

WESTINGHOUSE BRAKE & SIGNAL CO. LTD.

82, YORK WAY, KING'S CROSS, LONDON, N.1

Telegraphic Address : Westinghouse, Nordo, London

Telephone No. : TERminus 6432

Rectifier Data Sheet No.

5th Edition

48

WESTINGHOUSE CINEMA ARC RECTIFIER EQUIPMENTS

for use on single- and three-phase supplies

incorporating

**“WESTALITE”
DOUBLE-VOLTAGE
RECTIFIERS**

NOTICE

The instructions and diagrams herein contained are the exclusive copyright of the Company and have been prepared for the convenience of our Licensees in assembling and installing Westinghouse Rectifying Apparatus, which is widely protected by numerous patents in all the principal countries of the world.

THREE-PHASE RECTIFIERS

1. GENERAL SPECIFICATION

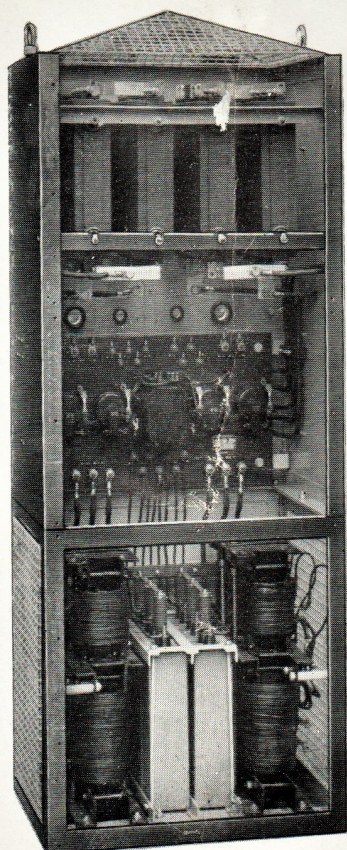
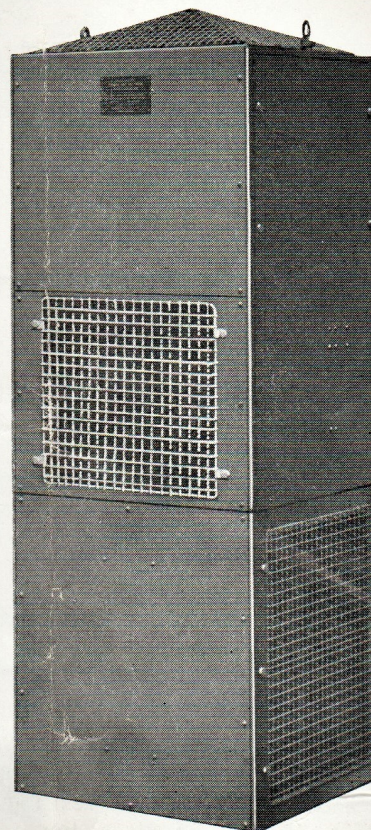
These Westinghouse cinema arc rectifier equipments have been developed from the well-known pre-war copper-oxide type, and utilize the same basic circuit.

“ Westalite ” double-voltage rectifiers are incorporated, resulting in a material decrease in size and weight. The rectifiers are naturally cooled, thereby removing the need for fans and simplifying the control circuits.

An improved type of contactor is provided, the control gear now being incorporated in the main rectifier housing. This greatly facilitates installation and simplifies the external wiring. The switches for remote control of the arc have also been improved.

Special attention has been paid to accessibility of the various components and also to the appearance and finish of the complete equipment.

The equipment complies with the requirements of the applicable specifications of the British Standards Institution and the applicable regulations of the Home Office, provided always that such equipment is installed according to the Company's instructions and such specifications and regulations.



2. EFFICIENCY

The efficiency of the Westinghouse “ Westalite ” metal rectifier by itself is approximately 84 per cent. and, due to the special ballast circuit avoiding the use of resistances, the overall efficiency of the complete equipment from the AC supply mains to the arc itself is approximately 78 per cent. This results in very low running costs and low Maximum Demand charges.

3. POWER FACTOR

The special patented circuit has been developed to provide the highest degree of arc stability without the disadvantage of low Power Factor. The Power Factor is 0.85 and this, combined with the high efficiency, means not only large savings in the units of electricity consumed, but also large savings in the Maximum Demand charge, whether this is based on kilowatts or kVA demand.

4. DETAILED SPECIFICATION

The Twin H.I.60B and the Twin H.I.80 consist of two entirely separate circuits, one for each arc, mounted within one framework and comprise :—

(a) **Rectifiers.** Two separate “ Westalite ” double-voltage rectifiers, each giving 3-phase full-wave rectification, are used for each twin set. The rectifiers are protected against corrosion by dipping in a special compound.

(b) **Transformers.** Two transformer-reactance units, one for each rectifier, vacuum-impregnated and complying with B.S.171.

(c) **Control Gear.** Built-in contactors, complete with auxiliary transformer with 110-volt secondary and rectifiers to provide DC

THREE-PHASE RECTIFIERS—continued

for their operation, are fitted to provide remote control of the equipment. Two individual arc control switches, for fitting near the projectors, are provided. These operate the contactors to give a reduced output for "striking" and "burning-in" and the full output for "running."

(d) **Ballast.** Two separate ballast arrangements, one for each rectifier, are incorporated in the equipment and provide constant arc current over the normal working range of arc voltage.

No external ballast is necessary and, in fact, must not be used.

(e) **Adjustment.** The output may be adjusted over the range given in the table opposite by means of the air gap spacers provided with the equipment :—

(f) **AC Power Supply.** Suitable for use on any supply mains from 346 to 440 volts, 3-phase, 50 cycles, AC.

These sets can be modified to operate from 200/250 volts three-phase if required.

Special transformers can be supplied to enable the standard equipment to operate from two-phase supplies, while Westinghouse static phase converters are available for use on single-phase supplies.

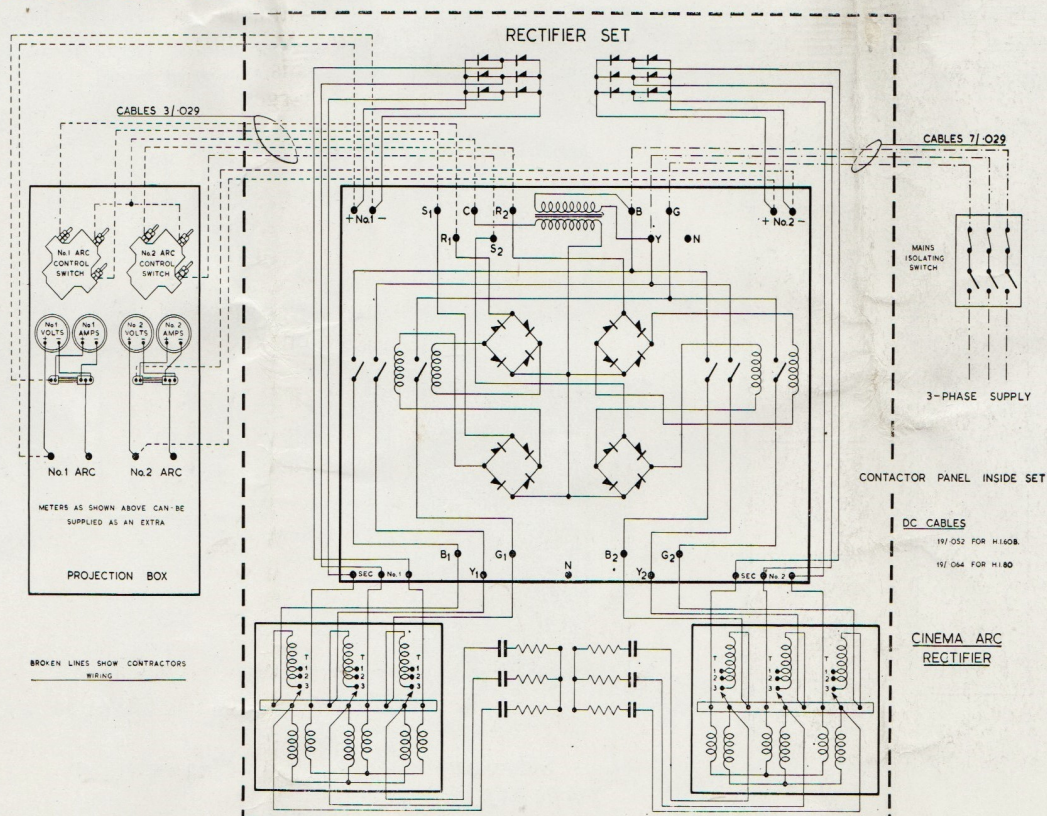
(g) **Finish.** The case is finished in "battleship grey" enamel.

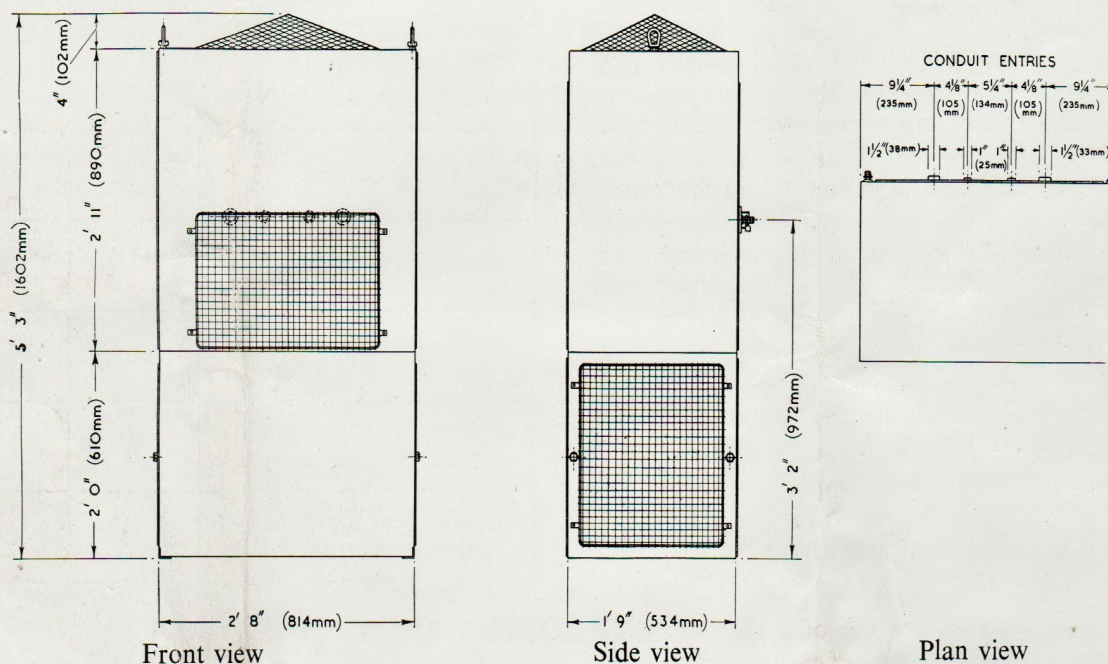
Type of rectifier	Twin H.I.60B	Twin H.I.80
Suitable for arc voltages up to :—	45-v	50-v
Maximum current	65A	80A
Minimum current	40A	40A
Maximum total current	130A	160A
kW input for maximum output on one arc	3.8 kW	5.2 kW
Line current for maximum output on one arc 400-v	6.5A	8.9A

5. CIRCUIT

The Westinghouse special patented circuit is employed for ballast purposes. This is a semi-resonant circuit, which enables the equipment to behave as if it had an infinite line voltage and thus give constant arc current regardless of arc volts. The system does not determine the arc voltage, but keeps the current constant at any value called for, and the

arc voltage follows from the characteristics and gap of the arc. Accurate maintenance of arc focus is, therefore, very greatly simplified and, in the event of carbon breakage, the arc can be restruck instantly on full load. No ballast resistances are necessary and, in fact, must not be used.

5. 1. CIRCUIT DIAGRAM

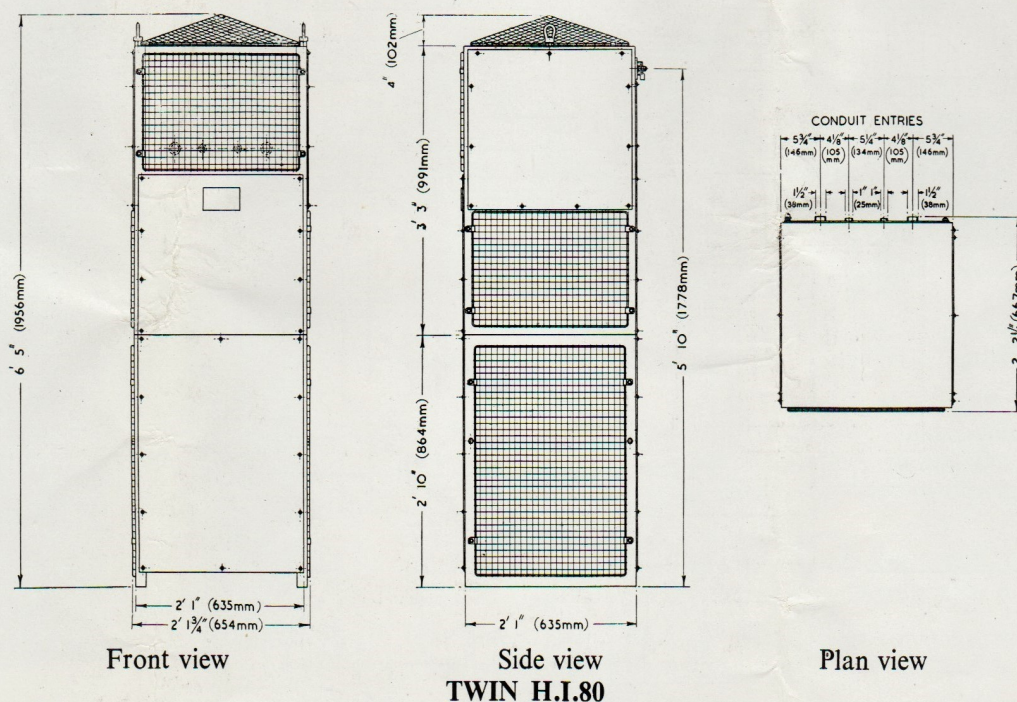
THREE-PHASE RECTIFIERS—continued**6. MECHANICAL DESIGN AND DIMENSIONS OF RECTIFIERS TYPES TWIN H.I.60B AND TWIN H.I.80****TWIN H.I.60B**

Each set is made in two sections to facilitate carrying to the rectifier room in the cinema. Lifting eyes are provided for use in either section. The upper one, containing the rectifier and contactor panel, weighs about 1½ cwt. (76 kgms.) in the case of the H.I.60B and 2 cwt. (102 kgms.) for the H.I.80, while the lower section, containing the two transformers and condensers, weighs about 3½ cwt. (178 kgms.) (total weight, 5 cwt.—254 kgms.) for the H.I.60B

and 4 cwt. (203 kgms.) (total weight, 6 cwt.—305 kgms.) for the H.I.80.

At the back of the rectifier are provided two 1½-in. conduit nipples for the four DC leads; and two 1-in. conduit nipples for the incoming AC cables and the two sets of leads to the projection box for remote control of the arc current.

Access to terminals for all external wiring connections and for the contactor panel is obtained by removing the grill in the front panel.



SINGLE-PHASE RECTIFIERS

(British Patent Nos. 518,632, 612,191, 627,646)

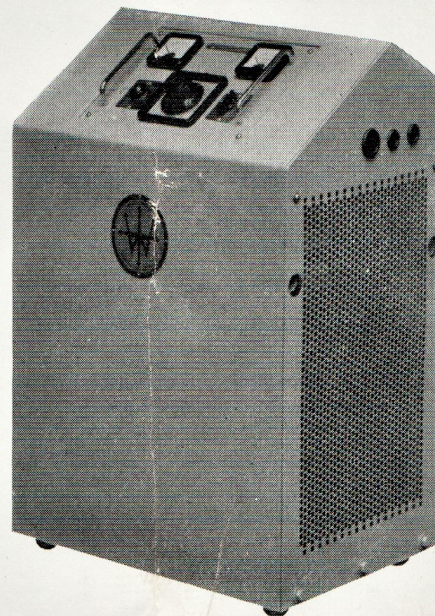
7. GENERAL SPECIFICATION

This single-phase rectifier has been designed for use in the projection box and to fit underneath the lamp house. It is compact and is capable of operating either high or low intensity arcs and automatically gives the correct arc voltage for any type of arc. With high intensity arcs, the output is continuously variable from 35 to 65 amperes, while low intensity arcs can be operated satisfactorily at currents of from 20 to 38 amperes.

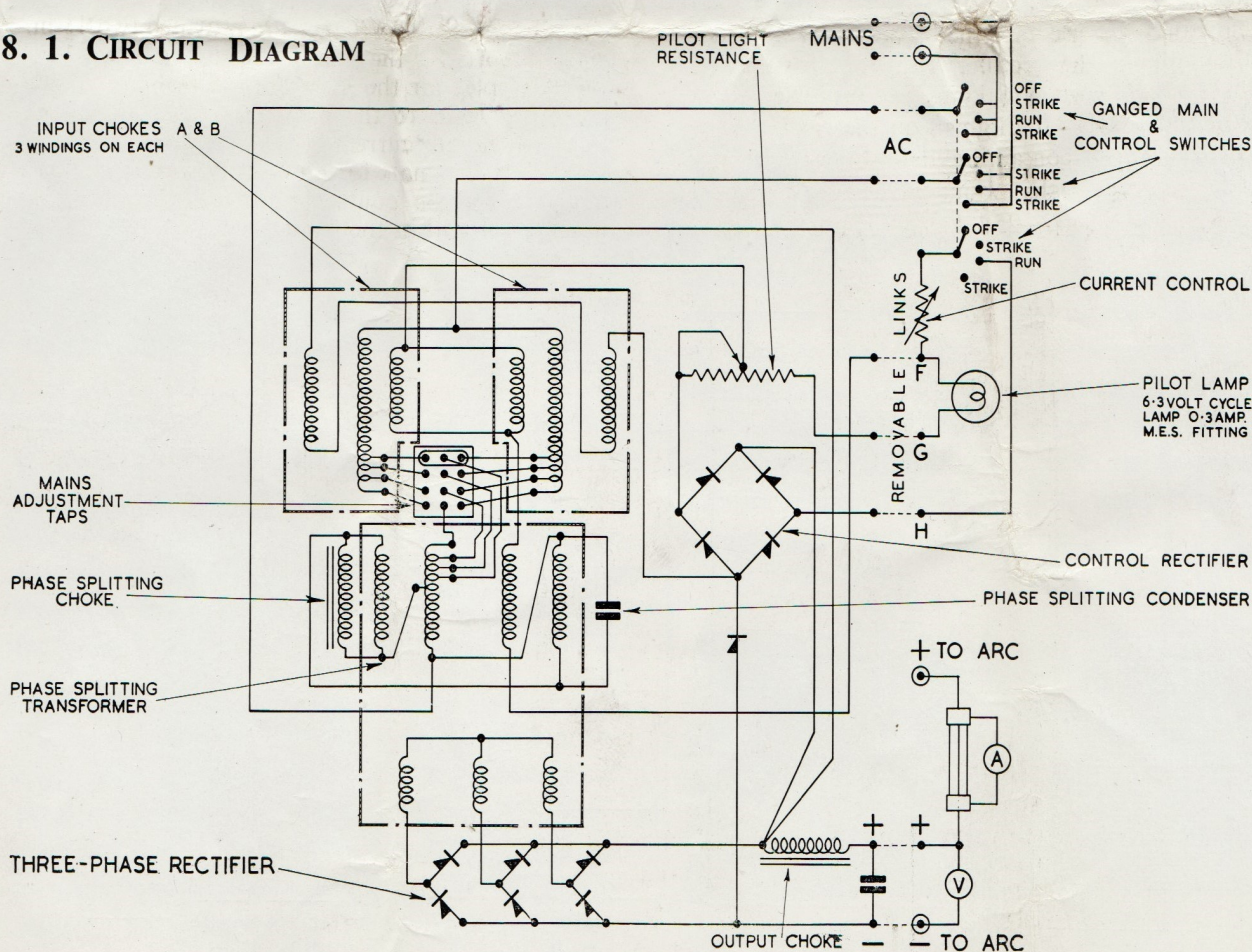
8. CIRCUIT

The design incorporates one of the patented Westinghouse phase-splitting circuits by which means the single-phase supply is split into three phases and a standard three-phase rectifier is employed to provide the DC supply to the arc. By this means, the ripple component is reduced to the same magnitude as that of a normal three-phase equipment without the use of large banks of electrolytic condensers.

Control is effected by the use of a rheostat, which provides a continuously variable output. The losses in this rheostat are negligible.



8. 1. CIRCUIT DIAGRAM



SINGLE-PHASE RECTIFIERS—continued**9. REMOTE CONTROL**

The control panel, which carries the on/off switch, pilot light, current control and meters, has been so designed that it is easily removable and, if desired, can be mounted on the arc lamp pedestal with the

rectifier situated in an adjacent room. In this case the wiring would consist of only five light leads in addition to the DC output leads to the arc itself.

10. POWER FACTOR

The Power Factor of this set is high and varies with the arc voltage. At 36 arc volts it is approxi-

mately 0.8 and at 55 arc volts approximately 0.95.

11. DETAILED SPECIFICATION**(a) Rectifiers**

Westalite double-voltage rectifiers are used to give three-phase full-wave rectification. The rectifiers are protected against corrosion by dipping in a special compound.

(b) Transformer and chokes

These are vacuum-impregnated to comply with B.S.S.171.

(c) Control gear

There are no contactors. Once the set has been switched on it is entirely controlled by means of the rheostat, which is mounted on the panel together with a moving-coil voltmeter, a moving-coil ammeter, on/off switch and indicator lamp.

(d) Ballast

Ballast is not necessary and, in fact, must not be used.

(e) AC power supply

The set is suitable for use on any single-phase 50 c.p.s. power supply of 200/250 volts.

At maximum output of 65 amperes on high intensity lamps, the AC line current is 18 amperes at 230 volts.

(f) Finish

The case is finished in "battleship grey" enamel.

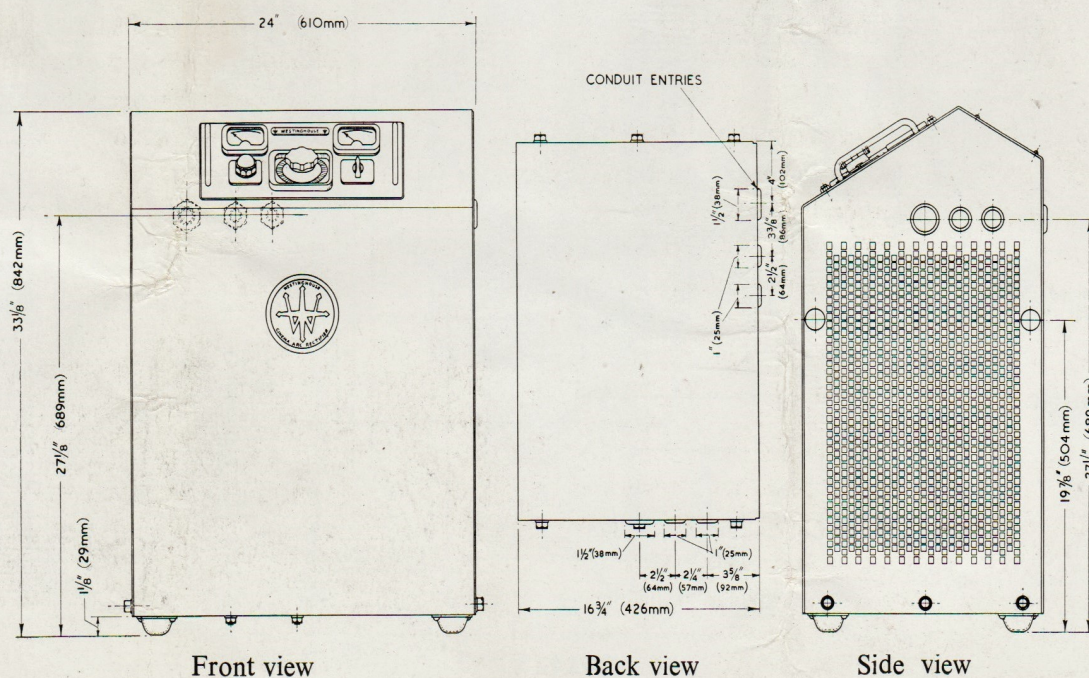
(g) Weight

4 cwts. approximately (203 kgms.).

(h) Wiring

Two alternative sets of conduit entries (one at the side and one at the back) are provided for the incoming AC cables and for the DC leads to the arc.

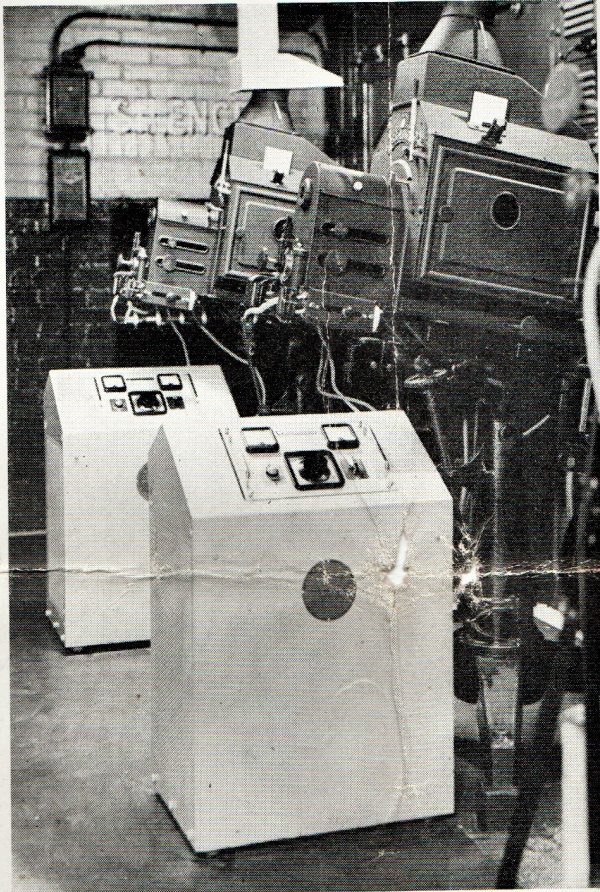
Access to terminals for all external wiring connections is obtained by removing part of the back panel.

12. MECHANICAL DESIGN AND DIMENSIONS

13. INSTRUCTIONS FOR INSTALLATION AND OPERATION OF

SINGLE-PHASE RECTIFIERS—*continued*

This equipment is designed to fit under the rear of the arc lamp so that the projectionist is able to operate the control switch with his left hand while striking the arc with the right.



The alternative cable entries enable the rectifier to be placed at right-angles to the lamp if there is insufficient room in the projection box between the rear of the lamp and the back wall. If it is desired to use remote control the instrument panel can be removed readily and fitted in a convenient position at the lamp or front wall while the rectifier itself is installed in a separate rectifier room.

After the rectifier has been placed in position, the cover plate on the opposite side to the instrument panel should be removed to enable the AC supply wires and the DC leads to the lamp to be connected to their appropriate terminals, which are clearly marked. The adjustment for the mains supply voltage

can now be made by moving the link to the required voltage tap. The set is now ready for operation.

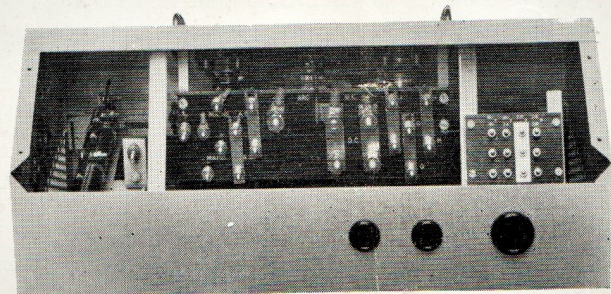
IMPORTANT

To operate, first turn the current control to the minimum position and then bring the carbons together.

WHEN THE CARBONS ARE TOUCHING TOGETHER TURN THE SWITCH THROUGH STRIKE TO RUN AND THEN OPEN OUT THE CARBONS SLOWLY TO STRIKE THE ARC.

As soon as the crater is formed, the current control can be rotated to the running position giving the ampereage required. It will be found that as the current control is rotated, a continuous control of current, to a fraction of an ampere, can be obtained throughout the whole range. Should it be desired to alter the current during the run there is no danger of the arc being extinguished, as can happen by switching from stud to stud on a stepped control.

Many projectionists, used to other makes of rectifier, will feel a little diffident about leaving the carbons jammed together with the rectifier switched on. However, with the Westinghouse equipment this is the best method of striking the arc, and it is possible to place a lead or screwdriver across the lamp terminals while the arc is running without doing any harm to the equipment. In this case the amperage taken on short-circuit is very little more than that taken for normal running. This feature has another practical advantage in that, should a carbon break while the arc is running, the carbons can be brought together immediately and the arc restruck without manipulating switches and controls.



SINGLE-PHASE RECTIFIERS—*continued*

The equipment automatically gives the correct arc voltage whether for low intensity carbons or the various types of high intensity carbons without any adjustment, but it is recommended that the projectionist should consult the carbon manufacturers as to the correct arc voltage required for his particular trim and then operate the arc at this voltage, which will indicate that the correct arc gap is being maintained.

If the feed motor resistance is properly adjusted it is possible to run through the whole reel without touching either the lamp or rectifier controls.

When switching off, the current control should be turned back to the minimum position ready for striking the arc again for the next reel. Many projectionists mark the escutcheon plate on the control so that the correct running position can be found

readily as the current is increased after the formation of the crater.

The red pilot indicator lamp indicates when the rectifier set is alive or has inadvertently been left alive. The lamp is fitted with a readily replaceable 6.3 volt 0.3 ampere M.E.S. cycle headlamp bulb. The correct current rating of replacement bulb must be used as the lamp is connected through a series resistance.

Two tubular passages are provided, one each side of the casing on the same level as the cable entries (see photograph).

These are for inserting heavy conduit or gas barrel for lifting the rectifier set—the *handles on the panel must not be used for this purpose.*

14. WARRANTY

Westinghouse Cinema Equipment manufactured by Westinghouse Brake & Signal Company Limited (hereinafter called "The Company") shall be accepted by a Purchaser and User on the following Conditions and express Warranty which exclude all other Conditions warranties and liabilities whatsoever whether statutory or at common law or otherwise and do not extend to cover consequential loss or damage or injury attributable to any defect in the Equipment or any part of it:—If any part or parts of such Equipment become defective within a period of twelve months after the date of despatch from the Company's Works and such defect is due to faulty material workmanship or design then the Company upon receiving written notification within the said period from the Purchaser and User undertakes after satisfying itself by inspection or otherwise that the defect is due to the above-mentioned causes either to repair or at its option to replace free of charge to the Purchaser and User the defective part or parts of such Equipment. The Company's decision on all questions as to defects

shall be accepted by a Purchaser or User as final and binding. The Company further warrants that such equipment conforms with the requirements of the applicable specifications of the British Standards Institution and the applicable regulations of the Home Office provided always that such Equipment is installed according to the Company's instructions and such specifications and regulations.

The Company shall not be liable for any defects in any such Equipment arising from wear and tear, misuse, neglect, maladjustment or from any acts or omission of any installation or wiring contractor or any other person, firm or company employed by the Purchaser and User or for any contingent or consequential loss or damage whatsoever and howsoever arising.

The terms and conditions and Warranty above-mentioned cannot be varied in any manner by any employee or agent of the Company.