Equipment

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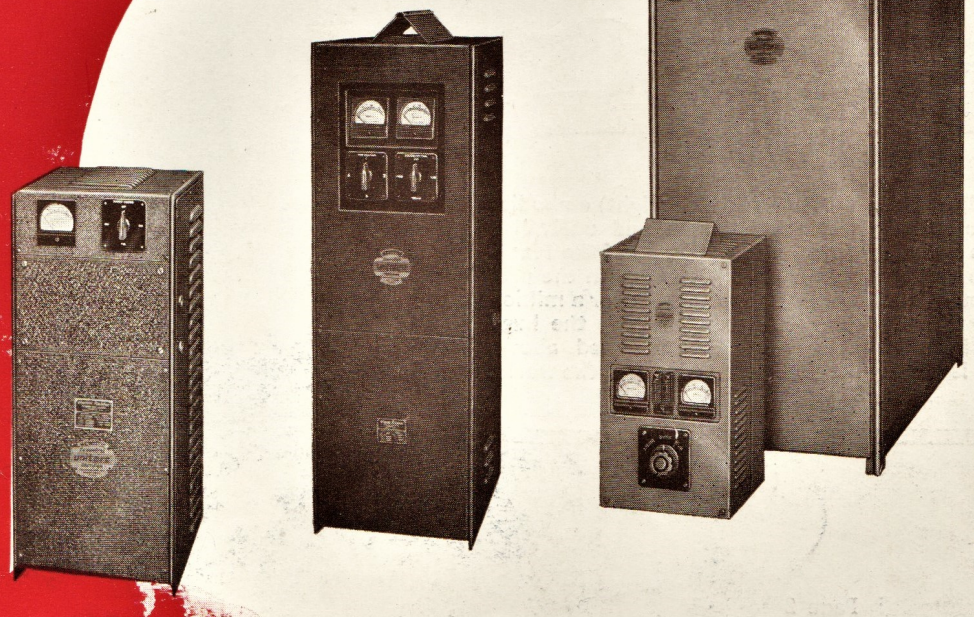
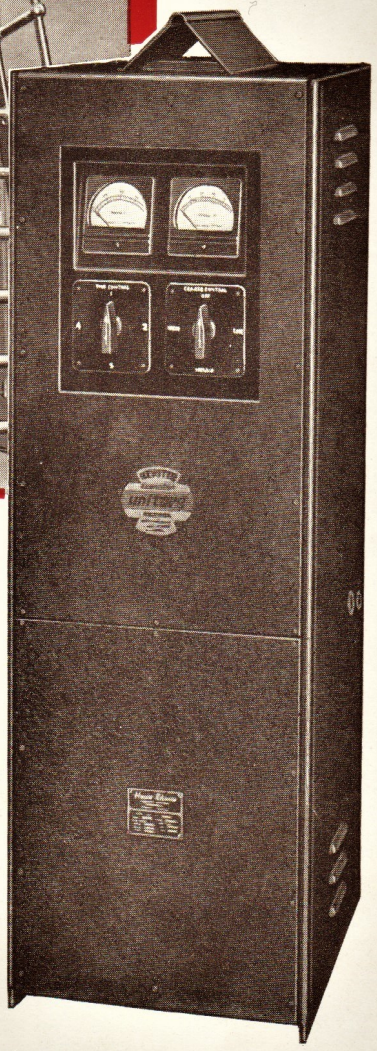
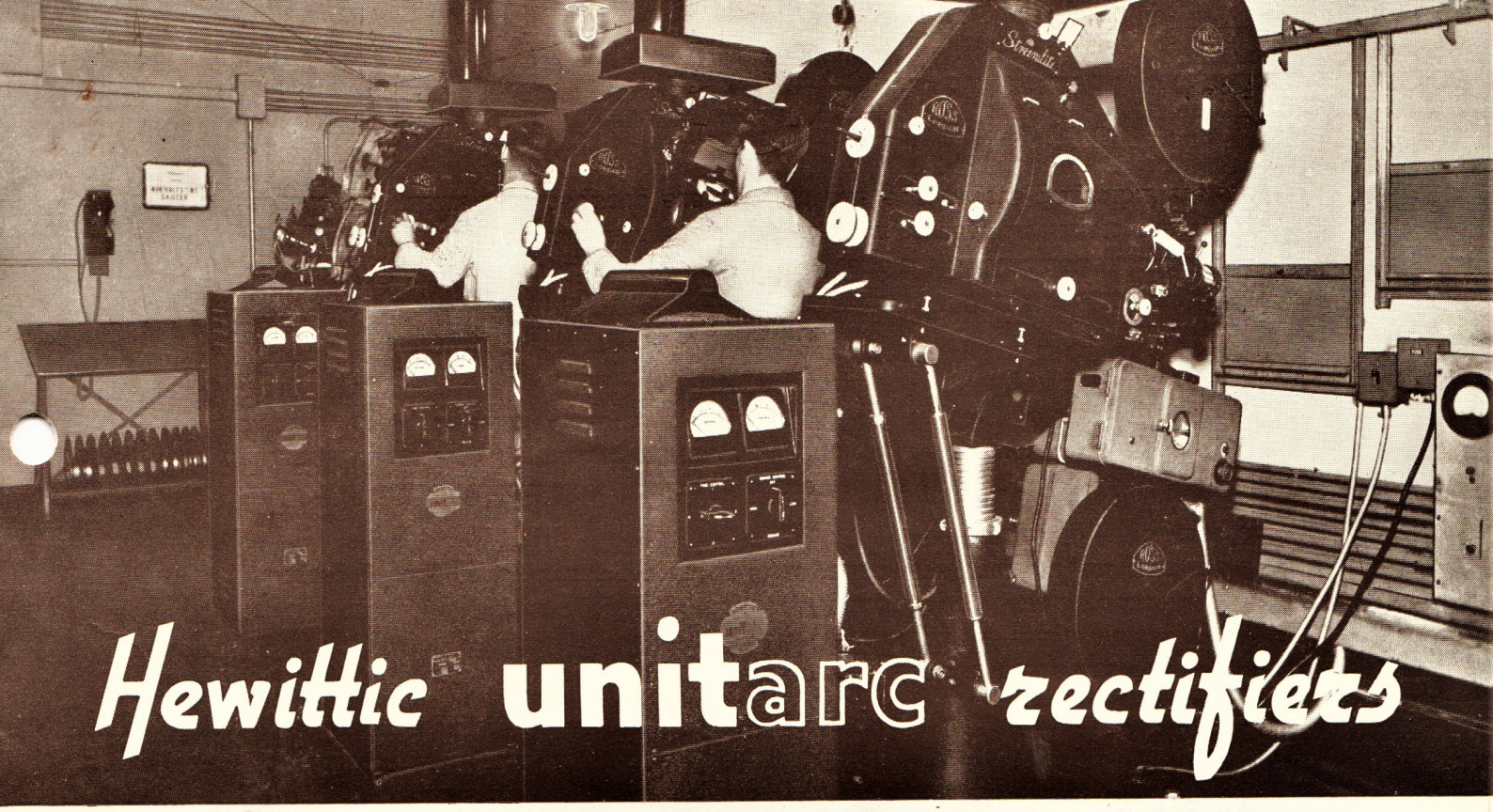
Hewittic Econotrol unitarc rectifiers





The Hewittic UNITARC rectifier (right) embodies the sound engineering technique and unrivalled design and manufacturing experience of the Hackbridge and Hewittic Electric Company in the production of rectifier plant aggregating over a million kilowatts. Typifying this experience is the huge 8,750 kW. Hewittic rectifier illustrated above, which is the largest glass bulb rectifier in the world.



Hewittic unitarc rectifiers

Photograph by courtesy of The Granada Theatres Ltd.

THE name HEWITTIC needs no introduction to the cinema industry. Well over 1,500 cinemas have installed Hewittic rectifiers for the operation of their projector arcs, and still, as in the earliest days of the industry, they remain the finest of all cinema converting plant. This reputation has been achieved and maintained through a policy of constant research and development in close collaboration with all related sections of the industry, with the projector makers, the carbon manufacturers and cinema management and technical personnel.

Backing this progressive development is a modern factory with a genuinely unrivalled experience in rectifier manufacture, for Hewittic rectifiers have a world-wide reputation not only in the cinema field but also in the field of heavy engineering, operating electric railway and trolley bus systems and industrial plant such as steel rolling mills and cranes. The largest glass bulb rectifier equipment in the world, with the huge output of 8,750 kilowatts, was designed and manufactured by the Hackbridge and Hewittic Electric Company, and in fact all the largest glass bulb rectifier equipments in the world, with individual capacities from 2,500 kW. up to 8,750 kW., have been designed and manufactured by this Company, whose aggregate output is now over 1,000,000 kW.

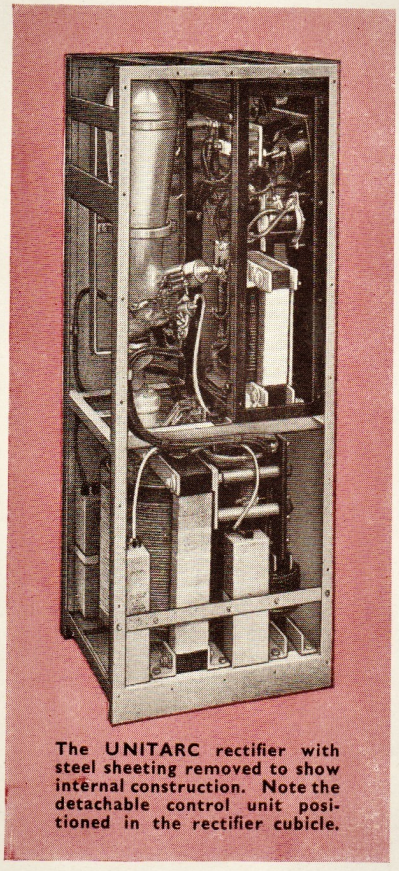
The development of the Hewittic rectifier, static, simple, efficient and requiring negligible maintenance, was largely responsible for the eclipse of the motor generator as the most used form of cinema converting plant. It was the Hackbridge and Hewittic Electric Company also that led the field by the introduction of a new type of rectifier which made unnecessary the wasteful ballast resistances, at one time considered necessary to give the drooping voltage characteristic essential to the proper control of the arc. This is the famous "ECONOTROL" equipment which has effected such economies in projector arc supply that in many cases the rectifier has paid for itself in power savings within the first year or so of its installation.

HEWITTIC Econotrol unitarc RECTIFIER

It is natural that various similar equipments followed the "ECONOTROL" which, however, has remained supreme in its field, with its advantages of high economy, low maintenance, instantaneous one-hand control of arc voltage to match any carbon trim, and other important features.

A very large number of "ECONOTROL" rectifiers is in service and many were supplied to the Armed Forces throughout World War II, during which they acquired an enviable reputation for reliability and efficient service, often under far from ideal conditions.

During the war period, competition appeared from the A.C. arc which, as the result of investigations eliminating some of its disadvantages, became a practical proposition, low in cost because the only equipment needed was a tapped inductor for current control. But its main disadvantages are fundamental. With the A.C. arc the light output can never be as high as from the D.C. arc, since with the former the carbons become positive alternately, so that with every cycle of the alternating current supply i.e., 50 times a second, the positive crater, which is the main source of light, is directed away from the mirror ; whereas with the D.C. arc the positive crater is presented continuously as a steady intense light source, towards the mirror. In the A.C. arc also, considerable shielding of the light source from the mirror results from the fact that both carbons must be of the same size and worked with a comparatively small separation.



The UNITARC rectifier with steel sheeting removed to show internal construction. Note the detachable control unit positioned in the rectifier cubicle.

Many attempts have been made to overcome these fundamental disadvantages, by such means as the use of very high current values and special optical systems but the basic fact remains that the A.C. arc is an uneconomic light source or, in other words, that the D.C. arc unquestionably gives the highest screen illumination for a given power cost. It is also much more economical in carbons, due to the lower current values necessary for a given screen intensity.

Undoubtedly the shortage of rectifier bulbs and other equipment during the war years was largely contributory to the development and use of the A.C. arc. Now, however, converting plant is once more freely available, and cinemas, instead of pursuing a policy of expediency, are able to select for their re-equipment the best and most economical plant for supplying their projector arcs. The modern choice, therefore, lies between the several kinds of rectifier equipment, and it is worth noting briefly the main reasons why the Hewittic or mercury arc rectifier is superior to other types.

In the Hewittic rectifier bulb, which is the heart of the equipment, nothing is consumed. The necessary electron emission is obtained by raising to incandescence a tiny spot on the surface of the mercury cathode and the resulting mercury vapour merely

rises to the upper part of the bulb chamber, there to condense and return as mercury to the cathode, so that the bulb can go on operating indefinitely like the rest of the equipment. Since filaments are not used, there is nothing to disintegrate progressively in service and so limit the life of the bulb. Thus, with Hewittic rectifiers, bulb replacement need not be reckoned as a recurrent maintenance charge—a most important point when estimating the true overall cost of the rectifier equipment over a period of years.

The bulb itself is robustly made with special heat resisting glass of ample mechanical strength, and does not deteriorate with age. It has none of the intricate cooling surfaces to collect dust and so impair operation, which are a feature of metal rectifier design ; and being a sealed glass vessel, its rectifying properties are not affected by adverse atmospheric conditions.

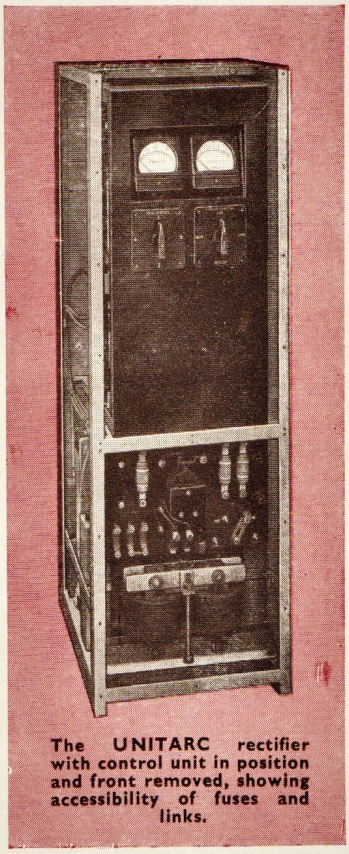
In addition, the reliability of the Hewittic rectifier is increased, in comparison with other types, by the inherent construction of the rectifier bulb which affords high insulation and long tracking distances between the electrodes. Inspection is simple, all internal parts of the bulb being clearly visible so that its proper functioning can be easily confirmed at a glance.

Hewittic rectifiers possess also a high overload capacity and will withstand not only heavy current overloads but also high voltage overloads. In addition, their high efficiency remains constant. In other words the efficiency of a Hewittic rectifier is the same after ten years' service as when it is new, which is not true of other types, a fact which reflects itself in lower running costs over a period of years.

The mercury arc rectifier, therefore, still stands supreme, as in fact it has done ever since it was introduced by the Hackbridge and Hewittic Electric Company which, with the addition of the Econotrol UNITARC series of rectifiers, with an outstanding list of star features, has proudly maintained its long-established lead in the design and manufacture of cinema rectifiers.

The Hewittic UNITARC series, described in the following pages, comprises four Econotrol cinema rectifiers, the UNITARC, the UNITARC Minor, the UNITARC Major, and the UNITARC Monotrol. These provide a comprehensive range to meet most effectively the needs of the great majority of cinema installations. Each meets a specific requirement and provides, for its particular application, the soundest choice of modern cinema rectifier equipment.

The Hackbridge and Hewittic Electric Co. will always be pleased to assist in the selection of the most suitable UNITARC rectifier for any cinema installation.



The UNITARC rectifier with control unit in position and front removed, showing accessibility of fuses and links.

The unitarc rectifier

The UNITARC rectifier is a genuine Econotrol rectifier introduced by the Hackbridge and Hewittic Electric Company for a range of application up to 65 amperes arc current and having the ideal voltage characteristics, simple control and remarkable economy in power costs that have made the ECONOTROL famous. The standard UNITARC rectifier is illustrated on pages 2 and 3, with interior views on pages 4 and 5.

It operates from any single phase, 50-cycle A.C. supply between 200 and 250 volts, and will feed any make of D.C. arc lamp with either high or low intensity carbon trim.

Closely variable control of arc current is provided between 25 and 65 amperes by means of two rotary snap-action switches giving immediate, correct adjustment to meet any variation in carbon trim, density of film, or atmospheric condition, or to compensate for fluctuation in the incoming A.C. supply which sometimes occurs, for example, in industrial districts where there are heavy, variable demands on the electricity system.

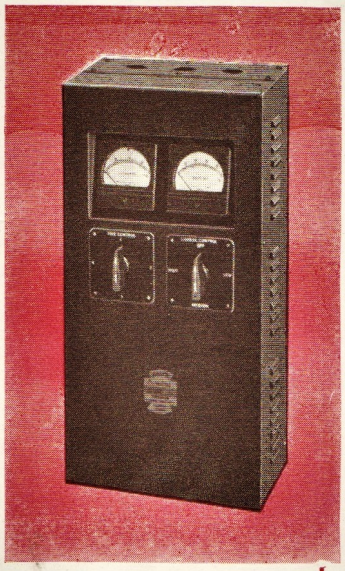
It is outstandingly simple both in control and installation. Electrical installation involves only a twin cable from the A.C. supply to the rectifier and the same from the rectifier to the arc lamp. Once the rectifier has been energised from the A.C. supply the operator has merely to snap the "coarse" control switch to the "low" position and strike up the projector arc. This automatically starts the rectifier, and the arc current can be adjusted immediately through a range of 12 steps, each of $2\frac{1}{2}$ to 3 amperes, by means of the "coarse" and "fine" control switches, the former providing an initial output setting to suit the carbon trim and the latter a final adjustment of the volt/ampere characteristic of the arc. Control is completely flexible to meet every operating requirement. Thus, for example, with a new carbon trim, a perfect crater can be formed without difficulty using low current settings, before switching over to the required normal operating current.

It has automatic starting and complete, instant, wide-range control with only two switches. Here is simplicity indeed. Here, too, is economy, for the rectifier bulb is brought into operation and is consuming energy only when the projector arc is burning, so that there is absolutely no power consumption during periods of standby.

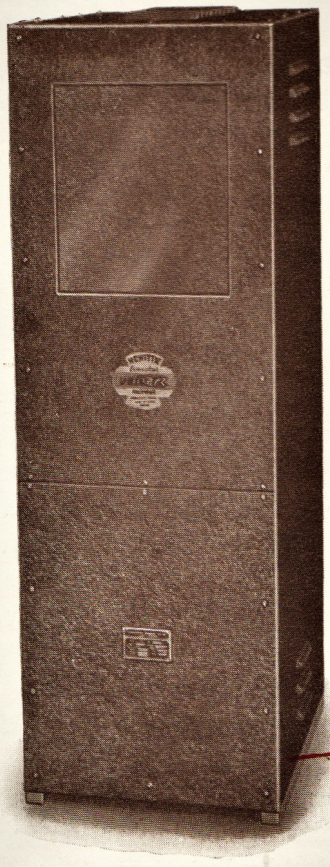
The UNITARC occupies a floor space of only 17 × 20 inches, with a height of 49 inches, enabling it to be tucked in alongside the projector it operates. Normal practice is to install one UNITARC per projector, and sometimes a third to operate slide lanterns and spotlight. A third unit provides a useful standby and in general is recommended ; but it is not essential, since one UNITARC has sufficient capacity to feed two projector arcs under emergency conditions.

Remote Control. By clever design features, unique in the UNITARC, its controls, comprising the two multi-trim switches and two high grade moving coil meters indicating arc voltage and current, are grouped in a small, detachable

control unit, which may, if desired, be used at the projector for remote control, the rectifier being situated conveniently in some other room. The full range of arc current adjustment and constant indication of arc voltage and current are available at the projector under remote control conditions, with only six connections between control unit and rectifier.



These space-saving features of the UNITARC make it obviously the ideal equipment to meet many installation conditions. The fact that the control unit can be mounted separately from the rectifier unit affords complete flexibility in installation, which can take the form of local or remote control, with the rectifiers situated in or out of the projection box, to suit the room available and the layout of the cinema, or to meet the regulations for the area. In the event of modification or rebuilding of the cinema the rectifier can be changed from local to remote control, or vice versa, without difficulty.



The UNITARC rectifier arranged for remote operation. The detached control unit (above) provides complete control of the rectifier from the projection box with only six interconnections.

Its interior design and construction reflect the Company's long experience in the design and manufacture of large rectifiers for industrial service. Features are extreme robustness, neat and simple layout, complete accessibility, the incorporation of a double-wound transformer (which is better and safer than an auto-transformer), tropic proofing of all components, and the special double-cushioned bulb mounting which is so effective that the rectifier is despatched from the factory with the bulb in position ready for service.

Finish. The standard finish of UNITARC rectifiers is matt crackle black, with satin black, non-reflecting control panel, which will generally provide a pleasing match with other equipment in the projection room. Alternatively, and without extra cost, the UNITARC rectifier and its control box can be supplied finished in light stone colour with mid-brown edging, or in two shades of grey. The finish required should accordingly be specified when ordering.

The control panel is illuminated by concealed lighting and sloped for easy reading of the meters which are Grade 1, accurate instruments of modern square pattern.

The unitarc Minor

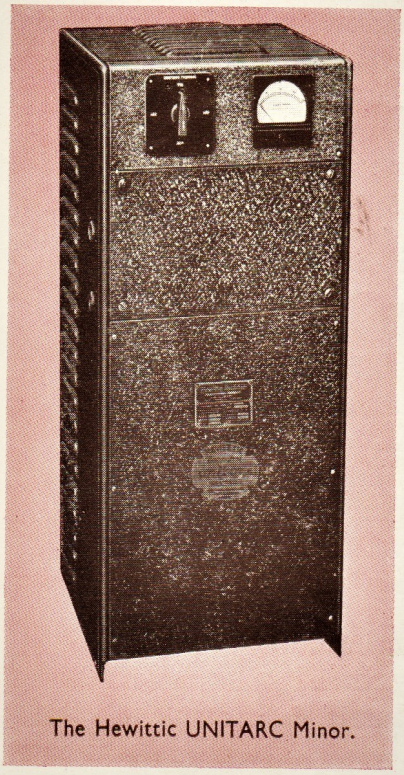
The needs of the smaller halls have been studied in the development of the Hewittic UNITARC Minor which is lower in cost than the standard UNITARC rectifier, yet retains its principal advantages of low running cost, negligible installation charges and simple, reliable operation.

Its lower cost has been achieved, not by any cheapening of material, workmanship, or design, all of which are of the same excellence as in the standard UNITARC but by dispensing with those features which experience has shown are not normally required by the smaller halls.

It is designed for the operation of a high or low intensity D.C. arc from any single phase A.C. supply between 200 and 250 volts. The three-position control switch provides alternative current ranges of 35 to 45 or 25 to 35 amperes, preselected by a link arrangement, for the operation, respectively, of high or low intensity arcs.

It is extremely compact, measuring only 16 ins. by 18 ins. by 34 ins. high, being designed specially for neat and unobtrusive mounting alongside its projector. Because of this and of the fact that, in the field for which it is designed, remote control of the rectifier is rarely wanted, the removable control box which is a valuable feature of the larger UNITARC, has been dispensed with. If remote control of a UNITARC Minor should be specially required, however, this can be provided for at a reasonable extra cost.

The UNITARC Minor is neatly housed in a robust louvred steel cabinet which matches well with modern projection equipment. It weighs approximately 200 lbs. The controls are the essence of simplicity, comprising only a modern square pattern arc current ammeter and the snap-action control switch with its matching, square, black escutcheon clearly engraved in white with the range of three current values and an "off" position. A section of the cabinet front, below the controls, can be removed easily by undoing the fasteners provided, to give quick access to the fuses and to the terminals provided for the initial adjustment of the rectifier to suit the A.C. supply voltage.



The Hewittic UNITARC Minor.

The main components, compactly housed in the cabinet, comprise the rectifier transformer (double-wound as with the standard UNITARC), the cushion-mounted single phase rectifier bulb, the simple automatic ignition unit and the smoothing inductor. Adequate ventilation is provided by louvring a liberal area of the sides and top of the cabinet. All components are tropic proofed.

In general, the UNITARC Minor is just the equipment for the smaller halls where there is no need for the

high current output, wide range of current settings, or the remote control features of the larger standard equipment, but which need above all, a simple, efficient and extremely reliable rectifier at a low cost. If the wider specification of the standard UNITARC is not required, there need be no hesitation in choosing the Minor, for in its own field of application it is by far the best rectifier on the market.

It is not the cheapest in initial cost, since no attempt has been made to risk, by cheap design and components, the reputation of the Hackbridge and Hewittic Electric Company, built up over 40 years.

It cannot, however, be too strongly stressed that initial cheapness is particularly a snare and a delusion where cinema rectifiers are concerned and, in comparing types of rectifier before purchase, it should be borne in mind that there are no recurring replacement charges with Hewittic rectifiers, for the heart of the equipment, the bulb, has no filament or other part that deteriorates in service ; nor does the efficiency of the equipment fall away after a few years' service.

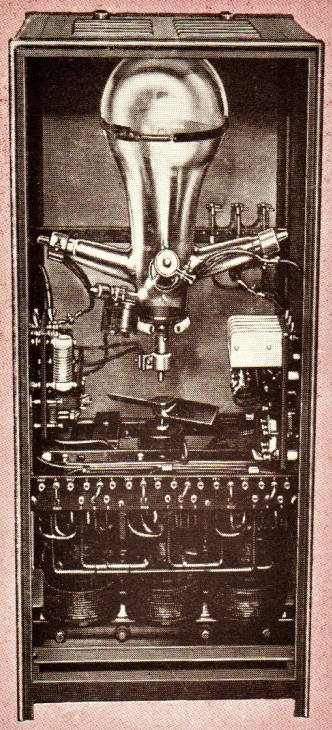
It is for these reasons that Hewittic ECONOTROL rectifiers, including all four types of UNITARC, have proved themselves to be, in actual service, the cheapest as well as the best cinema rectifiers on the market.

The unitarc Major

The Major is the largest capacity rectifier of the UNITARC series, having an output of 40 to 75 amperes (at 34-42 arc volts). It is designed primarily for the operation of a high intensity arc, but if required, can be arranged to supply a low intensity carbon trim by the substitution, for the standard chokes, of chokes specially designed for this loading. Its main difference from the UNITARC and the UNITARC Minor is that, whereas these are for operation from a single phase supply, the UNITARC Major is a three phase equipment suitable for installations where there is objection to single phase, or a preference for three phase operation. It is designed for connection to a three phase, 50 cycle, four wire supply of between 360 and 440 volts.

Because of the higher voltage of this three phase supply, it is not normally permissible for UNITARC Major rectifiers to be installed in the projection box, as is commonly done with the UNITARC and UNITARC Minor, and the Major is accordingly intended for installation in a separate room adjacent to the projection box. One UNITARC Major rectifier is supplied for each projector, as with other UNITARC rectifiers, and remote control of each rectifier unit is provided by a neat control box mounted conveniently near the corresponding projector.

The UNITARC Major is a very compact equipment for its output, having plan dimensions of only 23 by 22 inches, with a height of 48 inches, these small dimensions greatly easing the problems of delivery and installation. With reasonable ventilation of the room, the two UNITARC Major rectifiers comprising a normal installation may be placed quite close together (though enough space



The Hewittic UNITARC Major. View showing internal arrangement

should be available to permit access for inspection or maintenance) and being so compact, they can, if necessary, be accommodated within a remarkably small space. The weight of the Major is only about 3½ cwts. so that it is relatively easily handled and, being essentially a static equipment, it needs no special foundations or even fastening to the floor.

Construction of the Major is similar to that of the other UNITARC rectifiers. It is notably robust, the components being housed in a welded angle iron framework, with easily removable sheet steel panels, louvred where necessary for ventilation and with a door at the front affording ready access to all parts of the equipment. The door is swung on concealed hinges and has recessed type catches. All edges and corners of the cubicle are rounded. Special provision is made to facilitate lifting of the equipment during installation.

The main components comprise the three phase rectifier bulb, mounted at the top of the cubicle, a ventilating fan, the simple automatic starting relay, a three pole A.C. contactor controlling the incoming A.C. supply and, at the base of the cubicle, the double wound air cooled transformer, the Econotrol choke and the smoothing inductor. Tappings from the transformer primary are brought out to a convenient link board at the front of the cubicle, to permit adjustment of output current (plus and minus 5% and 10% tappings being available for this purpose) and matching of the equipment to the A.C. supply voltage.

These arrangements are clearly shown in the illustration above and it is obvious that a clean, simple and workmanlike layout has been achieved, in keeping with the good engineering practice characteristic of all Hewittic rectifiers.

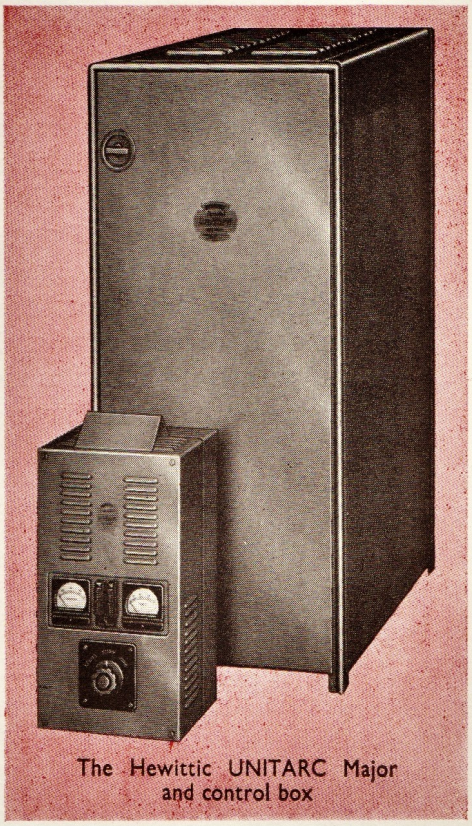
The Remote Control Box, which, as will be seen from the illustration on page 11, is of neat and attractive appearance, is 12 ins. wide, 27 ins. high and 8 ins. deep, and is designed for wall or pedestal mounting in the projection room. It is of sheet steel construction, louvred for ventilation and has a deep removable cover affording complete access to all the components. These comprise high grade ammeter and voltmeter (indicating arc current and voltage), a robust, heavy current (75 ampere) rotary selector switch with three positions (labelled "Strike," "Burn," and "Run"), a bank of heavy current resistance elements associated with the selector switch, a small toggle switch for remote switching of the A.C. supply to the rectifier, voltmeter fuses, and entries for the cables to the projector arc and to the rectifier.

Control of the UNITARC Major differs from that of the UNITARC and UNITARC Minor in that the required operating current is preset by off-load adjustment of the rectifier, using the tapping link board referred to above ; while the arc

current control necessary for striking the arc and burning in the carbons is obtained by switching the appropriate ballast resistance units into the arc circuit by means of the selector switch. In the "Run" position of this switch all the resistance is cut out and there are therefore no "ballast resistance" losses to reduce the efficiency and economy of the equipment.

As with other UNITARC rectifiers, starting of the equipment occurs automatically with the "striking" of the carbons, and the rectifier bulb is in operation and consuming energy only when the arc is burning, so that there is no power consumption during standby.

The toggle switch on the control box operates the three pole contactor (situated in the rectifier cubicle) which is in the A.C. input to the rectifier and is in conformity with Home Office and County regulations, which require that means shall be provided in the projection box for the complete isolation of the rectifier from the A.C. supply.



The Hewittic UNITARC Major and control box

Operation of slide lanterns. The rating of the resistance elements in the control box is such that, with the selector switch in the "Burn" instead of the "Run" position, the rectifier may be used to supply a slide lantern, at a current of 25 to 35 amperes. This is a convenient and useful feature which obviously may also permit valuable economy in plant, since where it is used, a separate rectifier for the slide lanterns is not essential.

The standard external finish of the rectifier cubicle of the UNITARC Major, is matt crackle black with glossy black edging. The control box can be supplied in any of three finishes, i.e., black, light brown, or grey, to match with other equipment in the projection box ; and the finish required should be specified accordingly.

The unitarc Monotrol

This equipment has the outstanding feature of single knob, stepless control of arc power over the whole range from striking current to optimum running current, for any carbon trim ; this absolute simplicity of operation and complete smoothness of control being achieved without the use of switches.

It is similar in size, outward appearance, and current range to the UNITARC Major and, as with that equipment, the rectifier is designed for installation outside the projection room, with the control box mounted conveniently at the

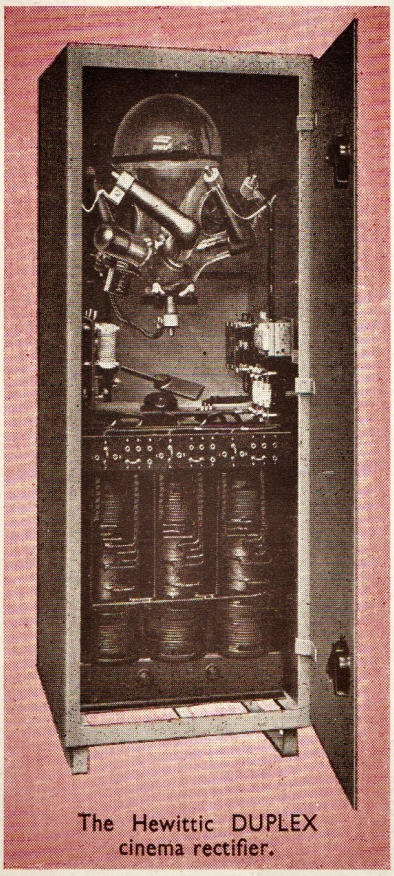
projector. The rectifier can be supplied to operate from any 3-phase mains voltage.

While incorporating new technical developments, the UNITARC Monotrol retains all the automatic features, economy in operation and exceptional reliability that are characteristic of the UNITARC range of rectifiers. It does not replace the UNITARC Major which is the most suitable for the same current range, wherever, as will often be the case, it is sufficient to preset the operating current at the rectifier, with only " Strike," " Burn " and " Run " control at the projector ; but for installations where it is considered an advantage to have, at the projector, a smooth instantaneous and continuously variable adjustment of arc power, for any carbon trim and to meet any variation in operating conditions, the Monotrol is an ideal choice. Fuller technical information can be supplied on request.

OTHER TYPES OF HEWITTIC CINEMA RECTIFIERS

While the UNITARC series of rectifiers most effectively meets the great majority of modern cinema requirements, other types can still be supplied if specially required.

The Econotrol DUPLEX, for example, is a three phase equipment, in which a single six arm bulb, connected to operate as two three phase rectifiers, feeds both the projector arcs. The many DUPLEX equipments that have been installed have given extremely satisfactory service, due to the great reliability of Hewittic rectifier bulbs, but obviously they have the potential disadvantage that if the bulb should cease to function, there is no standby plant.



The Hewittic DUPLEX cinema rectifier.

For this reason, modern practice favours the use of two UNITARC Major rectifiers which provide the same facilities as the DUPLEX, whilst ensuring the availability of a standby equipment in an emergency.

Hewittic Cinema Rectifiers with Ballast Resistance Control can also be supplied if required, though it should perhaps be emphasised that the excellent control of arc current afforded by this type of equipment must be offset against its higher operating cost, as compared with UNITARC and other Econotrol rectifiers.

In general, the Hackbridge and Hewittic Electric Company are able to supply glass bulb mercury arc rectifier equipment for either standard or special requirements and if, as the result of unusual conditions or personal preference, requirements cannot be met from the standard range of UNITARC rectifiers, the Company will always be pleased to offer the fullest co-operation in providing the rectifier equipment most suitable for any specified application.

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