outgoing line terminals.
One set of hinged doors over breaker operator with electrical interlock switch.

optional equipment

Capacitor trip devices in lieu of transformer trip coils.
Three-pole gang-operated line disconnect switch complete with mechanical interlock and wire glass window.
Set hook-stick operated line disconnects.
Three-phase JOY cable couplers (5 kv) complete with shorting type cover plate.
Three-phase PLM cable couplers (5 or 7.2 kv) complete with shorting type cover plate.
Westinghouse type KA-241 a-c indicating ammeters.
Westinghouse type KA-241 a-c indicating voltmeters.
Westinghouse type W instrument transfer switches.
Westinghouse type CB-2F, two-element watt-hour meter.
Additional potential transformers (for required metering).
Cable ground wire monitoring scheme.
Westinghouse DH air breaker in lieu of oil breaker, if desired.
Internal illumination.
Line-type or station-type lightning arresters.
Surge capacitors.
Incoming or outgoing roof bushings.
Reverse phase or undervoltage relay protection (requires two potential transformers).

dimensions in inches

not to be used for construction purposes unless approved



circuit breaker type	voltage rating, kv			current capacity, amperes	interrupting capacity, mva	approximate dimensions in inches											
	5	7.5	15			single breaker, no disconnect			single breaker, line disconnect			two breakers, no disconnect			two breakers, line disconnect		
						L	W	H	L	W	H	L	W	H	L	W	H
F-122	●	600	25 50 50	78	42	70	78	52	70	78	52	70	84	60	80
F-124	●	●	...	600													
	●	1200													
F-100	●	●	...	600	100 100 100	92	46	78	92	56	78	92	56	78	102	66	82
	●	●	...	1200													
	●	●	...	2000													
138-F-150	●	●	●	600	150 150 250	98	56	84	98	68	84	98	68	84	135	66	90
	●	●	●	1200													
138-B-250	●	●	●	1200													
138-B-500	●	●	●	1200	500 500	98	56	84	98	68	84	98	68	84	135	66	90
	●	●	●	2000													

• Voltage rating available.

Westinghouse Electric Corporation

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