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A GRID LIGHTING SYSTEM FOR TELEVISION STUDIOS

MANY TELEVISION STUDIOS, particularly in North America, employ the "saturation" form of lighting suspension. To this can be attributed more or less directly the need for enormous patching panels, great expense in providing lanterns and the wastage of considerable man-power in operating. A new system is described which offers a simpler and cheaper installation, a more accurate and more easily controlled positioning in space for each and every lantern and a quicker turn-round time without sacrificing the art of good lighting.

STUDIO LIGHTING REQUIREMENTS

The ideal television studio lighting installation would, amongst other characteristics, offer the following facilities:

1 It should be possible to place anywhere in the cubic volume of the studio, any lantern of any brightness, pointed in any direction and having a "polar-diagram" which can be adjusted to requirements.

2 It should be possible to place the lantern in its required position with practically no manual effort and in a very short time.

3 It should be possible to connect the electrical supply to the lantern through an operationally flexible means of switching and dimming, and preferably without the need for complex and hazardous patching systems.

4 It should be possible to "strike" all the lanterns immediately after a studio production, in order to make way for the next.

5 Whatever method of suspension or mounting is adopted it should not conflict with ability to "fly" scenery, picture monitors, microphones, etc.

SATURATION SYSTEM

One attempted solution to the near impossible specification outlined above is the saturation system employing closely packed tubular barrels, suspended from the roof of the studio in rows some 4 ft apart and running across the entire width of the studio. On these barrels are mounted, close alongside one another, lanterns of various wattage, pattern, and polar diagram, in the hope that a suitable lantern will always be found sufficiently near to the required position. In such a system, there could easily be 400 lanterns permanently suspended in a studio having a floor area of 5,000 sq ft. A reasonable number which might be required at any one time for a fairly elaborate drama production, for example, would be 100, i.e. 25%. Thus, four times as many lanterns are mounted as are ever required simultaneously, solely on account of the difficulty in positioning the right lantern in the right place.

A further direct outcome of having 400 lanterns when only 100 are required, is that means have to be provided for choosing 100 out of 400 pairs of wires, so that the right wires may be connected to the lighting control apparatus for switching and dimming. It is manifestly uneconomical and physically too massive to attempt to build a lighting, switching and dimming equipment which could handle 400 lanterns at the same time, hence the evolution of the patching panel, which is reminiscent of a cord type telephone switchboard.

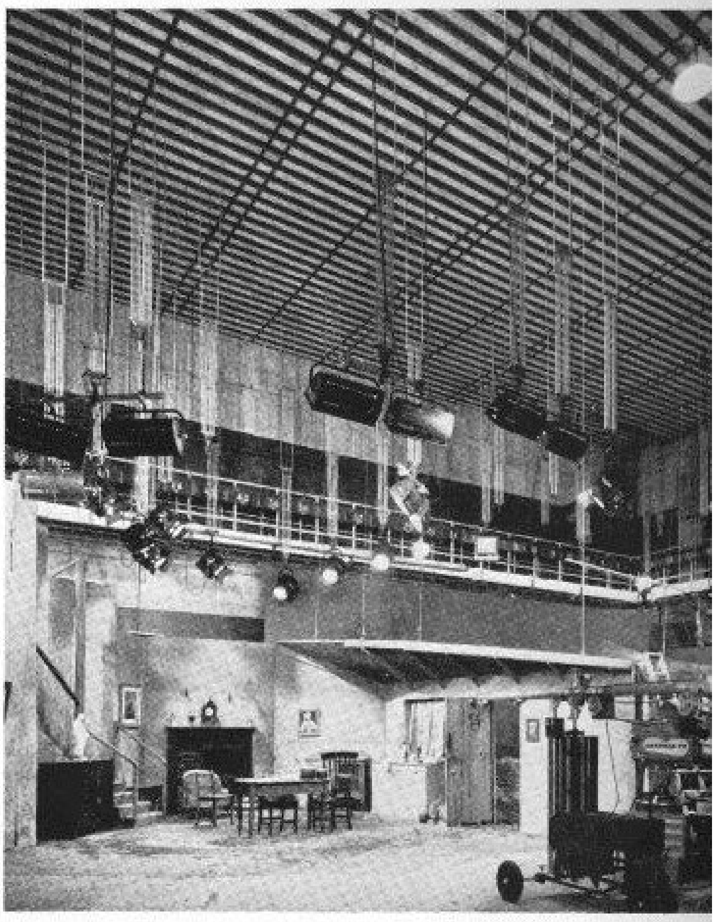
A patching panel to carry 400 connections and 100 outlets is not only expensive but complicated to operate and liable to introduce errors and faults. It often demands extra man-power for its operation and certainly requires valuable space for its installation.

The theory upon which the saturation suspension system was based is that there will seldom be any need for exchanging one type of lantern for another, or re-positioning any given lantern in space, because there are sufficient already suspended to ensure that no change will be called for. Though this theory is invalid, one needs only a short experience with the system to discover that there is no severe disadvantage if the need to change a lantern is realised sufficiently early in the preparation for a television show, because it is always possible to lower the barrel to the floor, thus enabling any number of lanterns to be replaced or re-positioned. Such moves, however, have to be planned by the application of much experience and a good deal of foresight into the precise way in which a given production will develop.

Far more frequently in practice, the need to change a lantern is not discovered until the scenery and properties are in position on the studio floor and an initial "walk-through" with cast, cameras and lights has already been undertaken. In a medium-sized studio which is already filled to capacity with sets, the chances of being able to lower a barrel to floor level with all its lanterns affixed, without fouling scenery or properties, will be extremely remote. The nett result is that the Lighting Supervisor has either to tolerate the imperfections in his lighting, occasioned by the inconvenience of changing a lantern, or else he has to direct an electrician to replace the lantern at high level with the use of tall step ladders and considerable expenditure of effort.

GRID LIGHTING SYSTEM

An elegant solution to the studio lighting problem where new studios specifically designed for television work are concerned, is the Grid lighting system, an example of which is the arrangement used by Granada TV Network Limited at their Manchester studios. However, such a method, which would involve the complete rebuilding of the roof and, indeed, perhaps the walls of any given building, must be ruled out. For this reason, the method proposed in this article is intended to apply to studios which are constructed for the purpose of television, and it is not suggested that there is likely to be any frequent application in the case of adapted buildings.



General view of Granada Studios at Manchester, showing grid-lighting system.

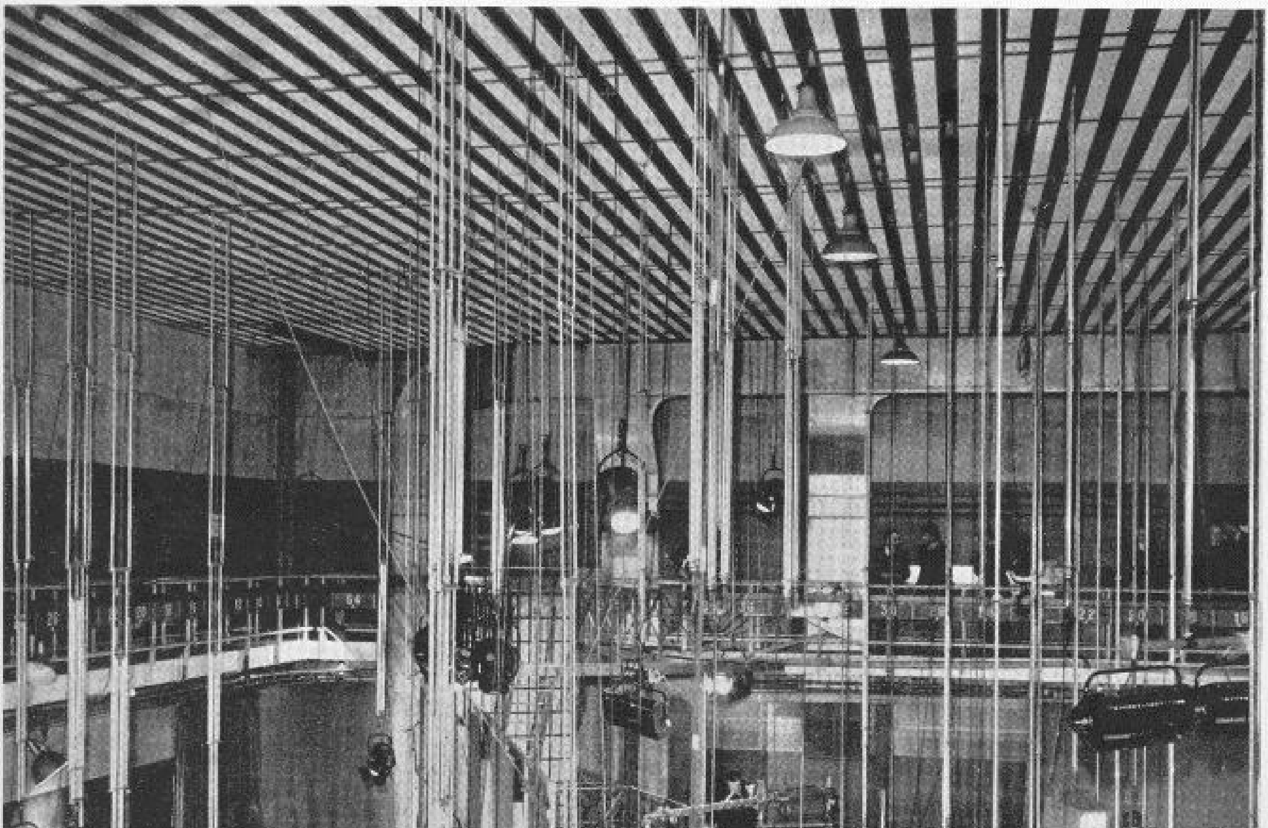
Essentially, the Grid system consists of an elevated deck of steel rails, supported by the studio roof structure, carrying small trolleys each supporting a lighting unit via a telescopic pendant assembly.

In the latest design of the Grid, as used at Manchester, the decking which consists of $7\frac{1}{2}$-in. wide 'U' sections separated by $2\frac{1}{2}$-in. wide spacings, is suspended from the main rolled steel joists by means of metal straps, leaving enough clearance for the head of the suspension unit to pass between the upper surface of the decking and the lower face of the rolled steel joists. The head of the suspension consists of a trolley, carrying the hoisting winch, and four tapered steel rollers which rest on the top of the grid slots whilst the telescopic sections hang through the slots, allowing the whole suspension to be moved freely along the whole length of the grid—in this case, approximately 85 ft.

It is normal practice in our studios to rough-set all lanterns and suspensions initially; hence, only comparatively small movements of the telescopes are necessary and these can easily be accommodated by the cables provided. If, however, circumstances arose where it was required to move the complete suspension more than about 20 ft, it would be necessary to replug the lantern into an outlet adjacent to the new position.

When it is required to move telescopes from one channel into another, it is merely necessary to unplug and remove the lantern and then lift up the telescope, which can easily be carried by one man. The length of telescopes when fully retracted varies to some degree according to range of heights required and number of sections, but, in our case, they are approximately 4 ft 6 in. long. The frequency of such repositioning depends mainly upon the number of units employed in any given studio, but it has been found that movement is comparatively small. For instance, in a studio of approximately 4,500 sq ft, using 100 telescopes, about 10% would be moved during the course of major re-setting and lighting.

In the system employed by Granada in Manchester,



View showing grid structure and telescopic pendant assemblies supporting lanterns and monitors.

all lighting outlets are controlled from the lighting console and hence no patching facilities are needed. It is pertinent to note here that only a certain percentage of such lighting outlets are dimmable, the remainder being controlled by straightforward switches. So far, in Manchester, we have worked on a figure of 50% dimmable ways, but experience shows that, in the case of a studio used principally for major light entertainment, at least 75% of the ways should be dimmable.

COMPARISON OF INSTALLATION COSTS

Ultimately, whatever the attractiveness of any particular scheme, the final justification for any method of lighting suspension will be economy. The only qualification to this is the matter of perfection in the artistic results obtained by lighting, but accepting lighting perfection as being an aim with which compromises can only be worked out by individual broadcasting authorities, economy is the first consideration when deciding upon the scheme of lighting suspension to be adopted in any new installation.

The fact that 95% of the television studios in existence today have been converted from old buildings has most probably been responsible for the choice of lighting suspension.

In the following calculations of cost, a studio having a floor area of 5,000 sq ft has been considered and in the case of saturation lighting it has been assumed that there will be four rows of 12 ft long barrels running down the length of the studio, each barrel carrying five lanterns. Parallel to each barrel will be another barrel spaced from it at a distance of 5 ft, the parallel rows of barrels running laterally across the studio, so that in a studio having a length of about 70 ft there would be some 15 rows of barrels. Fifteen rows of four each gives a total of 60 barrels, all orientated laterally across the studio. Between the four lines of barrels running down the length of the studio will be three aisles some 5 or 6 ft wide, separating the ends of the 12 ft barrels and, in these spaces, experience has shown that it will be necessary to provide a selection of barrels running longitudinally down the length of the studio, so that we have here another 5 barrels per aisle, making a total of another 15. In all, therefore, we have 75 barrels providing complete cover over the area of the studio, and each barrel will contain 5 lanterns.

The next consideration is the cost of the steelwork in the two methods which is required to support the quantity of lighting which each method demands. The new system demands a grid comprising folded sheet steel sections, which form a deck over which the lighting electricians can work. This decking is underslung beneath rolled steel joists, which are spaced roughly 15 ft apart and the steel sections have been calculated upon the basis of something like a hundred suspensions, used at any given time together with something like 2 or 3 electricians who would be working above the grid.

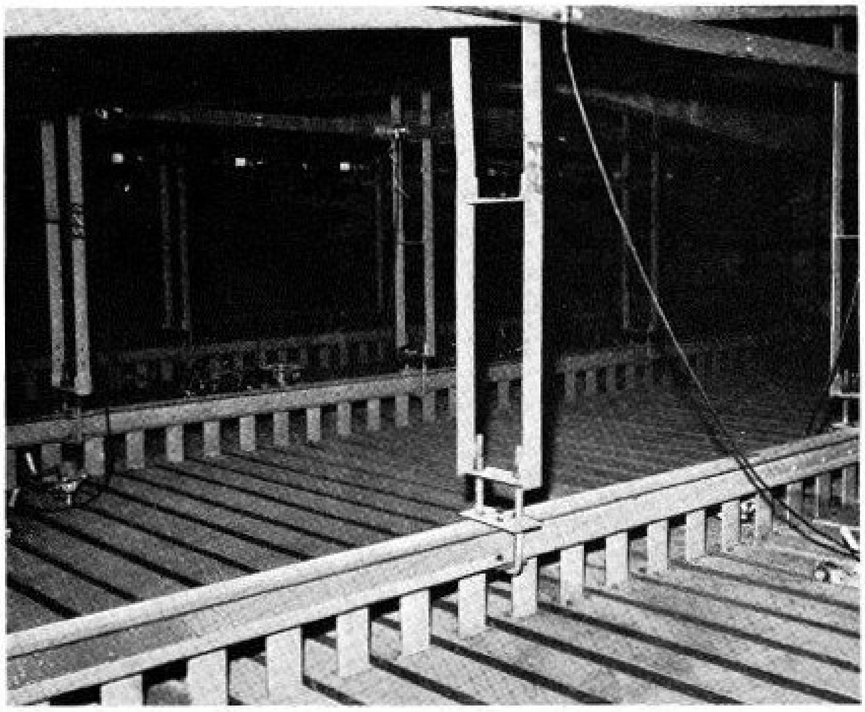
The saturation system demands a structure which will carry a very substantially greater load in the form of the 75 barrels, carrying in all some 375 lanterns, and the hoisting devices. No precise figures are available for the cost of steelwork for such a support and roof structure, but an assumption has been made that it will not fall far short of the £5,500 which was the cost of the grid structure for the new method. In fact, the figure of £4,000 has been put down and a correction can be applied to this if a more accurate figure is obtained.

Next must be considered the patching system, which is inevitable when some 375 lanterns are suspended at all times and when a selection of some one hundred out of the 375 has to be made for any large production. An estimate of £10 per way for such a patching system has been included, making a total of £3,750 for the patchboard. The cost of the lighting control system, including dimmers and control console, has been omitted from the calculations in view of the fact that this cost is common to both systems.

An item which is peculiar to the new method is the cost of telescopic suspension units, a hundred of which are required for a studio of this size and at a cost of £35 each—this works out at £3,500.

One argument which will undoubtedly be raised is that the electrical hoists which are estimated for in the case of the saturation system provide an effortless means for raising and lowering the barrel, whereas in the telescopic suspension method only manual raising and lowering is provided.

This is true, as far as the present installations go, but experiments have been continuing for some time to mechanize the telescopic units, not on the basis of electric motors per telescopic unit, but based on a scheme of a hand-held, electrically operated, tool as an



View above deck and steel rails, showing the trolleys and hand-operated winches and lighting power outlets.

aid to raising and lowering, which the electrician working above the grid can apply to the unit when he requires to raise or lower. Adequate financial cover for such mechanical aids would come to considerably less than £1,000 whilst, at the same time, providing a means for considerably speeding up the setting of lighting and reducing the amount of effort which the electricians have to exert.

To sum up, in calculating comparative costs of saturation as against grid system lighting, we have had to assume that the saturation system lives up to its name and employs the maximum number of lanterns deemed to be practicable. Assuming a studio of 5,000 sq ft, and excluding the lighting control system, e.g. console, we estimate that the supply and installation of a saturation system, using motorised barrels and a typical assortment of lanterns, would be £23,000, compared with £17,000 for a grid, together with telescopes and a suitable assortment of lanterns.

RUNNING COSTS

Finally, we are left with running costs and speed of operation. These two factors are largely interchangeable in that, to reduce the turn-round time, a larger number of electricians can be employed or, conversely, if turn-round time is unimportant, then a smaller payroll can be achieved. A further factor entering the equation is the extent to which the ideal is aimed at in the lighting result.

For this reason it is not easy to equate results on the basis of turn-round time, man-power and artistry. All that can be claimed for the new system is, however, that the turn-round time is certainly no longer and the man-power no greater than that required for the saturation method, but it is claimed furthermore that the artistry in lighting can be improved, mainly because there is less compromise demanded in the positioning of the lanterns.

A by no means negligible bonus comes out of the new method, namely in the form of a completely clear floor, free of all floor stands for lighting and the accompanying cables. An overall impression of neatness and lack of complicated suspensions and wiring gives the artist and technicians alike a feeling of smoothness and efficiency, which cannot but improve production generally.

The approximate prices quoted in the article are those estimated by the author and have not been checked by the Editor.