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A complete statement on "the open stage" which will prove of value to architects, consulting engineers and school administrators in the construction of college, community and school auditorium theaters. Directors and teachers of drama should find this booklet a practical source of advanced technical knowledge in their field. The introduction deals with the language of vision in general while the remaining sections are directed specifically to architects, engineers, administrators, dramatics and background projection. Specific areas dealt with include--(1) six typical plans and sections with production sketches and brief project histories, (2) curtains and the open stage, (3) acoustical design of auditoriums, (4) architectural and engineering layout factors, (5) lighting equipment and lighting control switchboards, (6) typical questions and answers regarding the application of the open stage to school, college, and community groups, (7) direction for the open stage, (8) approach to scene design, (9) lighting, (10) stagecraft, and (11) architectural planning to the preparation of imagery. (RK)

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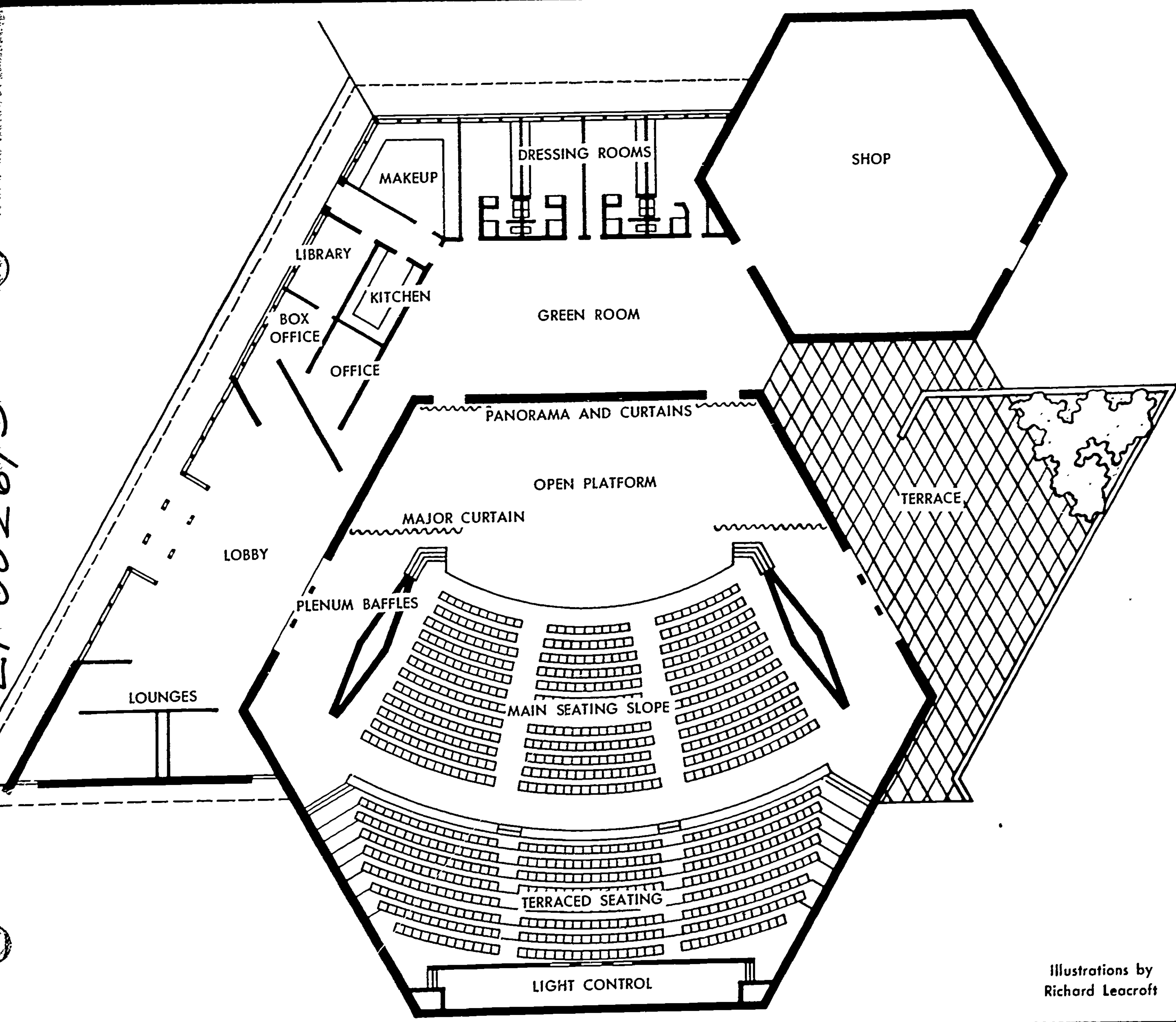


Illustrations by
Richard Leacroft

HUB REFERENCE MANUAL No. 109

The Open Stage

INDEX

INTRODUCTION

The Language of Vision..........Page 3

ARCHITECTS' AND ENGINEERS' SECTION

Six Typical Plans and Sections, with Production Sketches and Brief Project Histories ....Page 4

Curtains and the Open Stage..Page 15

Acoustical Design of Auditoriums ....Page 17

Architectural and Engineering Layout Factors ....Page 21

Lighting Equipment and Lighting Control Switchboards ....Page 26

ADMINISTRATORS' SECTION

Typical Questions and Answers Regarding the Application of the Open Stage to *School, College* and *Community* Groups......Page 49

DRAMATICS SECTION

Direction for the Open Stage..Page 53

Approach to Scene Design......Page 56

Lighting ....Page 61

Stagecraft ....Page 62

BACKGROUND PROJECTION SECTION

From Architectural Planning to the Preparation of Imagery ....Page 67

HUB ELECTRIC COMPANY, INC.

2255 West Grand Avenue
Chicago, Illinois 60602

Over 50 Years of Service to the Educational Theatre

A Message from Hub . . .

Following a tradition of fifty years, the underlying philosophy of the Hub Electric Company, continues to be directed towards engineered equipment based on sound artistic principles; these ends cannot be accomplished without the counsel of recognized professional designers. I sincerely believe that the Contributors of Bulletin No. 109 have made the publication one of the most complete statements on "The Open Stage" existing anywhere in the world today. I hope that this material will prove of value to Architects, Consulting Engineers and School Administrators, in the construction of college, community and school auditorium theatres. Directors and Teachers of Drama should find this booklet a practical source of advanced technical knowledge in their field.

I. M. Fixman
President
Hub Electric Co., Inc.

Contributors

James Hull Miller, one of the contemporary pioneers of the free-form open stage, has been consulting designer for some forty theatre projects. His influence on theatre architecture comes from his experiments with visual forms of stagecraft and a new dynamics of dramatic environment. His background is in technical theatre but he has a keen appreciation of modern architectural trends. His views are summarized in the Summer 1963 issue of the *Tulane Drama Review.* Mr. Miller lives in Shreveport, La.

Richard Leacroft, with professional backgrounds in both architecture and theatre, is well known for his published research and illustrations. Recent works include an outline history *The Theatre* (Roy Publications), *The Building of Ancient Egypt* (Young Scott Books) and his studies on "Actor and Audience" appearing in the April and May 1963 issues of the *Royal Institute of British Architects' Journal.* Professor Leacroft lives in Leicester, England, and is with the School of Architecture of the Leicester College of Art.

Percy Corry has been closely associated with theatre, both amateur and professional, for fifty years, as actor, director, technician, lecturer and administrator, and lastly, as theatre planner. He has an equipment factory in Manchester, England, where he also lives. He is a former president of England's first amateur little theatre, the Stockport Garrick. He has written several books and is a regular contributor to *Tabs,* the informative quarterly published by the Strand Electric Company of London.

Irwin J. Atkins has been an East Coast actor, has worked in many educational theatres and television programs and is currently at the University of Minnesota. Professor Atkins is interested in the different relationships of an audience to radio, television, motion pictures and especially to the various forms of live theatre. His article here reflects a study of directoral notebooks for the Stratford Festival Theatre in Ontario.

Russell Johnson, a member of the staff of Bolt Beranek and Newman Inc., Cambridge, Mass., has served as consultant on the acoustical design of numerous campus and civic auditoriums including La Grande Salle at the Place des Arts in Montreal, Clowes Memorial Hall at Butler University in Indianapolis, and Warner Concert Hall at the Oberlin Conservatory of Music. He is a member of the Acoustical Society of America, the Audio Engineering Society, the United States Institute for Theatre Technology, and has authored several articles on auditorium design.

Albert M. Koga has designed and developed special lighting, stage lighting, and lighting control switchboards in collaboration with architects and engineers throughout the United States. A graduate of the College of Engineering of the University of California, and a former college instructor of mathematics and physics, he has had wide experience in various phases of lighting. For many years he has been Chief Lighting Engineer of the Hub Electric Company, Inc. and has worked as technical consultant to James Hull Miller on numerous open stage projects. He has served on the Board of Managers of the Illuminating Engineers Society, Chicago Section, and in various Offices of the Chicago Lighting Club.

Introduction: The Language of Vision

The purpose of this bulletin is to orient and encourage . . . by the example and experience of others. The ideas expressed here are so new that ten years ago this bulletin could not have been written.

Who were those who went forward and built without security of prior example?

Open Stage Pioneers

The three general forms of the open stage described on the following pages, the *forward thrust platform*, the *reverse curve caliper* and the *arcade*, were pioneered, respectively, by Art Cole and the Midland Community Theatre, Ted Skinner and the Lamar College of Technology in Beaumont, Texas, and Barbara Lange of Swarthmore College in Pennsylvania.

Behind these projects lie the influences of Thomas Wilfred in lighting research, John Ashby Conway in production, George Kernodle in his penetrating writings of the historical time-space equations, and Eric Pawley, architect and student of visual psychology.

Scene Design Defined

Scene design is the language of vision which communicates the meaning of the dramatic environment to the audience. And, in the last analysis, it is what the audience remembers that is important.

In the theatre, it is not always necessary to display every single piece of the environment as it exists in real life in order to make the proper impression.

With very elaborate equipment, some proscenium frame theatres are able to transcribe scenes taken from life itself. The open stage enthusiast, however, believes that the nature of his theatre permits him to cut right to the heart of an environment and select highly characteristic details which will trigger a chain of imagery in the mind of the audience. This can provide much the same post-production recall as if the spectator had seen the actual objects rendered in complete detail.

Advantage of the Open Stage

What, then, is the particular nature of an open stage theatre which makes this possible? The answer lies in the neutral enclosure of the playing area by architectural decor. In this space there is placed free-standing scenery in the amounts and sizes determined by the scenic artist.

It will be seen at once that this sort of scenery dominates the heart of an acting area, rather than defining its perimeter. With scenery centrally developed, more than one acting area is possible.

It is here that the proscenium frame and the open stage theatres differ most sharply.

The open stage in all its traditional forms has always been a free-form, multi-scene theatre, while the proscenium theatre was developed around the idea of making one scene at a time within the space defined by the picture frame.

An example of open stage scenery is illustrated below. It is a typical free-standing set, here formed primarily of folding arch screens and self-supporting by virtue of its angular deployment.

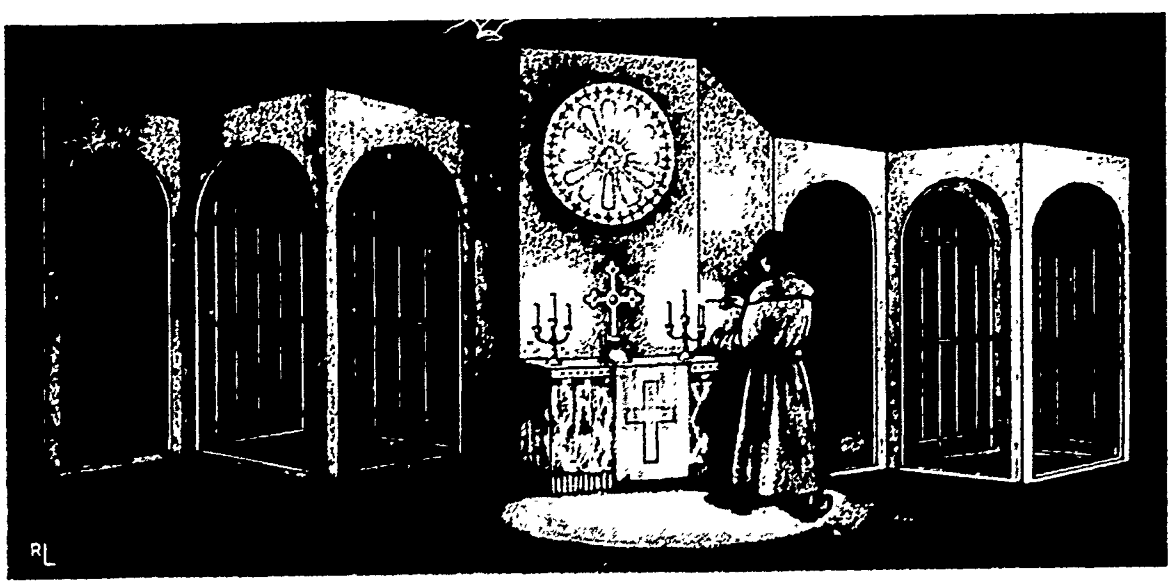
Obviously the size of the platform upon which this set is placed is of no concern, for the same set could be placed with equal success upon a dais at the end of a ballroom. Masked areas and covered passage to the vicinity of the island are created by folding screens of variously sized panels.

Who is the Open Stage Client?

Resistance to the open stage is largely resistance to new forms of scene design, and as such, is largely institutional in character, in much the same manner as "academy" painters discourage new artistic delineation and "conservatory" musicians frown on new tonalities and modular systems.

The typical open stage client is one whose resources are modest. He is also aware that the traditional methods of theatre communication have become costly and, in many instances, of dubious value from a practical standpoint. Being knowledgeable in contemporary art and architecture, fields which have undergone considerable changes in the last twenty years, he acts upon new ideas which may help him create a first class theatre along open stage lines.

JAMES HULL MILLER



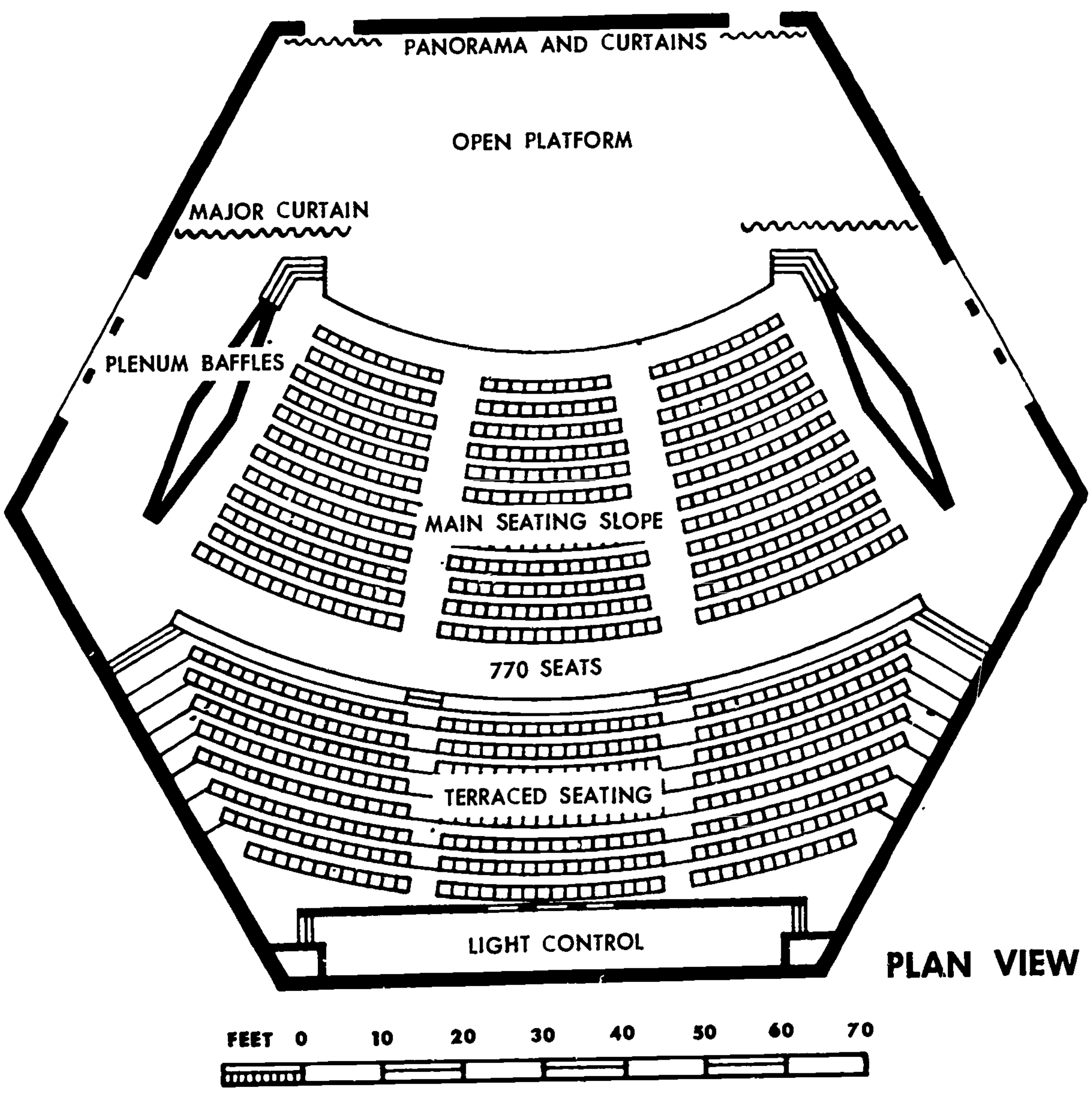
A typical open stage set, free standing and, here, self-supporting. It consists primarily of folding arch screens angularly deployed.

Open End Theatre for Senior High School

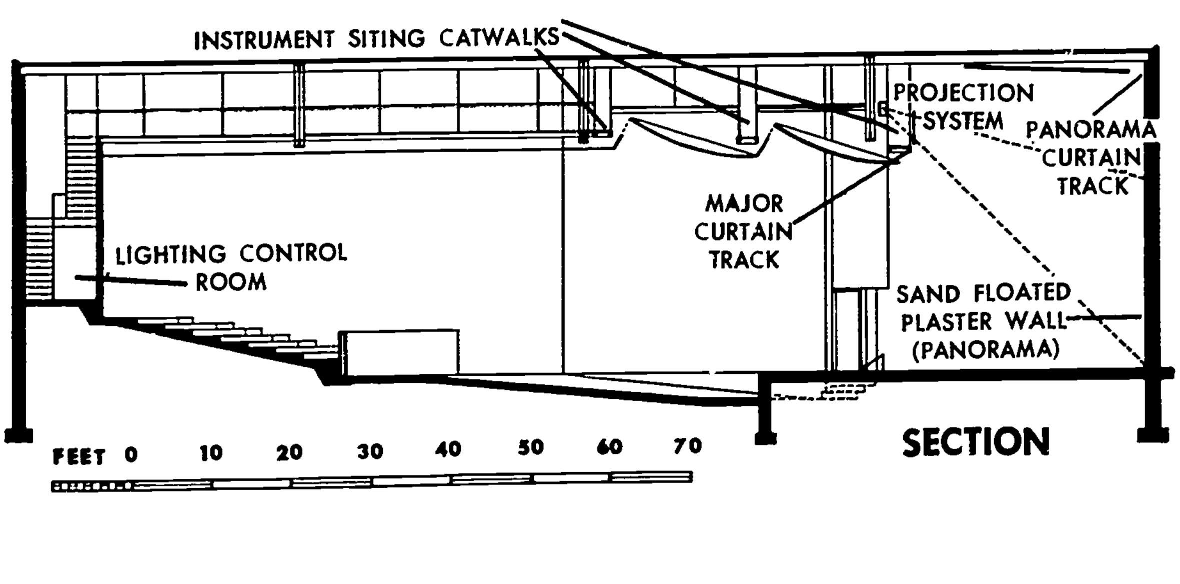
Findlay, Ohio

ROBERT A. VAN AUKEN
Superintendent of Schools

PERKINS & WILL
Architects and Engineers
Chicago, Illinois



PLAN VIEW



SECTION

The plan for this theatre chamber was developed by Robert L. Palmer of the architectural firm of Perkins and Will, and James Hull Miller, consulting designer, for an educational assembly, concert and modern drama center.

Later, the plan was reworked for community theatre needs (see cover illustration) and published as a project in the December 1962 *Players Magazine.*

Basic Design Intent

It was the intention of the designers that the dramatic environments of this theatre follow the open stage principle of settings which stand free in space and therefore possess their own terminal lines.

Thus the auditorium itself becomes the initial background to the playing area.

Five of the six walls and the baffle walls are of masonry and are sandstone in color. The sixth wall, the panorama wall, is of sand-floated plaster and is wedgewood in color—a blue-gray tint suitable for rear projection from overhead.

Wing controls, that is, the creation of sheltered areas offstage, including covered access to selected scenic groupings, are by two sets of 3′ x 12′ four-fold panel screens to each side.

These folding panel screens give the theatre completely flexible service areas or, when struck, a free platform area as wide as the building.

The building itself forms an acoustical shell for large musical activities, while acoustical shells for smaller musical programs are fashioned from folding screens of plywood similar in appearance to the wing controls described above.

Interior Illumination

Interior illumination for this theatre is divided into two distinct phases:

1. **Architectural Downlighting**
   This phase was achieved by baffle ring fixtures throughout the entire chamber, subdivided for purposes of control, by remote stations, into the seating, the forestage, and the upstage areas.

2. **Theatrical Lighting**
   This second phase was achieved chiefly by spotlights and by the background projection system, from overhead instrument-siting catwalks, with control at the rear of the auditorium.

The theatrical lighting schedule (listed on page 27) includes 1000 watt fresnel spotlights, with round and oval beam lenses, 750 watt ellipsoidal spotlights, and a combination of 750 watt scoop floodlights and the 2100 watt beam projection unit for background projection (described on page 67). Control, by reason of budget, is by 6000 watt autotransformer dimmers, though the initial equipment schedule called for a silicon controlled rectifier or magnetic amplifier dimming system.

Curtains, Floor and Ceiling

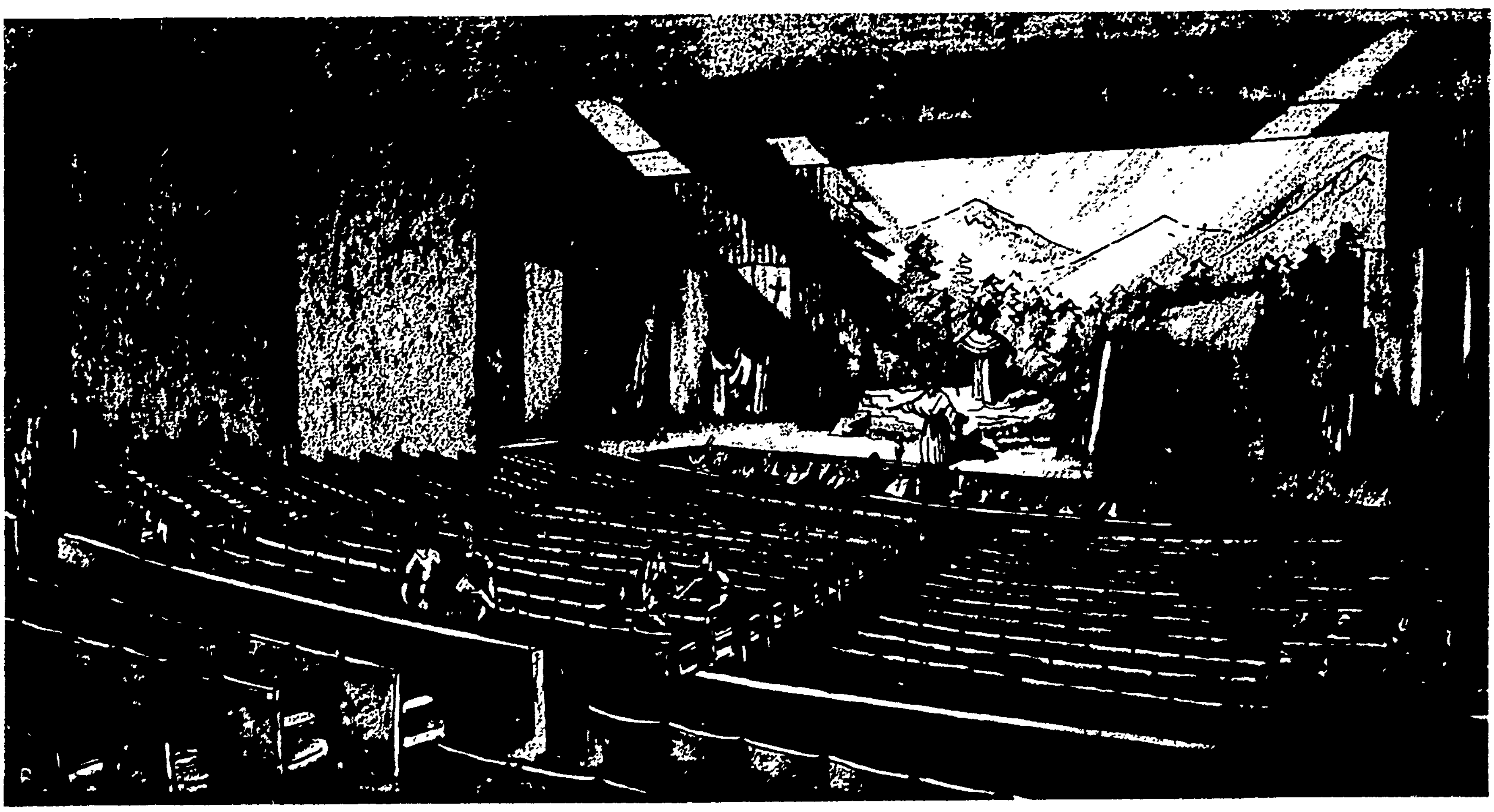
There is one main curtain of rust velour, operated by hand purchase line, and two sets of adjustable curtain panels, slate and dark blue, on I-beam tracks just ahead of the panorama.

The stage and all other flooring at stage level are of dark-stained maple. The overhead ceiling panels are gunmetal gray in color.

The audience seating area accommodates 770.

This theatre was activated in the fall of 1963 with a five-day workshop conducted by Mr. Miller. As this chamber was to be a civic facility, jointly used, representatives of nearby Findlay College and the Fort Findlay Players, a community group, attended the workshop as well as faculty, students and administrators of the Findlay school system.

Presentations from the stage have ranged from a single performer to a combined chorus and orchestra of 300. The facility was reported in the December 1963 issue of *Nation's Schools.*



Dress rehearsal on the Findlay stage. Settings stand free in space with the background projected on the panorama wall from overhead. Note the wing control which, by folding screens, creates sheltered areas offstage; when folding screens are struck the stage becomes a free platfrom as wide as the building.

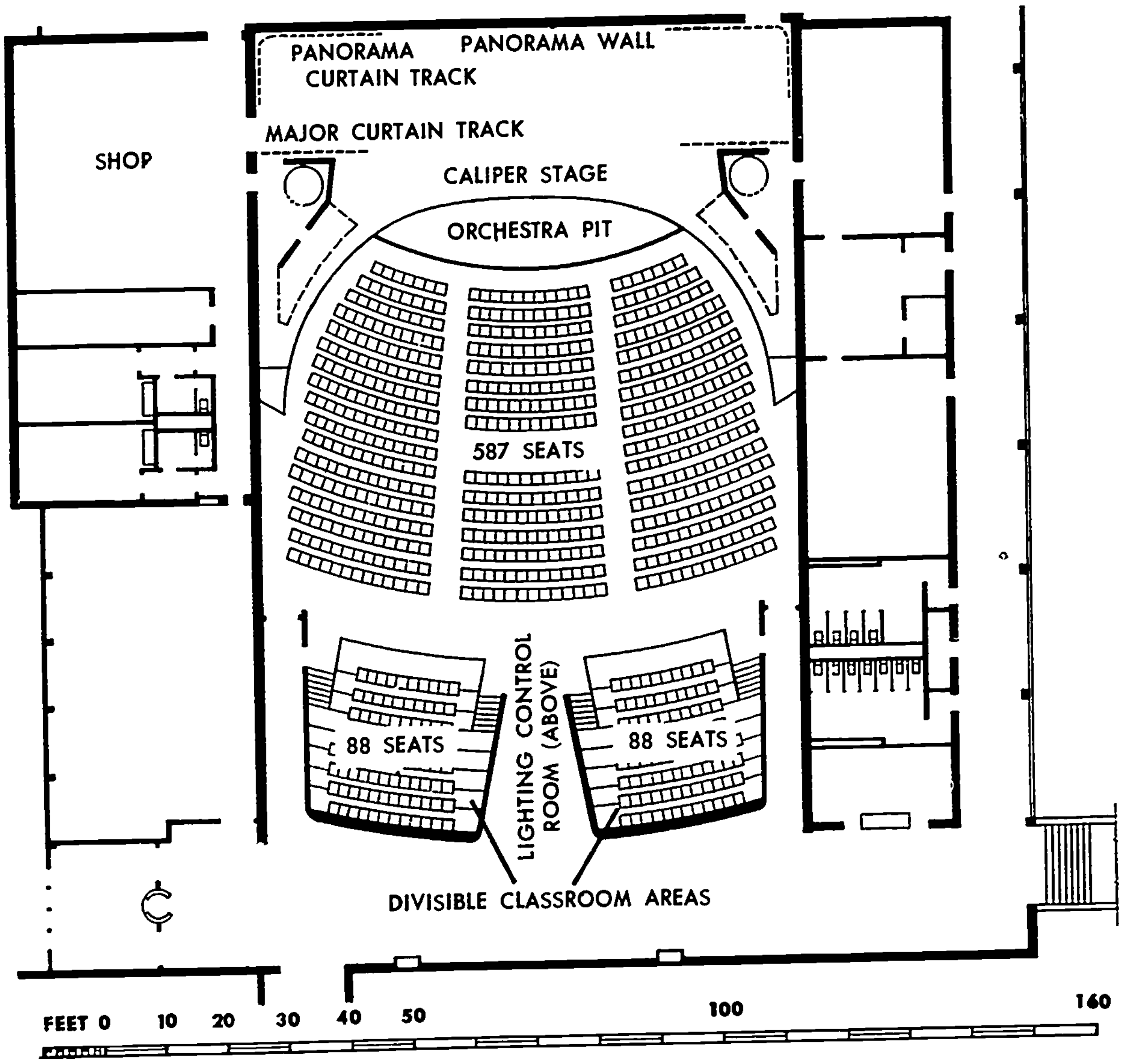
Caliper Stage For Senior High School

Longmont, Colorado

MERLE V. CHASE
Superintendent of Schools

BUNTS & KELSEY
Architects, Colorado Springs, Colo.

EDUCATIONAL FACILITIES LABORATORY
New York, New York



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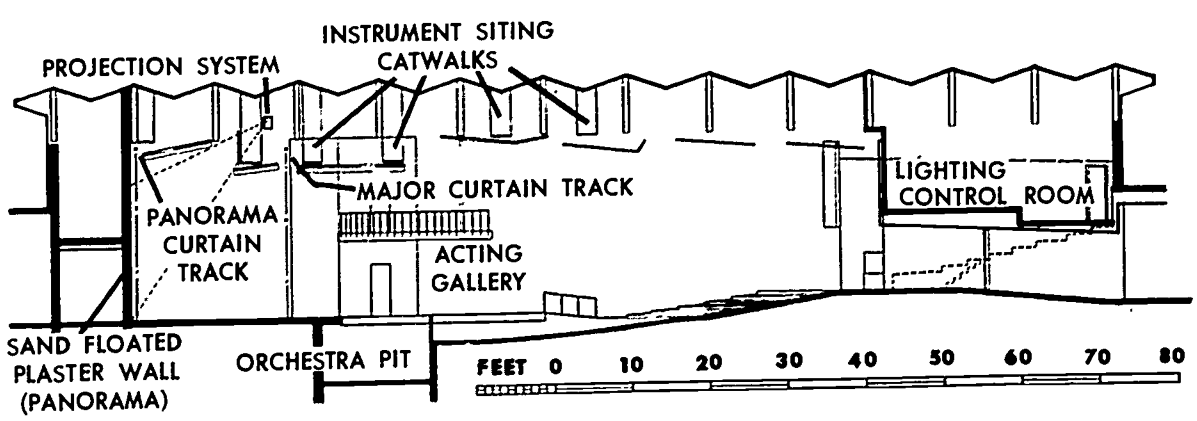


SECTION

This auditorium is an excellent example of open stage concepts applied to a conventional rectangular shape and seating arrangement.

It was the belief of the architects that the traditional proscenium stage does not handle with efficiency the total high school program imposed upon it.

They felt that the proscenium stage was too broad for dramatics in conventional trappings, not intimate enough for lectures and forums, and acoustically bad for concerts unless a sound shell were to be erected.

Open Stage Advantages

It was also felt that the newer stagecraft forms which serve the open stage were more suitable for student participation. Set pieces and projected backgrounds are more economical than full sets and painted backdrops, and are also smaller in scale, changing the logistics of preparation and storage.

Other advantages stressed by the architects in their report to the Educational Facilities Laboratory were:

1. The reduction in fire hazard by the elimination of the stagehouse loft.
2. The safety afforded by catwalks to the lighting positions in lieu of portable ladders.
3. A lower equipment installation cost.

The architects achieved the open stage design chiefly through a common ceiling, with breaks for lights and curtain tracks; by widening the proscenium opening; and by softening the proscenium line through the addition of caliper stage extensions and the actors' towers, two stories in height, in place of the usual "frame".

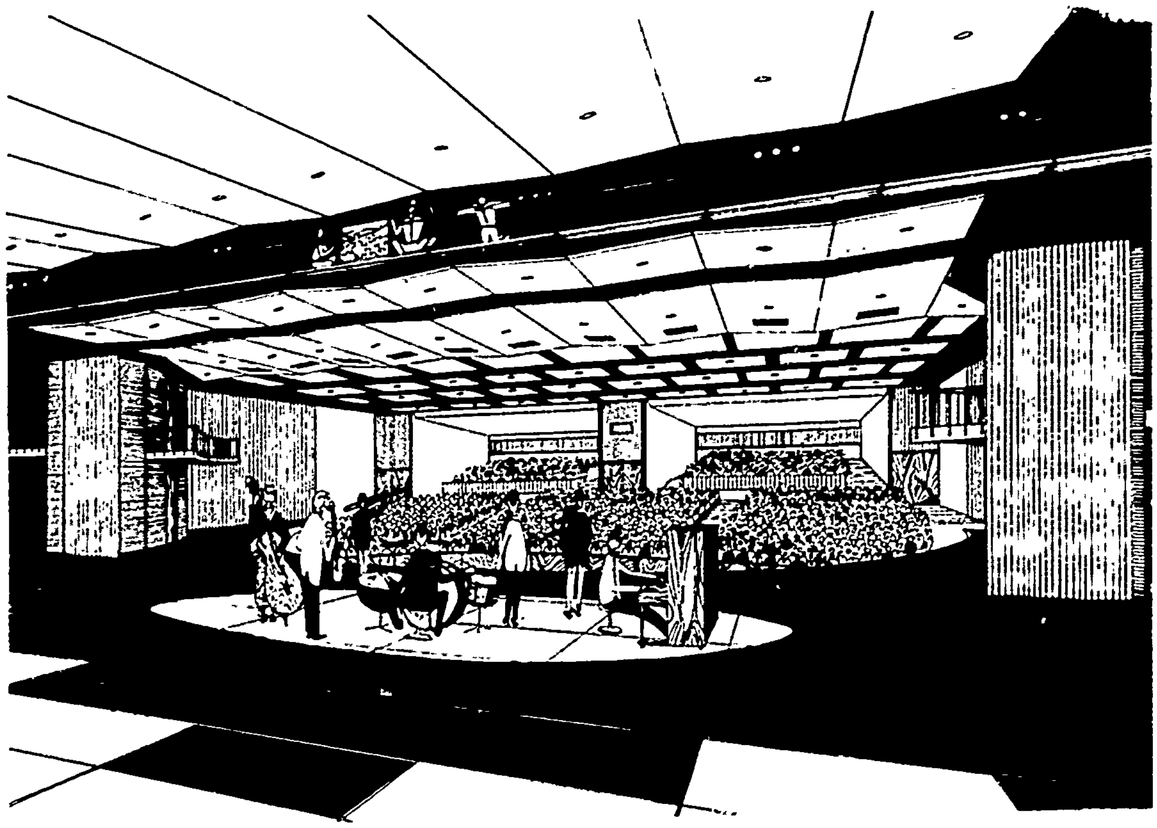
Wing areas of this theatre are controlled by folding screens, and the entire "backstage" area, with the exception of the panorama wall, was decorated to match the auditorium walls.

A complete schedule of the auditorium and theatrical lighting recommended for this theatre is listed on page 31.

On the basis of its design, Longmont High School was the recipient of the "School of the Month" award by *Nation's Schools* magazine for December 1963.

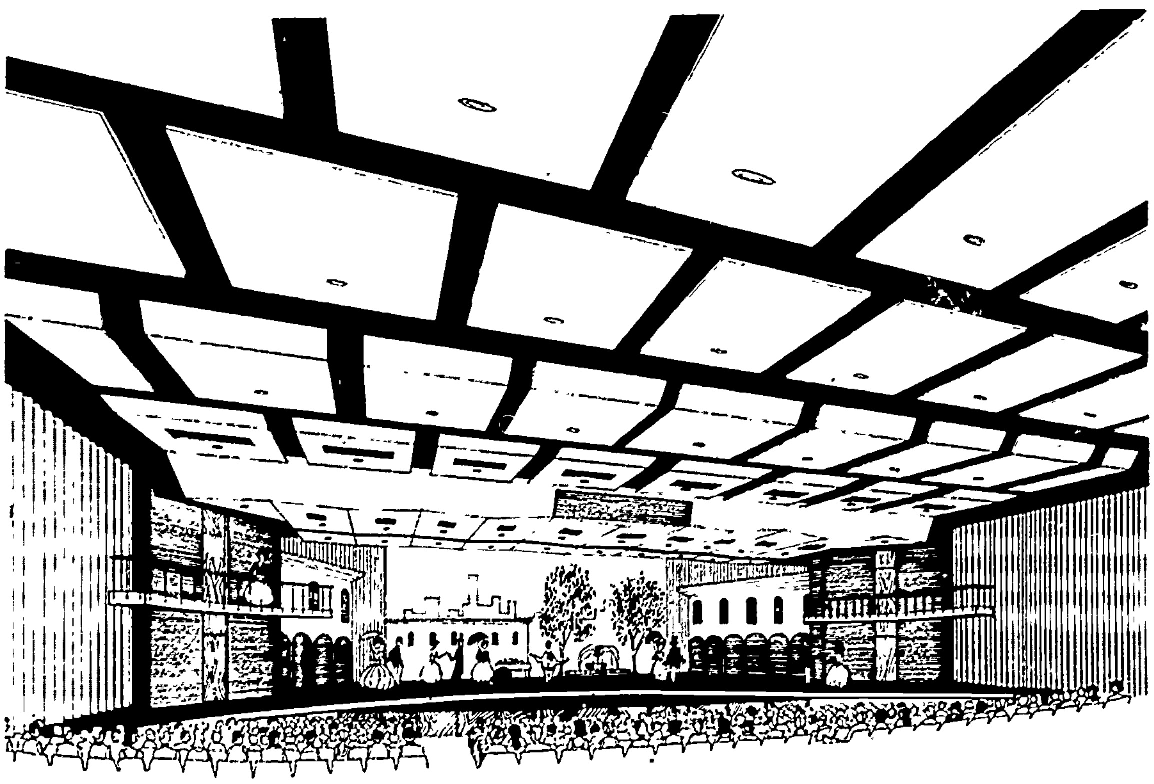
This theatre was activated in the fall of 1964 by a five-day workshop conducted by Mr. Miller. The workshop was the final phase of a design grant program by the Educational Facilities Laboratory of New York.

In his workshop, Mr. Miller concentrated on the time-space quality of the wide acting área, developing a series of scenes which carried pilgrims up the caliper approach, across a projected vista, to a sanctuary pavilion of actual scenery, thus paralleling in contemporary theatrical form the "long shot," the "pan," and the "close-up" techniques of the motion pictures.



VIEW ON PLATFORM

View on platform illustrating common ceiling with "breaks". Note typical open stage catwalk for lighting and background projection equipment.



VIEW TOWARD PLATFORM

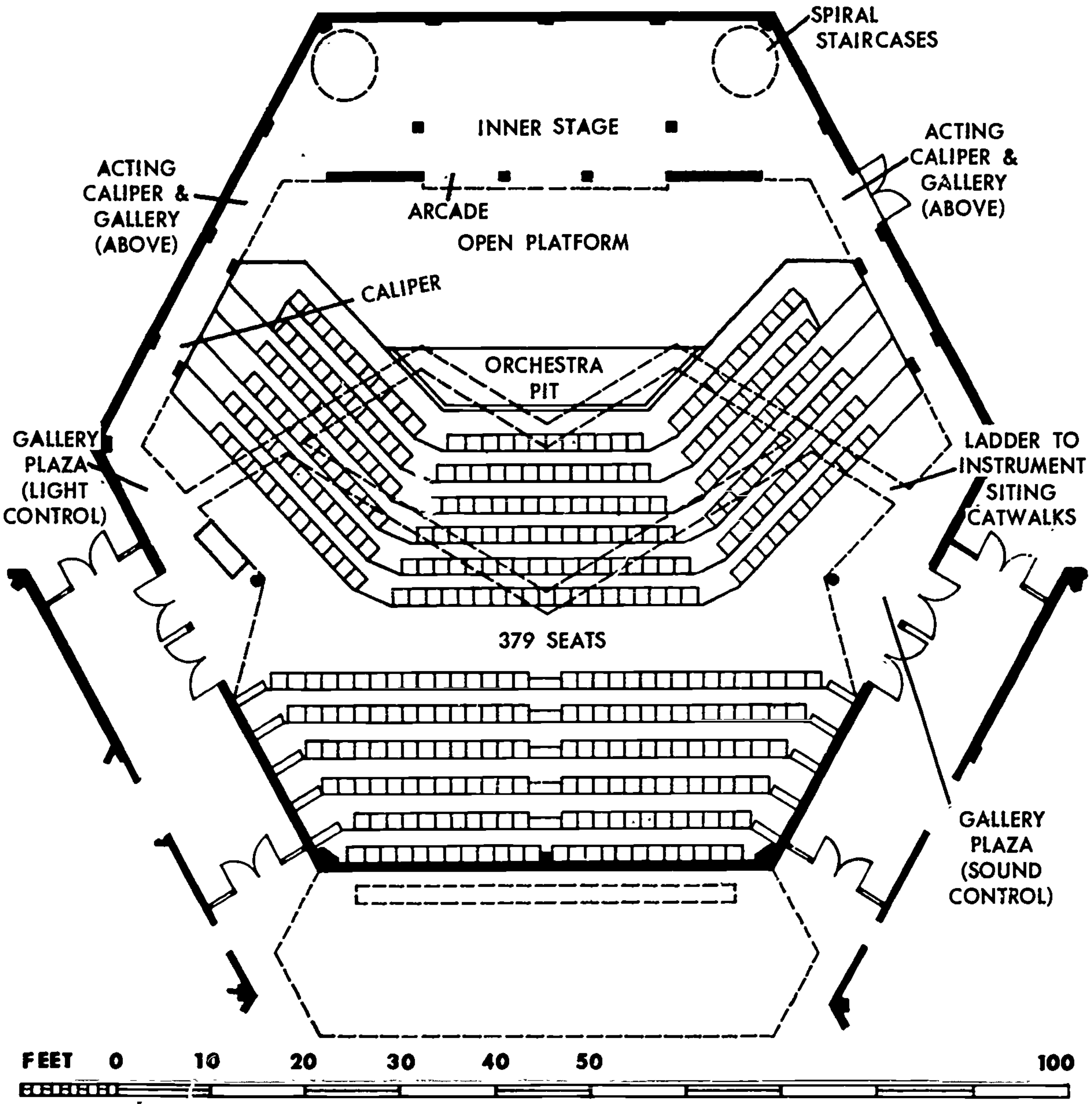
View toward platform showing caliper stage extensions and actors' towers. The ceiling over the auditorium and the stage area is common, with breaks for lights and curtain tracks.

Combination Fore-Thrust and Caliper Stage for Senior High School

La Junta, Colorado

PHILIP RULE
Superintendent of Schools

SHAVER AND COMPANY
Architects, Salina, Kansas



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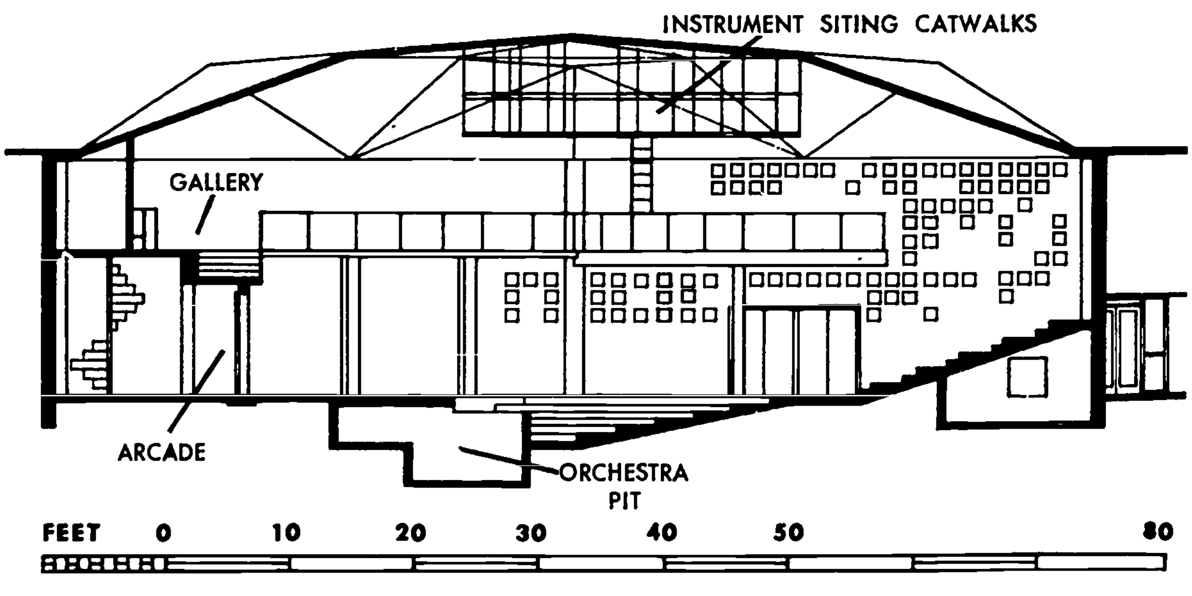


SECTION

The basic plan of this theatre features an apron-type stage with caliper arms which encircle the forward seating terraces and form a connecting cross-aisle through the center of the auditorium.

The forward stage shape possesses a large focal area with a number of flanking areas for additional dramatic action.

An arcade encloses an inner acting area at the stage level and forms a portico supporting an acting area above. Gallery calipers extend the upper level and lead to elevated plazas for light and sound control.

Scenery for all of these acting areas takes the form of space sets as pavilions or poly-folded screens.

Treatment of Arcade

The colonnade of the arcade forms embrasures into which both conventional flats and translucent screen panels may be locked. These translucent screen panels serve as a composite backdrop and panorama, receiving color and imagery from a rear projection system as described on page 67.

Translux screen panels or inserts may also be locked into place to serve television, motion picture and slide projectors located at the rear.

Curtain tracks are attached to the front and rear of the arcade lintel.

Two Phases of Lighting

Illumination for this theatre is divided into two phases:

1. Architectural downlighting, by areas, throughout the chamber.
2. Theatrical lighting, the majority of which is located on the open catwalks suspended below the dome.

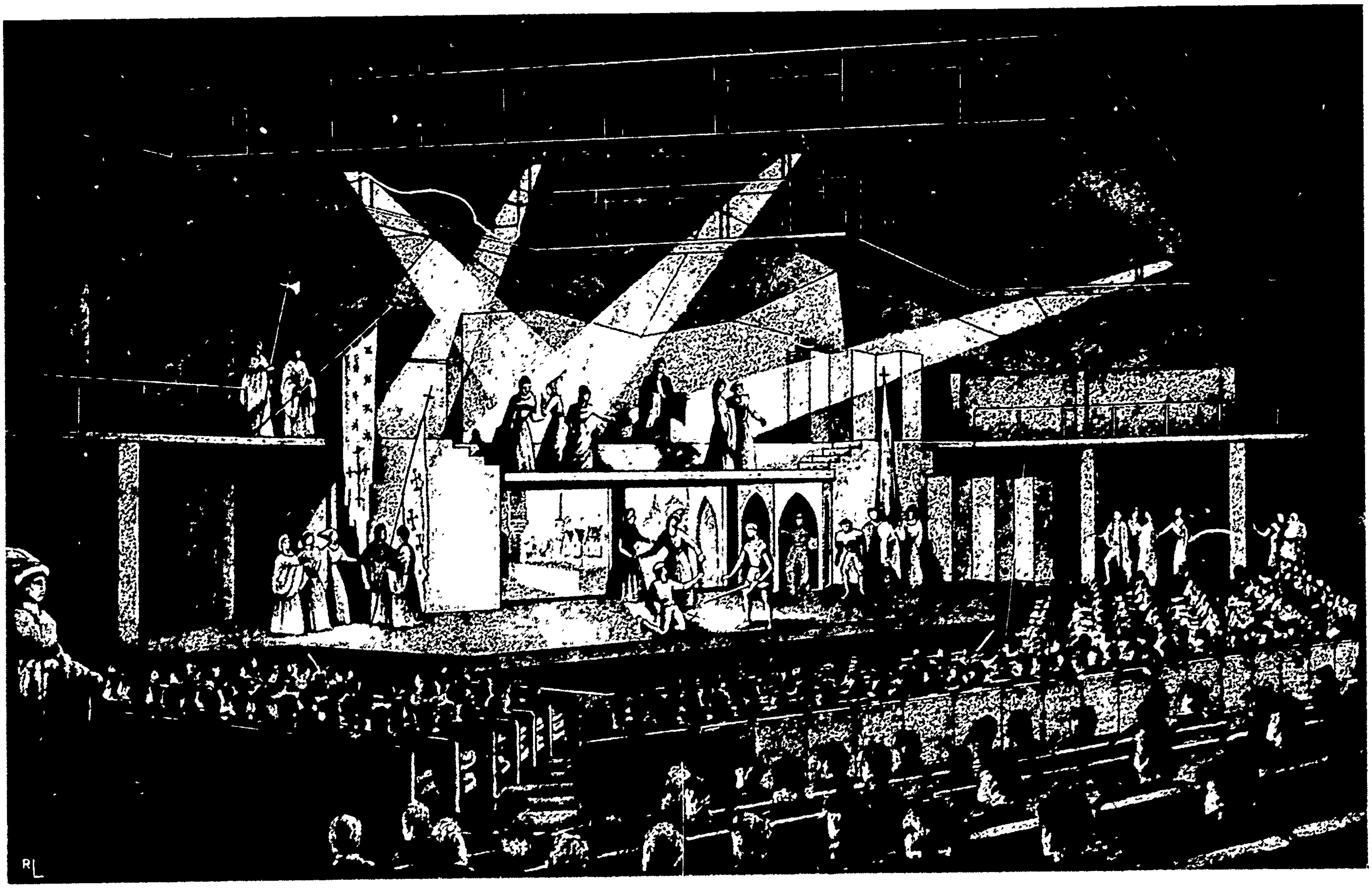
A complete lighting and lighting control schedule is listed on page 35.

The possibilities for the scenes are numerous, including the bi-level acting area, space for numerous sets arranged simultaneously, lighting by zone, the tripartite panorama, and the architecturally complete stage volume into which actors, properties and sets may be introduced at will.

This theatre was activated in the fall of 1964. During the preliminary workshop considerable attention was given to the use of the arcade, especially with the translucent screen panels which were constructed during the workshop.

Preliminary training in the use of the arcade-type theatre is particularly challenging, since the stagecraft forms are highly ideographic — almost a kind of visual shorthand, and thus appropriate to the new time-space concepts in playwriting today.

The modern designer believes that polar perception is rapidly replacing the more familiar rectilinear perspective in our visual language and that the living theatre, in contrast to the framed media of television and motion pictures, holds the key to the understanding of human nature confronting the space age.



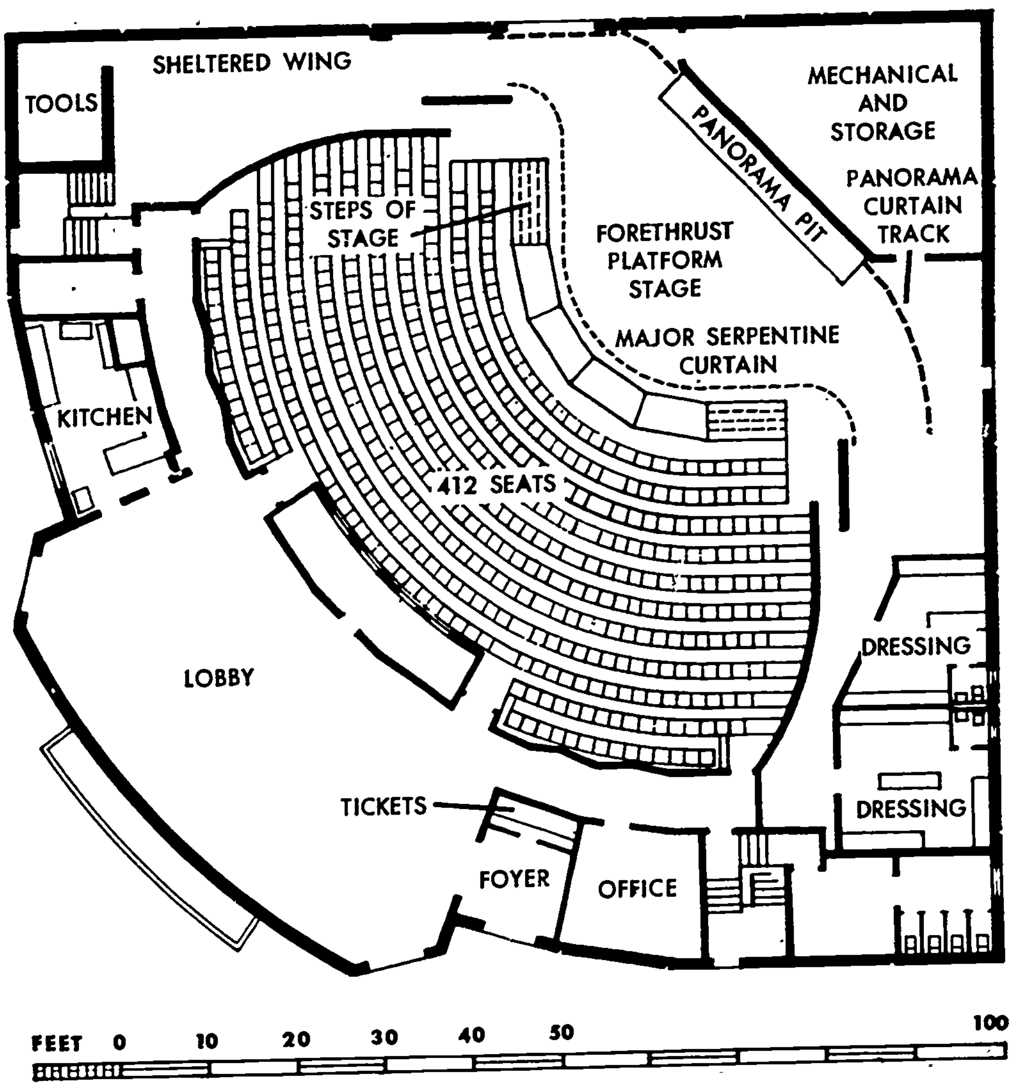
The design of this stage permits several areas for additional dramatic action, both at the sides and on the portico and the upper gallery calipers.

The elevated plazas and catwalk contain the lighting and sound equipment.

Fore-Thrust Platform Stage For Community Theatre

Western Springs, Illinois

GUS ORTH
Architect, Chicago, Ill.



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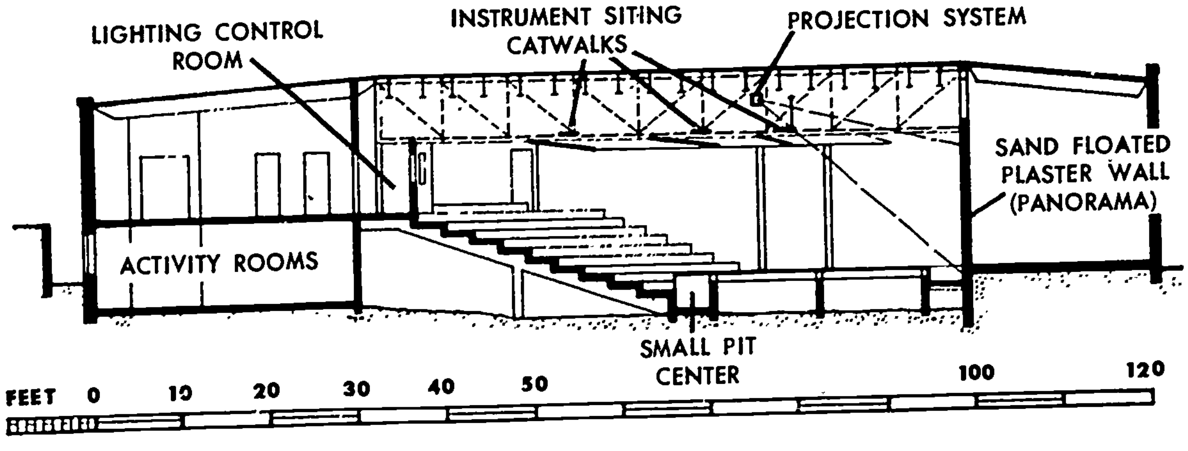

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The operating group for this theatre is community centered, with individuals from many professional walks of life. The group had been in operation 28 years before undertaking the planning of this open stage, and it had produced plays in many locations and in all possible manners.

It was concluded that the proscenium style was definitely not economical of time, money or energy, all of which are limited in community theatre operation.

On the other hand, it was felt that arena production was too restrictive, excluding a great part of vertical design and subtle illumination, as well as excluding the participation of members in these areas.

For these reasons the open stage was selected as an ideal form.

Seating on Slope

The audience of 412 at Western Springs is seated about a stage whose front is approximately a quarter circle. The steep (20°) seating slope is good acoustically and visually, and this is accomplished by a series of terraces each 12 inches high by 38 inches deep.

These terraces create a highly dimensional acting area since the audience looks down upon it.

Stage Dimensions

The radius point from which the stage and seating arcs are struck lies 18½ feet upstage, the plaster panorama wall for background projection (see page 67) lies another 11 feet upstage, giving a total stage depth of 29½ feet, fairly normal for this wide a seating plan. The total stage width between the permanent architectural screens is 52 feet.

The plaster panorama wall is 32 feet wide, and its entire surface is visible from every seat in the theatre.

This theatre is an excellent example of a low rise building. The technical equipment overhead, including catwalks, is contained within a 7 foot truss system. Clear distance to the stage floor is 15 feet.

To this open truss system are wired the cement-asbestos board acoustical panels which also shelter the majority of the instrument-siting catwalks. A complete listing of the lighting equipment is shown on page 38.

Other Design Advantages

The forward edge of the stage is flexibly designed and can be converted to steps or a small orchestra pit.

The near stadium slope of the audience seating area creates a split-level space under the lobby for rehearsal and storage.

The entire plant was built and equipped for approximately $250,000.

This theatre opened in 1961 to the membership with a production of *My Three Angels*. This was followed by a three-day workshop by Mr. Miller illustrated by actual scenery shipped from his Arts Laboratory in Shreveport. Following the workshop, the theatre made its public premiere with a production of *Dark of the Moon*.

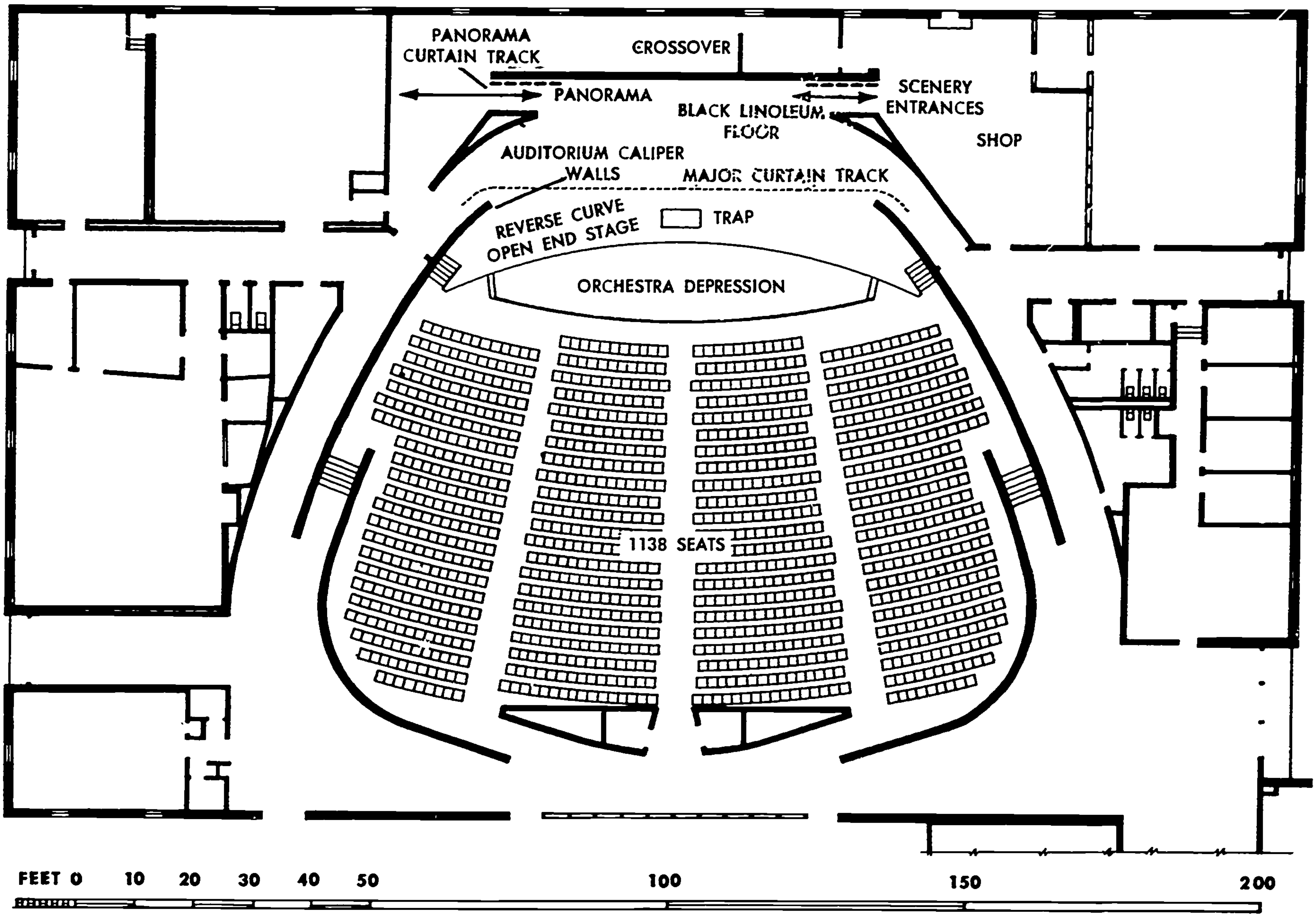
This order of events is mentioned because it is particularly important to live with a new theatre for a number of months and to learn its artistic potential before opening to the general public.

Since its opening this theatre has attracted visitors from all over the world and has been written up in numerous publications, including *Encore, Tabs* (London), and the *Journal of the Association of British Architects*. It was the subject of a paper presented by Mr. Miller to the 1961 London Conference of the International Association of Theatre Technicians.

Interior scene at Theatre of Western Springs.

Reverse-Curve Open End Stage For High School Auditorium

New Providence, New Jersey



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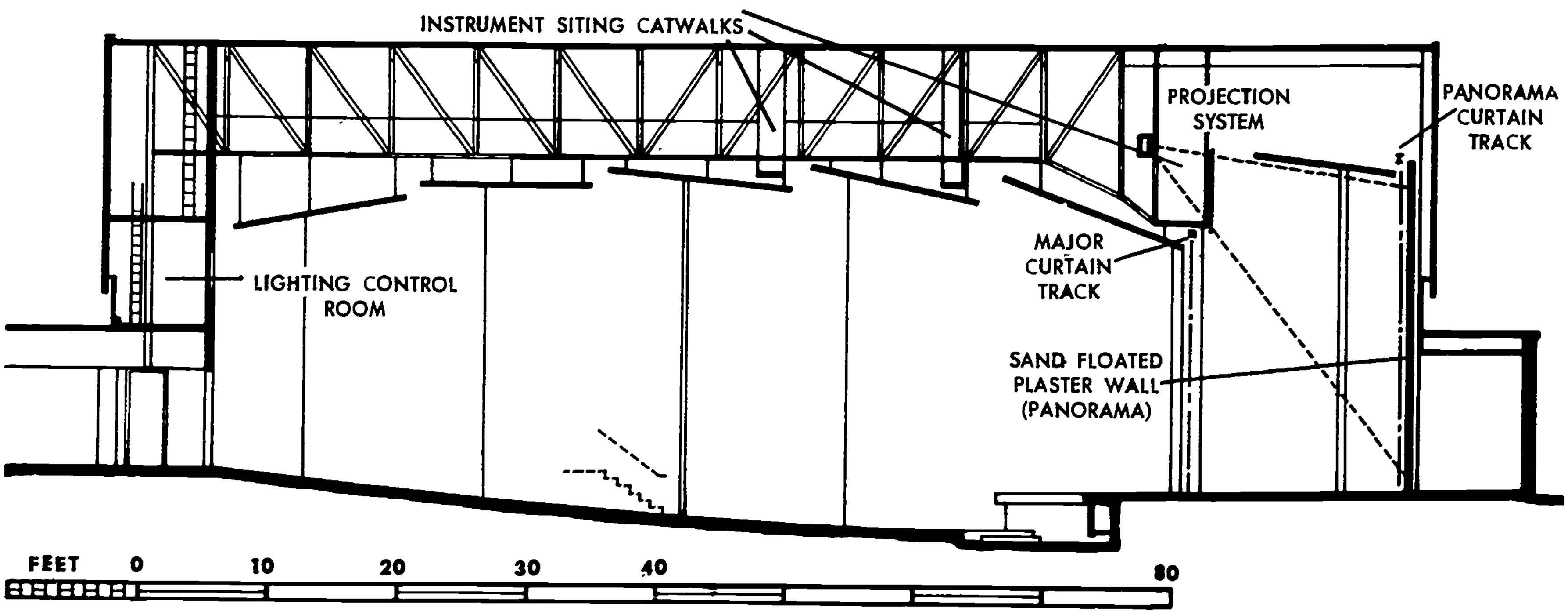

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ALLEN W. ROBERTS
Superintendent of Schools

KUHN & DRAKE
Architects, Summit, New Jersey

This high school auditorium fits within a square architectural shape of a higher rise than the surrounding classroom areas.

The ovaloid plan affords a wide seating area that focuses on a platform 27½ feet deep (minimum) by 64 feet which is encircled by offset caliper arms of the auditorium walls themselves and the plaster panorama wall.

This design avoids both the far corner seats associated with a fan-shaped plan, and the seating in depth associated with a more rectangular plan.

The plan is an excellent example of the architectural envelope which forms a container for both the platform and the seating area, and becomes a background for island-type set pieces used in dramatic productions.

In this section, and also in the preceding Findlay section, the termination of the auditorium ceiling planes, the main curtain track, and the image position of the background projection system *all occur at a common location.*

This is *not* intentional from an artistic standpoint, as the more these positions are offset, the less separation there appears to be between playing and audience areas, but this situation may occur when the ceiling trim is from 20 to 24 feet above the stage floor.

A complete equipment schedule used in this auditorium will be found on page 42, and details of the background projection system, on page 67.

This theatre was opened in the fall of 1964. The acoustics are remarkable and the architectural design suggests intimacy despite the high seating capacity.

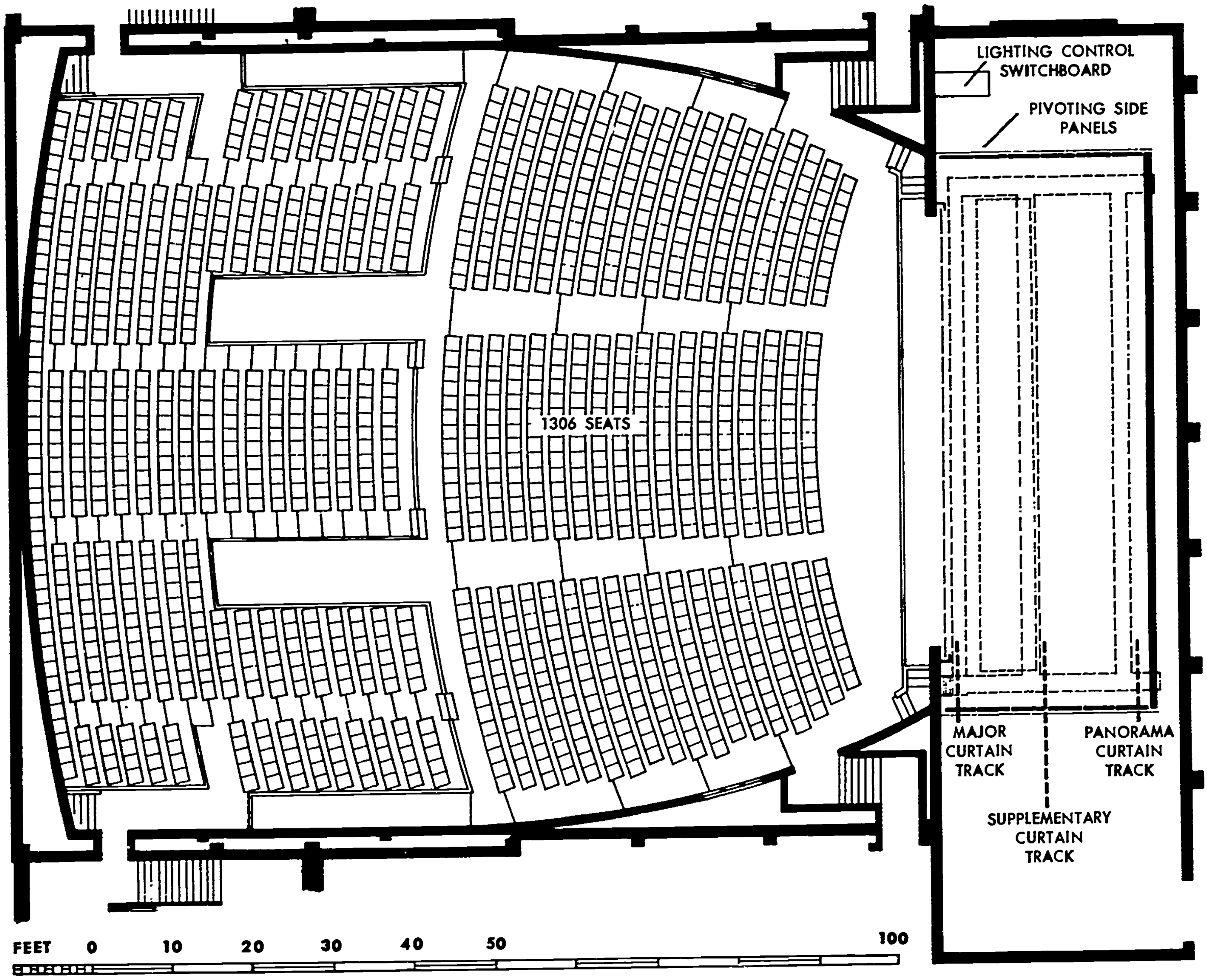
In the spirit of true school cooperation, the workshop was attended by faculty members and students of the shop, art crafts and speech departments.

Since the seating capacity is large, special attention was given to the handling of ceremonials, fashion shows and other presentational activities as well as the usual instruction in the design of space-centered scenery.

Interior scene of the New Providence auditorium showing the platform encircled by the offset caliper arms of the auditorium walls. Note the typical open stage free-standing scenery and background scene projection.

Modified Proscenium Stage For Trinity High School

River Forest, Illinois



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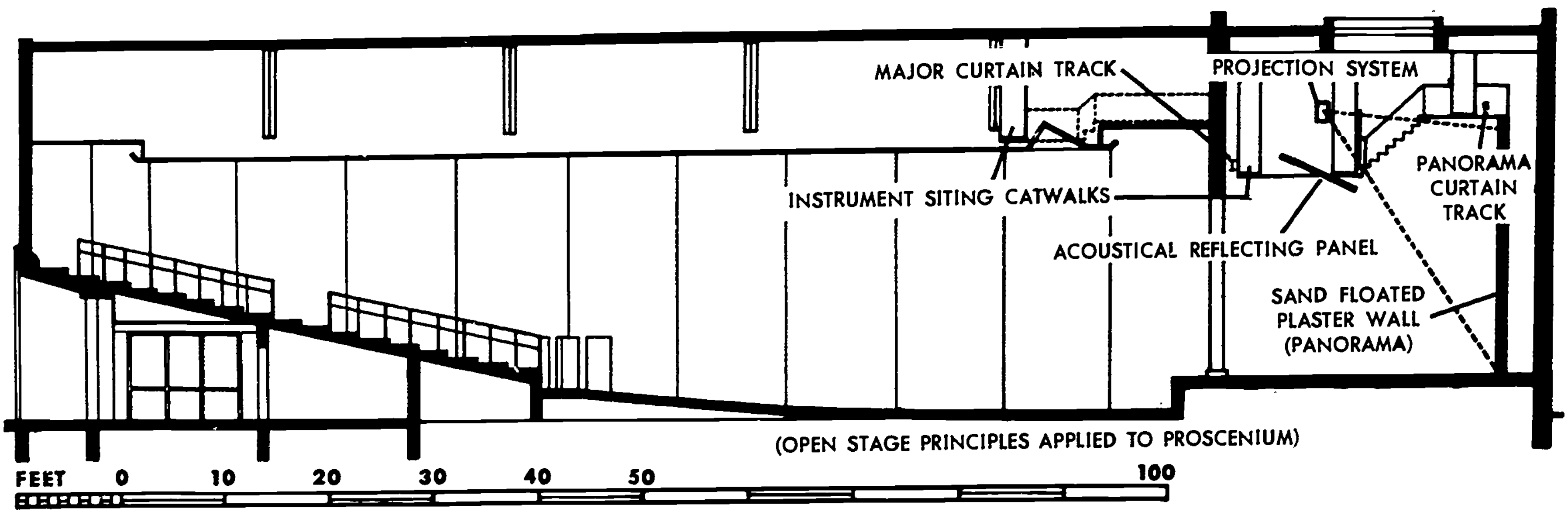

SECTION

SISTER FRANCIS MARY, O.P.
Principal

CHILDS & SMITH
Architects & Engineers, Chicago, Ill.

R. L. IGNELZI
Associate Architect

"Modified proscenium" here means the proscenium stage which incorporates the features of the open stage overhead—in place of the stage loft that is conventionally associated with a proscenium plan.

Three Great Advantages

The modified proscenium installation offers three important advantages:

1. The hard overhead panels which replace the cloth masking system provide excellent acoustical reflection, and acoustical reflection is also obtained from the flexible architectural screens to the sides of the stage and from the plaster panorama to the rear. Each flexible wing screen is suspended from a central pivot, the pivot device in turn riding on an up- and down-stage track system.
2. A finer quality of lighting is achieved through better equipment locations, reached in safety by catwalks.
3. Background projection replaces painted drops. Refer to page 67. for a full discussion of this system.

Fits in Wasted Space

One observes that the acoustical ceiling for the stage, the spotlighting illumination system serviced by catwalks, efficient downlighting, and the background projection device can be inserted into most conventional school auditoriums without changing the basic architectural design . . . and in a space *now wasted* with acoustically absorptive cloth masking systems which, in turn, encourage the installation of more lighting equipment than required.

Economic Advantages

When we are talking proscenium "plan" in conjunction with these new "elevations" some *direct* comparisons in costs may be drawn from experience with recent installations.

One can expect a 25% reduction in equipment costs, even including the architectural downlighting fixtures over the stage area, for the illumination of non-dramatic programs; a 40% reduction in maximum current consumption for theatricals; and there can be a reduction of 55% in current consumption with the use of the downlighting fixtures in place of borderlights for such programs as band concerts, meetings, and early rehearsals.

Savings in the initial equipment will offset cost of catwalks and the more customized electrical circuitry of the open stage. A complete listing of the lighting equipment specified for this installation is shown on page 45.

Those interested in further pursuing the advantages of a "modified proscenium" installation can find an additional discussion in Hub Bulletin No. 105, available on request, at no charge.

CURTAINS and the Open Stage

Curtains for the open stage are optional. The chief reason for the inclusion of a major curtain occurs where the theatre chamber has a strong multi-purpose program of lecture, forum, assembly, music and drama.

The selection and arrangement of the curtains for the open stage involve the early consideration of the architect, for such installations will affect the design of the highly specialized architectural ceiling planes over the platform area; whereas curtains for the proscenium theatre are in the nature of accessories applied to the uncommitted volume of the stagehouse.

Two Curtains Useful

The open stage, with its space set pieces and modular folding screen sets, eliminates such traditional curtain items as wing or tormentor pieces, teaser or border cloths and, of course, the cloth backdrop and cyclorama pieces.

However, two sets of curtains remain useful to the open stage:

1. A major curtain downstage for purposes of "show", concealment, or forestage background.
2. Curtains upstage to conceal or reshape the plaster panorama.

These must be provided for in the "reflected ceiling plan", with the exception of arcade theatres like La Junta and Swarthmore (illustrated on pages 8 and 71 respectively) where there are no major curtains, but lesser curtains associated with the arcade portals.

Choice is Limited

Due to the low-rise feature of the open stage buildings, the architect will be denied the mechanics of the "drop" curtain to conceal scene changes, and the width of the open stage precludes the tableau curtain, so choice is limited to the

Platform of the Olathe (Kansas) High School Auditorium, showing the curtains closing on the "scenic area" while a new scene commences on the forestage. Illumination from the overhead projection system passes through a trapezoidal cut in the stage canopy and onto the 12' by 14' plaster panorama standing free at the rear of the platform area. Here a curtain of semi-transparent material is used. Two curtain panels are mounted on a single I-beam track and the amount of transparency is controlled manually by arranging the fullness.

French valance or contour, or the simple draw or traveller curtain, the latter made complex through the preference and often necessity for serpentine track runs.

The rear curtains associated with the panorama wall should consist of a number of separate panels attached to I-beam tracks and should be maneuvered into position by hand, using batons attached to the lead carriers of a panel, so that a variety of arrangements are possible.

The forward curtain track, if one is to be used, is generally purchase-line operated from off-stage or by remote control via a motor unit.

Is Forward Curtain Necessary?

The discussion of this forward curtain track, its plan, its method of operation, even its inclusion, will elicit a wide range of opinion.

This is understandable when one realizes that the curtain as we know it today was not used as a device for masking scene changes until the middle of the nineteenth century, but was primarily decorative and employed to mark the beginning and end of a performance. Concealed scene changes were not the custom.

The curtain was unknown in the medieval and classical theatres, save in pavilions, arcades and other embrasures such as the Elizabethan inner stage.

Curtain Track Placement

In the modified proscenium plan there is no problem, and the track is placed in the usual position. On reverse-curve caliper stages such as Longmont, the curtain, slightly upstage, may still ride on a straight track, packing behind the actors' towers.

With fore-thrust plans such as Western Springs, a serpentine track is required, and it is in this situation that negative factors may often outweigh the benefits of such a major curtain track:

1. Noise of carriers.
2. Necessity of motor drive, with mechanical rhythm.
3. Excessive length of track.

In the larger auditoriums with major curtains, some musical directors prefer to have the orchestra set-up entirely behind the curtains. This means that the curtain will have to be placed well downstage.

On the other hand, the curtain should be far enough upstage to permit the performing of small scenes before it.

Olathe Solution

A rather unusual application of the curtain is found in the 365 seat high school auditorium at Olathe, Kansas, Wayne Fick, Superintendent of Schools, and Shaver & Co., of Salina, Kansas, Architects.

The auditorium is designed in such a manner that the major curtain track encloses *only* that area of the stage platform on which would be located the larger scenic pieces for dramatic use, due to extreme sightlines.

Visibility to the forward area and free circulation to all areas of the stage platform are unaffected by the closing of this curtain, and a peninsular space about 15 feet deep remains for dramatic scenes or other activity.

Scene Design Needs Study

There is no doubt that surprise is one of the dramatic elements of theatre, but one wonders whether the heavy use of a major curtain in an open stage theatre for the concealment of changeable scenery is not a anachronistic today as is the changeable scenery itself, which requires such concealment.

The architect is referred to the Scene Design chapter in the DRAMATICS Section for further study.

Fire Curtains

Most codes and ordinances dealing with the subject of stage and audience separation for purposes of fire control were written during a period when the proscenium frame theatre was in the ascendancy. Scenery for the proscenium theatre is generally associated with the perimeter of the acting area, and, subsequently, is considerable in size, a great deal being attached to the theatre itself through rigging. Actually the proscenium stagehouse is a combination warehouse and performance area, with its high rise stage tower and sheltered wings.

As staging concepts move from the linear to the polar, from backdrops and flat, rigged settings to multi-dimensional set pieces and projected backgrounds, many codes reflect this change by distinguishing between theatres with operating lofts and those without them. Now, as the proscenium frame itself melts away and the audience encircles the playing area to a greater degree, architects seek interpretations to existing codes by having their preliminary plans reviewed by the authorities responsible for public safety.

Since national, state and local codes are involved either simultaneously or in part, it would be imprudent to lay out guidelines for future projects based on specific experiences in the past. The reader may rest assured that all the theatres in Bulletin 109 were cleared by the required authorities in each case.

Some of the essential points which should be emphasized are the lack of storage areas within the theatre chamber, the extremely compact nature of open stage scenery, the proper security of shop and other service areas from the chamber and the effectiveness of sprinkler systems under low rise building conditions.

Floors and the Open Stage

Both the positioning of the actor and his scenery in the architectural space of the theatre *and* the steeply pitched audience resulting from a considerable degree of encirclement bring the stage floor into play as a vital part of the background. Consequently, a surface of some beauty and permanence is required.

The proximity of the audience demands a density of structure for quietness. The surface should be mat in finish to prevent the reflection of directional illumination onto the panorama or arcade panels. The proscenium solution of a canvas floor covering cannot be adapted to the open stage, for the cloth itself needs to be framed by masking elements not found here, such as the footlight cut, wing pieces and the settings themselves.

One of the requirements of open stage scenery is that it be designed to be inherently self-supporting. The application of an accessory system of support such as the stage brace and screw familiar in proscenium technique would be most limited in view of the broadened audience perspective, especially on peninsular platforms where set pieces are surrounded by space.

Therefore a dark-stained hardwood such as maple or a heavy linoleum such as Armstrong 1/4" heavy gauge (brown or black), are found on the stage floors of the majority of theatres shown in this bulletin. Sub-flooring in turn should rest upon sleepers mounted upon concrete via spring clips or mastic pads. It is important that traps, where used, are sufficiently solid in construction to present the same appearance and sound reflection as the floor surrounding them. Dual trap closures are required for sound isolation where areas below the stage are used for other activities.

Acoustical Design For the Open Stage

By RUSSELL JOHNSON
Bolt Beranek and Newman Inc.
Consultants in Acoustics

Auditoriums can be categorized into two broad groups:

1. Multi-purpose auditoriums.
2. Specialized auditoriums.

Specialized auditoriums include recital halls, playhouses, cinemas, concert halls, lecture halls, etc.

The *traditional* forms of these specialized types, as realized in completed buildings, usually are peculiarly adapted to the primary activity for which they were intended.

As a natural consequence these buildings do not lend themselves comfortably, functionally or acoustically, to most other types of activity. For example, it is difficult to stage operas or plays using conventional stagecraft in a conventional recital hall. Similarly, conventional playhouses usually are acoustically inhospitable to concert activities.

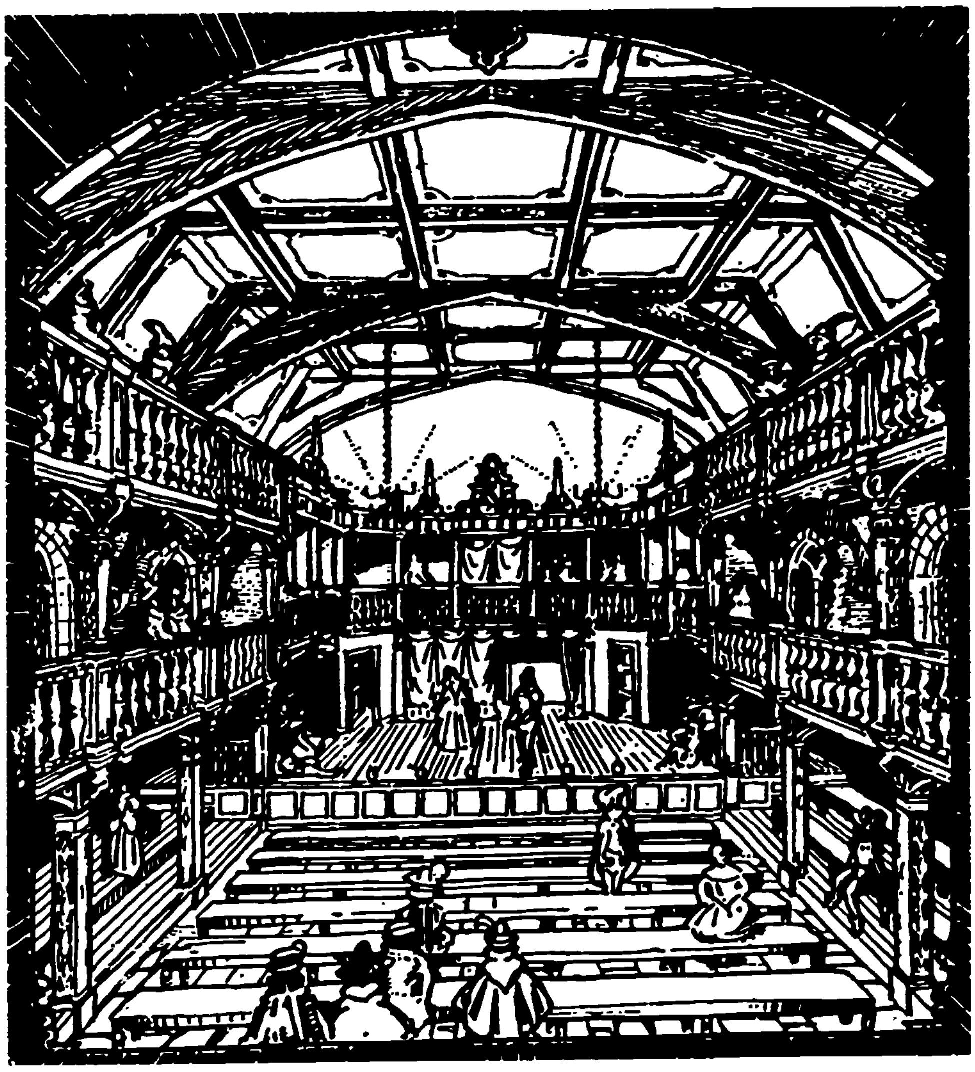

Figure 1. An open stage, the Blackfriars Theatre in London, circa 1590, as reconstructed by G. Topham Forrest. One hundred eighty years later, this basic form was again in use in the Schouwburg in Amsterdam, including the open platform and the triple tiers of audience seating along the sides of the hall.

Evolution of Specialized Halls

The basic forms of contemporary specialized auditoriums have evolved from earlier building types. Opera production and public concerts became a part of the culture of the Western world in the 16th and 17th centuries, and as the institutions of concert music and opera grew, opera houses and concert halls evolved simultaneously, developing from other building types, including churches, refectories, cortiles, courtyards, inn yards, tennis courts; banqueting, reception, and audience halls.

Halls originally used for the occasional production of speech plays and operas, and for the presentation of recitals and concerts, were usually long, narrow, rectangular, high-ceilinged rooms, often with shallow side galleries and a makeshift platform at one end. (Later, the portable platform evolved into a permanent platform.)

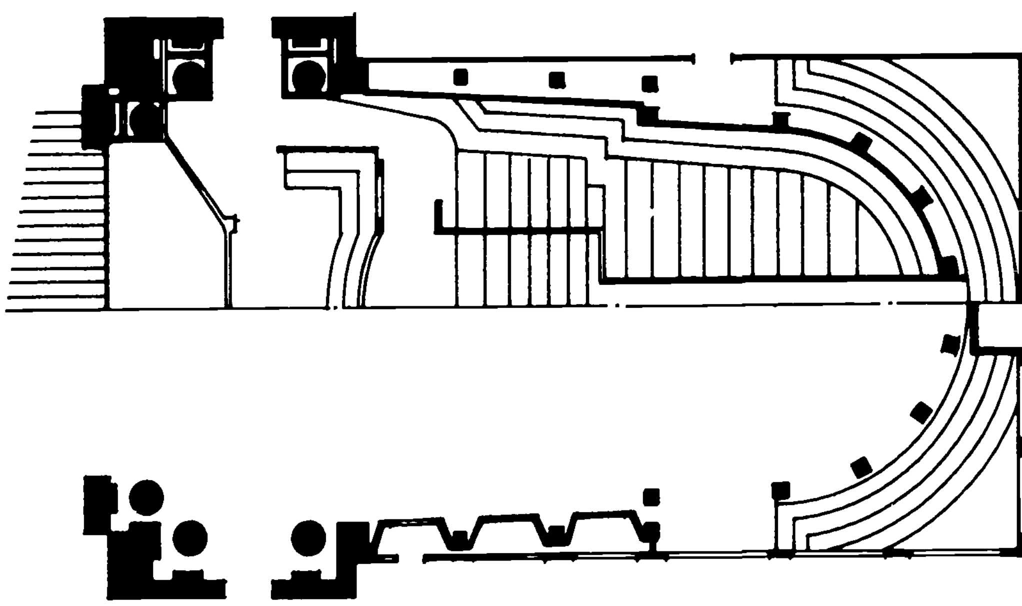

Figure 2. Plan of a theatre designed by Amandi (Paris, 1660). Note the resemblances to Figure 3.

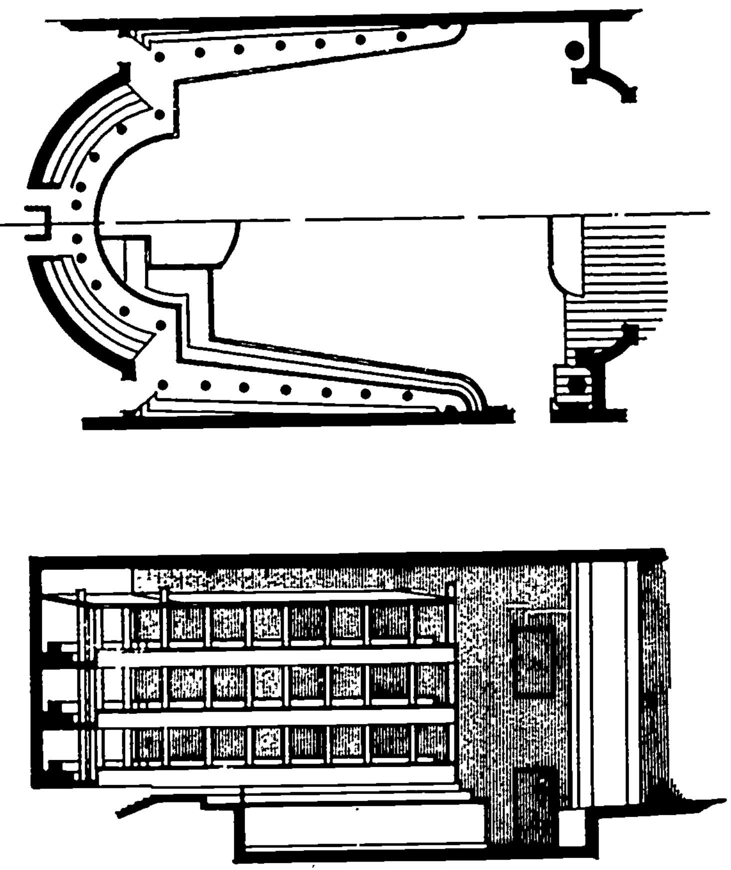

Figure 3. This plan and section, published by Fabricio Carini Motta in 1676, shows close relationships with the theatres of 1630 and 1660 in the Palais-Royal, Paris, and the later Bibiena Markgraflische Opernhaus in Bayreuth (1748), and the Dresden Opernhaus (1719). Structural technology of the time limited the length of the roof trusses, encouraging long narrow rooms such as this. Other influences on plan shape and size were the value of land in the heart of a city, and that available sites were often based on rectangular surveys and plats.

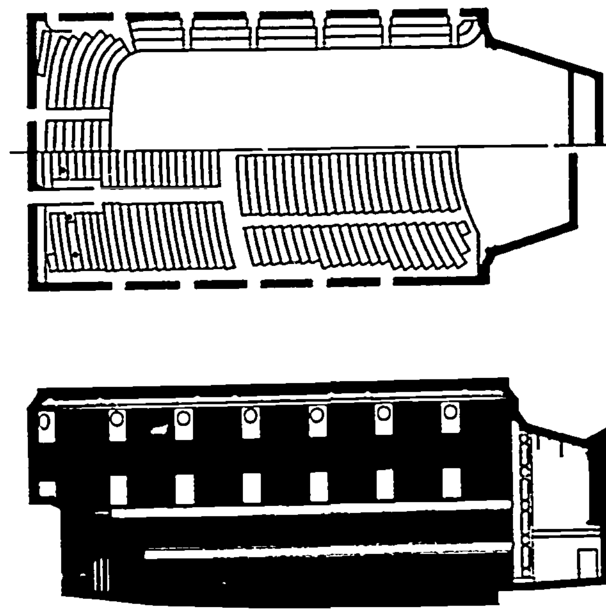

Figure 4. Symphony Hall, Boston, 1900. One of the best known concert rooms in the United States. In its predecessor, the Boston Music Hall, the concert platform was completely open to the room and flanked on the sides by audience seating.

The Rectangular Shape

These halls, of course, had been designed and built for other purposes. Most of them were of rectangular shape because this form was, for reasons of structure, site shape, and habit, the most prevalent for roofed spaces.

Many of these spaces, designed as banquet-halls, or audience halls, and sometimes used for masques, revels, plays, or ballet, had one or two encircling open galleries. These shallow galleries provided space for the largest audience that could be accommodated within the confines of the building.

These 16th and early 17th century halls, both those with demountable stages and those with permanent stage platforms, were all quite small compared with contemporary auditoriums, and the actor, the singer, the instrumental ensemble were in the same "acoustical enclosure" as the audience.

Such concert halls as New York's Carnegie Recital Hall, the Salle Gaveau in Paris, Vienna's Musikvereinssaal, Boston's Symphony Hall, and, also, a hall proposed for one of the major American orchestras clearly exhibit descent from the 16th century prototypes . . . long, narrow high halls with encircling galleries.

The Opera House

However, the opera house (or theatre) developed from the same origins into a "machine" for spectacle. This evolution moved in pace with the vogue of elaborate scenery for court masques and opera. The portable platform at one end of a ballroom was gradually transformed into a cavernous stagehouse which dwarfs the audience chamber in practically all of the "Italian" opera houses on the continent.

This heritage is with us today . . . in opera houses, and in many community and college playhouses and multi-purpose auditoriums . . . in the form of large stagehouses that communicate with the audience chamber through a proscenium opening.

In auditorium buildings of the "opera house" or multi-purpose type, which must house both the paraphernalia of "picture frame" theatrical illusion *and* the performance of concert music and recitals, it is essential to be able to transform the stagehouse into at least a rudimentary form of the "sending end" of the pure concert hall.

The Concert Shell Solution

This is done by temporarily erecting a "room," or enclosure, within the stagehouse which walls off the fly loft, the side stages, and their cloth cycloramas, teasers, legs, and traveller curtains.

At Detroit's Ford Auditorium and in the new Clowes Memorial Hall in Indianapolis, this concert shell is flown. In Northrop Auditorium, the Minneapolis Symphony uses a steel shell which folds into a space at the upstage wall of the stagehouse.

The enclosure proposed for a new auditorium in Michigan incorporates large castered towers to handle the walls, and only the ceiling is flown. In La Grande Salle in Montreal, the walls of the concert shell telescope into the stage floor. Another project in the planning stage includes a full shell on casters, complete with orchestra risers, chairs, music stands, and lighting, to ease the scheduling problem of interleaved symphony, opera, ballet, and other theatrical rehearsals and performances.

These conversion procedures, and variations of them, are used in many multi-purpose halls and will continue to be; for the goal of most building committees is to design and build multiple-purpose auditoriums that will satisfactorily house a full range of performances, from play productions through concerts and convocations.

However, many colleges and universities do not use the concert shells they own because of the labor costs involved in erecting and striking them. In fact, there are many multi-purpose auditoriums that operate without the acoustical advantages of a demountable concert-recital enclosure.

In particular, many high school and university auditoriums suffer acoustically because no concert shell is available; or because the rigging of their shell requires too many man-hours, or because they own a poorly designed shell.

The Open Stage Solution

Low or moderate budget operations such as these can derive considerable benefit from the use of a stage that is simultaneously a concert shell and an acting area ready to accommodate a practical system of scenic investiture. The open stage is such a stage. It eliminates the need for a cumbersome, demountable music shell, and at the same time avoids the other acoustical problems inherent in the proscenium theatre.

The teasers, borders, cloth cycloramas, and other paraphernalia of the proscenium theatre absorb sound . . . particularly detrimental to music performance. This acoustical problem is compounded by the proscenium wall with its relatively small proscenium opening. This wall has a tendency to contain the sound in the stagehouse, and gives the sound-absorbing materials in the stagehouse more opportunity to "kill" the sound of the music, producing the effect usually referred to as "dry" acoustics.

The open stage, however, avoids the acoustical problems of the proscenium stage . . . the acres of sound-absorbing material, the difficult-to-handle music shell, the obstruction of the proscenium wall, and the loss of sound energy in the cubage of the stagehouse.

The basic concept of the open stage, as described in this bulletin, grew from the economic need in this country for less expensive methods of mounting theatrical productions. The open stage, in returning to simpler procedures of theatrical productions has returned to an earlier, but still valid form which is simultaneously an auditorium for the presentation of plays as well as concert music, without the need for a demountable music shell.

It should be noted that a building owner planning an auditorium which must house touring shows with a full investiture of conventional scenery must plan for both a conventional stagehouse and a demountable concert shell.

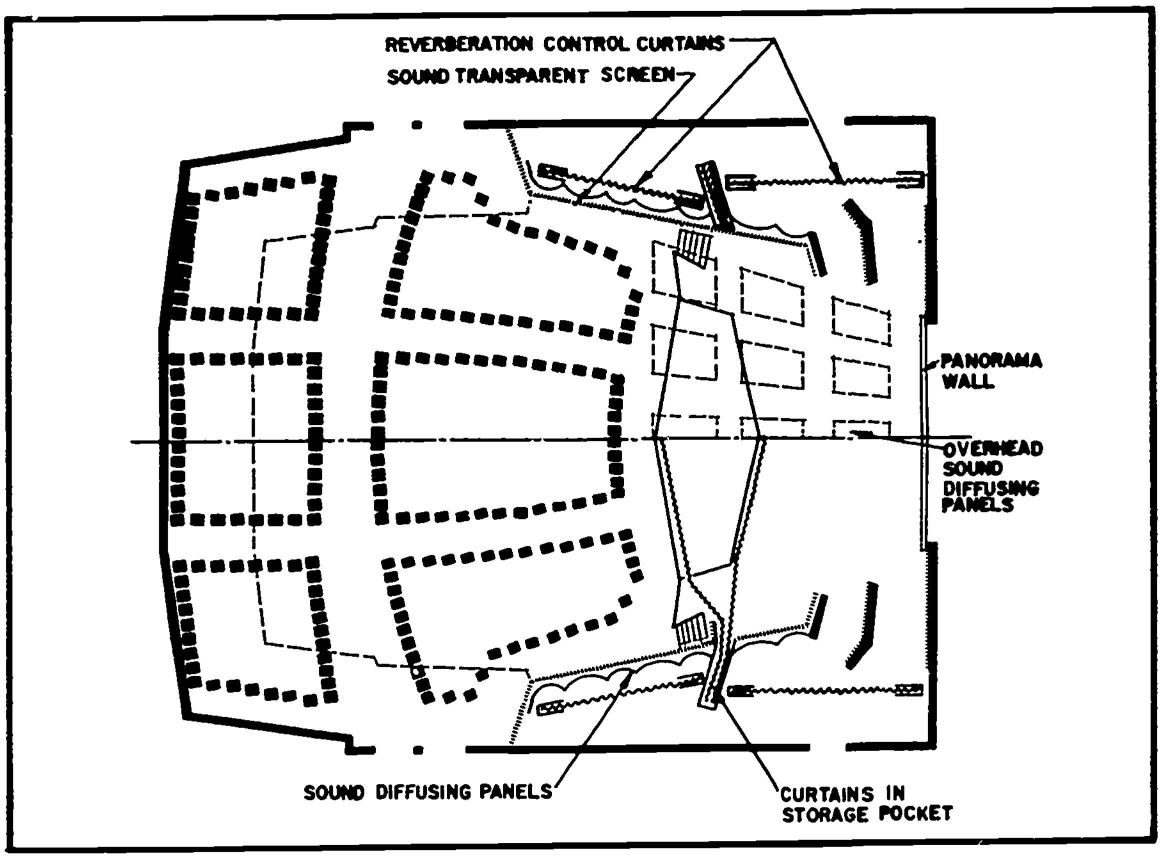

Figure 5. Plan of a multi-purpose, open-stage auditorium for a hypothetical campus showing partial height sound-diffusing panels.

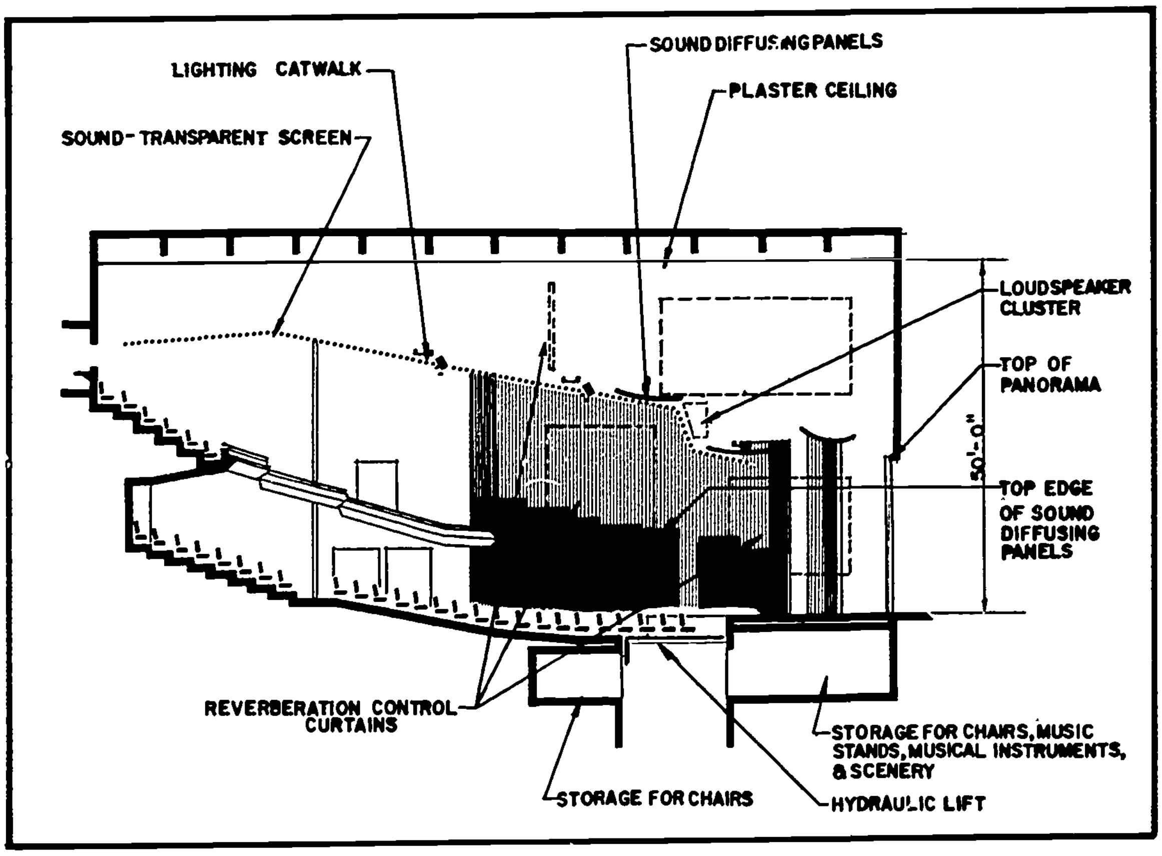

Figure 6. Longitudinal section showing cubage above visual ceiling used to develop reverberation for concert use.

An Open Stage Prototype

Figures 5 and 6 show some typical aspects of the acoustical design of an open stage, multi-purpose auditorium. The schedule of activities includes pageants, convocations, drama, band concerts, choral concerts, recitals, chamber music, lyric theatre, film exhibition, revues, infrequent symphony concerts, and opera (modestly mounted).

This design was developed from the basic dimensions of the stage platform, which incorporates a large hydraulic lift. The lift services a complex of large storage rooms below the stage and below the audience area.

The platform, when the lift is positioned at stage level, is approximately 37 feet deep, and is about 44 feet wide upstage and 55 feet wide downstage.

These dimensions can accommodate a large symphony orchestra accompanied by a sizeable choral group. With the lift lowered for additional audience seating, or to serve as an orchestra pit, the size of the platform remaining is about 22 feet deep by 44 feet wide.

Given these platform dimensions, note the narrow front portion of the audience chamber. The average width does not exceed 62 feet. This promotes clarity for music and intelligibility for speech. Beyond the eighth or tenth permanent row of audience seating, the house widens considerably.

The polycylindrical sound-diffusing surfaces along the front side walls, which vary in height from 10 to 18 feet, are concealed by a sound-transparent screen. This screen might be constructed of small, widely-spaced wood strips; or of perforated or expanded metal (approximately 60% open), or open-weave plastic cloth such as Lumite.

Design of the Ceiling . . .

The visual ceiling is constructed in a similar manner. The purpose of the cubage above this lower, visual ceiling is to develop sufficient reverberation for music activities. Note that the upper ceiling is approximately fifty feet above the level of the stage platform. (A rough rule of thumb is to provide 40 to 44 cubic feet

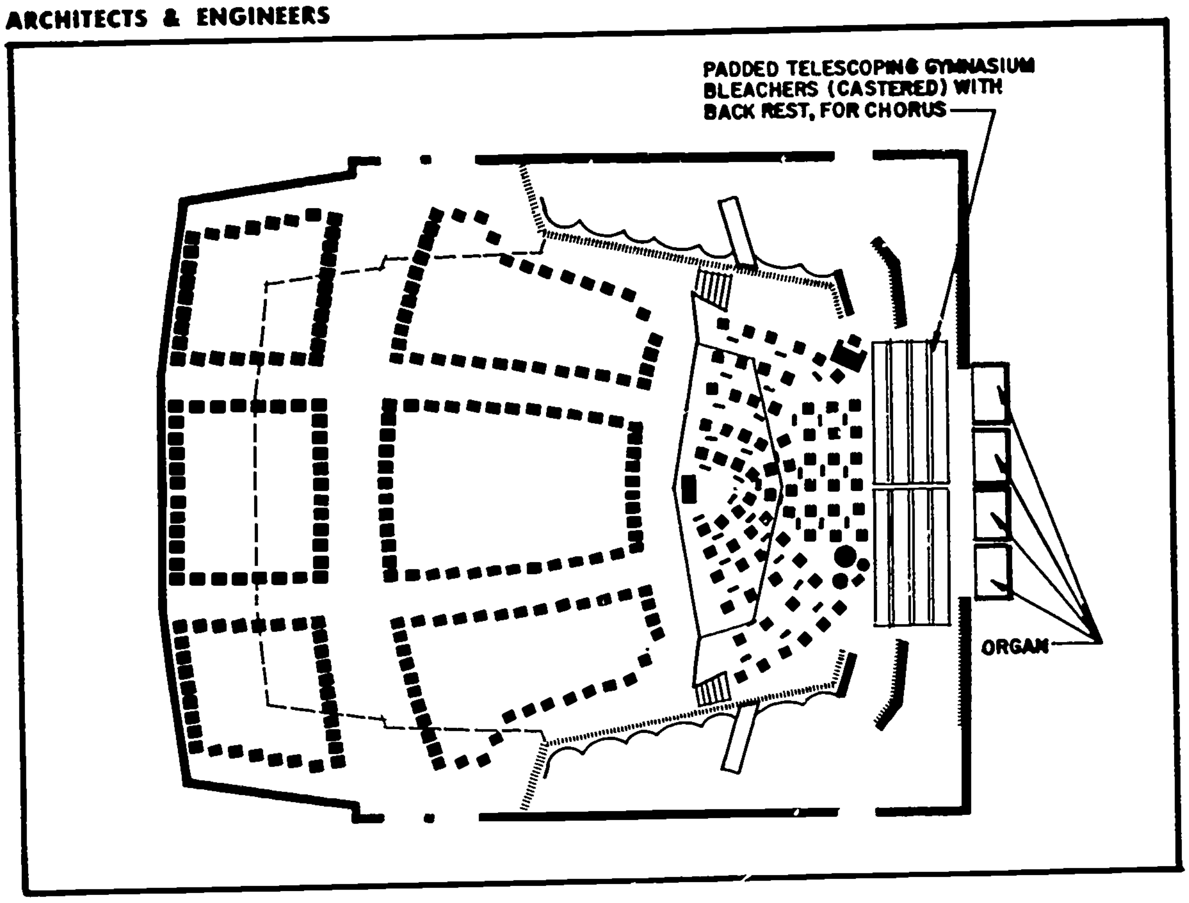

Figure 7. Stage set up for large orchestra with chorus and organ.

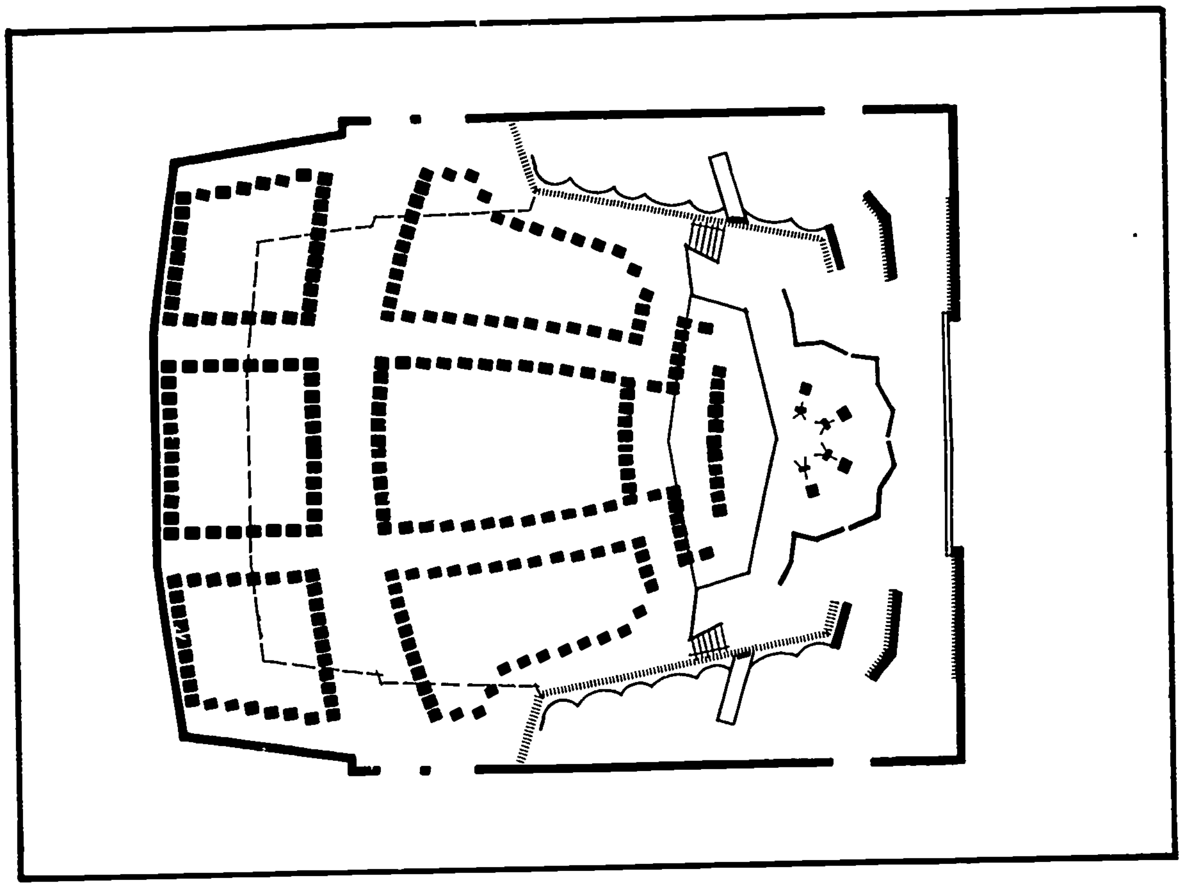

Figure 8. Use of folding hardboard screens to form an acoustical shell for small instrumental ensembles. Forestage lift used for extra audience seating.

or room volume for each square foot of balcony floor, main floor, and stage platform.

The height of the lower, visual ceiling can be established only after considering all aspects of the problem . . . the esthetic scale of the space, acoustical requirements, needs for concealing the loudspeaker cluster and theatrical lighting, and positioning of the projection machine for the panorama wall. If a large symphony orchestra is to be accommodated, the height of the ceiling just below the loudspeaker cluster should be at least 22 feet.

Concealed just above the sound-transparent ceiling, in the front of the room, are sound-diffusing acoustical reflectors. These should have curvature in two planes, and for this reason should probably be made of plaster or plastic. The solution suggested here consists of three rows of these double-curved sound reflectors, five panels in each row.

. . . And the Curtains

Three-layer cloth curtains on traveller tracks, which can be retracted into dry-wall storage pockets, should be provided for adjustment of the reverberation time for various types of stage activities.

Part of these curtains should be located in the open lofts above the tops of the polycylindrical panels, and the rest in the space above the sound-transparent ceiling.

Generally speaking, lengthy reverberation is hospitable for choral concerts, chamber orchestra, violin, cello, or voice recitals, organ, symphony, and opera. The reverberation should be reduced by drawing the acoustical-adjustment curtains out of their dry-wall houses for convocations, film exhibition, plays, musical comedies, revues, band concerts, pageants, dance bands, jazz combos, etc.

Other Features

There is not sufficient space available here to discuss all aspects of the design of this prototype. Note, however, the steep ramp of the main floor. The steeper this slope the better, both for sight lines and for hearing.

Balcony cantilevers should be limited to three or four rows of overhang. The sightlines into the offstage space are arranged for masking "back-stage" areas from the corner seats. The sound-transparent screen can be used on the upstage masking walls partly to camouflage the four entryways.

Small chamber ensembles, string quartets and recitalists should use portable, vertical sound reflectors. Folding screens can be used for this purpose. The core of each leaf should be 1/8 inch hard fiberboard. Burlap (for visual texture) may be glued directly to the face of the hardboard. These screens should be 10 feet high. Enough of them should be provided to surround an area of approximately 14 feet by 26 feet as illustrated in Figure 8.

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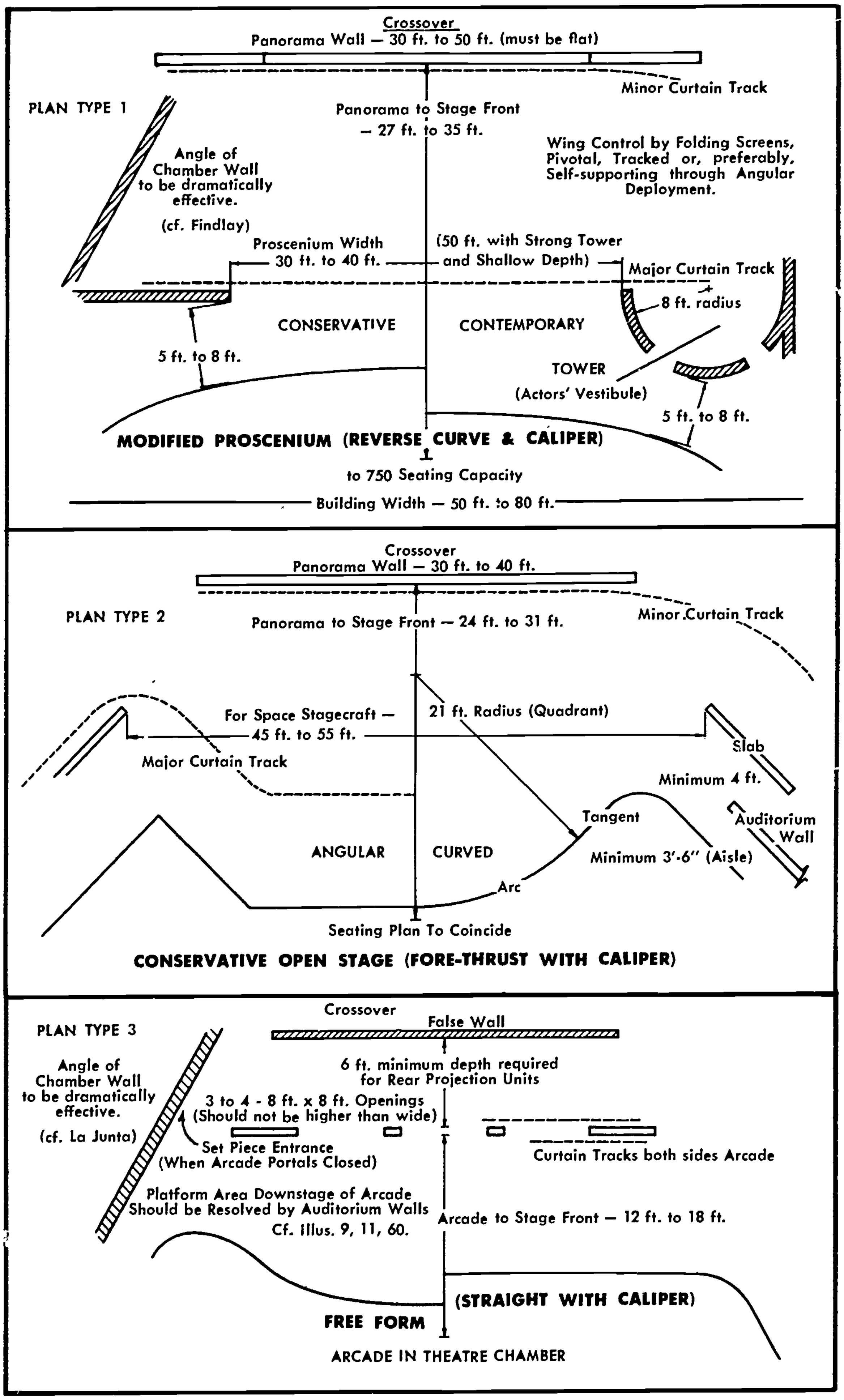
Architectural and Engineering Layout Factors



Both the architect and the engineer are vitally involved in every aspect of the open stage theatre chamber, and both must be fully aware of the principles of dramatic production to be used.

In the immediate past, the stagecraft of a theatre was largely contained in a stagehouse separate from the auditorium and the majority of this stagecraft consisted of floating equipment which could be jobbed into a relatively simple building volume.

The size of the proscenium frame determined scenic and sightline requirements, and the production elements to be serviced were determined in many cases by a commercial shuttle system, the road show. Essential was standardization of shape, equipment and stagecraft.

Open Stage Standards Differ

The open stage has developed no standards equivalent to the above partly because its development has been associated either with individual festival programs or with smaller (300 to 500) capacity theatres removed from commercial pressures, and partly because of the nature of its stagecraft: floor-based "island" compacts arranged on a free-form platform space.

Indeed, freedom to diversify in architectural design may well be a characteristic of the open stage and one of its main attractions.

In order to demonstrate the degree of involvement of the architect and engineer, the balance of this section will be used to analyze a typical theatre project ... from programming to stage operation.

Phase One

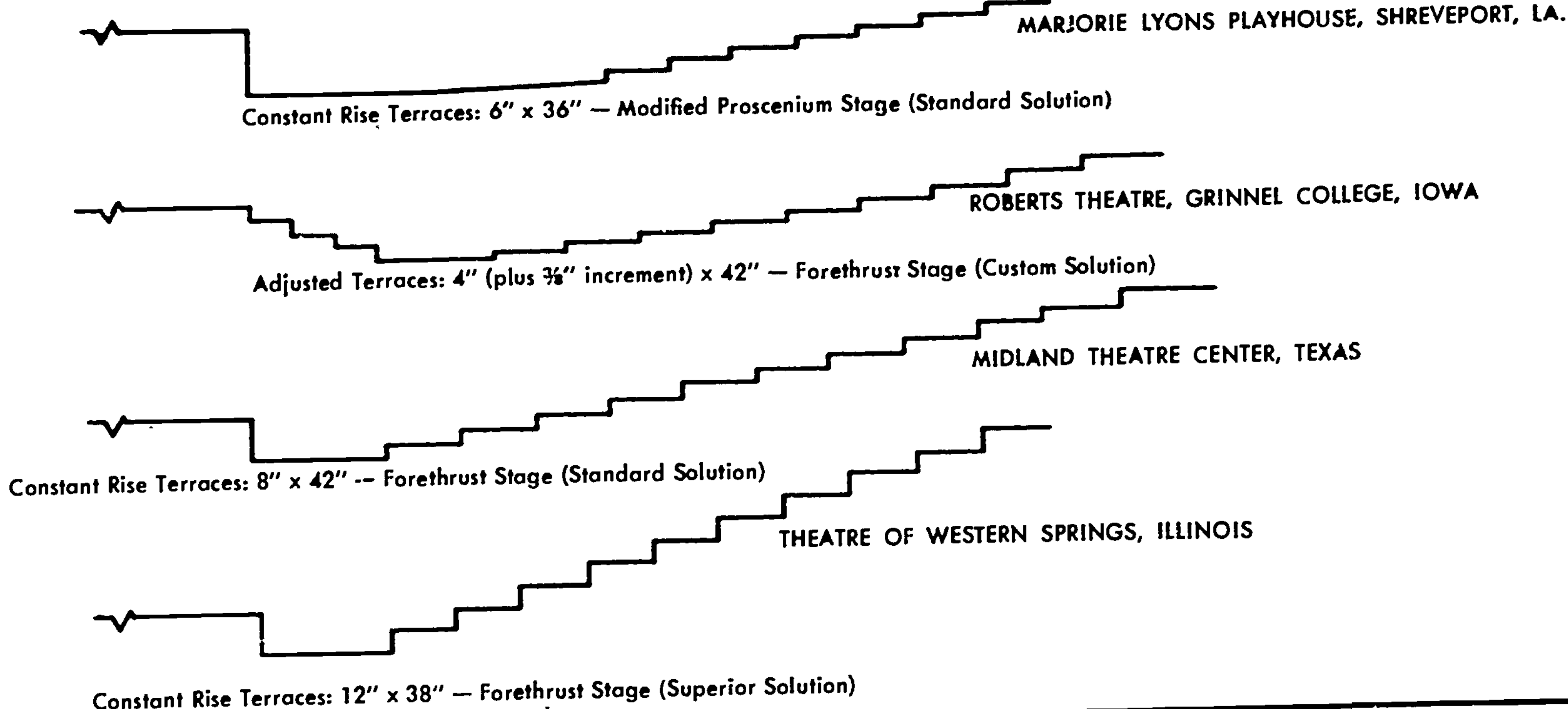
The client decides on open stage as the design approach to his future theatre and works with a theatre consultant concerning his program, the philosophy of production, and stagecraft requirements.

When the audience capacity and the nature of the stage space have been determined, the architect then proposes the building envelope. In open stage design, the architectural aspects of the envelope or theatre chamber are extremely important, for the same structural elements which form a weather shelter may also be part of the dramatic experience as architectural decor which surrounds actor and audience alike. *Furthermore, the engineering is inserted into the custom design of structure and decor rather than applied to it.*

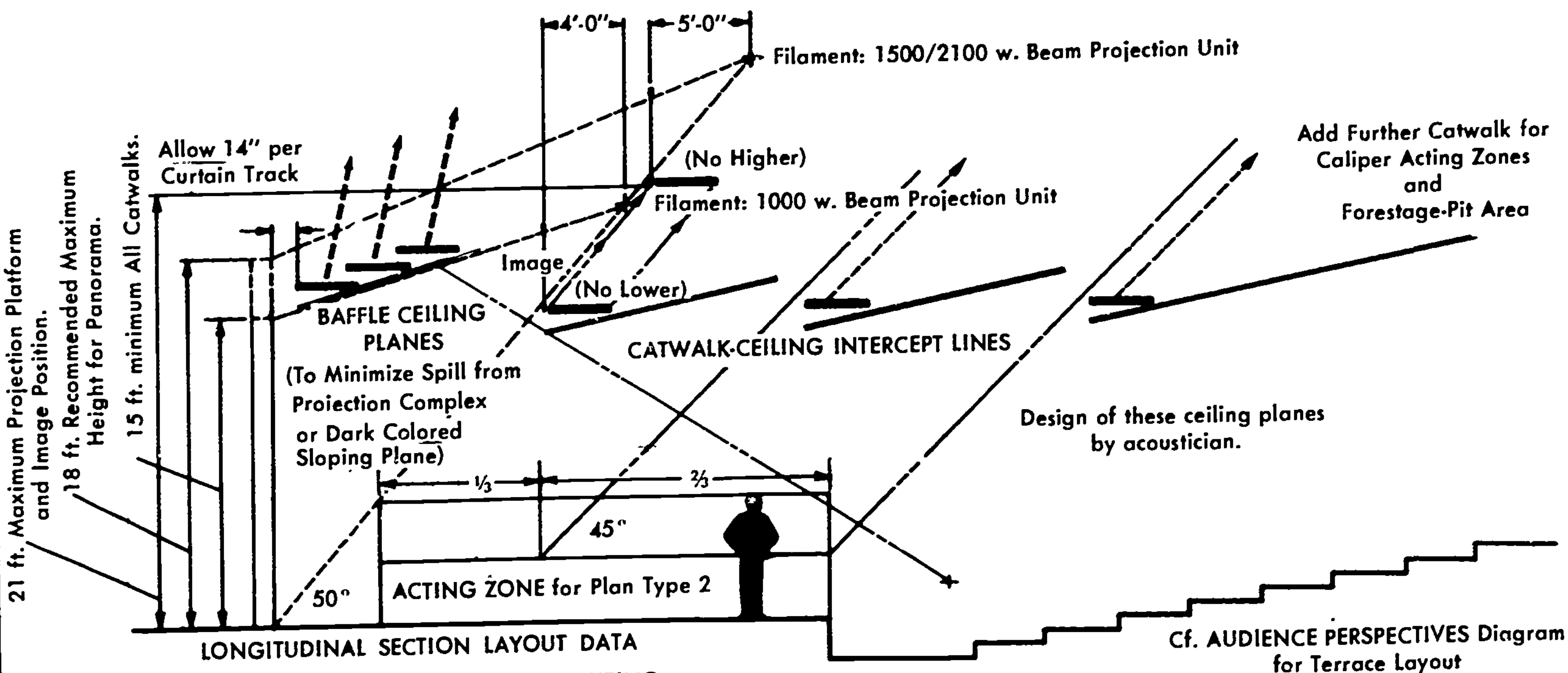
Both the artistic and practical success of open staging depends on how well expressed is the idea of a chamber common to actor and audience, for by this the

AUDIENCE PERSPECTIVES

(Taken from Theatres Known for Good Sightlines)



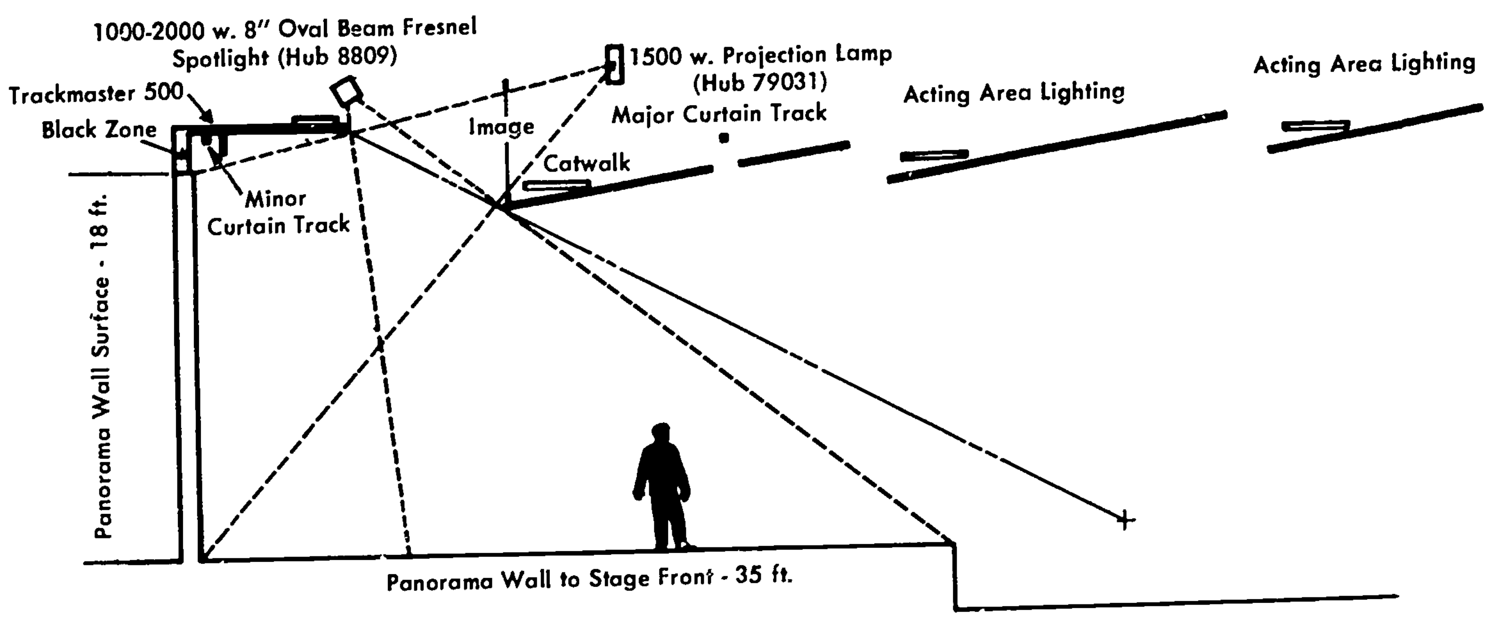
CEILING PLANE DETERMINANTS



Depending on Project Conditions Introduce BACKLIGHTING,
Read All Material on LIGHTING and PROJECTION, incl. DATA,
Eliminate Overhead Projection Where Using ARCADE, Plan Type 3.

DEVELOPMENT OF BACKLIGHTING POSITION

Cf. ARCHITECTURAL LAYOUT Plan Type 1, Deep Stage.
Cf. BACKGROUND PROJECTION Section.



director can select playing areas from the general platform space, yet the areas unused will appear natural to the chamber rather than vacant.

The devices by which this is achieved include:

A. Extension of audience area wall surfaces about the playing area.

B. Extension of the stage platform into the audience area.

C. Extension of the audience ceiling canopy over the playing area.

D. Completion of the envelope by the plaster panorama wall at the platform rear.

E. Use of a dual lighting system: the dramatic illumination; and downlighting of a uniform quality throughout, the audience and several platform areas being under selective control.

Examples of these devices can be noted in the six typical plans preceding this section, and it is by the use of these same features that the general programs of lecture, forum and concert are enhanced.

In this section are illustrated three plan types, audience slopes, and ceiling determinants. Various combinations of these are possible. However several considerations should be kept in mind:

1. The wider and more embracing the seating arc, the shallower will be the stage, for the panorama wall must be visible to all spectators and acting in depth in this case would appear unnatural.

2. The panorama wall should appear as a slab in space, quite unlike the conventional cyclorama which attempts a surround of the entire playing area. Frequently the space above the panorama is painted a dark color.

3. The further the stage thrusts forward into the audience, the steeper must be the seating terraces.

4. The ceiling may be as free form (floating clouds) or as closed (double-plated, with lighting slots) as is consistent with the architectural and acoustical design, with the exception that the background projection, operation must be screened from the view of the audience.

5. Since the insertion of an orchestra pit into the theatre (a) separates the audience from the playing area or (b) takes valuable space from the playing area, pits require skillful design.

6. From an audience point of view, compactness in a theatre is a virtue. The sense of enjoyment is heightened by the knowledge of popular attendance and every effort must be made to emphasize audience presence.

In the open stage theatre with its continuation of the auditorium chamber into and about the stage platform, a sense of compactness must be everywhere. The cavernous vacancy of the proscenium stage is absent.

It must also be remembered that each theatre will have its own stagecraft system so that the size of the service areas will be determined by the nature and scale of the theatre chamber and the demands of the particular program.

Phase Two

Prior to the preparation of the final plans, the architect, engineer, and theatre consultant should meet and review the operation of the theatre in detail.

From this discussion the composition, textures, and colors important to the theatre operation are learned, as well as locations for equipment, requirements for mounting, and wiring diagrams pertinent to stage lighting and communication.

In many cases it is impossible to separate architectural and engineering functions. A typical list of design specifications follow:

a. Platform floor — maple, stained Antique Brown, with lusterless finish (Brown or black Armstrong 1/8″ linoleum is also recommended). In open staging, the floor forms an important part of the background; also, a dull surface prevents low angle illumination from reflecting upon the panorama.

b. Panorama wall—sand-floated plaster, applied with straight strokes, tinted or spray-painted a light gray-blue.

c. Auditorium walls—warm in tone, sand or darker, especially where they pass onto the platform area.

d. Overall ceiling — dark gray; suspended panels (where used), slate gray.

e. Walls — to be kept clean, no exposed conduit, etc. especially about the platform area, as walls may form the visible outer envelope to the playing space, with low screens forming temporary sheltered areas.

f. Curtains—one or two "walk-along" I-beam tracks, just forward of the rear wall, to form a partial or complete panorama cover (frequently these curtains mask shop doors): medial and front curtains on traverse tracks optional (free form serpentine track for these curtains possible but not recommended). (Folding screen-sets replace side curtains).

g. Orchestra pit—allow 12 square feet per player, adding 50 feet for tympani. For safety hydraulic or screw lifts must include the total pit area; whereas a permanent pit may be undercut below the stage to one-third its width.

h. Playing area — bear in mind that an area 25 by 35 feet will be adequate for a forward thrust stage and that an open end stage is sufficiently wide at 55 feet.

i. Illumination — by two distinct types:

1. *General lighting* for both the seating and stage areas is by architectural shadow-baffled downlights: from 15 to 30 foot-candles over the seats and from 30 to 60 foot-candles over the stage, with seating, forestage, and stage areas controlled independently by motor-driven dimmers located in either the stage control switchboard or in a separate cabinet, these dimmers being operated from several remote control stations.

2. *Dramatic lighting* is by spotlights, floods and the shadow projection system operated through dimmers (autotransformer, magnetic amplifier, or semi-conductor types, in order of expense) via an inter-connecting (cross-connection) panel. *Every stage branch circuit must have two wires* (no common neutral wire). Light control should be at the rear of the auditorium in full view of the stage.

The subject of artistic control of lighting is discussed in the DRAMATICS Section. The stage lighting schedules, a ceiling plan wiring diagram, descriptions of control boards, as well as equipment photographs will be found in the LIGHTING AND LIGHTING CONTROL Section. The lighting schedules cover the six previously mentioned plans.

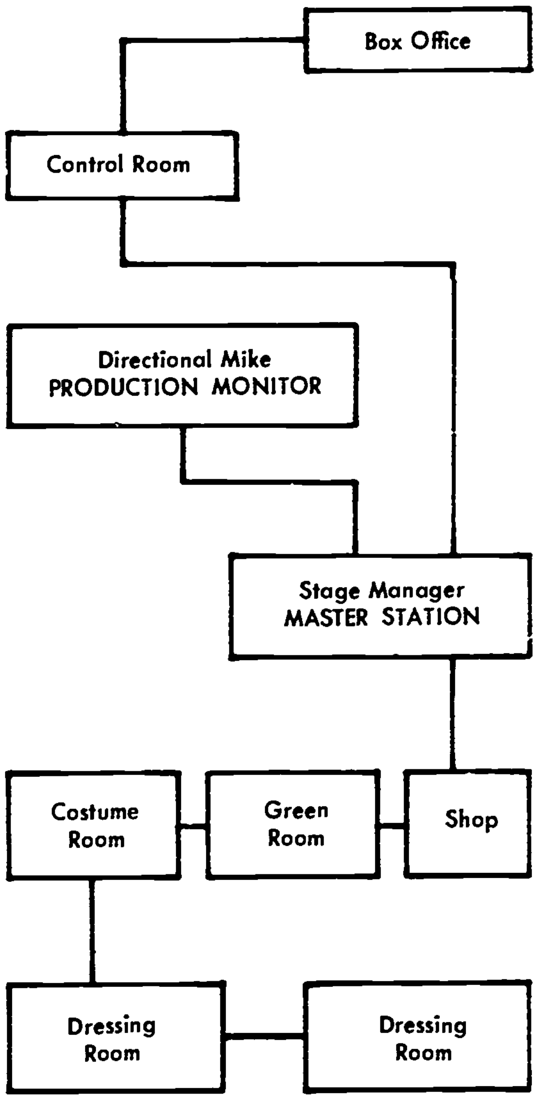
j. Passage of dramatic light — probably the most sensitive area of the ceiling design, for the free passage of light through structural and architectural elements is not comprehended by simple sectional drawings but should be studied from full-scale mock-ups of catwalks and ceiling slots using all instrument types.

k. Signal and intercommunication — see charts in this section.

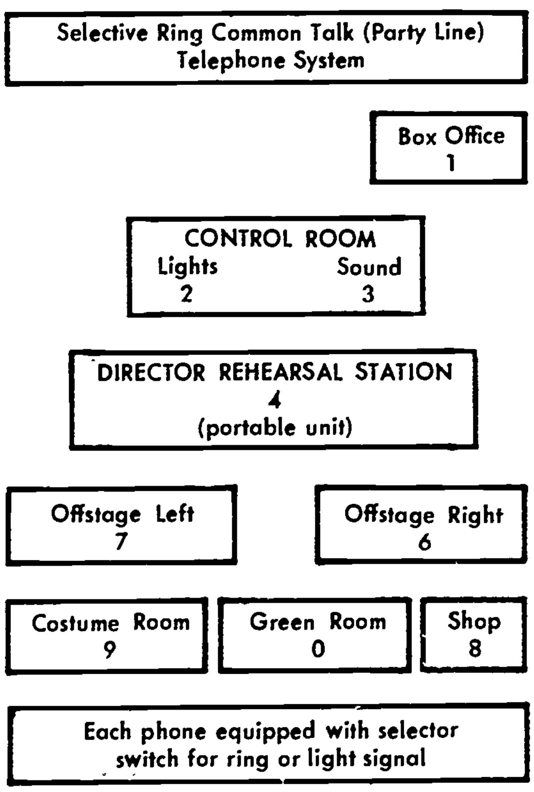
l. Catwalks — the development of an efficient catwalk system, with spot-welded expanded metal tread or subway grating for quietness, and ship's ladders or spiral stairs to facilitate movement with equipment in hand.

m. Custom items—the consultant designates responsibility for design, procurement of materials, and/or manufacture of essential items not commercially available, such as the folding screens for side masking and entrance control, projection image supplies, etc.

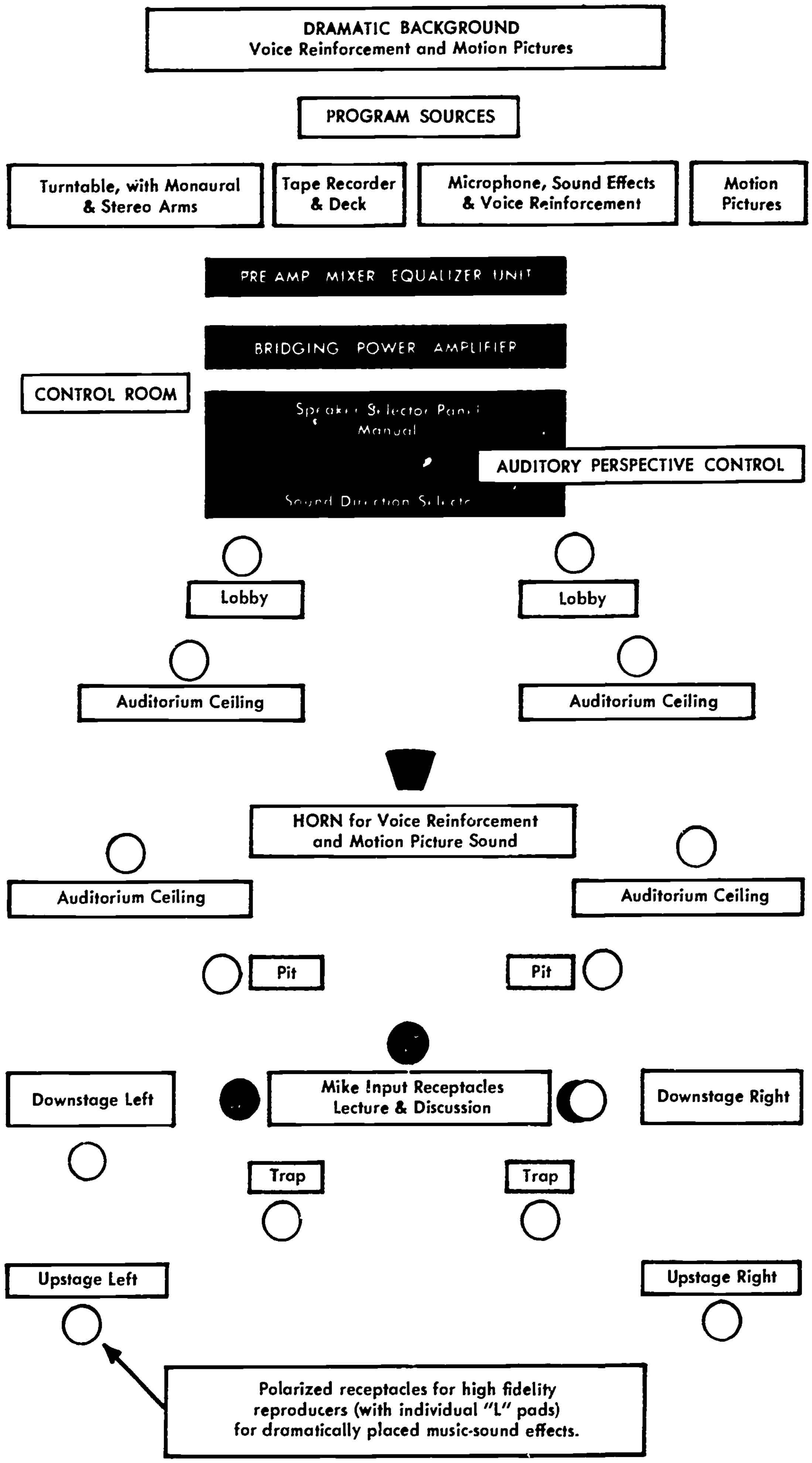
STAGE MONITOR
with Talk-back Switches



INTERCOMMUNICATION



SOUND



n. Miscellaneous—in addition to the electrical requirements for dramatic and general lighting, a theatrical operation places certain demands upon routine wiring of the building, such as special equipment receptacles as shown in accompanying chart.

o. If a compressed air system is included in the building, furnish an 85 PSI outlet to the dramatics workshop for tackers and nailers.

Phase Three

During this phase the building is constructed and equipped. The client assumes the plans and the building will be alike, the architect and engineers rarely have the proper funds for adequate supervision, and the consultant can only wait and wonder.

What are the things which go wrong most frequently?

I. Appearance of electrical conduits across clear mounting spaces for portable equipment. Excuse: electrician worked by a schematic diagram only.

II. Appearance of electrical receptacles and junction boxes on wall designed to be clean, such as the side walls in the platform area of hexagonal chambers and along the base of the panorama wall, except where noted. Excuses: assumption of conventional stagehouse situation, lack of coordination between mason and electrician, floor poured before all conduits were laid down.

III. Improper levels on free-hanging downlights between panorama wall and the projection system; improper space allowance for same in respect to curtain movement; poorly planned air-ducts, interfering with catwalks, curtain installations, etc.; failure to analyze the operation of the projection system, resulting in obstructions and improper mounting provisions.

IV. Careless mistakes such as wrong lamps or a lack of lamps for lighting instruments, misplaced receptacles, incorrect floor finish, improper illumination levels, and intolerable noise levels from machinery and ventilation equipment.

"Floating" Equipment Problems

In addition to the above, there is the matter of equipment bids, a most sensitive area, for there are the specified equipment, the "or equal" and "alternate" equipment, and the contractors' services, frequently so intertwined that it is nearly impossible to sort the elements and evaluate them separately.

Then there is the problem of reducing to purely verbal descriptions the performance value of a lighting instrument or track or dependability of a control board, as well as the different values of guarantees from manufacturers.

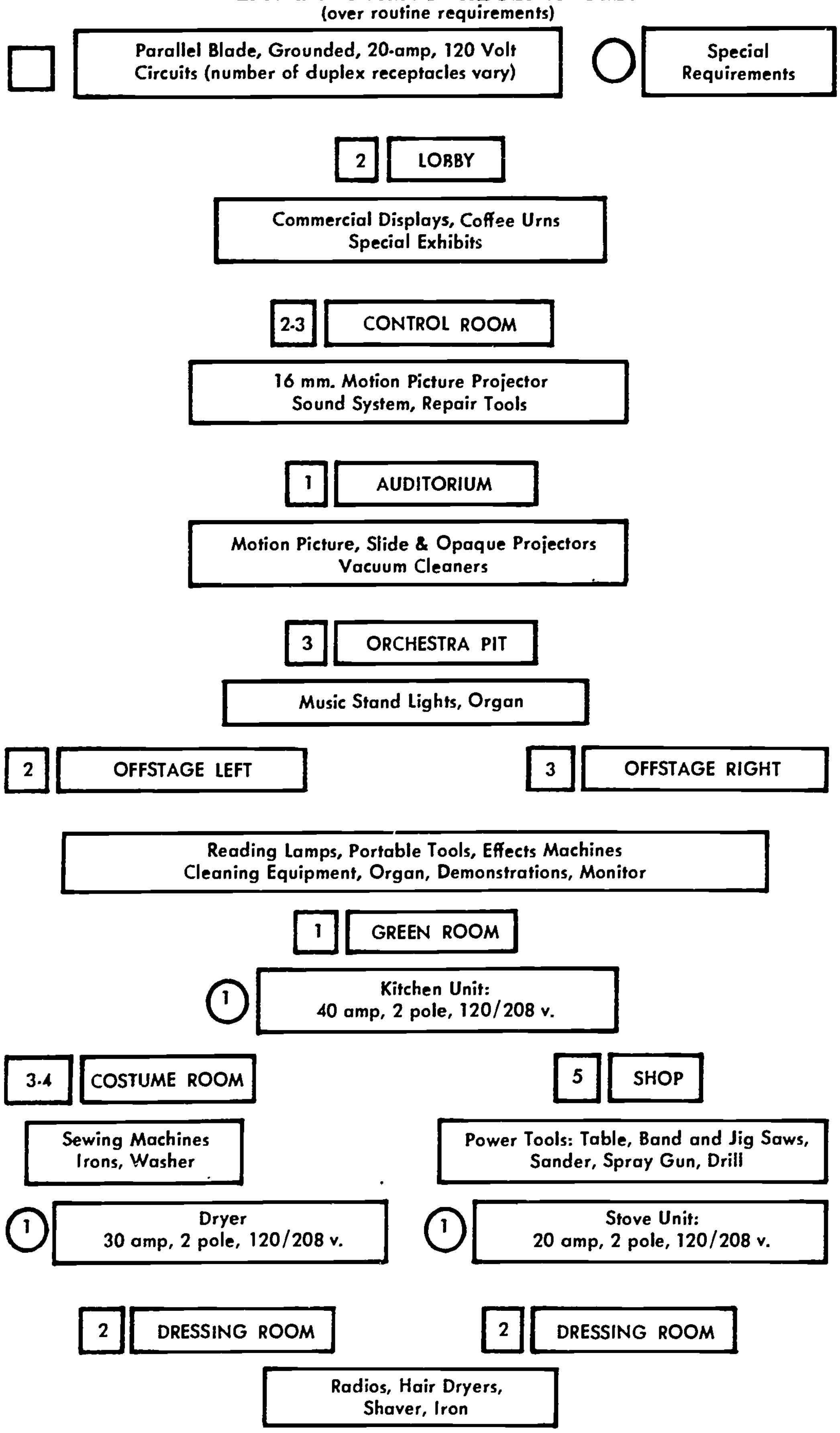
Frequently, to bring a building down in cost, the architect and client will cancel all "floating" equipment, such as curtains, tracks and spotlights, items that are not "nailed down", unlike control boards and wiring devices. This encourages supply companies not in the original bidding to approach the client directly.

Often, representatives of such companies do not understand the operating concepts and attempt to sell equipment that is superfluous and even detrimental to the theatre. Lamentably, such a sales approach is often a combination of arrogance and ignorance masked in the disguise of "the old pro", and the client's confidence in his project may be undermined.

Other items which have proven troublesome in the area of "floating" equipment include substandard or misapplied serpentine traverse tracks, inadequately supported I-beam tracks, and poor light fields from spotlights due to faulty reflector and lens design.

Thus it can be seen that full awareness, by the architect and engineer, of the dramatic principles associated with the open stage theatre is important to design and construction of such a theatre.

EXTRA UTILITY RECEPTACLES
(over routine requirements)



Lighting and Lighting Control Equipment

by ALBERT M. KOGA
Chief Lighting Engineer
Hub Electric Co., Inc.

While the general principles of illumination remain the same for any free form or open stage space, the specific lighting layouts will vary by project. As illustration, circuitry, equipment schedules and specifications for lighting control dimmer boards have been prepared for the six architectural layouts previously discussed by Mr. Miller.

Various parts of the stage are interconnected to such a degree that centralized supervision of all installations is required. Engineers at the Hub Electric Co. review all plans submitted to them by their agents and they make the necessary equipment proposals. These field agents are trained also to observe projects during the construction phase in order to prevent errors of judgment on the job site where visualization of the future operation on the part of all workers is obviously beyond normal expectation.

It was in 1957 that Hub became interested in the designs of Mr. Miller and in 1959 I observed his techniques in one of his workshop programs in an open stage theatre. It was immediately apparent that his philosophy of physical production had enabled him to simplify his stage space and equipment, *yet it was equally evident that this simplicity in turn put a heavier burden on the "performance" values of both equipment and the precise shapes and decor of the architectural arrangements.* Subsequently it became necessary to review all of our equipment in relation to these open stage requirements. All equipment in this bulletin has been tested by Mr. Miller in operation in his research laboratory in Shreveport and on many of his projects. Further improvements to our equipment line are constantly being made.

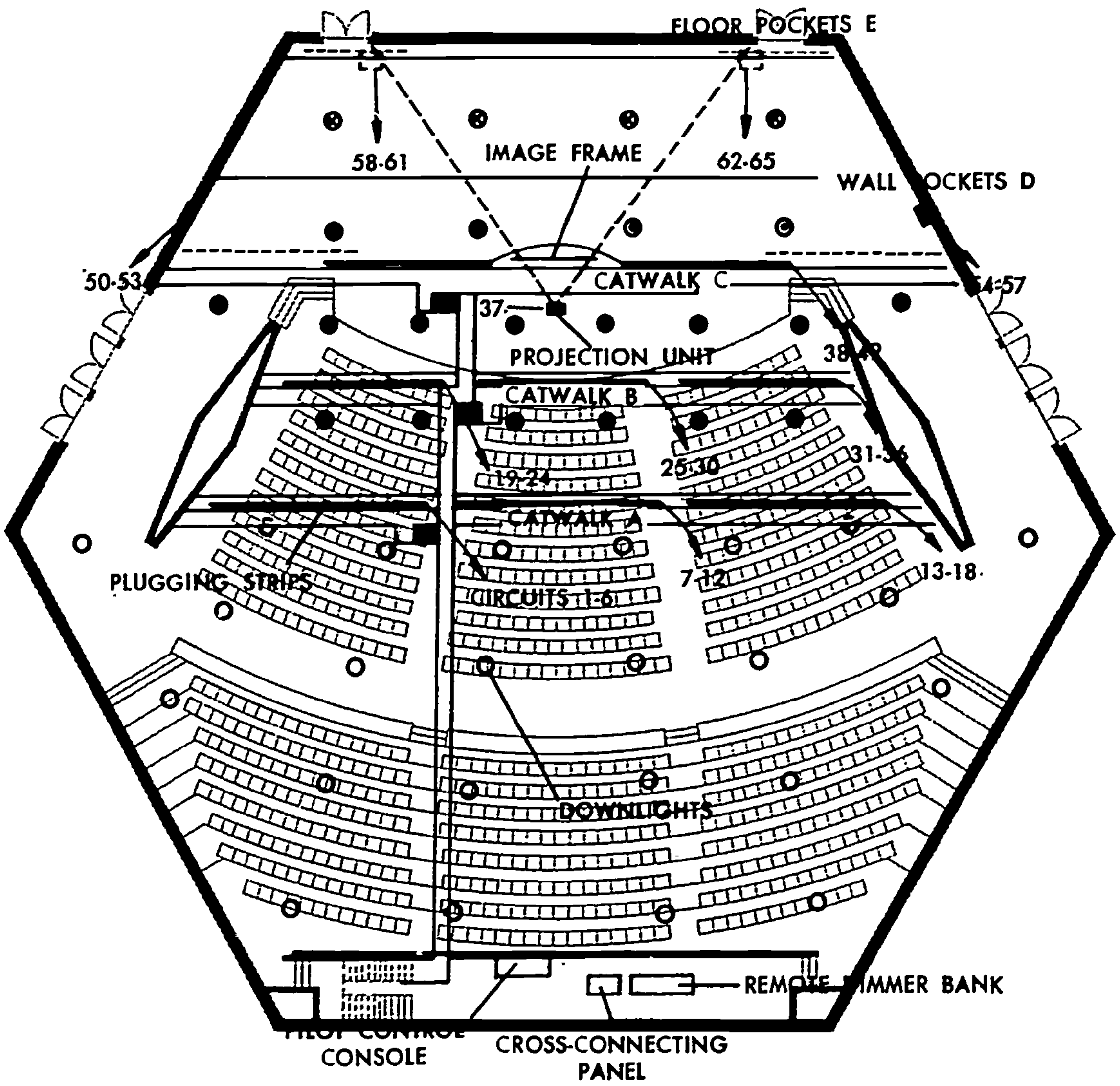
A very desirable by-product of Mr. Miller's *theatre* designs is the achievement of a fine "concert" stage of the platform type with space suitable both visually and acoustically for assembly, ceremonials, musical programs and the like. This has made his stages useful for schools and community centers. Special attention must be paid to the achievement of the proper brilliance of the general lighting — the downlights, concert directional floodlights, and optional wall washes — which comprise the motor driven control system with its remote stations placed at the convenience of personnel not requiring dramatic lighting. Frequently these lights, especially "over the stage," are mistaken for "work lights" only. Actually, these combine both worklight and concert functions.

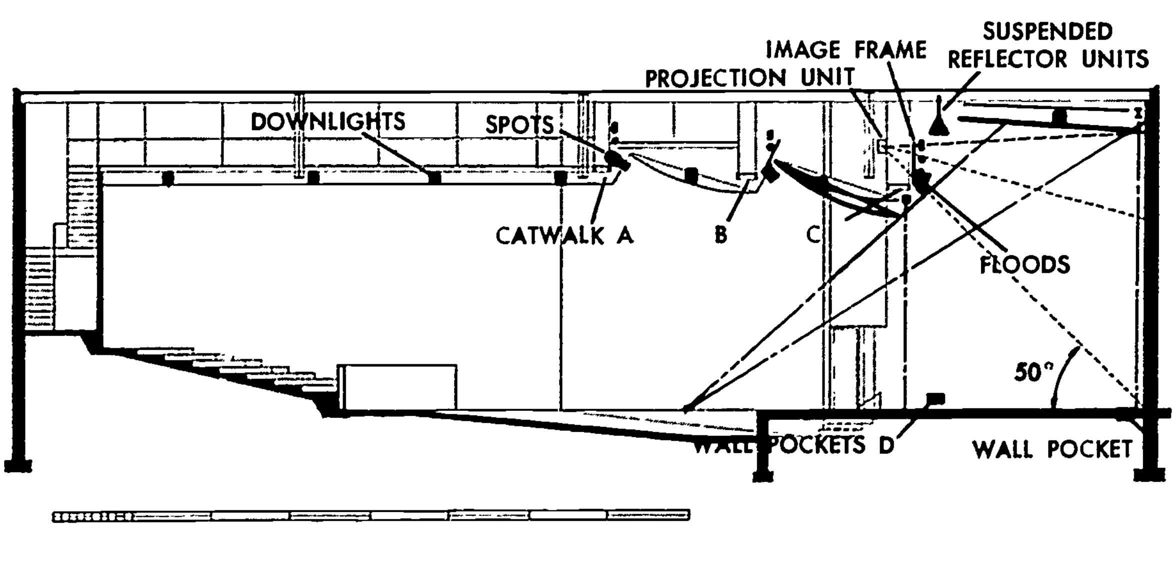
With the requirements of all non-dramatic programs satisfied by the general lighting, the dramatic lighting equipment may be highly specialized, and its control restricted to trained operators. Such arrangements will be reflected in all of the following layouts. Analyses of equipment schedules have shown that this "dual" lighting system, made possible by the continuation of the architectural ceiling canopy over platform and auditorium spaces, is no more costly than the older single system with centralized control and proscenium borderlights.

Lastly, special attention must be paid to such highly interrelated parts as angle of background projection to rear wall and clearances for the light paths of both the image and floods from the projection catwalk to the panorama; ceiling plane slots as related to servicing catwalks and clear pathways for light to the stage, both forward *and* diagonal; and to the natural architectural development of backlighting positions and the concealment of those instruments whose lenses face in the general direction of the spectators. Also, the reflective values of the wall and floor surfaces will vary with each project and must be individually considered.

Lighting Equipment Schedule

For Open End Theatre for Findlay (Ohio) Sr. High School





REMOTE CONTROL SWITCHBOARD

CR-2445-H Varitron (Silicon Controlled Rectifier) Type
Model MA-2445-G Mina-Mag (Magnetic Amplifier) Type or

- **Dimming Facilities**

  For Stage Lighting:
  2 groups of 6—6000 watt dimmers
  2 groups of 6—3000 watt dimmers
  1 group of 4—3000 watt Non-Dim.
  For general Lighting of Auditorium and Stage:
  3—6000 watt dimmers.

- **Control Facilities:**

  For Stage Lighting:
  Two Scene Preset plus Rehearsal (Independent) with 4 groups sub-master, scene masters, and stage master controllers.

  For General Lighting of Auditorium and Stage: Independent controllers.

- **Switching Facilities:**

  Cascade control through remote contactors and relays.

  House ON-OFF and transfer switches for worklite (Panic) System.

- **Extended Control:**

  One group of six dimmers for stage lighting and dimmer for general lighting on portable extended control.

  Switching control (Usher) stations.

- **Cross Connecting Facilities:**

  64-96 retractable cords and SAFETY-TYPE plugs for each stage branch circuit.

  Eight Multi-finger jacks for each 6000 watt dimmer and four for each 3000 watt dimmer and non-dim control.

  Load-tester with meter and jack.

- **Physical Data (approx.)**

  Pilot console 40″ high x 48″ wide x 36″ deep.
  Cross connect panel 78″ high x 60″ wide x 24″ deep.
  Remote Dimmer Switchboard 78″ high, 77″ wide, 27″ deep.
  Portable extended control 24″ wide x 18″ deep.

ALTERNATE MANUAL FLEXIBLE CONTROL SWITCHBOARD

Model OBB-2442-E

- **Dimming Facilities**

  For Stage Lighting:
  2 groups of 6—6000 watt dimmers
  2 groups of 6—2500 watt dimmers
  1 group of 4—2400 watt non-dim control.

  For general lighting of Stage and Auditorium: 3—6000 watt dimmers.

- **Control Facilities**

  Manual dimming control of stage lighting: 4 dimming groups, each dimmer with mechanical interlock handle extending its control to group master handle.

  Stage Auditorium General Lighting: Dimmers on separate motor drives.

- **Switching Facilities:**

  Single cascade control of stage lighting. Contactor of each dimmer for independent, group, stage master and extended switching controls.

  House ON-OFF and transfer switches by contactors and relays.

- **Extended Control Facilities:**

  ON-OFF switching control of stage master on stage.

  General lighting dimming control on stage.

  ON-OFF switching of general lighting on stage and usher's stations.

- **Cross Connecting Facilities:**

  Integral plugging panel with 64-96 retractable cords and SAFETY-TYPE plugs for each stage branch circuit.

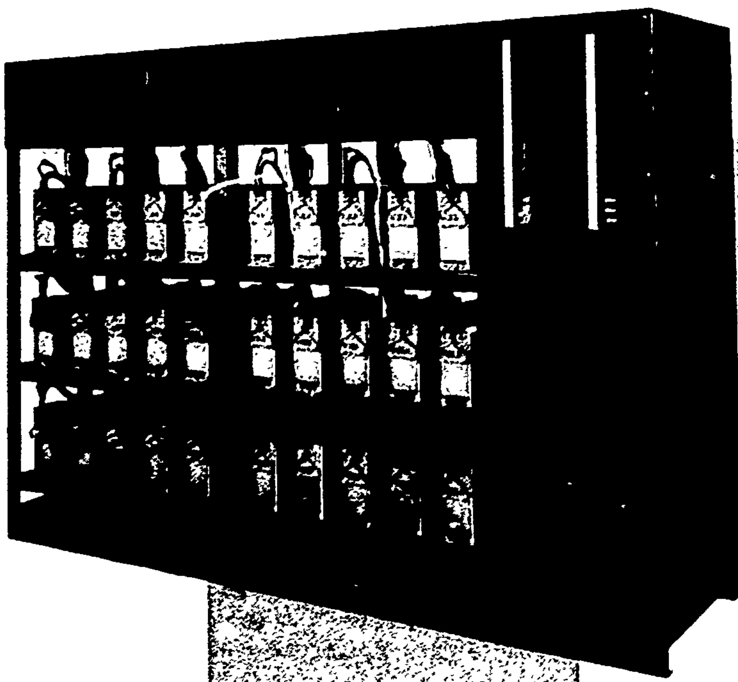
  Six multi-finger jacks for each 6000 watt dimmer, three for each 2500 watt dimmer and non-dim control.

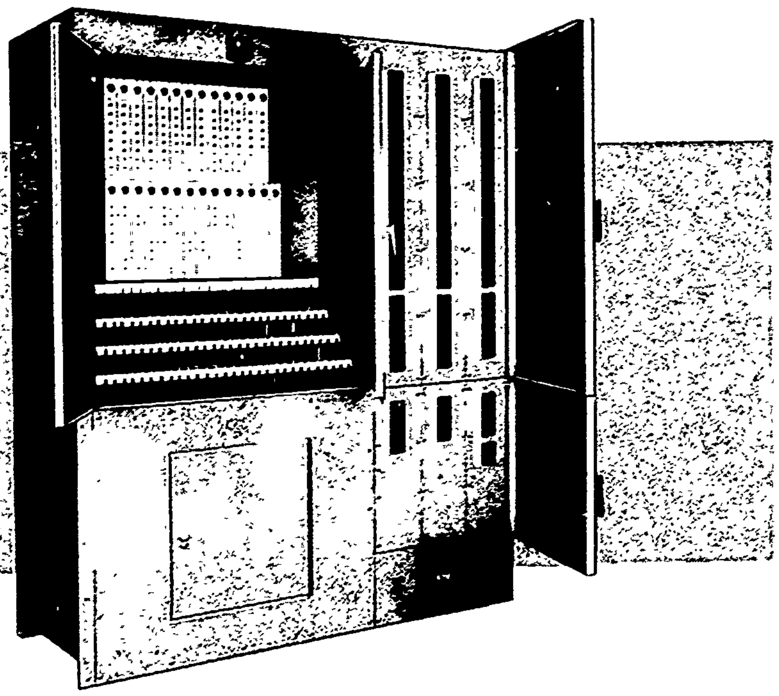
  Load-tester with meter and jack.

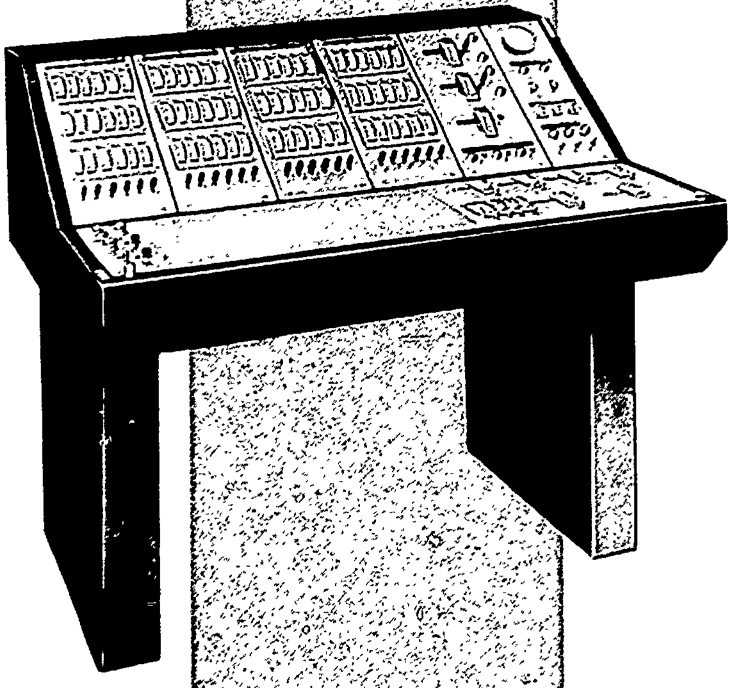
- **Physical Data:**

  Baked gray-green wrinkle enamel finish.

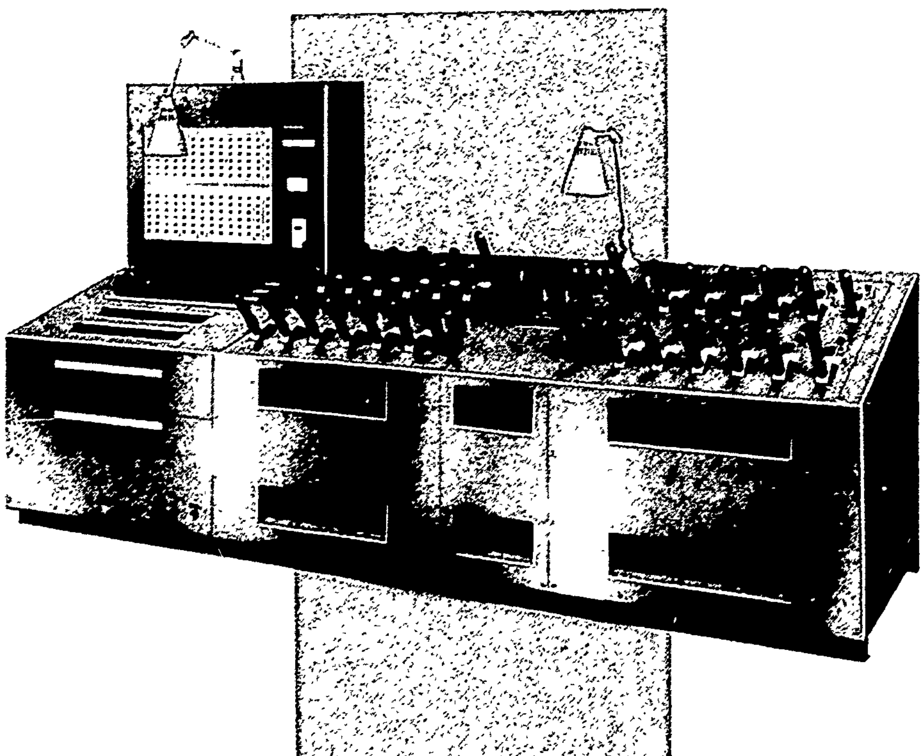
  Overall size 128″ wide x 35″ deep x 40″ high.







CR-2445-H



Model OBB-2442-E

LIGHTING EQUIPMENT SCHEDULE

FINDLAY SR. HIGH SCHOOL

Hub Cat. No.	Qty.	Lamp Spec.	DESCRIPTION	Function	*Circuit No.
			CATWALK A (Downstage Acting Area Lighting)		
20009-F	3		Plugging Strip 20 ft. long with (6) 20 Amp. duplex (X) pin plug receptacles with multi-finger floating jacks, terminal block and mounting brackets. Provide (2) duplex parallel blade receptacles for 8736 floodlights.	Distribution of (21) circuits.	1-18 113-115
8809	12	1000/G40/SP Mog. PF	Fresnel spotlight with 8″ oval beam co-louvered fresnel lens, color frame, C-clamp, 6′ leads and 20 Amp. pin plug.	Visibility color fill.	
8760-I	2	2000/T30/1 Mog. PF	Ellipsoidal spotlight with 8″ co-louvered step-lens, framing shutters, iris, wooden handle, C-clamp, color frame, 6′ leads and pin plug.	Dramatic pools of light; follow spot.	
8764	15	750/T12/9 Med. PF	Ellipsoidal spotlight with 6″ co-louvered step-lens, framing shutters, color frame, C-clamp, 6 ft. leads and pin plug.	Dramatic pools of light; highlighting; Side accent.	
403	12		C-clamp with vertically adjustable pipe and adjustable mounting bracket.	Maximum flexible positioning of spots.	
601K	9		Extension cables, 50′ long with male and female pin plugs.		
			CATWALK B (Upstage Acting Area Lighting)		
20009-F	3		Plugging Strip 20 ft. long with (6) duplex pin plug receptacles.	Distribution of (18) circuits.	19-36
8811	12	1000/G40/SP Mog. PF	Fresnel Spotlight with 8″ round beam co-louvered fresnel lens, color frame, C-clamp, 6′ leads and pin plug.	Directional illumination.	
8764	15	750/T12/9 Med. PF	Ellipsoidal spotlights as before.		
8768	6	500/750/T12/9 Med. PF	Ellipsoidal Spotlight with (2) 6″ condenser lenses, framing shutters, color frame, C-clamp, 6 ft. leads and pin plug.	Dramatic Pools of light; highlighting; Side Accent.	
403	12		Adjustable hanger as before.		
601K	9		Extension cables as before.		
			CATWALK C (Panorama Projection and Upstage Cross Lighting)		
11328	1		Surface mounting pocket with single pin plug receptacle.	Distribution of a circuit.	37
79030	1	2100/T24/8 60 Volt Mog. Bi-Post	Projection Unit with 4-way matting shutters, tilt lamp adjustment, blower, 12 ft. lead, pin plug, and 120/60 volt step-down transformer.	Transfer of Image to Panorama Wall.	
420	1		Projection Unit Mounting Assembly.	For Precise adjustment.	
421	1		Image Frame Mounting Assembly.	For variously sized frames.	
20009-F	2	†	Plugging Strip 20 ft. long with (9) duplex pin plug receptacles.	Distribution of (12) Circuits.	38-49
8361	12	750/PS52/IF Mog. Screw	18″ Scoop floodlight with ALZAK reflector, yoke, C-clamp, color frame, 6 ft. leads, and pin plug.	Color washes on Panorama Wall.	

Continued on next page.

LIGHTING EQUIPMENT SCHEDULE

FINDLAY SR. HIGH SCHOOL

Hub Cat. No.	Qty.	Lamp Spec.	DESCRIPTION	Function	*Circuit No.
			WALL POCKETS D (Downstage Side Lighting)		
304	2		4-Gang flush mounting type with doors, (4) duplex pin plug receptacles.	Distribution of (8) circuits.	50-57
20110	2		Tree with 10 ft. vertical pipe, 3 sets cross-arms, 24" cast iron base and plugging strip with (3) duplex pin plug receptacles and (3) 6 ft. leads with pin plug.	Support of units for low side accent lighting.	
8768	6	500/T12/9 Med. PF	Ellipsoidal spotlight with (2) 6" condenser lenses, framing shutters, color frame, "C"-clamp, 3 ft. leads and pin plugs.		
			FLOOR POCKETS E (Panorama)		
104	2		4-Gang type with cast iron door and (4) duplex pin plug receptacles.	Distribution of (8) circuits.	58-65
21632	4	150/A23/IF	Strip-light 8 ft. long with (12) reflectors and color frames, for gelatine or roundels, wired on 3 circuits, castered cradles, (3) 6 ft. leads and pin plugs.	Occasional horizon glow.	
20824	4	60/A19/IF	Strip-light 30 inches long with (8) receptacles, hook, 6 ft. lead and pin plug.	Interior set illumination.	
			DOWNLIGHTS (Upstage)		
3540-S ⊙		500-PS40 IF Mog. Screw	Suspended reflector unit with stem and swivel outlet box covers.	General Lighting on Dimmer A.	101-104
8584-F ⊗	4	750 R-57 Mog. Screw	Flush mounted with Micro-Baffles and plaster ring for sloped ceiling.		105-108
			DOWNLIGHTS (Downstage)		
8584-F ●	14	750 R-57 Mog. Screw	Same as above.	General Lighting on Dimmer B.	109-112
8736	6	500 Watt PAR-64	Floodlight with C-clamp, 3-ft. leads and parallel blade receptacles on Catwalk A.	Angled lighting for re-enforcement. on Dimmer B.	113-115
			DOWNLIGHTS (Auditorium)		
8579-F ○	23	500 R-57 Mog. Screw	Flush mounted with Micro-Baffles and plaster ring for flat ceiling.	General Lighting on Dimmer C.	116

(X) All receptacles provided with 20 Amp. multi-finger floating jacks for positive electrical contact. Receptacles are also available with 2-pole plus ground (add suffix G to Cat. No.).

⊙ ⊗ ● ○

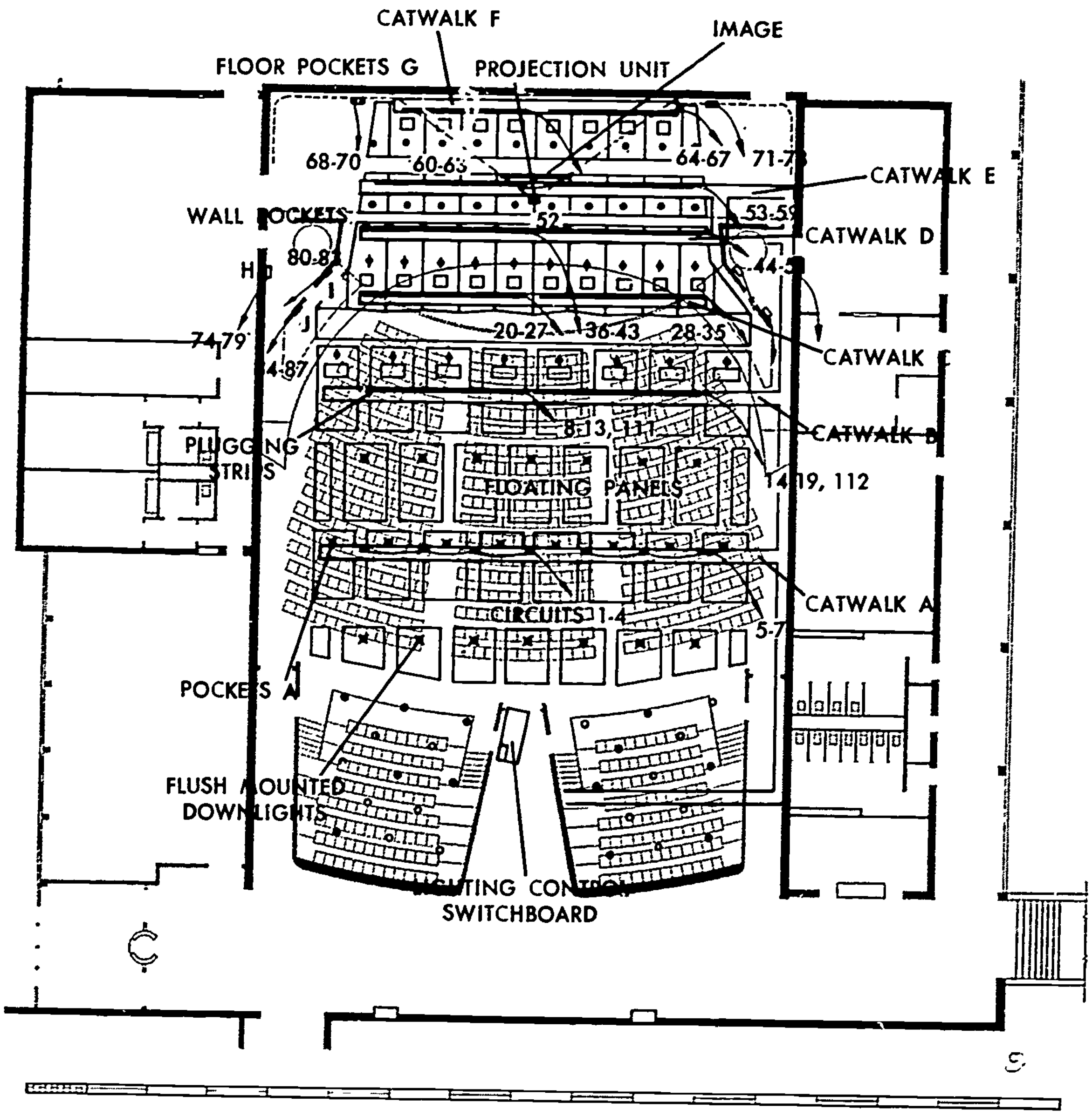
Symbols are shown on plan-view drawing.

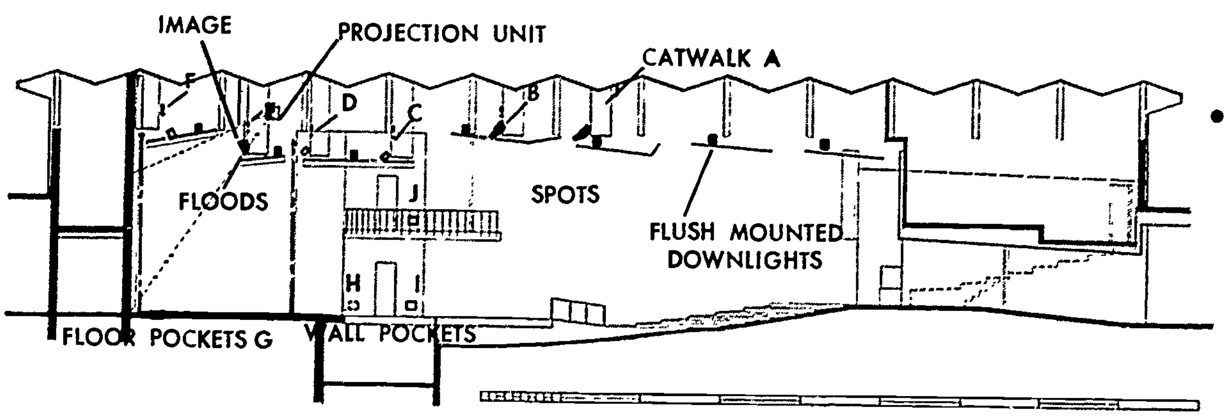
*Circuits 1-65 for stage lighting controlled through Cross-connecting panel. Each circuit must have own neutral. Circuits 101-116 for general lighting controlled by Silicon Controlled Rectifier or Magnetic Amplifier type dimmers.

†6 receptacles adjacent to each side of image frame on 6 circuits for floodlights: other receptacles on individual circuits.

Lighting Equipment Schedule

For Caliper Stage of Longmont Sr. High School





MANUAL FLEXIBLE CONTROL SWITCHBOARD

Model WS-742-E Auto-transformer Type

- **Dimming Facilities:**

  For stage lighting
  6 groups of 1—6600 watt master dimmer and 3—2500 watt minor dimmers.
  1 group of 1—6600 watt master dimmer and 6—1200 watt minor dimmers.
  1 group of 4 — 2400 watt non-dim control.
  For General lighting of Stage and Auditorium: 7—6000 watt dimmers.

- **Control Facilities:**

  Manual dimming control of stage lighting: 7—proportional dimming groups, each with one master and minor dimmers. Each master dimmer serves a dual function, it can operate independently or as a proportional master.

  It has mechanical interlock handle extending its control to master handle.

  Each minor control unit is of the modular plug-in type and has non-interlocking handle.

  It can operate independently or under proportional control.

  Motor driven dimming control of general lighting: Dimmers for stage and auditorium on four motor drives in separate housing.

- **Switching Facilities:**

  Single cascade control of stage lighting with contactor for each master dimmer and each group of minor dimmers.

  Master dimmer on independent or as proportional master.

  Minor dimmer on independent or under proportional control.

  House ON-OFF and transfer switches by contactors and relays.

- **Extended Control Facilities:**

  ON-OFF switching control of stage master on stage. General lighting-dimming control on stage.

  ON-OFF switching control of general lighting on stage and usher's stations.

- **Cross Connecting Facilities:**

  Integral plugging panel with 72-96 retractable cords and SAFETY-TYPE plugs for each stage branch circuit.

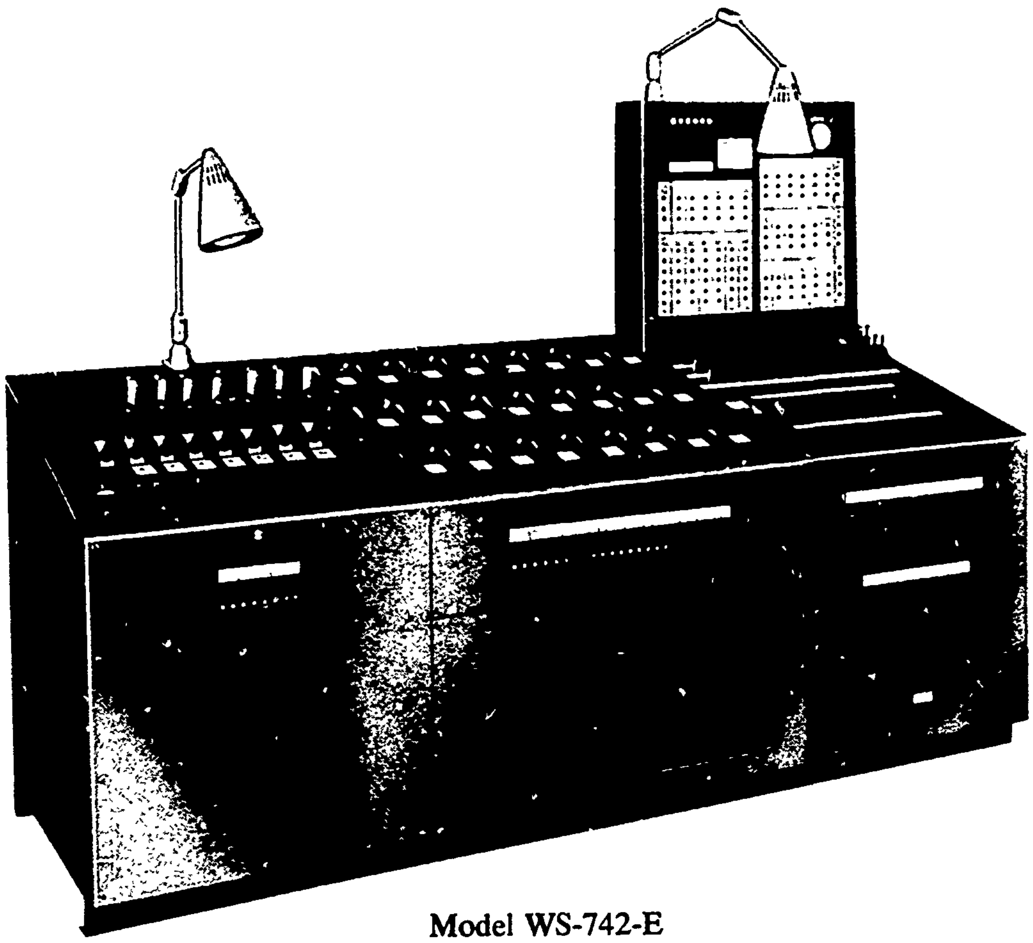
  Six multi-finger jacks for each 6600 watt dimmer, three for each 2500 watt dimmer and non-dim control and two for each 1200 watt dimmer.

  Load-tester with meter and jack.

- **Physical Data:**

  Baked gray-green wrinkle enamel finish.

  Approximate overaall size 110″ wide x 35″ deep x 34″ high.



Model WS-742-E

LIGHTING EQUIPMENT SCHEDULE

LONGMONT SR. HIGH SCHOOL

Hub Cat. No.	Qty.	Lamp Spec.	DESCRIPTION	Function	*Circuit No.
			CATWALK A (Caliper and Pit Acting Area Lighting)		
11328-2	7		Single gang surface mounting pocket with one 20 Amp. duplex pin plug receptacle with (x) multi-finger floating jacks.	Distribution of (7) circuits.	1-7
8764	16	750/T12/9 Med. PF	Ellipsoidal spotlight with 6″ step-lenses, framing shutters, color frame, C-clamp, 6 ft. leads, and pin plug.	Dramatic pools of light; high-lighting.	
8760-I	2	2000/T30/1 Mog. PF	Ellipsoidal spotlight with 8″ co-louvered step-lens, framing shutters, iris, wood handle, C-clamp, color frame, 6′ leads and pin plug.	Dramatic pool of light; follow spot.	
			CATWALK B (Down-stage Acting Area Lighting)		
20009-F	2		Plugging Strip 30 ft. long with (6) duplex pin plug receptacles, terminal block, and mounting brackets. Provide (3) duplex parallel blade receptacles for No. 8736 floodlights.	Distribution of (14) circuits.	8-19 111-112
8809	8	1000/G40/SP Mog. PF	Fresnel spotlight with 8″ oval beam co-louvered fresnel lens, color frame, C-clamp, 6′ leads, and pin plug.	Visibility color fill.	
8811	8	1000/G40/SP Mog. PF	Same as 8809 with 8″ round beam lens.	Directional illumination.	
8764	8	750/T12/9 Med. PF	Ellipsoidal spotlights as before.	Dramatic pool of light.	
403	16		C-clamp with vertically adjustable pipe and adjustable mounting bracket.	Maximum flexible positioning of spots.	
601K	12		Extension cables, 50′ long with male and female pin plug.		

LIGHTING EQUIPMENT SCHEDULE

LONGMONT SR. HIGH SCHOOL

Hub Cat. No.	Qty.	Lamp Spec.	DESCRIPTION	Function	*Circuit No.
CATWALK C (Mid-stage Acting Area Lighting)					
20009-F	2		Plugging strip 28 ft. long with (8) duplex pin plug receptacles, terminal block, and mounting brackets.	Distribution of (16) circuits.	20-35
8809	10	1000/G40SP Mog. PF	Oval beam fresnel spotlight as before.	Directional illumination.	
8764	6	750/T12/9 Med. PF	Ellipsoidal spotlight as before .	Dramatic pool of light.	
403	10		Adjustable hanger as before.		
CATWALK D (Up-stage Acting Area Lighting)					
20009-F	2		Plugging strip 28 ft. long with (8) duplex pin plug receptacles, terminal block, and mounting brackets.	Distribution of (16) circuits.	36-51
8811	10	1000/G40SP Mog. PF	Round fresnel spotlights as before.	Directional illumination.	
8764	8	750/T-20/9 Med. PF	Ellipsoidal spotlights as before.	Dramatic pools of light.	
CATWALK E (Panorama Projection and Up-stage Cross Lighting)					
11328	1		Surface mounting pocket with single pin plug receptacle.	Distribution of a circuit.	52
79031	1	PH IM/T-20/40 (DSB) PH 1500/T-20/39 (DTJ) Mog. PF	Projection unit with 4-way matting shutters, tilt lamp adjustment blower, 12 ft. lead, and pin plug.	Transfer of image to panorama wall.	
420	1		Projection unit mounting assembly.	For precise adjustment.	
421	1		Image Frame Mounting Assembly.	For variously sized frame.	
20009-F	2	†	Plugging strip 24 ft. long with (8) duplex pin plug receptacles, terminal block, and mounting brackets.	Distribution of 7 circuits.	53-59
8360	12	500-PS40-IF Mog. Screw	15″ Scoop floodlight with ALZAK reflector, yoke, C-clamp, color frame, 6 ft. lead, and pin plug.	Color washes on panorama wall.	
8768	4	750 T12/9 Med. PF	Ellipsoidal spotlight with (2) 6″ condenser lenses, framing shutters, color frame, C-clamp, 6 ft. leads and pin plug.	Cross lighting.	
403	4		Adjustable hanger as before.	As before.	
CATWALK F (Back Lighting)					
20009-F	2		Plugging strip 20 ft. long with (4) duplex pin plug receptacles, terminal block, and mounting brackets.	Distribution of (8) circuits.	60-67
8809	2	1000/G40SP Mog. PF	Oval beam fresnel spotlights as before.	Directional Illumination.	
8768	4	750T12/9 Med. PF	Ellipsoidal spotlights as before.	Separation of actors from scenery.	

Continued on next page.

ARCHITECTS & ENGINEERS

LIGHTING EQUIPMENT SCHEDULE

LONGMONT SR. HIGH SCHOOL

Hub Cat No.	Qty.	Lamp Spec.	DESCRIPTION	Function	*Circuit No.
			FLOOR POCKET G (Panorama)		
103	2		3-Gang type with cast iron door and (3) duplex pin plug receptacles.	Distribution of (6) circuits.	68-73
21632	6	150/A23/IF	Striplight 8 ft. long with (12) reflectors and color frames for gelatin or roundels, wired on 3 circuits, castered cradles, (3) 6 ft. leads and pin plugs.	Occasional horizon glow.	
20824	4	60/A19/IF	Striplight 30 inches long with (8) receptacles, hook, 6 ft. lead and pin plug.	Interior set illumination.	
602K	10		Extension cables, 25′ long with male and female pin plugs.		
			WALL POCKETS H (Downstage Side Lighting)		
303	2		3-Gang flush mounting type with doors, (3) duplex pin plug receptacles.	Distribution of (6) circuits.	74-79
20110	2		Tree with 10 ft. vertical pipe, 3 sets cross-arms, 24″ cast iron base and plugging strip with (3) duplex pin plug receptacles and (3) 6 ft. leads with pin plugs.	Support of units for platform side accent lighting.	
8768	6	500/T12/9 Med. PF	Ellipsoidal spotlight with (2) 6″ condenser lenses, framing shutters, color frame, "C"-clamp, 3 ft. leads and pin plugs.		
			WALL POCKETS I (Tower Interior)		
302	2		2-Gang flush mounting type with doors, (2) duplex pin plug receptacles.	Distribution of (4) circuits.	80-83
			WALL POCKETS J (Tower Balcony)		
302	2		Same as above.	As above.	84-87
			DOWNLIGHTS (Upstage)		
8583-F ●	20	300 Watt R-40	Flush mounted with Micro-Baffles and plaster ring for sloped panel.	General Lighting on Dimmer A.	101-106
			DOWNLIGHTS (Downstage)		
8909-F ◆	18	300 Watt R-40	Same as above.	On Dimmer B.	107-110
8736	6	500 Watt Par 64	Floodlight with "C"-clamp, 3-ft. leads and parallel blade cap on Catwalk B.	Angled lighting for re-enforcement. on Dimmer B.	111-112
			DOWNLIGHTS (Auditorium Center Area)		
8943-F ✖	22	500/R-57 Mog. Screw	Flush mounted with Micro-Baffles and plaster ring.	General lighting on Dimmer C.	113-122
			DOWNLIGHTS (Auditorium Rear)		
8909-F O	26	300/R-40 Med. Screw	Same as before.	General lighting on Dimmer D.	123-128

(x) All receptacles provided with 20 Amp. multi-finger floating jacks for positive electrical contact. Receptacles are also available with 2-pole plus ground (add suffix G to Catalog No.)

● ◆ ✖ O

Symbols are shown on plan-view drawing.

*Circuits 1-87 for stage lighting controlled through cross-connecting panel. Each circuit must have own neutral. Circuits 101-128 for general lighting controlled by four motor driven dimmer groups.

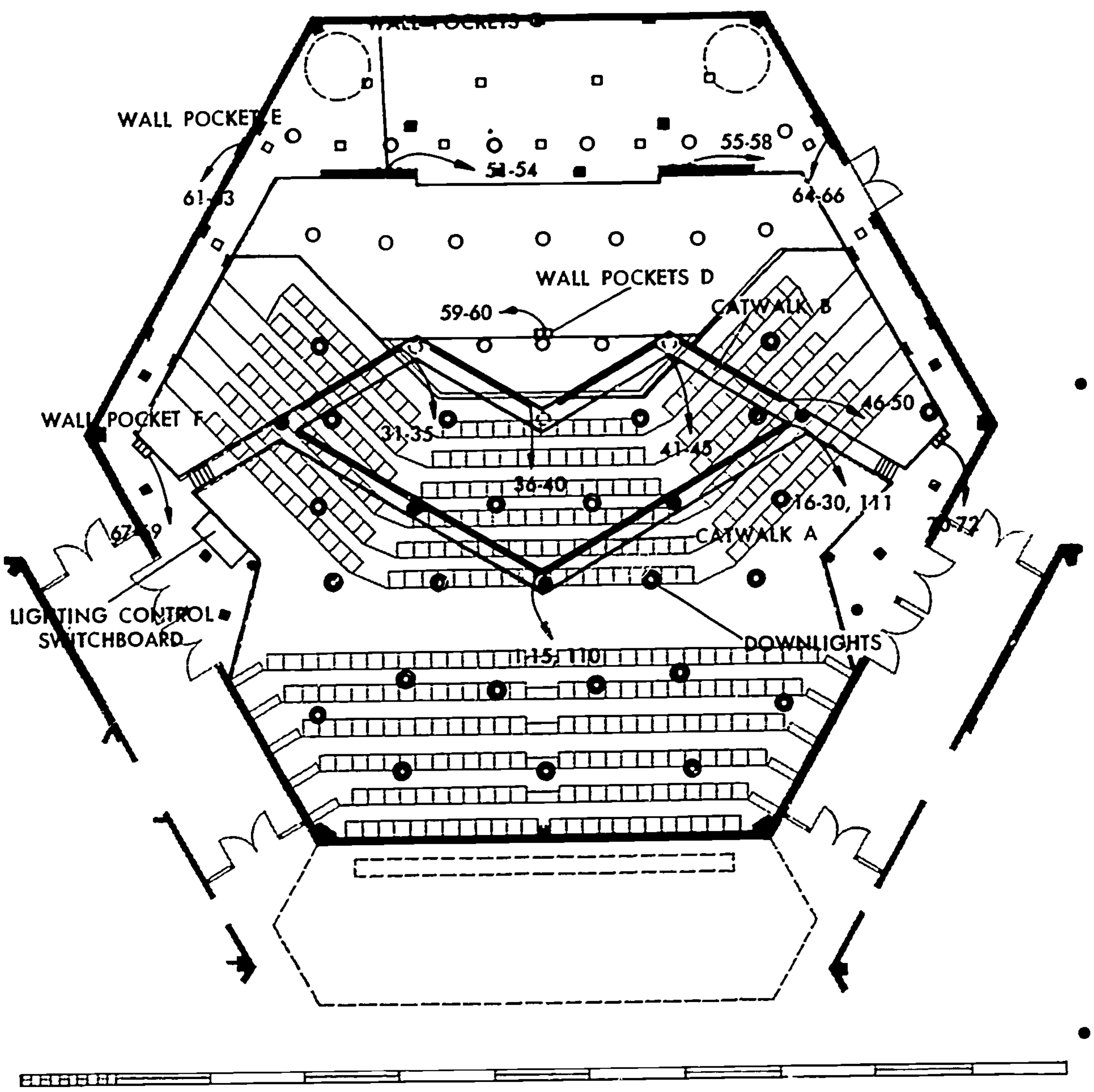
†6 receptacles adjacent to each side of image frame on 3 circuits for floodlights: other receptacles on individual circuits.

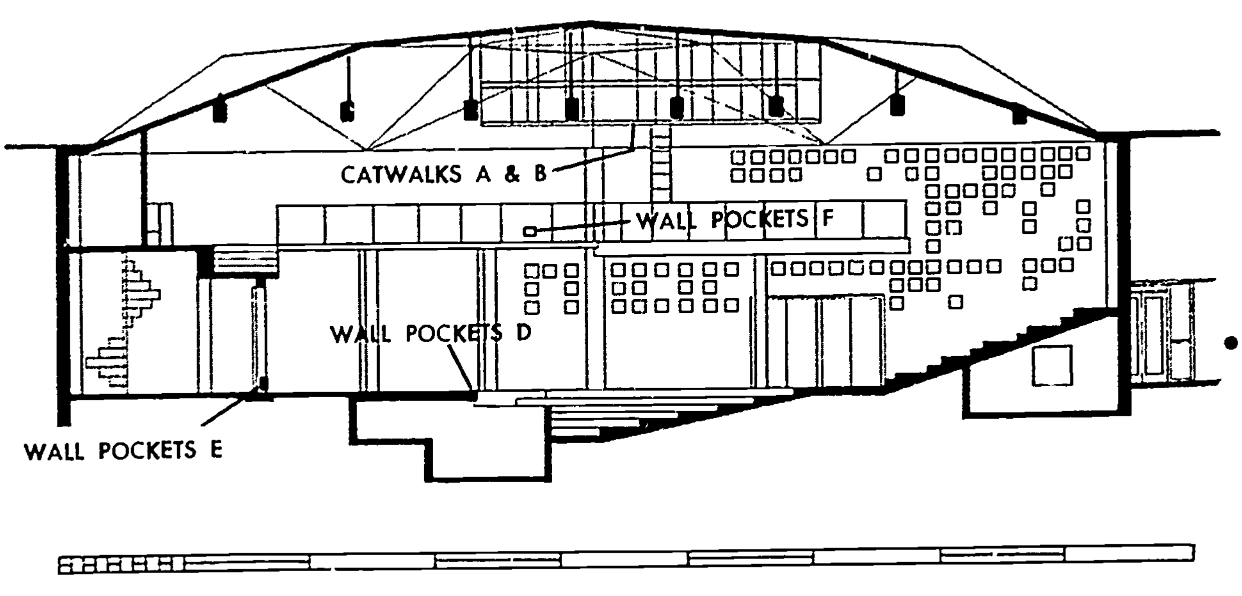
Lighting Equipment Schedule

For Caliper Forethrust Open Stage

La Junta (Colo.) Sr. High School

Theatre





MANUAL FLEXIBLE CONTROL SWITCHBOARD

Model WS-642-E-2
Auto-transformer type.

- **Dimming Facilities:**

  For Stage Lighting:
  2 groups of 1—3600 watt master and 3—1200 watt minor dimmers.
  4 groups of 1—6600 watt master and 3—2500 watt minor dimmers.
  1—group of 4—2400 watt non-dim control.

  For general lighting of stage and auditorium: 3—6000 watt and 1—2500 watt dimmers.

- **Control Facilities:**

  Manual dimming control of stage lighting: 6 proportional dimming groups, each with one master and three minor dimmers. Each master dimmer serves a dual function, it can operate independently or as a proportional master. It has mechanical interlock handle extending its control to master handle.

  Each minor control unit is of the modular plug-in type and has non-interlocking handle. It can operate independently or under proportional control.

  Motor driven dimming control of general lighting:

  Dimmers for stage and auditorium on three motor drives.

- **Switching Facilities:**

  Single cascade control of stage lighting with contactor for each master dimmer.

  Manual stage master.

  Master dimmer on independent or as proportional master.

  Minor dimmer on independent or under proportional control.

  House ON-OFF and transfer switches by contactors and relays.

- **Extended Control Facilities:**

  ON-OFF switching control of bank-master on stage.

  General lighting-dimming control on stage.

ON-OFF switching of general lighting on stage and usher stations.

- **Cross Connecting Facilities:**

  Integral plugging panel with 60-72 retractable cords and SAFETY-TYPE plugs for each stage branch circuit.

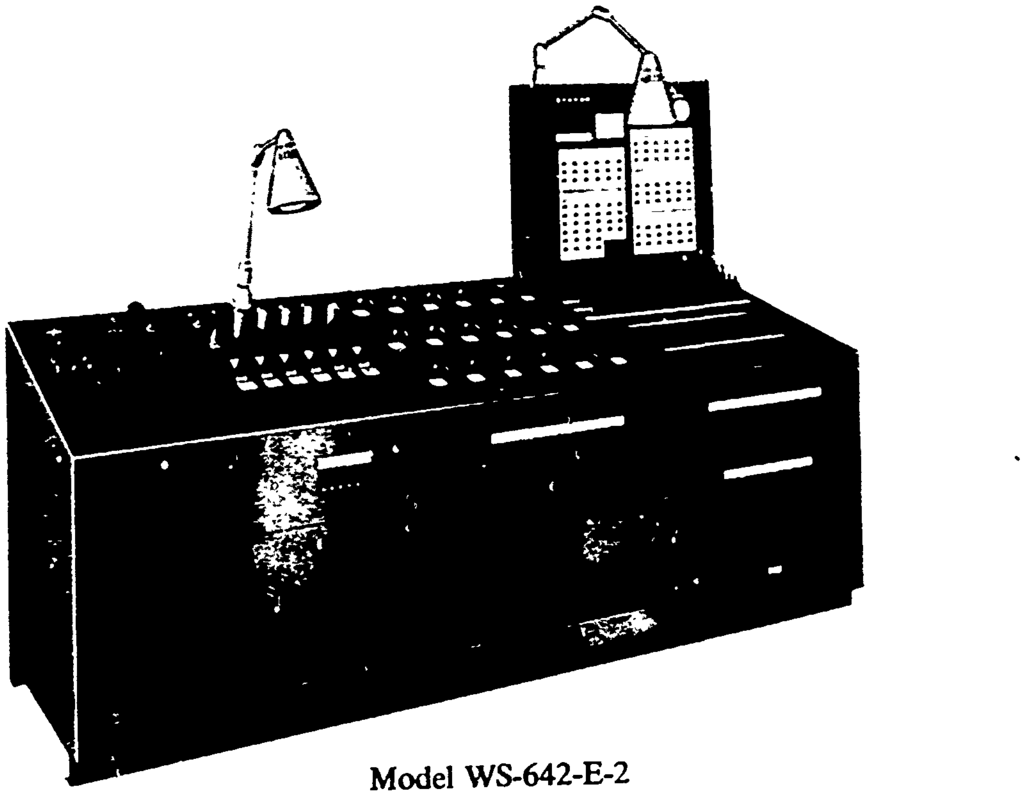
  Six multi-finger jacks for each 6600 watt dimmer, four for each 3600 watt dimmer, three for each 2500 watt dimmer and non-dim control, and two for each 1200 watt dimmer.

  Load-tester with meter and jack.

- **Physical Data:**

  Baked gray-green wrinkle enamel finish.

  Approximate overall size: 100″ x 35″ 34″ high.



Model WS-642-E-2

LIGHTING EQUIPMENT SCHEDULE

LA JUNTA SR. HIGH SCHOOL

Hub Cat. No.	Qty.	Lamp Spec.	DESCRIPTION	Function	*Circuit No.
			CATWALK A (Downstage Acting Area Lighting)		
20009-F	2		Plugging strip 30 ft. long with (15) 20 Amp. duplex pin plug receptacles with (x) multi-finger floating jacks, terminal block, and mounting brackets. Provide (3) duplex parallel blade receptacles for 8736 floodlights.	Distribution of (32) circuits.	1-30 110-111
8809	8	1000/G40-SP. Mog. PF	Fresnel spotlight with 8″ oval beam co-louvered fresnel lens, color frame, C-clamp, 6′ leads and pin plug.	Visibility color fill.	
8811	6	1000/G40-SP. Mog. PF	Same as above with 8″ round beam lens.	Directional illumination.	
8764	15	750/T12/9 Med. PF	Ellipsoidal spotlight with 6″ co-louvered step lenses, framing shutters, color frame, C-clamp, 6 ft. leads and pin plug.	Dramatic pools of light; high lighting, side accent.	
403	8		C-clamp with vertically adjustable pipe and adjustable mounting brackets.	Maximum flexible positioning of spots.	
			CATWALK B (Upstage Acting Area Lighting)		
20009-F	4		Plugging Strip 12 ft. long with (5) duplex pin plug receptacles, terminal block, and mounting brackets.	Distribution of (20) circuits.	31-50
8811	16		Round fresnel spotlights as before.	Directional illumination.	
8768	4	750/T12/9 Med. PF	Ellipsoidal spotlight with (2) 6″ condenser lenses, framing shutters, color frame, C-clamp, 6 ft. leads and pin plug.	Side accent.	
403	8		Adjustable hangers as before.		
			WALL POCKETS C (Panorama Rear Projection)		
304	2		4-Gang flush mounting type with door, (4) duplex pin plug receptacles.	Distribution of (8) circuits.	51-58

LIGHTING EQUIPMENT SCHEDULE

LA JUNTA SR. HIGH SCHOOL

Hub Cat. No.	Qty.	Lamp Spec	DESCRIPTION	Function	*Circuit No.
79032	3	PH500/T10/P Med. PF	Projection unit with 4-way matting shutters, tilt lamp adjustment, blower, 12 ft. lead, and pin plug.	Transfer of image to arcade screens.	
8365	12	200W. PS30 IF. Med. Screw	10″ Scoop floodlight, yoke, base plate, C-clamp, color frame, 6 ft. leads, 20-amp. pin plug. (See Page 70 for set-up instruction).	Color washes on arcade screens.	
602-K	6		Extension cable, 25 ft. long with male pin plug and parallel blade triplex receptacle.		
20824	6	60 W./A19 IF. Med. Screw	Striplight 30″ long with 8 receptacles, hook, 6 ft. leads and pin plug.	Interior Set illumination.	
WALL POCKETS D (Stage Apron Front)					
302	1		2-Gang flush mounting type with door, (2) duplex pin plug receptacles.	Distribution of (2) circuits.	59-60
WALL POCKETS E (Gallery Rear Wall)					
303	2		3-Gang flush mounting type with door, (3) duplex pin plug receptacles.	Distribution of (6) circuits.	61-66
WALL POCKETS F (Gallery Side Wall)					
303	2		Same as above.	Distribution of (6) circuits.	67-72
DOWNLIGHTS (Stage)					
8578-S ○	16	300 W. R-40 spots	Suspended type with Micro-Baffles and stem on swivel aligning plate.	General lighting on Dimmer A.	101-106
2729 ◌	3	300 W. R40 Spot	Surface mounted type with Micro-Baffles under Catwalk B.		107
6136 □	13	150 W. A-21. IF.	Flush mounted lens unit under stage gallery.	General lighting on Dimmer B.	108-109
8736	6	500 W. Par 64	Floodlight with C-clamp, 3-ft. leads and parallel blade cap on Catwalk A.	Angled lighting for re-enforcement. on Dimmer A.	110-111
DOWNLIGHTS (Seating Area)					
8578-S ◉	25	300 W. R40 Spot	Same as before.	General lighting on Dimmer C.	112-117
2729 ●	5	300 W. R40 Spot	Same as above under Catwalk A.		18
6131 ⊠	8	150 W. A-21. IF	Flush mounted lens unit under Caliper Galleries.		119

(x) All receptacles provided with 20 Amp. multi-finger floating jack for positive electrical contact. Receptacles are also available with 2-pole plus ground (add suffix G to Catalog No.).

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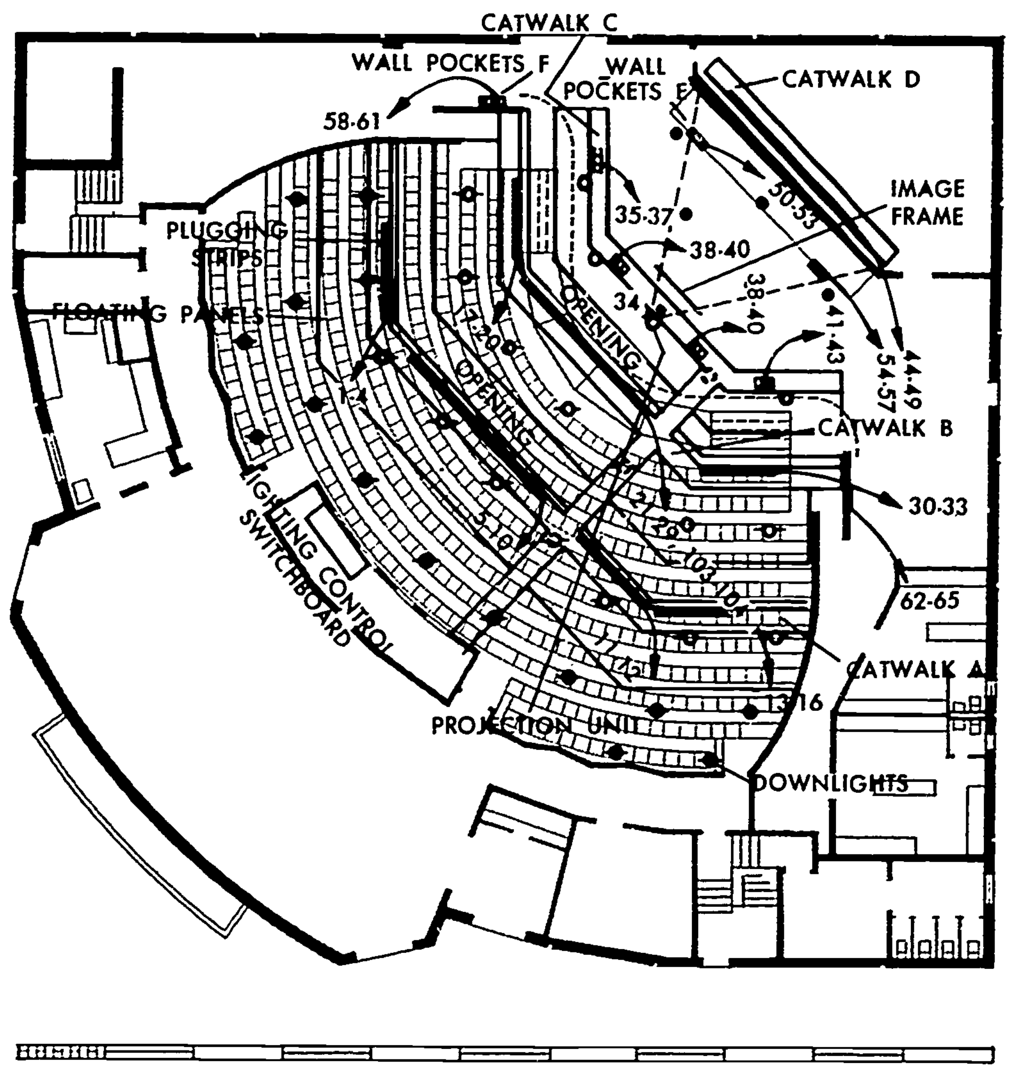
Symbols are shown on plan-view drawing.

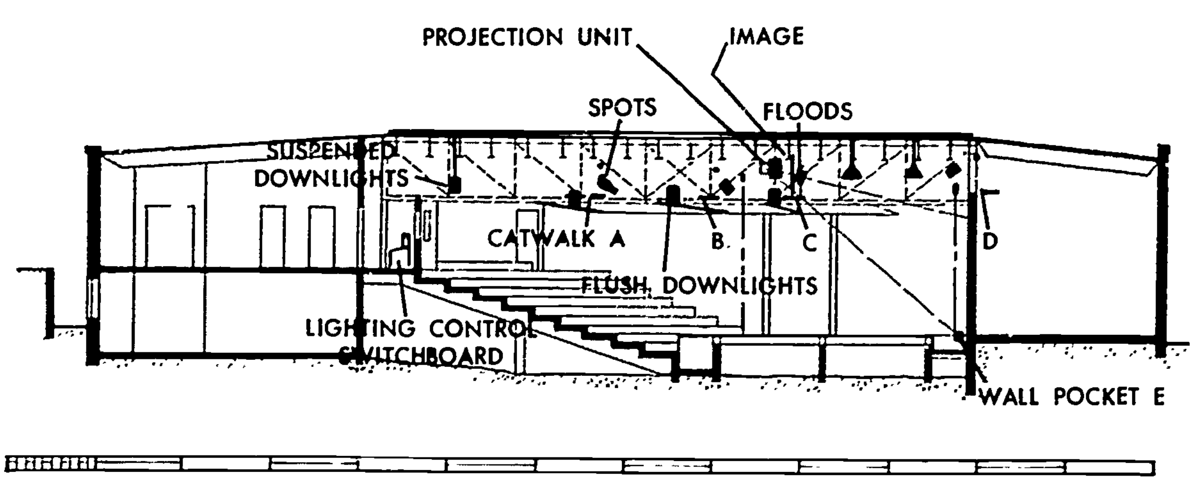
*Circuits 1-72 for stage lighting, controlled through cross-connecting panel. Each circuit must have own neutral. Circuits 101-119 for general lighting, controlled by three motor driven dimmer groups.

Lighting Equipment Schedule

For Forward Thrust Open Stage

Western Springs (Ill.) Theatre





MANUAL FLEXIBLE CONTROL SWITCHBOARD

Model WS-642-E-1
Auto-transformer Type

- **Dimming Facilities:**

  For stage lighting:
  4 groups of 1—6600 watt master dimmer and 3—2500 watt minor dimmers.
  2 groups of 1—6600 watt master dimmer and 6—1200 watt minor dimmers.
  1 group of 4—2400 watt non-dim control.

  For general lighting of stage and auditorium: 3—6000 watt dimmers.

- **Control Facilities:**

  Manual dimming control of stage lighting: 6 proportional dimming groups, each with one master and minor dimmers.

  Each master dimmer serves a dual function; it can operate independently or as a proportional master. It has mechanical interlock handle extending its control to master handle.

  Each minor control unit is of the modular plug-in type and has non-interlocking handle.

  Motor driven dimming control of General Lighting: 3 Dimmers for stage and auditorium on two motor drives.

- **Switching Facilities:**

  Single cascade control of stage lighting with contactor for each master dimmer and each group of minor dimmers.

  Master dimmer on independent or as proportional master.

  Minor dimmers on independent or under proportional control.

  House ON-OFF and transfer switches by contactors and relays.

- **Extended Control Facilities:**

  ON-OFF switching control of stage master on stage. General lighting-dimming control on stage.

  ON-OFF switching controls of general lighting on stage and usher's stations.

- **Cross Connecting Facilities:**

  Integral plugging panel with 64-72 retractable cords and SAFETY-TYPE plugs for each stage branch circuit.

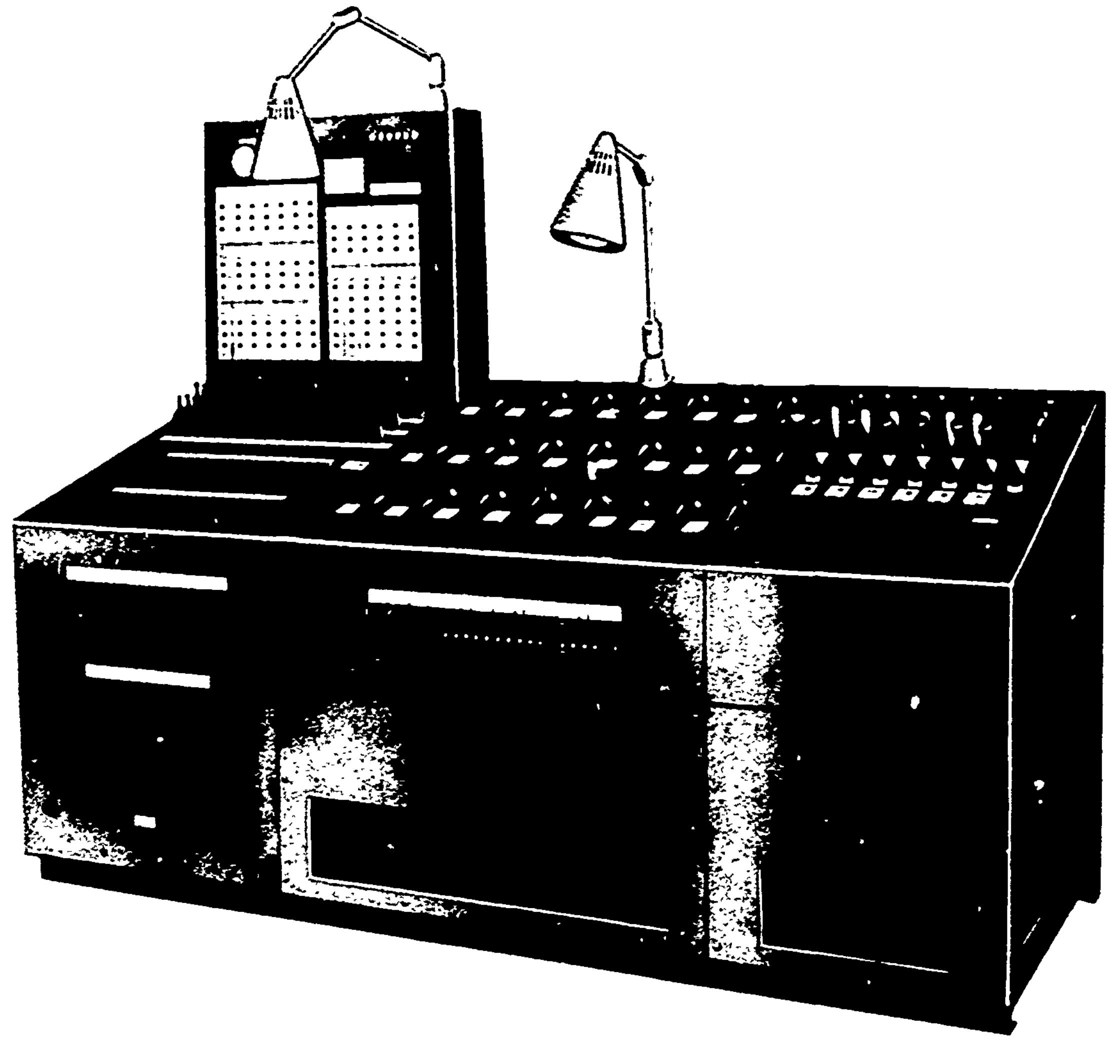
  Six multi-finger jacks for each 6600 watt dimmer, three for each 2500 watt dimmer and non-dim control and two for each 1200 watt dimmer.

  Load-tester with meter and jack.

- **Physical Data:**

  Baked gray-green wrinkle enamel finish.

  Approximate overall size: 100″ wide x 35″ deep x 34″ high.



Model WS-642-E-1

LIGHTING EQUIPMENT SCHEDULE

WESTERN SPRINGS THEATRE

Hub Cat. No.	Qty.	Lamp Spec.	DESCRIPTION	Function	*Circuit No.
			CATWALK A (Downstage Acting Area Lighting)		
20009-F	1		Plugging strip 20 ft. long with (8) 20 Amp. duplex pin plug receptacles with (x) multi-finger floating jacks, terminal block, and mounting brackets.	Distribution of (16) Circuits.	1-16
20009-F	3		Plugging strips 10 ft. long with (4) duplex pin plug receptacles.		
8809	8	1000/G40SP Mog. PF	Fresnel spotlight with 8″ oval beam co-louvered fresnel lens, color frame, C-clamp, 6′ leads and pin plug.	Visibility Color fill.	
8811	4	1000/G40SP Mog. PF	Same as 8809 with 8″ round beam lens.	Directional illumination.	
8760-I	1	2000/T-30/1 Mog. PF	Ellipsoidal spotlight with 8″ co-louvered step lens, framing shutters, iris, wooden handle, C-clamp, color frame, 6′ leads and pin plug.	Dramatic pools of light follow spot.	
8764	6	750/T12/9 Med. PF	Ellipsoidal spotlight with 6″ co-louvered step lenses, framing shutters, color frame, C-clamp, 6 ft. leads and pin plug.	Dramatic pools of light; highlighting Side accent.	
403	8		C-clamp with vertically adjustable pipe and adjustable mounting brackets.	Maximum flexible positioning of spots.	
602-K	6		Extension cables, 25 ft. long with male and female pin plugs.		

Continued on next page.

LIGHTING EQUIPMENT SCHEDULE

WESTERN SPRINGS THEATRE

Hub Cat. No.	Qty.	Lamp Spec.	DESCRIPTION	Function	*Circuit No.
			CATWALK B (Upstage Acting Area Lighting)		
20009-F	1		Plugging Strip 24 ft. long with (12) duplex pin plug receptacles, terminal block, and mounting brackets. Provide (4) duplex parallel blade receptacles for 8736 floodlights.	Distribution of (11) circuits.	21-29 103-104
20009-F	2		Plugging strips 8 ft. long with (4) duplex pin plug receptacles.	Distribution of (8) circuits.	17-20 30-33
8811	4		Round fresnel spotlights as before.		
8764	10	500/750 T/12/9 Med. PF	Ellipsoidal spotlight with 6″ co-louvered step lens, framing shutters, color frame, C-clamp, 6 ft. leads, and pin plug.	Dramatic pools of light; highlighting and side accent.	
8768	6	500/750 T12/9 Med. PF	Ellipsoidal spotlight with (2) 6″ condenser lenses, framing shutters, color frame, C-clamp, 6 ft. leads and pin plug.		
403	12		Adjustable hanger as before.		
			CATWALK C (Panorama Projection and Upstage Cross-lighting)		
11328	1		Surface mounting pocket with single pin plug receptacle.	Distribution of a circuit.	34
79031	1	PH IM/T20/40 (DSB) PH1500/T20/39 (DTJ) Mog. PF	Projection unit with 4-way matting shutters, tilt lamp adjustment, blower, 12 ft. lead, and pin plug.	Transfer of image to panorama wall.	
420	1		Projection Unit mounting assembly.	For precise adjustment.	
421	1		Image frame mounting assembly.	For variously sized frame.	
203	4		3-Gang Surface mounting type pocket with door and (3) duplex pin plug receptacles.	Distribution of (9) circuits.	35-43
8361	6	750 Watt PS52 IF Mog. Screw	18″ Scoop floodlight with ALZAK reflector yoke, C-clamp, color frame, 6 ft. leads, and pin plug.	Color washes on panorama wall.	
8786	6	500 T20/48 Med. PF	Fresnel spotlight with 6″ round beam, co-louvered lens, color frame, C-clamp, 6 ft. leads, and pin plug.	Directional and highlighting illumination.	
			CATWALK D (Backlighting)		
20009-F	1	†	Plugging strip 30 ft. long with (12) duplex pin plug receptacles, terminal block, and mounting brackets.	Distribution of (6) circuits.	44-49
8768	6	500T12/9 Med. PF	Ellipsoidal spotlight with (2) 6″ condenser lenses, framing shutters, color frame, C-clamp, 6 ft. leads and pin plug.	Separation of actors from scenery.	
403	6		Adjustable hanger as before.		

LIGHTING EQUIPMENT SCHEDULE

WESTERN SPRINGS THEATRE

Hub Cat. No.	Qty.	Lamp Spec.	DESCRIPTION	Function	*Circuit No.
WALL POCKETS E (Panorama Pit)					
304	2		4-Gang flush mounting type with door, (4) duplex pin plug receptacles.	Occasional horizon glow.	50-57
21632	4	150/A23/IF Med. Screw	Striplight 8 ft. long with (12) reflectors with color frames (for gelatine or roundels) on 3 circuits, castered cradles, (3) 6 ft. leads, and pin plug.	Interior set illumination.	
20824	3	60/A19/IF Med. Screw	Striplight 30 inches long with (8) receptacles, hook, 6 ft. leads and pin plug.	Distribution of (8) circuits.	
602-K	7		Extension cables, 25 ft. long with male and female pin plugs.		
WALL POCKETS F (Downstage Side Lighting)					
304	2		Same as before.	Distribution of (8) circuits.	58-65
20110	2		Tree with 10 ft. vertical pipe, 3 sets cross-arms, 24″ cast iron base, and plugging strip with (3) duplex pin plug receptacles, and (3) 6 ft. leads with pin plug.	Support of units for low side accent lighting.	
8766	6	500/T12/9 Med. PF	Ellipsoidal spotlight with (2) 6″ condenser lenses, framing shutters, color frame, C-clamp, 3 ft. leads and pin plug.	As above.	
DOWNLIGHTS (Stage)					
8578-S ●	5	300 Watt R-40 Med. Screw	Suspended with Micro-Baffles and stem.	General lighting on Dimmer A.	101-102
8583 ○	5		Flush mounted with Micro-Baffles and plaster ring.		
8736	4	500 Watt PAR-64	Floodlight with C-clamp, 3-ft. leads and parallel blade cap on Catwalk B.	Angled lighting for re-enforce-ment. on Dimmer A.	103-104
DOWNLIGHTS (Auditorium)					
8578-S ●	16	300W. R-40 Med. Screw	Same as before.	General lighting on Dimmer B.	105-112
8583 ø	15		Same as before.		

(x) All receptacles provided with 20 Amp. multi-finger floating jacks for positive electrical contact. Receptacles are also available with 2-pole plus ground (add suffix G to Catalog number).

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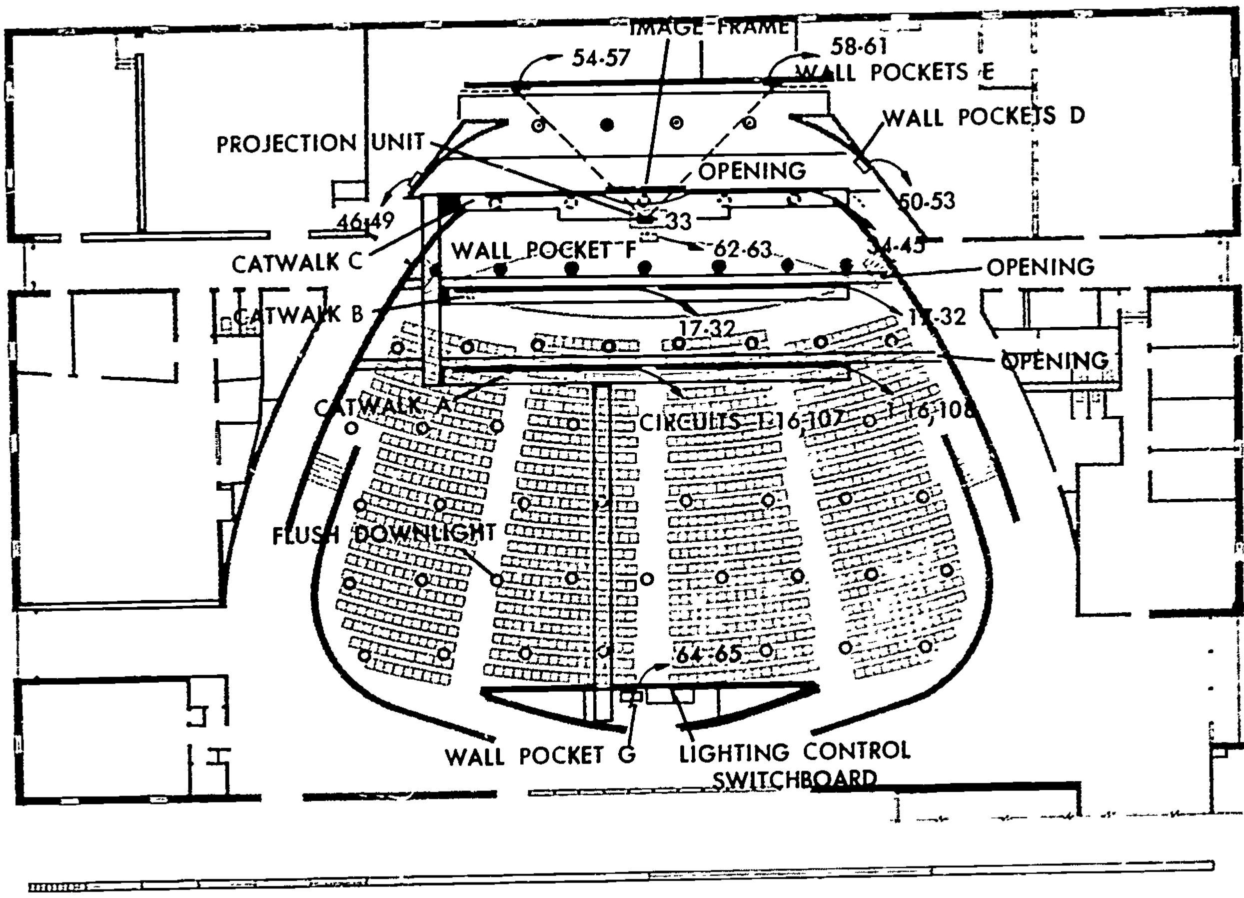
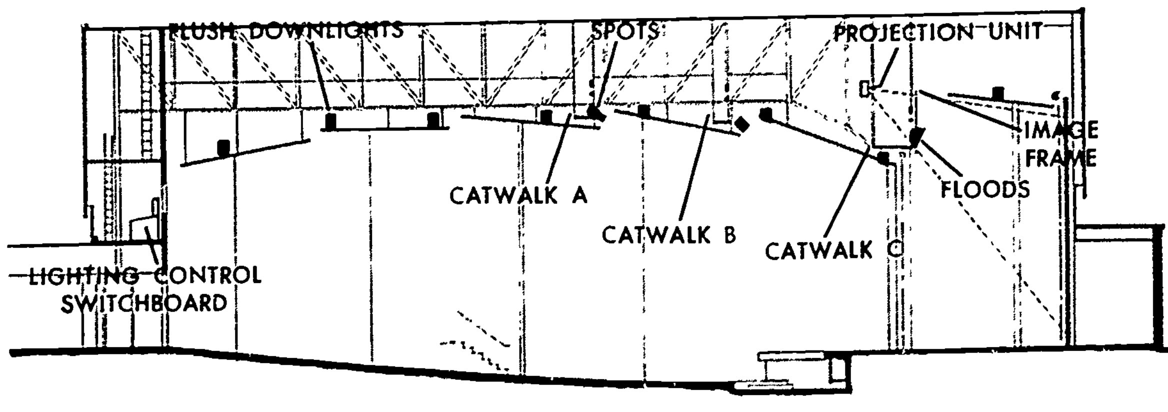
Symbols are shown on plan-view drawing.

*Circuits 1-65 for stagelighting, controlled through cross-connecting panel. Each circuit must have own neutral. Circuits 101-112 for general lighting; controlled by two motor driven dimmer groups.

†3 receptacles adjacent to each side of image frame on 3 circuits; other receptacles on individual circuits.

Lighting Equipment Schedule For Reverse Curve Open End Stage Of New Providence (N. J.) High School





MANUAL FLEXIBLE CONTROL SWITCHBOARD

Model WS-842-E
Auto-transformer Type

- **Dimming Facilities:**

For Stage Lighting:
8 groups of 1—6600 watt master dimmer and 3—2500 watt minor dimmers.
1 group of 4—2400 watt non-dim control.

For General Lighting of Stage and Auditorium: 5—6000 watt dimmers.

- **Control Facilities:**

Manual dimming control of stage lighting: 2 Banks of 4 proportional dimming groups, each group with one master and three minor dimmers.

Each master dimmer serves a dual function, it can operate independently or as a proportional master. It has mechanical interlock handle extending its control to one of two bank master handles.

Each minor control unit is of the modular plug-in type and has non-interlocking handle. It can operate independently or under proportional control.

Motor driven dimming control of general lighting: Dimmers for stage and auditorium on three motor drives.

- **Switching Facilities:**

Single cascade control of stage lighting with contactor for each master dimmer and each group of minor dimmers.

Master dimmers on independent or as proportional master.

Minor dimmers on independent or under proportional control.

House ON-OFF and transfer switches by contactors and relays.

- **Extended Control Facilities:**

ON-OFF Switching controls of stage master, and bank masters on stage.

General lighting-dimming control on stage.

ON-OFF Switching controls of general lighting on stage and at usher's stations.

- **Cross Connecting Facilities:**

Integral plugging panel with 64-84 retractable cords and SAFETY-TYPE plugs for each stage branch circuit.

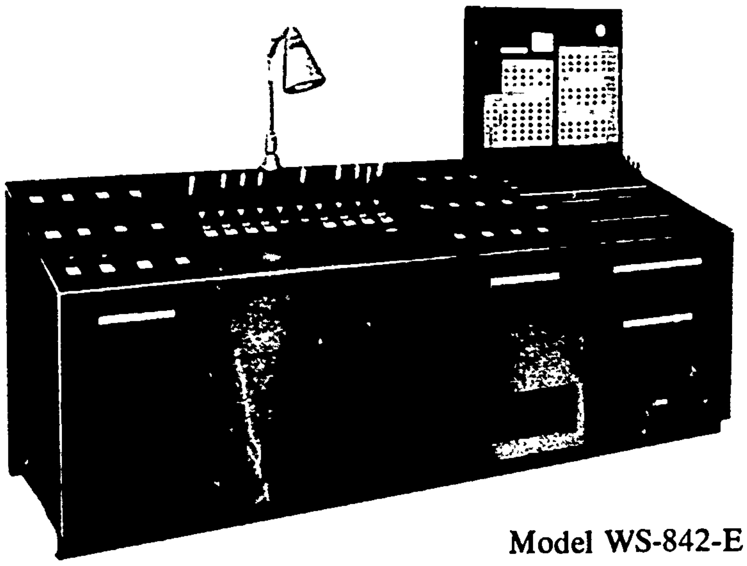
Six multi-finger jacks for each 6600 watt dimmer, and three for each 2500 watt dimmer and non-dim control.

Load-tester with meter and jack.

Physical Data:

Baked gray-green wrinkle enamel finish.

Approximate overall size: 115″ x 35″ x 34″ high.



Model WS-842-E

LIGHTING EQUIPMENT SCHEDULE

Hub Cat. No.	Qty.	Lamp Spec.	DESCRIPTION	Function	*Circuit No.
			CATWALK A (Downstage Acting Area Lighting)		
20009-F	2		Plugging strip 32 ft. long with (16) 20 Amp. duplex pin plug receptacles with (x) multi-finger floating jacks, terminal block, and mounting brackets. Provide (3) parallel blade receptacles for 8736 floodlights.	Distribution of (18) twice repeated circuits.	1-16 107-108
8809	12	1000/G40 SP. Mog. PF	Fresnel spotlight with 8″ oval beam co-louvered fresnel lens, color frame, C-clamp, 6′ leads and 20 Amp. pin plug.	Visibility Color-fill	
8760-I	2	2000/T30/1 Mog. PF	Ellipsoidal spotlight with 8″ co-louvered step lens, framing shutters, iris, wooden handle, C-clamp, color frame, 6′ leads and pin plug.	Dramatic pools of light; follow spot.	
8764	10	750/T12/9 Med. PF	Ellipsoidal spotlight with 6″ co-louvered step lenses, framing shutters, color frame, C-clamp, 6 ft. leads and pin plug.	Dramatic pools of light; high lighting side accent.	
403	12		C-clamp with vertically adjustable pipe and adjustable mounting bracket.	Maximum flexible positioning of spot.	
601-K	12		Extension cables, 50 ft. long with male and female pin plugs.		
			CATWALK B (Upstage Acting Area Lighting)		
20009-F	2		Plugging strip as before.		17-32
8811	12	1000/G40 SP. Mog. PF	Fresnel spotlight with 8″ round beam, co-louvered lens, color frame, C-clamp, 6′ leads and pin plug.	Directional illumination.	
8764	20	750/T12/9 Med. PF	Ellipsoidal spotlight as before.	Dramatic pools of light, highlighting; side accent.	
403	12		Adjustable hanger as before.		
			CATWALK C (Panorama Projection and Upstage Cross Lighting)		
11328	1		Surface mounting pocket with single pin plug receptacle.	Distribution of a circuit.	33
79030	1	2100/T24/8 60 Volt Mog. Bi-Post	Projection unit with 4-way matting shutters, tilt lamp adjustment, blower, 12 ft. lead, pin plug, and 120/60 Volt step-down transformer.	Transfer of image to panorama wall.	
420	1		Projection Unit mounting assembly.	For precise adjustment.	
421	1		Image Frame mounting assembly.	For variously sized frames.	
20009-F	2	†	Plugging Strip 20 ft. long with (9) duplex pin plug receptacles.	Distribution of (12) circuits.	34-45
8361	12	750-PS52IF Mog. Screw	18″ Scoop floodlight with ALZAK reflector, yoke, C-clamp, color frame, 6 ft. leads, and pin plug.	Color washes on panorama wall.	

Continued on next page.

ARCHITECTS & ENGINEERS

LIGHTING EQUIPMENT SCHEDULE

NEW PROVIDENCE HIGH SCHOOL

Hub Cat. No.	Qty.	Lamp Spec.	DESCRIPTION	Function	*Circuit No.
			WALL POCKETS D (Downstage Sides)		
304	2		4-Gang flush mounting type with door, (4) duplex pin plug receptacles.	Distribution of (8) circuits.	46-53
20110	2		Tree with 10 ft. vertical pipe, 3 sets cross-arms, 24″ cast iron base, and plugging strip with (3) duplex pin plug receptacles, and (3) 6 ft. leads with pin plug.	Support of units for platform side accent lighting.	
8768	6	500/T12/9 Med. PF	Ellipsoidal spotlight with (2) 6″ condenser lenses, framing shutters, color frame, C-clamp, 6 ft. leads and pin plug.		
			WALL POCKETS E (Upstage Sides)		
304	2		Same as above.		54-61
21632	4	150/A23/IF	Striplight 8 ft. long with (12) reflectors with color frames for gelatines or roundels, wired on 3 circuits, castered cradles, (3) 6 ft. leads, and pin plug.	Occasional horizon glow.	
20824	3	60/A19/IF Med. Screw	Striplight 30 inches long with (8) receptacles, hook, 6 ft. leads and pin plug.	Interior set illumination.	
602-K	7		Extension cables, 25 ft. long with male and female pin plugs.		
			WALL POCKET F (Orchestra Pit)		
302	1		2-Gang flush mounting type with door and (2) duplex pin plug receptacles.	Distribution of (2) circuits.	62-63
			WALL POCKET G (Auditorium Rear)		
302	1		2-Gang flush mounting type with door and (2) duplex pin plug receptacles.	Distribution of (2) circuits.	64-65
8788	1	2100/T24/8 60 Volt Mog. Bi-Post	Condenser lens spotlight with color changer, shutters, iris focusing system, blower, 120/60 volt step-down transformer, caster stand, leads and pin plug.	Follow-spot for floor operation.	
			DOWNLIGHTS (Upstage)		
8584-F ○	5	500 R-57 Mog. Screw	Flush mounted with Micro-Baffles and plaster ring for sloped ceiling.	General lighting on Dimmer A.	101-102
3540-S ◉	4	500 PS40 IF. Mog. Screw	Suspended reflector unit with stem and swivel outlet box cover.		103-104
			DOWNLIGHTS (Downstage)		
8583-F ●	7	300 R-40 Med. Screw	Flush mounted with Micro-Baffles and plaster ring for sloped ceiling.	General lighting on Dimmer B.	105-106
8736	6	500W. PAR-64	Floodlight with C-clamp, 3-ft. leads and parallel blade receptacles on Catwalk A.	Angled lighting for re-enforcement. on Dimmer A.	107-108
			DOWNLIGHTS (Auditorium)		
8583-F ○	42	300 R-40 Med. Screw	Same as before.	General lighting on Dimmer C.	109-118

(x) All receptacles provided with 20 Amp. multi-finger floating jacks for positive electrical contact. Receptacles are also available with 2 pole plus ground (add suffix "G" to Catalog number).

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Symbols are shown on plan-view drawing.

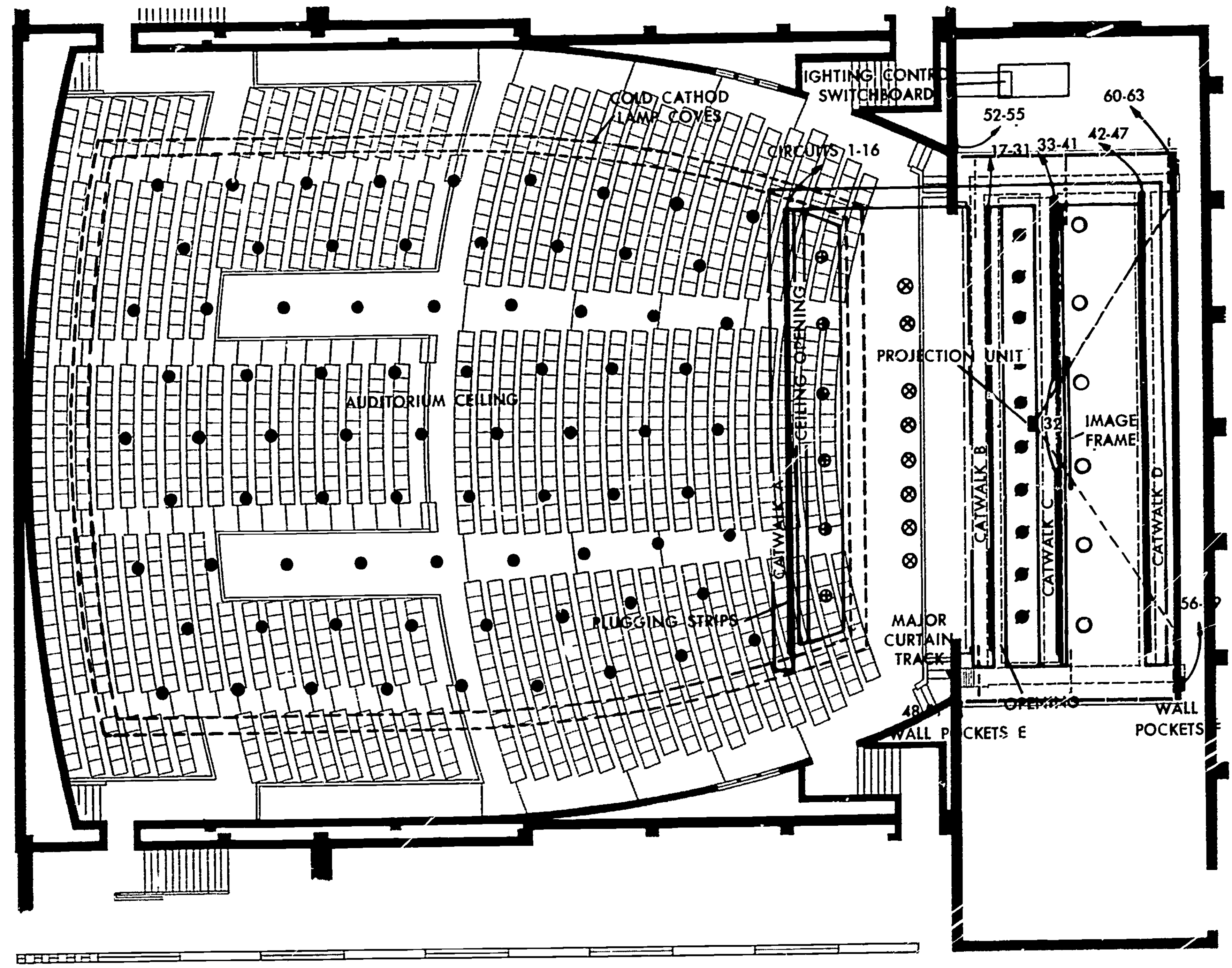
*Circuits 1-65, for stage lighting, controlled through cross-connecting panel. Each circuit must have own neutral. Circuits 101-118 for general lighting controlled by motor driven dimmers.

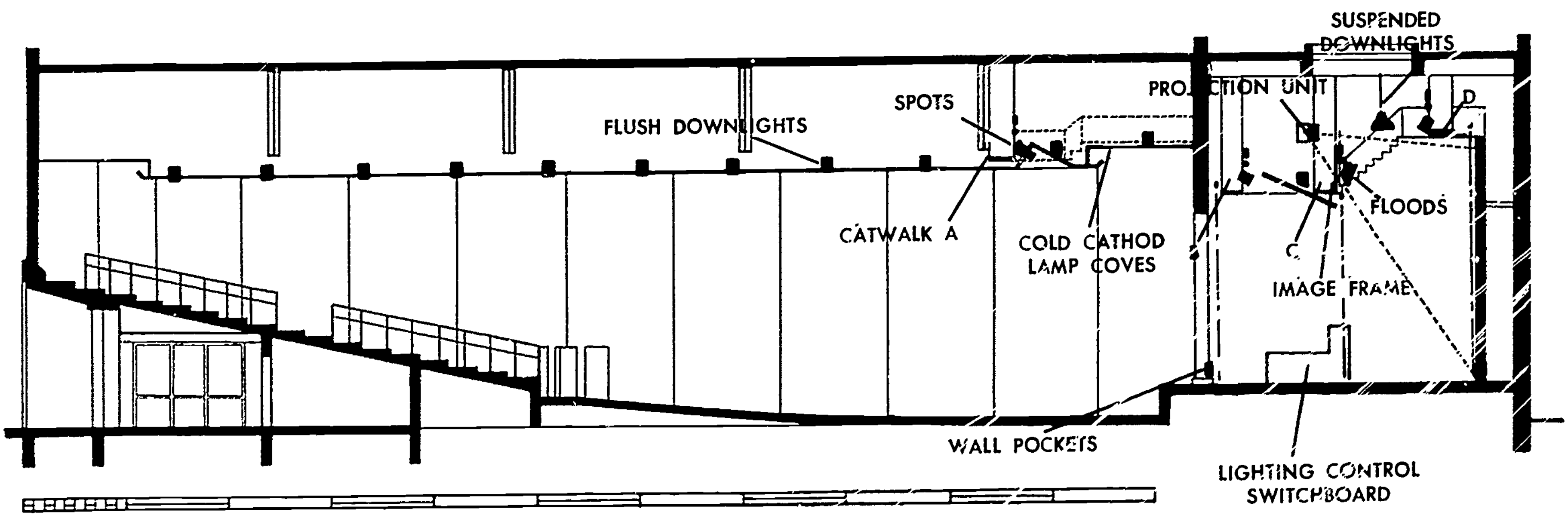
†6 receptacles adjacent to each side of image frame on 6 circuits for floodlights; other receptacles on individual circuits.

Lighting Equipment Schedule

For Modified Proscenium Stage

Of Trinity High School





MANUAL FLEXIBLE CONTROL SWITCHBOARD

Model WS-642-E
Auto-transformer type.

- **Dimming Facilities:**

For stage lighting:
6 groups of 1—6600 watt master and 3—2500 watt minor dimmers.
1 group of 4—2400 watt non-dim control.

For general lighting of stage and auditorium: 4—6000 watt dimmers.

- **Control Facilities:**

Manual dimming control of stage lighting: 6 proportional dimming groups, each with one master and minor dimmers.

Each master dimmer serves a dual function: it can operate independently or as a proportional master. It has mechanical interlock handle extending its control to master handle.

Each minor control unit is of the modular plug-in type and has non-interlocking handle. It can operate independently or under proportional control.

Motor driven dimming control of general lighting: Dimmers for stage, auditorium and coves on separate motor drives.

- **Switching Facilities:**

Single cascade control of stage lighting with contactor for each master dimmer.

Stage Master.
Master dimmer on independent or as proportional master. Minor dimmer on independent or under proportional control.

House ON-OFF and transfer switches by contactors and relays.

- **Extended Control Facilities:**

ON-OFF switching control of Bank-master at Auditorium rear.

General lighting and dimming control at auditorium rear.

ON-OFF switching of general lighting at auditorium rear and usher's stations.

- **Cross Connecting Facilities:**

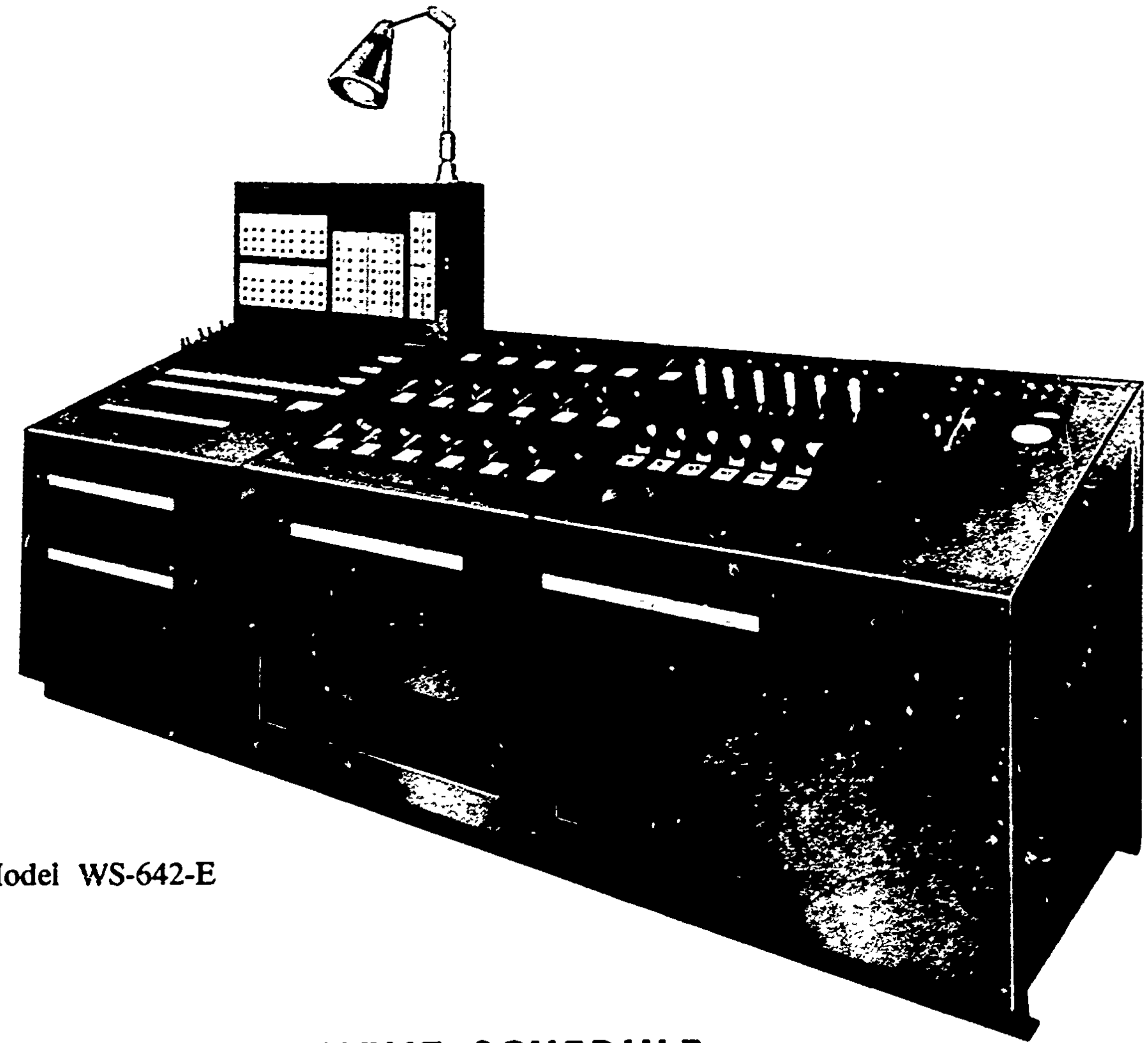
Integral plugging panel with 60-75 retractable cords and SAFETY-TYPE plugs for each stage branch circuit. Six multi-finger jacks for each 6600 watt dimmer, three for each 2500 watt dimmer and non-dim control.

Load tester with meter and jack.

- **Physical Data:**

Baked gray-green wrinkle enamel finish.

Approximate Overall Size: 106″ x 53″ x 36″ deep.



Model WS-642-E

LIGHTING EQUIPMENT SCHEDULE

TRINITY HIGH SCHOOL

Hub Cat. No.	Qty.	Lamp Spec.	DESCRIPTION	Function	*Circuit No.
CATWALK A (Downstage Acting Area Lighting)					
20009-F	1		Plugging strip 52 ft. long with (18) 20 Amp. duplex pin plug receptacles with (x) multi-finger floating jacks, terminal block, and mounting brackets.	Distribution of (16) circuits.	1-16
8809	6	1000/G40-SP Mog. PF	Fresnel spotlight with 8″ oval beam co-louvered fresnel lens, color frame, C-clamp, 6′ leads and 20 Amp. pin plug.	Visibility color-fill	
8764	18	500/750/T12/9 Med. PF	Ellipsoidal spotlight with 6″ co-louvered step lens, framing shutters, color frame, C-clamp, 6 ft. leads and pin plug.	Dramatic pools of light; side accent.	
403	12		C-clamp with vertically adjustable pipe and adjustable mounting brackets.	Maximum flexible positioning of spots.	
601-K	12		Extension cables, 50 ft. long with male and female pin plugs.		

LIGHTING EQUIPMENT SCHEDULE

TRINITY HIGH SCHOOL

Hub Cat. No.	Qty.	Lamp Spec.	DESCRIPTION	Function	*Circuit No.
CATWALK B (Upstage Acting Area Lighting)					
20009-F	1		Plugging strip 52 ft. (21) duplex pin plug receptacles.	Distribution of (15) circuits.	17-31
8811	12	1000/G40/SP Mog. PF	Fresnel spotlight with 8″ round beam co-louvered lens, color frame, C-clamp, 6′ leads and pin plug.	Directional illumination.	
8360	9	500PS40-IF Mog. PF	15″ Scoop floodlights with ALZAK reflector, yoke, C-clamp, color frame, 6′ leads and pin plug.	Visibility Color-fill	
403	6		Same as before.		
CATWALK C (Panorama Projection and Upstage Cross Lighting)					
11328	1		Surface mounting pocket with single pin plug receptacle.	Distribution of a circuit.	32
79031	1	PH-1000/T20/40 (DSB) PH-1500/T20/39 (DTJ) Mog. PF	Projection unit with 4-way matting shutters, tilt lamp adjustment, blower, 12 ft. lead, and pin plug.	Transfer of image to panorama wall.	
420	1		Projection unit mounting assembly.	For precise adjustment.	
421	1		Image Frame mounting assembly.	For various sized frames.	
20009-F	2	†	Plugging strip 22 ft. long with (6) duplex pin plug receptacles.	Distribution of (9) circuits.	33-41
8360	12	500-PS40 I.F. Mog. Screw	Same as before.	Color washes on panorama wall.	
CATWALK D (Backlighting)					
20009-F	1		Plugging strip 54 ft. long with (12) duplex pin plug receptacles.	Distribution of (6) circuits.	42-47
8768	6	750/T12/9 Med. PF	Ellipsoidal spotlight with (2) 6″ condenser lenses, framing shutters, color frame, C-clamp, 6 ft. leads and pin plug.	Separation of actors from scenery.	
WALL POCKETS E (Downstage Side Lighting)					
304	2		4-gang type with door, and (4) duplex pin plug receptacles.	Distribution of (8) circuits	48-55
20110	2		Tree with 10 ft. vertical pipe, 3 sets cross-arms, 24″ cast iron base, and plugging strip with (3) duplex pin plug receptacles and (3) 6 ft. leads with pin plug.	Support of units for low side.	

Continued on next page.

LIGHTING EQUIPMENT SCHEDULE

TRINITY HIGH SCHOOL

Hub Cat. No.	Qty.	Lamp Spec.	DESCRIPTION	Function	*Circuit No.
8768	6	500/T12/9 Med. PF	Ellipsoidal spotlights as before.	Accent lighting.	
			WALL POCKETS F (Panorama)		
304	2		Same as before.		
21632	6	150/A23/I.F.	Striplight 8 ft. long with (12) reflectors with color frames for gelatine or roundels, wired on 3 circuits, castered cradles, (3) 6 ft. leads with pin plugs.	Occasional horizon glow.	56-63
20824	3	60/A19/IF Med. Screw	Striplight 30 inches long with (8) receptacles, hook, 6 ft. leads and pin plug.	Interior set illumination.	
602-K	7		Extension cables, 25 ft. long with male and female pin plugs.		
			DOWNLIGHTS (Stage)		
3540-S ○	6	500PS40-IF Mog. Screw	Suspended reflector unit with stem and swivel outlet box cover.	General lighting on Dimmer A.	101-104
8583-F ⊘	10	300-R40 Med. Screw	Flush mounted with Micro-Baffles and plaster ring for sloped ceiling.		
			DOWNLIGHTS (Fore-Stage)		
8956 ⊗	9	300 PAR-56 Flood	Flush mounted with gimbal adjustable rings, louvered, and color roundel (optional).	General lighting on Dimmer B.	105-106
			DOWNLIGHTS (Auditorium)		
8583-F ⊕	6	300 R-40 Med. Screw	Same as before.	General lighting on Dimmer C.	107
8908-F ●	77	300 R-40 Med. Screw	Same as above for flat ceiling.		108-125
			COVES (Auditorium)		
7899	Special Cold Cathode		Light Strips with two rows of staggered lamps, custom-built.	Effect lighting on Dimmer D.	126-129

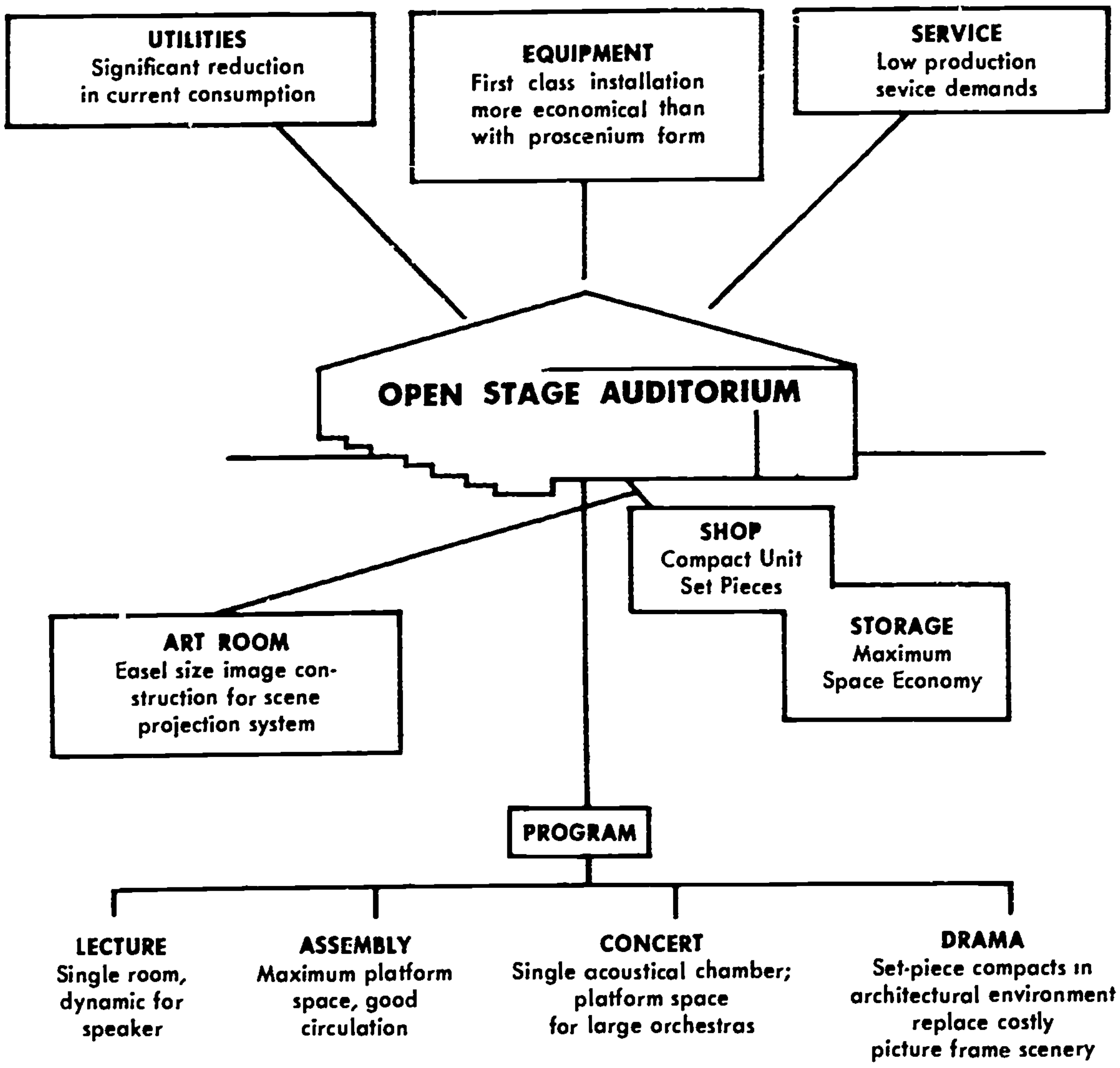
(x) All receptacles provided with 20 amp. multi-finger floating jacks for positive electrical contact. Receptacles are also available with 2-pole plus ground (add suffix "G" to Catalog number).

○ ⊘ ⊗ ⊕ ●
Symbols are shown on plan-view drawing.

*Circuits 1-63 for stage lighting, controlled through cross-connecting panel. Each circuit must have own neutral. Circuits 101-129 for general lighting, controlled by motor driven dimmers.

†3 receptacles adjacent to each side of image frame on 3 circuits; other receptacles on individual circuits.

Why the Open Stage is Economical, Practical and up to date Artistically



By James Hull Miller

ARCHITECTURALLY, the open stage is a chamber both *visually* and *acoustically* complete, with ample space for a variety of activities. Aside from curtains for effect or closure, the usual complement of teasers, tormentors, wing and cyclorama draperies are *not* required.

The ENGINEERING phase of the open stage includes a *dual* lighting system, one portion for the lecture-assembly-concert program, by means of architectural downlights in dimmer groups by area (such as auditorium, forestage, stage); the other portion, for the dramatic program, by means of specialized theatrical lighting equipment and its lighting control board.

This dual system is more economical in both installation cost and current consumption than the older proscenium-type installations. Furthermore, control for general illumination may be *accessible* while the specialized theatrical lighting control board may be *remotely located.*

A Dramatic Revolution

DRAMATICALLY, a major revolution has occurred in both the nature of decor for theatricals and the *logistics* of construction, shifting and storing of scenic items for the open stage. This has become known as SPACE STAGING.

Space Staging may be defined as the practice of dressing and using separate areas of the stage without having to continue the dramatic environments to the proscenium frame. *Set pieces* standing free in space replace settings which span the stage from side to side. One can represent many scenes simultaneously instead of moving one large set after another into position. Set pieces never need be as large as one continuous set, so the variety and spectacle of the scenery can be increased. Also, for space staging, the larger the stage the better, and with a larger stage other school activities can be accommodated properly.

Today, Space Stagecraft is the one positive answer to the many challenges facing the dramatics instructor. With the overall background controlled flexibly by the lighting system, only set pieces are needed to complete the illusion of environment.

These set pieces can be as spectacular as desired with a fraction of the effort which goes into the full picture-frame set. Since the scale of the settings no longer depends upon the happenstance of the proscenium width, the result is that economy of materials, preparation areas, and labor go hand-in-hand with the most complex productions. With scene changes less burdensome on the open stage, the dramatic pace is quickened. The background projection system and acoustically efficient stage wall replace the cyclorama cloth, cloth backdrops and rigging necessary to raise and lower them.

ARTISTICALLY, the new control over the scale of the setting and the freedom to design *compact* units of scenery within the architecturally finished space of the open stage, permit a range of styles from the most realistic to the most abstract. It also opens up additional sources of supply such as the artist's studio and smaller craft shops.

ADMINISTRATORS'

High School Section

For many years the school auditorium has resembled a conventional theatre with the mechanical equipment missing, and the proper off-on stage space relationship sacrificed. The solution is *not* to restore these, but to create the sort of space which meets the special challenges of a high school program. Below are some typical questions asked by administrators, with answers based on experience with the open stage form.

QUESTION: *The dramatic staff requests a 30 foot proscenium opening; the concert groups, an opening 50 feet wide. How should I resolve this situation?*

ANSWER: The open stage design eliminates compromise since the proscenium is not an aesthetic requirement for open stage dramatic productions. If a proscenium wall is required for building code reasons, the width of the opening should be set for the largest activity.

QUESTION: *Dramatics play a minor role in our school. Will not specifications for dramatic equipment add a great deal to the cost of the auditorium?*

ANSWER: Equipping the open stage completely is not any more expensive than the majority of the older arrangements which incidentally did little for the dramatic program. Architectural arrangements of the open stage auditorium itself replaces most of the curtain equipment. And, the newer, more compact, two system lighting layout (one for dramatics, the other for concert-assembly programs) effects economies in both equipment and in current consumption.

QUESTION: *What savings, specifically, can be effected?*

ANSWER: Up to 25% in equipment; and from 40% to 55% in electrical current consumption, from theatricals to concerts and lectures respectively.

QUESTION: *How is this possible?*

ANSWER: The extension of the auditorium ceiling plane over the forward stage area eliminates the practice of sandwiching solid borderlight strips between cloth masking pieces, and permits a continuation of the more efficient auditorium downlighting. Borderlights consume a great amount of current with relatively low illuminating output, and by eliminating them, it is possible to reduce sharply the capacity of the stage lighting control board. Furthermore, the ideal placement of open stage dramatic lighting instruments encourages an economy of equipment.

QUESTION: *We have an extensive dramatic program. Should I not include stage facilities of the proscenium form in the new auditorium?*

ANSWER: Should a secondary school education be one of learning principles or of acquiring specific techniques? If an apprentice-type education is not involved, it would appear that the open stage form, with the lower production cost factor, would be the most ideal for the secondary school.

Proscenium and open stage art forms are quite different in the methods they use to organize the dramatic environments. A stage which serves both forms well is complex and expensive. The proscenium was developed in order to perfect the more pictorial aspects of "changeable scenery", while the open stage, with a very old tradition, solves many space-time requirements of environment in a manner highly ideographic.

QUESTION: *It is not so much the design of the auditorium as the provision of space for the fabrication and storage of sets which is a problem. Does the open stage auditorium plan help with this problem?*

ANSWER: Definitely. Open stage scenery is unit scenery placed at the heart of each playing area and its form is naturally compact. The logistics of preparation and storage of open stage sets make sense in the high school.

QUESTION: *Our auditorium must serve also as a community center. Would not a proscenium design be essential for commercial bookings?*

ANSWER: The economy of the theatre is shifting; thus touring companies which require the rigged stagehouse and proscenium frame arrangement seldom contract for auditoriums seating under 2000, and companies which can afford to play to smaller houses already have a more versatile stagecraft. Exclusive of the booking phase, the open stage is the more practical space for a general community program of lectures, concerts and amateur theatricals.

QUESTION: *What about conflicts of schedule between a strong dramatic program and other auditorium activities?*

ANSWER: There are three considerations that minimize such conflicts:

1. There is the dual lighting system: downlighting for all general activities and special theatrical lighting for dramatics . . . each system with its own controls.
2. Settings for open stage are "compacts", easily maneuvered.
3. Overall backgrounds beyond the practical set pieces are created by illumination rather than by paint and cloth.

QUESTION: *What are some specific drawbacks to the majority of conventional auditoriums in our schools today?*

ANSWER: Most stages are badly overdraped, leading to excessive sound absorption and poor acoustics. The rows of overhead teaser cloths serve no useful purpose where no fly loft is present. Between these teasers are the borderlight strips, more than required because of the limited lighting angles.

The multiplicity of tormentor and teaser curtains emphasize the "picture-frame" quality of the stage and this in turn requires the maximum of scenic decor for dramatic environment.

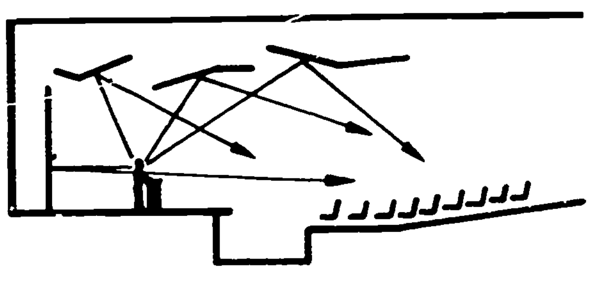
These drawbacks can not be dealt with singly. They are so completely interrelated that to correct any,one had best start from the beginning, from a study of the auditorium program as a whole. And in this bulletin, we consider the open stage form as a unified or integrated solution to problems presented by a varied program.

QUESTION: *Some educators favor the removal of dramatics from the program requirements of the auditorium and the creation of a modest but more specialized facility such as a "double-classroom". Does this solution have merit?*

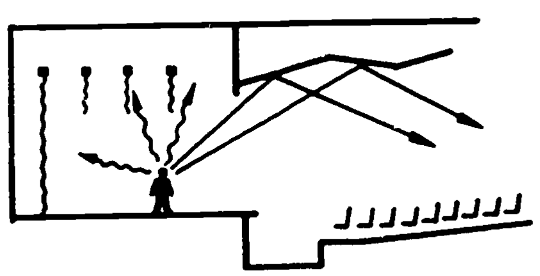
ANSWER: This solution has serious limitations. There are many valuable dramatic experiences such as concert, dance, operetta, and musical comedy which cannot be programmed into the classroom theatre. Proponents of this theory are generally proscenium-oriented and are uncomfortable on a larger platform. "Open staging" is at home on these larger spaces provided they are properly designed. It is an administrative responsibility to see that philosophies of production are evaluated with objectivity.

QUESTION: *How are acoustics for the open stage?*

ANSWER: The extension of the auditorium ceiling over the platform and the presence of the firm plaster wall for background projection reinforce the acoustical qualities desirable for the "sending" end of the auditorium. The open stage approach to auditorium design might be described as the enclosure of the audience and the performance platform in one architectural (and therefore acoustical) envelope.



OPEN STAGE



PROSCENIUM STAGE

Comparison of the proscenium and open stage forms demonstrate that all sound is projected from the open stage while a large proportion of sound is lost in the "stagehouse" with its conventional curtains which form a stage enclosure that is acoustically negative.

College Section

The small college theatre may be:

1. A dramatic club,
2. A departmental educational unit, or
3. A combination lecture room and theatre chamber.

These facilities differ from the high school auditorium chiefly through a less centralized administration, with more responsibility for the program vested in the operating staff. Consequently, administrative questions will be related to specific situations. As in the preceding section the questions are those more frequently asked, rather than those representing a complete coverage of this phase of theatre design. Answers are based on experience with the open stage form.

QUESTION: *In a small college department, with funds for only one building, what sort of a theatre should be constructed?*

ANSWER: Educators have said that a student familiar with open stage design technique can adapt very quickly to proscenium, but that students trained first in proscenium have a more difficult time adapting themselves to the open stage.

This is because scene design concepts for the proscenium stage are fairly close to those for television and the motion pictures while a great deal more imagination is required to design easily on the open stage.

QUESTION: *Would not a theatre adaptable to various styles be the best solution?*

ANSWER: An adaptable theatre is very useful. However, it is only fair to warn the administrator that he is undertaking a fairly complex problem, one to which no really artistic or economical solution has been found. In the first place, proscenium and open stage forms have quite different seating plans and adaptability requires some sort of audience rearrangement. Second, much of the "style" of a theatre is lost to the anonymous look of an adaptable system. Third, the more mechanically efficient adaptability becomes, the more frozen are its patterns for the future.

QUESTION: *Does not a proscenium-oriented forestage-pit hydraulic lift combination help solve this problem of adaptability?*

ANSWER: This is a very difficult question to answer. In the Community Theatre section that follows I recommend such a type of lift because it will help expand the scheduling of the theatre for lectures, concerts and meetings of a civic nature . . . all activities ill-housed behind a proscenium frame. I would be less inclined to recommend it here because I do not think a really good open stage experience results from this arrangement, unless the proscenium frame is architecturally de-emphasized to the point where its presence is not felt when the two stages are used in conjunction.

It must be remembered that such a hydraulic device used as an orchestra pit subtracts area from the playing space *at that very time* when the maximum playing space is needed for operas, operettas, and musical comedies.

QUESTION: *Can the open stage be faithful to the intentions of a script written for the proscenium theatre?*

ANSWER: A playwright creates what he hopes is a marketable commodity. His style of scene arrangement is influenced by whatever production methods are available. And I certainly do not believe specific production methods affect the genesis of his material. Thus, the fidelity to the literary style of the original script is not in jeopardy; rather, there is involved only the technical transposition of scenes from the one physical discipline to the other.

QUESTION: *Does not an educational institution have an obligation to its students in the presenting of the great dramas in a manner faithful to the periods to which they belong?*

ANSWER: Ideally a number of theatres of various types should be built, but this would be more possible at the university level. However, it is well to remember that the open stage spans the greater part of western tradition and represents the majority of oriental theatre styles.

QUESTION: *These program arguments for the open stage are most convincing, but do you have production photographs which show a variety of sets on the open stage?*

ANSWER: Frankly, I do not have photographs that are particularly meaningful. The impression an audience receives from an open stage experience is difficult, if not impossible to capture on film. The production environment is not organized in a pictorial fashion; rather, the dramatic environment consists of visual ideas set in the one space of the theatre, the space which contains both seating and playing areas.

The spectator may be aware of this relationship but subconsciously he sorts out the dramatic form from the architectural background. I have yet to see a photograph which does justice to the open stage. Actual models are more interesting, and, of course, good sketches help.

QUESTION: *How much equipment should the college theatre have for student training for later-in-life situations?*

ANSWER: Of course, dependence on equipment may weaken the art of improvisation, while ignorance of equipment may lessen technical achievement. The real danger from equipment systems, however, come from the rigid procedures which any highly mechanical method sets up. Students should be told that there never has been any proportional relationship between good theatre and the amount of equipment in its service. No blanket recommendation can be made in answer to this question. Each college program must be evaluated individually. Opinion is divided here, ranging from the "theatre of limitations" to a "machine for theatre".

QUESTION: *What is your definition of a "theatre of limitations"?*

ANSWER: A "theatre of limitations" is a negative term for a space whose definition suggests specific lines of scenic development. Brilliant technology within this form is the rule rather than the exception.

QUESTION: *Reports of so-called "uncommitted spaces" continue to appear in many theatrical and architectural periodicals. What is your opinion of theatres whose forms are created by each production?*

ANSWER: It is easily understandable why enthusiasm for the uncommitted space is at an all-time high. *Until* the formula for a really popular theatre subject-matter and style is discovered, no one knows what contemporary form will be our heritage. Therefore, experimentation is a vital and necessary phase.

In creating such a space, however, the client must not only be an adventurer but must be willing to undertake the greater costs of experimentation in time and materials, production by production. Unfortunately, much touting of the uncommitted space serves only as a camouflage for lack of decision.

QUESTION: *All the stagecraft of which you speak would appear to be perfectly valid for the large proscenium stage, would it not?*

ANSWER: It is perfectly true that space stagecraft has often been the salvation of artists faced with the large proscenium frame stage, though one has to dress the overall proscenium stage with something in the way of curtains or cyclorama units before the set pieces can be used. The open stage is dressed already by an extension of the auditorium walls and other neutral devices creating a single architectural envelope of the seating and playing areas.

ADMINISTRATORS'

Community Theatre Section

QUESTION: *Our audience enjoys seeing the latest shows from New York with copies of the real Broadway settings. Can the open stage simplify our production problems?*

ANSWER: Definitely not. In fact, the open stage may increase your problems. However, if you are willing to *redesign* these shows, using open stage concepts, you will be able to put them on with considerably less expenditure of materials and human effort.

QUESTION: *At present the majority of community theatre productions require indoor settings. Does not the open stage make this sort of setting more difficult to design?*

ANSWER: This is one of the questions most frequently asked. Some specific solutions are given in the DRAMATICS section of this bulletin.

The most important factor of design is to learn to consider the permanent architectural environment of the playing area as something distinct from the environment of the play.

Pretend that there is an imaginary proscenium frame around each set piece. For instance, if you have a screen representing three walls of a room, assume that the space around this screen is masked from the audience. Now, imagine that this frame is removed to a position upstage of the screen, and, in reality, that this frame is just a part of the general architecture of the theatre. The transition from proscenium to open stage is complete.

QUESTION: *Do you think that the open stage offers more artistic possibilities for the future?*

ANSWER: Artistically, I prefer the open stage, but I believe that the majority of my theatres were built because they met economic and practical challenges without diminishing artistic possibilities.

QUESTION: *Do you mean that financial limitations have caused some theatre groups to take a second look at their production philosophy?*

ANSWER: Exactly so. The natural desire to create a first-rate experience for an audience has caused these theatre groups to search for techniques closely allied to their production potential. The greatest thing about the open stage is that it is a unique space experience.

QUESTION: *Then would it not follow that the open stage is not the stage for the majority of different styles?*

ANSWER: No single stage is, not even the proscenium. I think you can create just as good a room set on the open stage, for instance, as you can on the proscenium stage, but you must work with the visual idiom of the open stage and not transport the proscenium box set to the open stage.

QUESTION: *You have stated that the open stage theatre is more economical to build, yet are not the audience and playing areas about the same for open and proscenium?*

ANSWER: There are two main reasons why open stage is more economical to build:

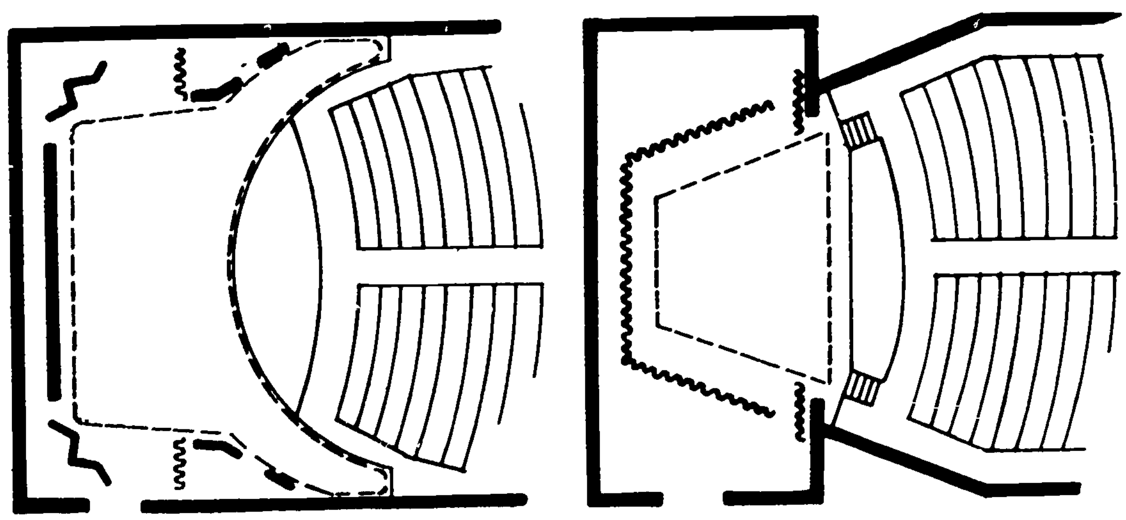
1. It is a low rise building, and
2. The logistics of settings are different than proscenium, with a more favorable ratio of service to playing area.

QUESTION: *Does active civic use of the theatre in addition to the regular dramatic productions influence the planning of the architectural toward one form over another?*

ANSWER: In my own experience I have found that the open stage is more suitable for a variety of activities than the proscenium stage. Lectures, concerts, and meetings are best staged on a platform rather than conducted from within the framed stage. An adequate forestage solves this in part, but each foot of forestage depth makes the picture frame stage more remote.

QUESTION: *Does not a forestage-pit hydraulic lift combination solve this problem of staging in both platform and proscenium forms in one building?*

ANSWER: It certainly offers some flexibility, especially where audience seating can be accomplished when the lift is not in use as pit or forestage. However, a lift adequate for this sort of program may run as much as $20,000. In a $250,000 building this is a large expenditure; in a $500,000 building, it would appear more reasonable.



Shown here is a direct comparison between the proscenium and open stage forms in terms of usable space, with a viewable working area 2½ times larger for the open stage in the same size building. In the case of the proscenium stage the service wings shown are even smaller than dictated by the accepted formula of wing width equal to ½ the proscenium width. The open stage shown is based on the Longmont, Colo. plan with strong calipers. The open stage need not depend on wing service areas to implement its dramatic expression. Personnel circulation is solved by the splayed acting towers and portable folding screens.

Direction for the Open Stage

By IRVIN J. ATKINS

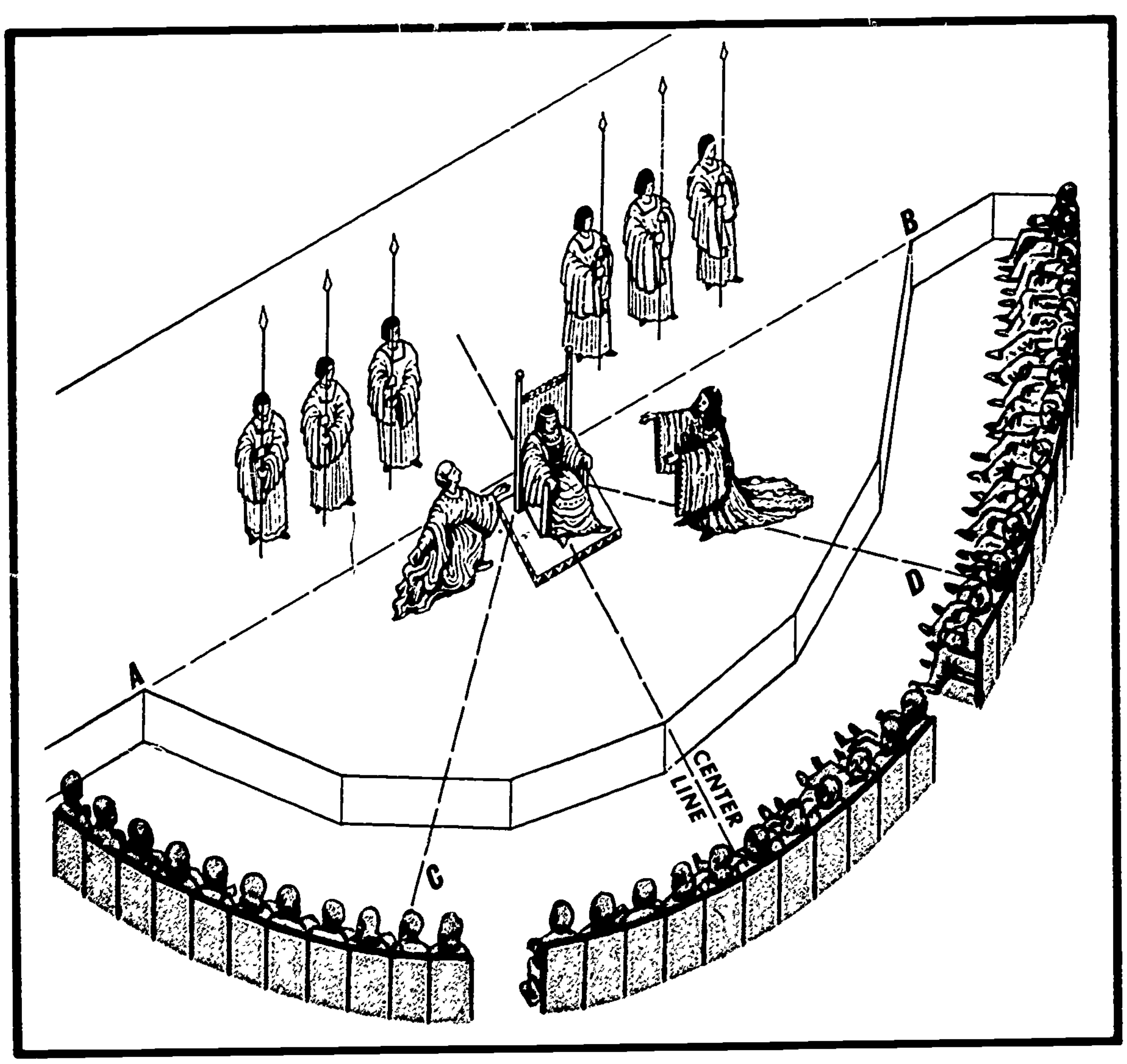
The proscenium stage presents a play to the audience from behind the frame of a picture. On this stage, pictures of each moment are designed by the director to transmit some sort of information to the audience.

The setting and properties convey the environment. Picturization, composition, and movement concentrate on clarifying the drama. Transmission of direct information of this sort is made possible by the fact that all of the audience are disposed before the proscenium opening in an arc C-D as illustrated below. The maximum angle of this arc allows each spectator to view the same basic relationship between objects in space.

Open Stage Dynamics

Where the open stage takes the form of an end stage there is little difficulty. The pictorial principles and dynamics of the proscenium hold. The caliper stage is closely related to the medieval multiple stage form and can be said to be a series of end stages.

Problems start to arise, however, with the fore-thrust or peninsular form. With this type of open stage we begin the process of ranging the audience about the action (as with the half-circle A-B) and pictorial principles break down, for here we find for the first time the challenge of multiple perspective.



Scene would "read" pictorially if audience were withdrawn to the area enclosed by the arc C-D. With audience in the half-circle area of A-B, King and Suppliants must either be moved upstage, a weak solution, or the principle of dynamic focus applied as described below.

Not all non-proscenium stages are multi-perspective stages. For example, anyone who has toured with a show which was blocked for the proscenium stage knows that, regardless of the architectural shape of the room, he finds on arrival at an unknown destination, he must play his show at one end, or side, with the audience before him.

This is the arrangement which best suits his presentation, and best solves his technical problems. The most important component of the proscenium is impressed upon the available space — the audience seating directly in front of the stage area.

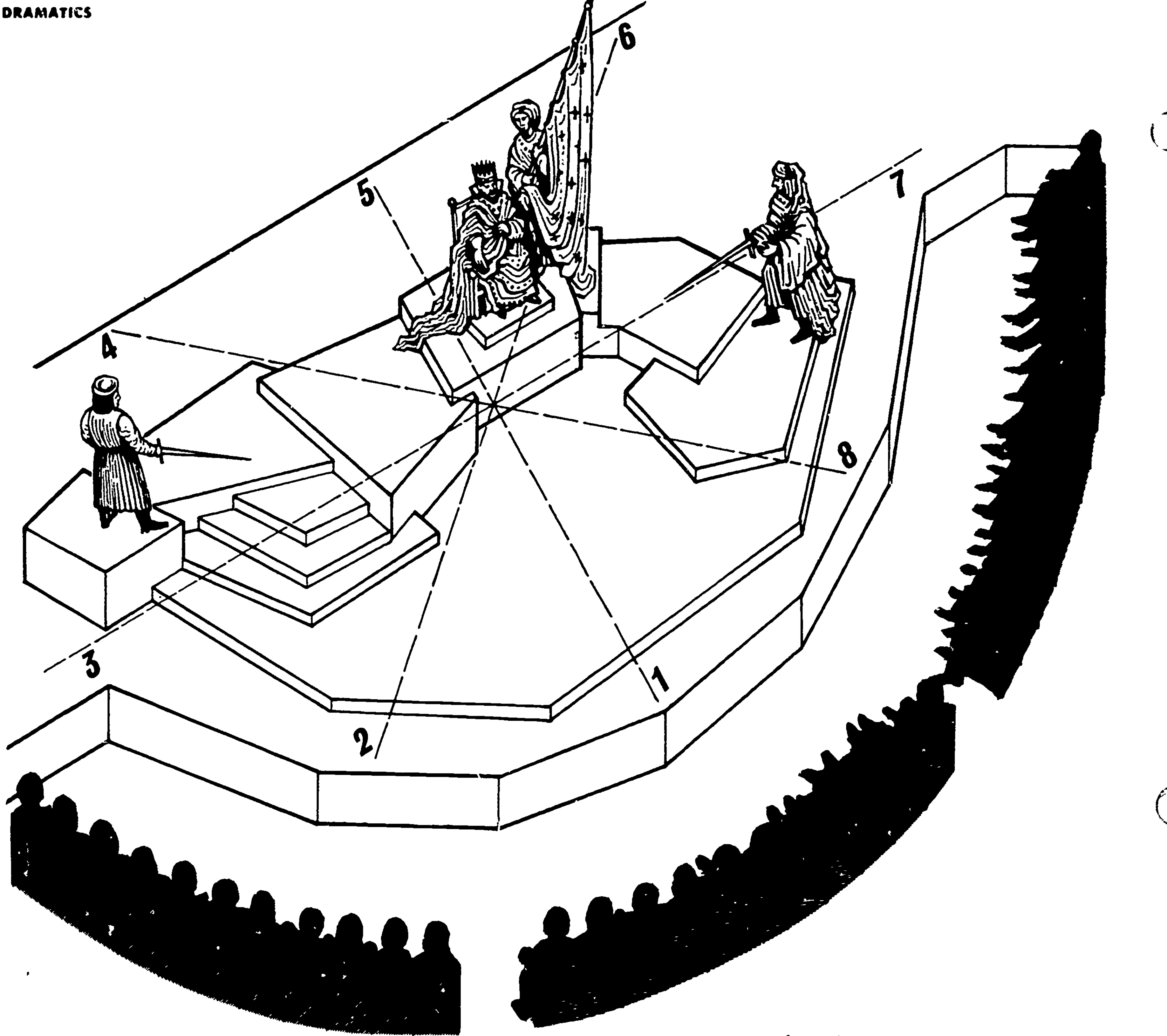
As long as this matrix is maintained, an actual proscenium arch is not a necessary feature; nor, for that matter, is a raised platform, though it may help sight lines. Our perceptual patterns have organized the space into a virtual proscenium.

The Multi-Perspective Stage

A multi-perspective stage organizes the audience about the playing area, not before it. The actual arc subtended is relatively unimportant. The theatre illustrated below shows an audience seated about 180 degrees of a circle. It might easily be 200, 240 or even 360 degrees and the multi-perspective principle would still obtain.

If we reduce the arc we find a lower limit. Once all of the audience is contained within the arc subtended by C-D, the relationship is one of virtual proscenium.

What is important is that the audience outside of this angle, on either side, see different relationships between the actors on stage and so interpret differently. The inability to perceive an intended relationship is the chief difficulty the director must overcome on the multi-perspective stage.



A system of geographical location for the open stage. Levels permit the focus of attention to be reinforced by the Knights in offset positions rather than in positions pictorially oriented about a single audience perspective.

Spatial Relationships

The main problem on the multi-perspective stage is the problem of spatial relationships. The auditory, cognitive, psychological, and interpretative problems of the play can be solved adequately with the tools available through training for the proscenium stage. It is exclusively in the sculptural, pictorial, and kinetic aspects that difficulties are encountered.

In this area, the stage director must take his cue from the modern sculptor, rather than from the pictorial artist.

Scene Placement

Generally speaking, with the audience disposed in a semi-circle, the area of the stage beyond the line A-B has been regarded as a virtual proscenium stage and has been used for scenes of static dialogue, tableaux, pageantry, and strictly pictorial scenes.

The area below this line has been used for scenes of action, dynamics, soliloquy, conflict, and other spatial scenes. Not all open stages today have such area divisions, and a system of scene placement must be evolved in terms of a truly peninsular stage.

Position

Stage geography on the fore-thrust stage becomes a rather confusing jumble of terminology unless a new system is devised. Upstage and downstage refer in the proscenium situation to an imaginary axis at right angles to the proscenium arch. So long as the audience is deployed before the actor, the terminology is excellent; once the audience begins to surround the actor, it breaks down.

It becomes much more expedient for the director to give directions in the system utilized by directors in the round, where directions are given according to aisle number.

To utilize the system to greater advantage, the director can set points arbitrarily about a sort of compass rosette as illustrated above. Crosses are then described to the actor by referring to the number assigned to the point toward which he is to move. Thus the actor at the stage can be asked to cross toward "8", "4", "12" or where you will without confusion.

Area Strength

The relative strength of "areas" on the proscenium has been the subject of discussion by authors of directing texts for some time. On the open stage, the subject again takes on a new configuration.

While center still holds the key spot in regard to relative strength for the single actor, the upstage to downstage axis is not longer axiomatic. Once the actor has passed through the line A-B and moves downstage, he becomes relatively weaker. This phenomenon is due to another cause which we might call "frontality", i.e., the greater the portion of the audience able to see the full front of an actor, the stronger he appears.

Solution: Focus of Attention

The focus of audience attention on the proscenium stage is usually controlled through movement, composition, and picturization. As used on the proscenium stage these terms refer to pictorial qualities.

The front-of-the-stage director blocks his show looking straight onto the stage from center, then adjusting slightly for extreme sight lines. In transferring to the peninsular or round, he finds himself frequently doing the same thing from habit. He will build a scene from one part of the house, then another and still another, each time creating a straight-on scene which has little validity for other locations in the audience. True, at some time, every part of the audience will have a scene of its own, but the result is a choppy and unsatisfactory performance of the play.

A better result can be obtained through a shift of directoral perspective from the objective onlooker to the subjective center of the particular grouping. The ability to see the action from the center of focus rather than from an audience viewpoint is an invaluable asset to the multi-perspective director.

Principle in Action

The illustration below shows the principle in action. The two Suppliants in no way diminish the power of the King as focal center since even the front row can see over their heads to this actor. The Chorus block sight lines from a portion of the audience and will become a nuisance if allowed to remain static. To displace them toward the Suppliants would solve the problem of sight lines but alter the implied relationship.

The solution, then, is either to put *them into motion about the focal center,* or to remove them to a place outside the sightlines along the circumference they now occupy. The choice will depend upon the qualities of the particular scene in question: if the scene is fluid the first suggestion may be acted upon; if static, the second.

The principle to be grasped here is simply that *the center of focus on this stage becomes the nucleus about which everything moves.* Thus the figure at center is more static than the figures about him, who are viewed as "ground".

Focus can then be shifted quite easily by selecting the figure about whom the ground will move. It will soon become apparent that the motion need not be circular, as the single illustration might imply, or even symmetrical, to achieve its effect, but that even the slightest shift in the pattern of motion will reinforce focus, shift focus, or even defocus.

This illustration shows the stage from the perspective of the King. His elevation above the Suppliants clears his sightline to the audience while the Choral Group maintains a series of dynamic positions by moving towards the left, thus continually clearing sightlines as well as emphasizing the fixed focus upon the King.

Approach to Open Stage Scene Design

Prior to designing for the open stage one must become familiar with some conventions of expressing environment in the free space and quasi-architectural surround of the playing area.

To illustrate some of these conventions we present four experiments. These involve an archway folding screen set, accessory shutters, and a bench, which are placed downstage of our panorama wall as shown below.

Experiment 1. Dark blue panorama from overhead scoops, oblique shaft of blue-green light passing through an arch, soft-edged orange spotlight pool downstage of arches. Scene: interior, late evening.

Experiment 2. Dark blue panorama from overhead scoops, soft-edged orange spotlight pool upon very low center of panorama, soft-edged blue-green spotlight pool downstage of arches, oblique shaft of orange light passing through arch. Scene: exterior, late evening.

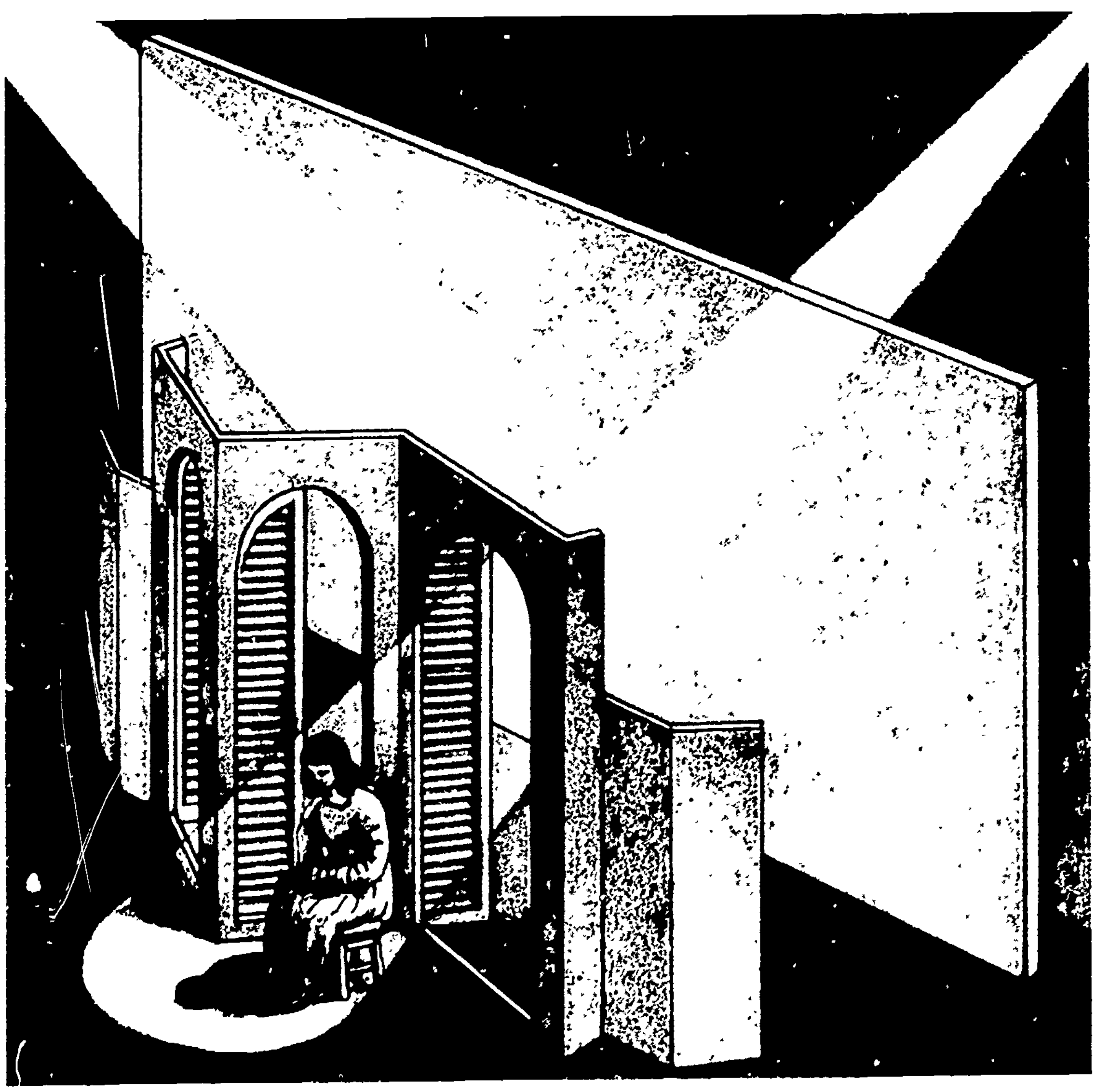
Experiment 3. Add ellipsoidal spotlight from projection catwalk direct to panorama to above set-ups. Scene: as above, with moon.

Experiment 4. Change panorama scoops to orange, pool of light downstage of arches to lavender, soft-edged orange spotlight direct from projection catwalk to panorama. Scene: interior, on a hot, dusty afternoon.

In the light of the above experiments it is possible to draw some conclusions and make some general observations:

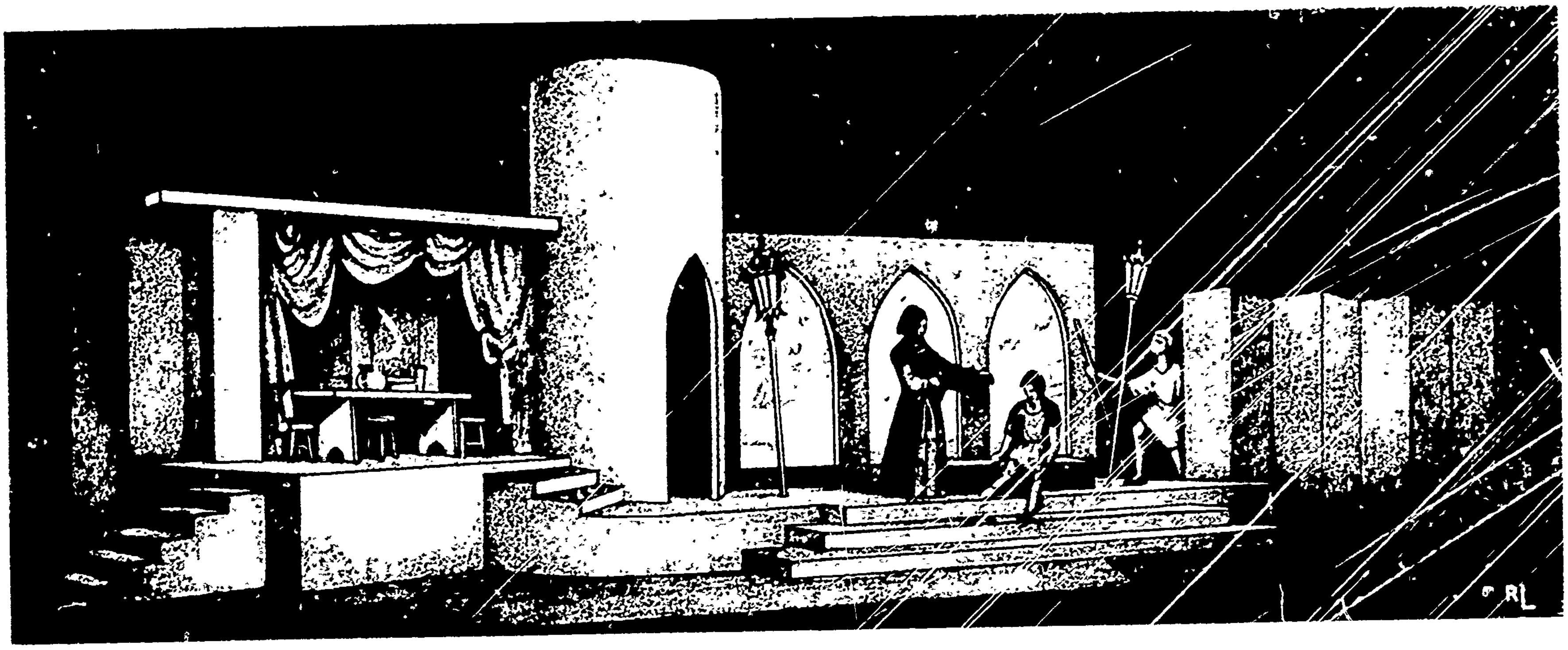
1. Complete pictorial description is not necessary on the open stage, but may exist in part, by degree, as desired.
2. Scenery takes the form of set pieces which dominate the heart of a playing area rather than surround its perimeter. This gives meaning to the phrase "space stage", and frees the playing area for multiple and simultaneous scenes.
3. Dramatic environment may be motivated by light upon highly ideographic scenic shapes.

It is frequently necessary to cover actors' movement to and from, or form sheltered areas in the vicinity of island units. Here shown are flanking sets of opaque folding screen sets. Traditionally of lesser height and panel width than the set pieces they serve, these screens are called "linking screens" and should overlap to the upstage rather than touch the leading edges of set pieces.



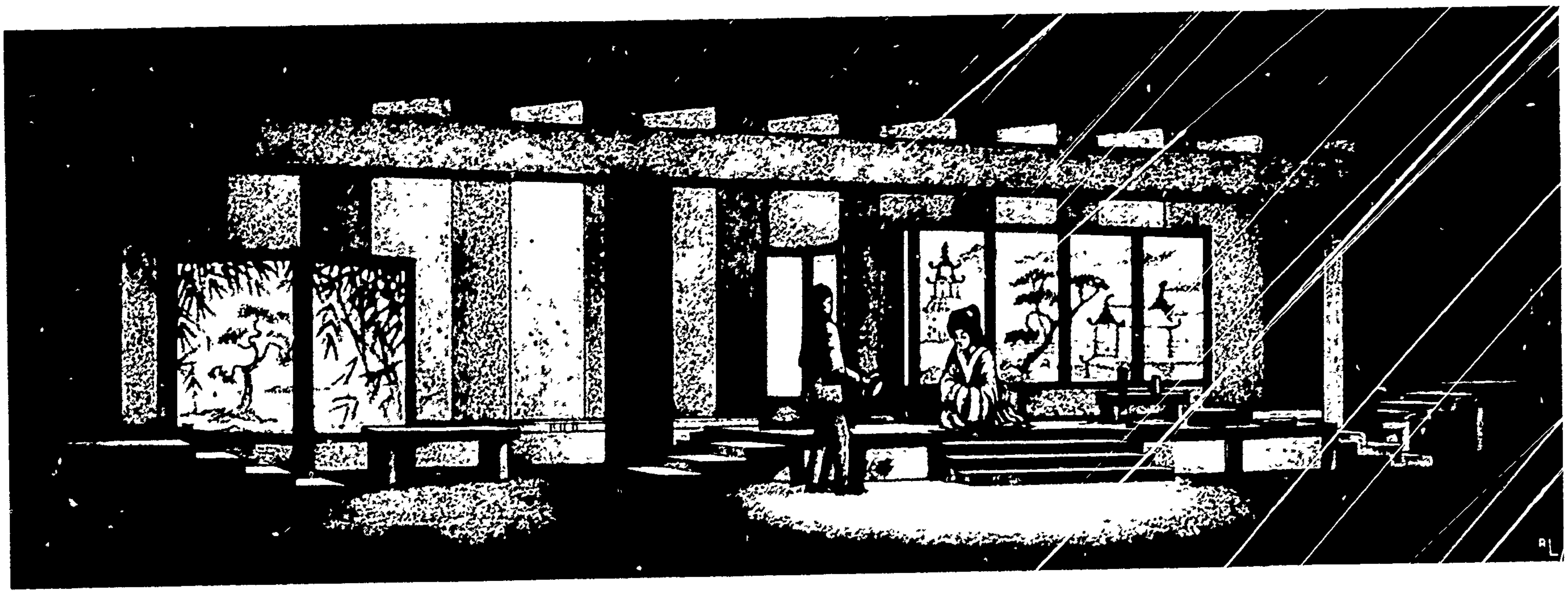
A scene design exercise illustrating some conventions of expressing envir·nment for the open stage.

Examples of Scene Design for the Open Stage



DESIGN PROBLEM: THE LOVERS, by Leslie Stevens. (Samuel French). A bold Medieval melodrama of a tangled romance. Scenes include a crossroads, fields, woods, doorways and the village square, a chapel and crypt, and various rooms in the castle.

THE SOLUTION, as designed by James Hull Miller for a 1962 production at the Orange Blossom Playhouse in Orlando, Florida, employed three basic architectural parts; a large low platform separated from a smaller though more elevated platform by a tower. The tower illustrates the open stage principle of high point toward the center. The large platform for the village and country scenes was backed by an arch arcade with translucent panels for color and pattern, the projection apparatus being located to the rear. The many scenes were handled through the use of properties and lighting and the projection of images, without recourse to a major curtain.

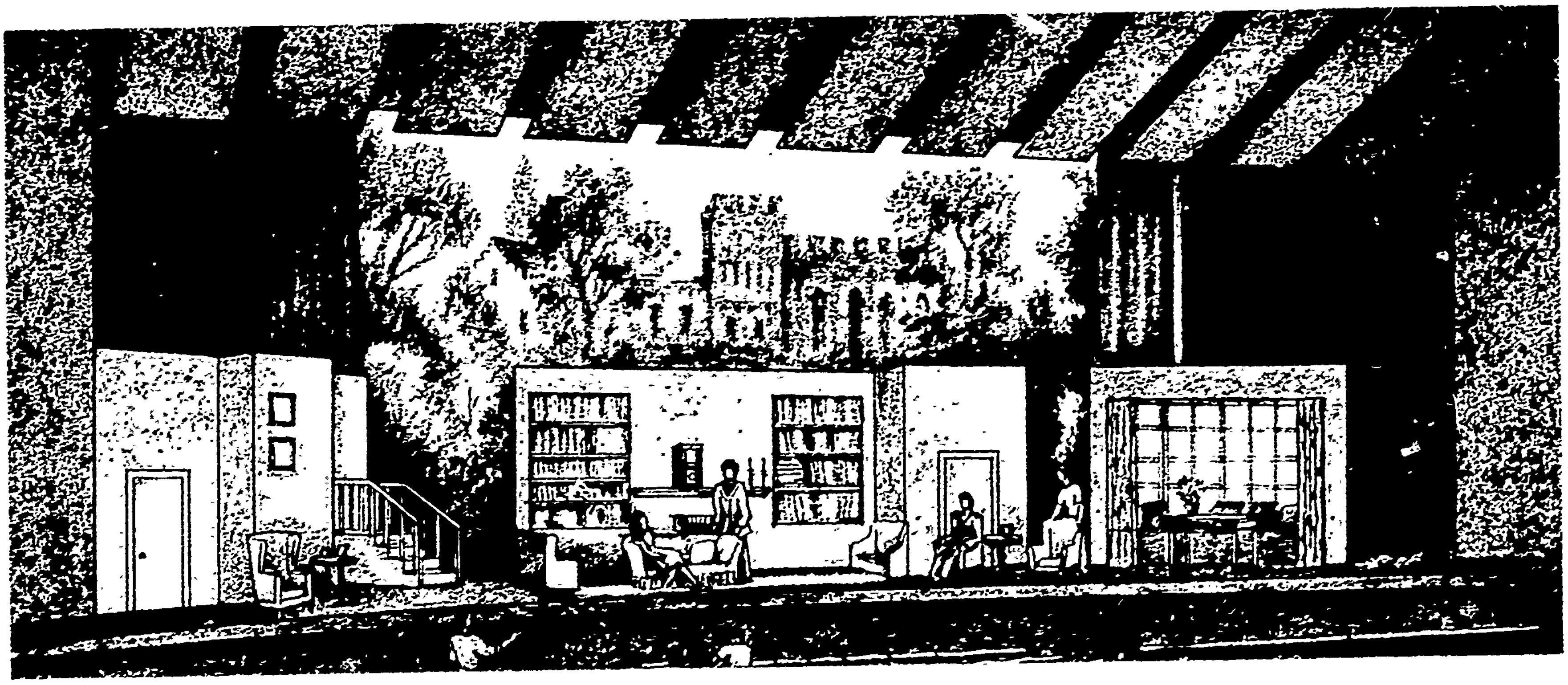


DESIGN PROBLEM: MADAM BUTTERFLY, by Giacomo Puccini. (Ricordi). This famous opera traditionally calls for a Japanese house, terrace and garden, and later, the interior of the house, all at various times of day and evening.

THE SOLUTION, as designed by James Hull Miller for the repertory of the Shreveport Symphony Opera series, 1959 to date, organizes the stage into public and private areas through the use of levels and a four-part translucent screen unit, all set within and before a typical Japanese framework of architecture and panels. Properties, lighting and some projected imagery are descriptive of the dramatic environments, and illumination is regarded as dynamic rather than static. No physical set changes are involved.

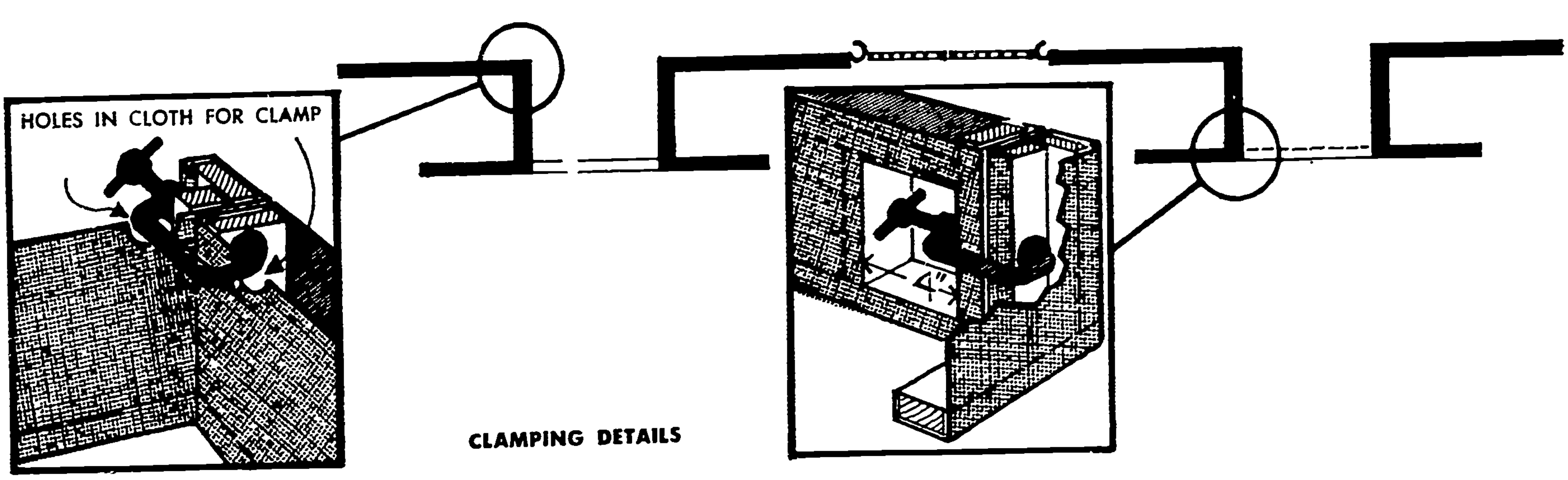
DESIGN PROBLEM: STRANGE BEDFELLOWS, by Ryerson and Clements. (Samuel French). This lusty comedy is played against the colorful background of an 1890 winter parlor in San Francisco's Nob Hill district.

THE SOLUTION, as designed by Nancy Schauer for the 1962 production at the Theatre of Western Springs, Illinois, illustrates the principle of using a set as a nucleus (here a reverse "L") dominating the core of an acting area instead of surrounding it. The terminal lines of the set resolve in space. Additional environmental information such as the fence, tree, and distant mountains (projected) are clearly visible.



DESIGN PROBLEM: THE MALE ANIMAL, by Thurber and Nugent. (Samuel French). This is a lively domestic comedy revolving about a young college professor, his wife, a visitor in the person of a former classmate of the professor, and an idealistic student. It is played in a living room scene.

THE SOLUTION, as designed by Dorothy Hattendorf for the 1963 production at the Theatre of Western Springs, Illinois (and here shown on the stage of the New Providence, New Jersey high school auditorium, by whim of the illustrator), shows the command the open stage possesses over complete environmental description. Using sections of the interior walls as space set piece units, one views the campus itself (in this instance in projected form).



CLAMPING DETAILS

DESIGN PROBLEM: BEAUTY AND THE BEAST, by Nicholas Stuart Gray. (Samuel French). The famous tale retold with many picturesque scenes, the Wizard's Garden, both before the Gate and within the Beast's Castle, and a room in Beauty's home.

THE SOLUTION, as designed by James Hull Miller for a summer 1962 presentation at the Marjorie Lyons Playhouse of Centenary College in Shreveport, Louisiana, used changeable set pieces which included the Wizard's pavilion and the tower units. Shown below the sketch is the ground plan for the tower units and details of the clamping which joined the component parts together. In a similar fashion, the gate posts, made from cardboard rug tubes, were clamped to the flanking walls. Shown beyond the hexagonal pavilion is a folding screen set such as is used for wing control.

Note that the components of a set may extend beyond the panorama and yet appear quite natural. To attempt to encircle the playing area entirely by a cyclorama defeats the space-centered principle of open stage scenery and returns the operation to proscenium conditions.

DESIGN PROBLEM: ON BORROWED TIME, by Paul Osborn. (Dramatic Play Service). A whimsical fantasy on Death, as developed by a grandfather, his grandson, and the Dark Gentleman himself, in a small town house and yard environment.

THE SOLUTION, as designed by Peggy Anderson for the 1962 production at the Theatre of Western Springs, Illinois, is not original with the open stage, but is an imaginative version and a *more spacious* arrangement of the same setting frequently used on the proscenium stage.

Design Interpretation

In conclusion, scene design involves the interpretation of a dramatic environment in the dual terms of its meaning and the physical characteristics of the theatre containing it. Thus one designs in separate fashion for proscenium, open, or arena theatres.

Though the open stage is a form considerably older than proscenium, the latter is more familiar to the average artist, and therefore he thinks more easily in it.

This is not to say, however, that the language of vision for proscenium is any more valid than that for the open stage. In fact, it is quite the contrary, for open stage dramatic environments have always displayed more forthright expressions of time-space relationships than those of the successive scenes of the picture-frame.

Control of Scenic Endeavor

It is also very apparent that a major difference between the conventional picture-frame theatre and the theatre of the open stage lies in the control of the scenic endeavor. In the one the scale is generally dictated by the dimensions of a proscenium, in the other, the scale is entirely in the hands of the designer.

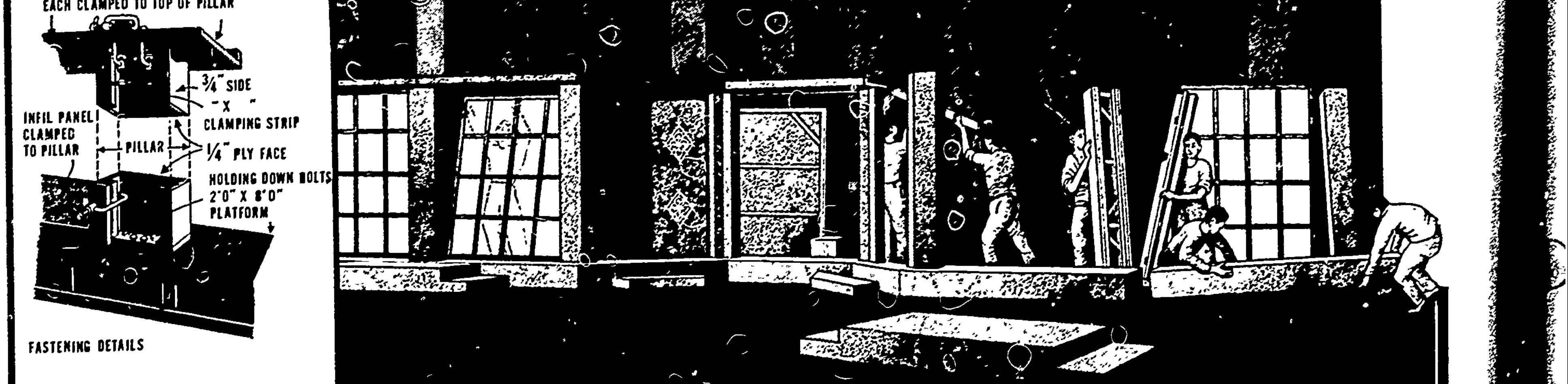
The open stage theatre is an architecturally finished space into which are placed only those objects which are deemed important . . . in much the same way as one hangs a picture or places a piece of sculpture in a room.

Much modern art that would be overwhelming in the full pictorial extension of the proscenium frame is entirely acceptable as dramatic scenery when its scale is properly balanced to the human scale.

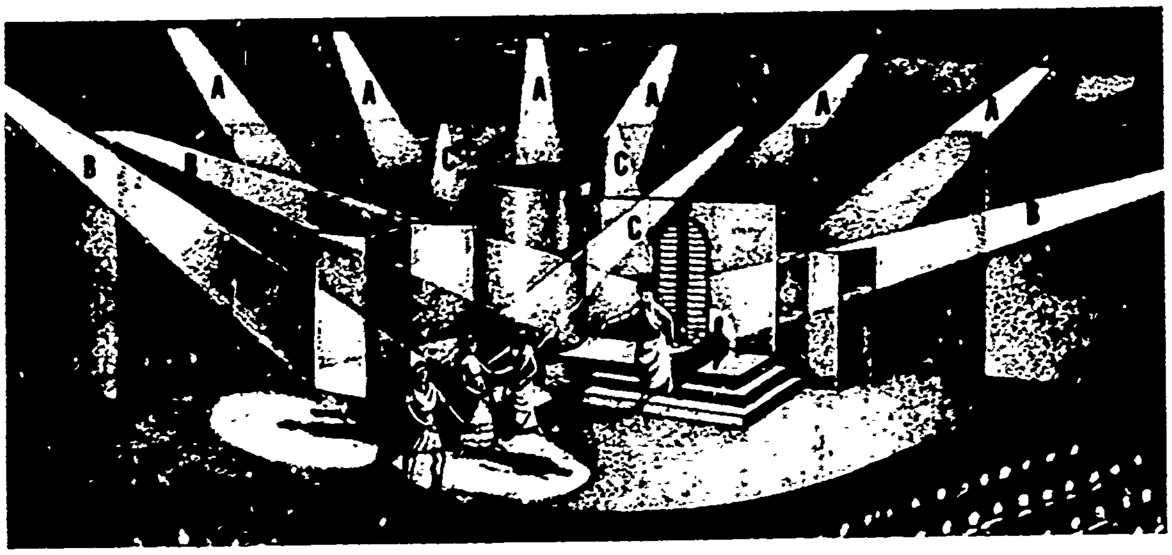
Shown here is an example of the design approach where changeable scenery requirements are redrafted in terms of a permanent structure with impermanent pieces maneuvered within it.

Illustrated in process of assembly is a semi-architectural facade, in this instance a portable framework for Mozartian operas designed by James Hull Miller, for which all removable panels are of a modular system, 6 ft. 8 in. by 7 ft.

With the La Junta auditorium and the Swarthmore theatre, this design approach is basic for the theatre architecture itself.



The Dramatic Lighting



Lighting the open stage involves techniques comparable to those used in studio photography: *fill. directional.* and *highlighting.*

Fill, primarily to achieve color wash and general visibility of facts and action, is by fresnel spotlights, usually equipped with the revolutionary oval beam lenses.

Directional illumination is by fresnel spotlights with round beam lenses.

Highlighting is by ellipsoidal spotlights.

In the sketch above, the lighting beams marked "A" represent both oval and round beam fresnel spotlights, providing fill and directional lighting, and the beams marked "B" and "C" represent ellipsoidal spotlights from side and rear forming the highlighting and furnishing the well-defined pools of light upon floor and set. Such pools of light must be kept to a minimum to avoid distraction.

On the other hand, the forward illumination frequently washes over the set pieces and playing areas onto the architecture itself, an effect desirable in itself in relating the theatre to the dramatic environment, but one which requires the diffuseness of a fresnel lens.

No attempt is made to provide the complete crosslighting pattern found in much proscenium style lighting. Such a pattern was largely evolved to meet the challenge of having to place equipment near the stage behind the teaser and border masking cloths. The greater distance of mounting positions from the open stage affords a superior distribution of illumination with fewer instruments. Borderlights are not required, their function being replaced by the oval beam fresnel spotlights which give a somewhat directional quality to the general illumination which the borderlights did not.

Proper Lighting Control

The open stage is a space where a variety of scenes are grouped in a free form manner. The proper lighting control is one through which the source and placement of illumination can be moved with considerable subtlety.

Overlapping and fractional cues are the rule rather than the exception. An autotransformer board in the hands of an artistically motivated operator makes a good control unit.

Preferred are the arrangements whereby 6000 watt dimmers are associated with groups of 3000, 2000, and 1000 watt dimmers, for electrical series mastering, with independent feed option per dimmer through individual selector switches. (present capacity ratings of autotransformer dimmers also include 6600, 3600, 2500, and 1200 watts for reasons not pertinent to this discussion.)

With this equipment, the operator may "play" the lighting console as he would a musical instrument, as well as set in motion a limited number of prearranged cues. HUB autotransformer boards, Model WS series, are designed to meet the specific requirements of each open stage theatre. See the Lighting Equipment section of this bulletin for typical autotransformer control board specifications.

Remote Versus Direct Control

Where mounting heights of lights are 22 feet or higher, wattages per instrument become greater and the combined loads make the use of a manual autotransformer board impractical. Then, the most practical method of light control is by a remotely located dimmer ban.. where the electrical outputs are regulated by low voltage potentiometers.

Presently, there are three recognized systems, the magnetic amplifier, the reactance and, the semi-conductor, listed in order of increasing cost, each with its peculiar but minor advantages and disadvantages. For the operator, however, the chief differences of remote over direct control lie, positively, in a superior mastering system, and, negatively, in the difficulties arising from the miniaturization of control dials and levers, and the identification of individual circuits for manual adjustments.

Remote control dimmer banks are rarely custom designed since they use higher capacity units, a condition which makes their application to smaller theatres economically infeasible.

Tips For Good Lighting

- Control equipment is equally as important as are lighting instruments.
- Shadows of actors are softened by the use of roughly textured scenic covering materials.
- Multiple shadows of actors may be reduced by using a minimum number of frontal lighting units and a maximum number of accent units from the sides and rear.
- The fewer the sources of illumination, the more dramatic the scene will appear.
- Lighting beams should be soft-edged, to avoid sharp cut-off lines. Architectural and scenic surfaces should be similar in texture for the same reason.
- Light falling on dyed or rough material appears more pleasant and realistic than light falling on smooth, painted surfaces.
- Scenery which possesses radiance in itself, through the use of translucent screens, windows, lanterns and concealed floodlighting, reduces the amount of light required for the actors.

The Non-Dramatic Lighting

The open stage being an ideal space for lectures, meetings and concerts, it is essential that a *uniform quality* of basic illumination be provided throughout the theatre chamber, subject to dimming control by areas such as the auditorium seating, forward stage and main stage.

These dimmer controls should be available to all who use the chamber for non-dramatic programs. Since a number of control points are desirable, some sort of remote control is mandatory. Motor-driven dimmers, with six second speed, offer the most economical solution.

However, if the control board for dramatics is of the remote control type, such as the silicon controlled rectifier or magnetic amplifier types, an additional bank of these dimmers on extended controls would constitute a more useful system for the general downlighting. Positions for extended control stations should include front-of-house, same side of stage as curtain control, lectern, and, of course, the dramatic lighting control board itself.

Stagecraft

Throughout this bulletin, emphasis has been placed on the concept of *self-supporting scenic units.* With such units the overall stage space may be committed to several environmental developments simultaneously, or only that much of the stage area may be employed as would be required for a particular scene.

There are several methods of joining the easily made screens into groupings of a self-supporting nature: *folding joints, clamped joints,* and the familiar *loose-pin hinge.*

Folding Joint Screens

The most useful folding joint is created in the manner of a Japanese screen, with cloth flap hinges of the same material as the overall scenic covering. This produces a flexible juncture of framed panels which is crack-free as well. (Illustration 1, 2).

This folding joint screen set has several distinct applications to the open stage:

- A series of opaque panels, properly arranged, may create necessary off-stage areas.
- Opaque panels, too, may furnish sheltered access to the various playing areas.
- Other opaque panels can form backgrounds to playing areas (Illustration 3, also the FINDLAY sketch in the preceding section).
- A combination of opaque and open screens may create temporary arcades, room interiors, and building exteriors (Illustration 4).
- A series of screens with arched openings may form a pavilion, a most useful three-dimensional unit of great stability.

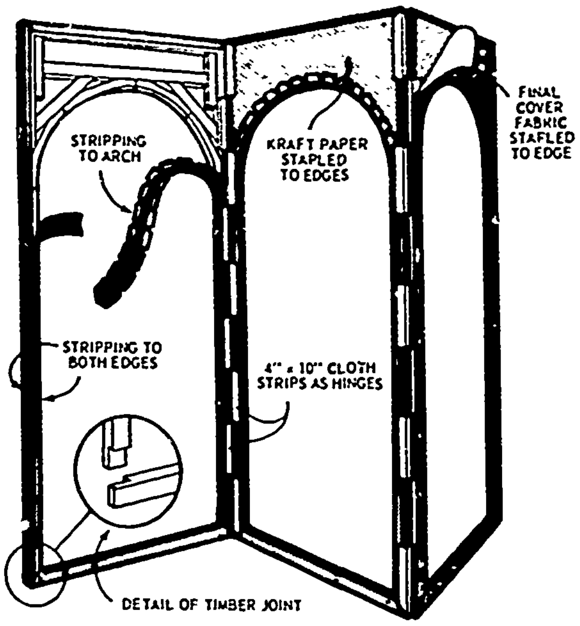


Illustration 2: The folding screen panel incorporating "open" construction. These too, are hinged with cloth flaps.

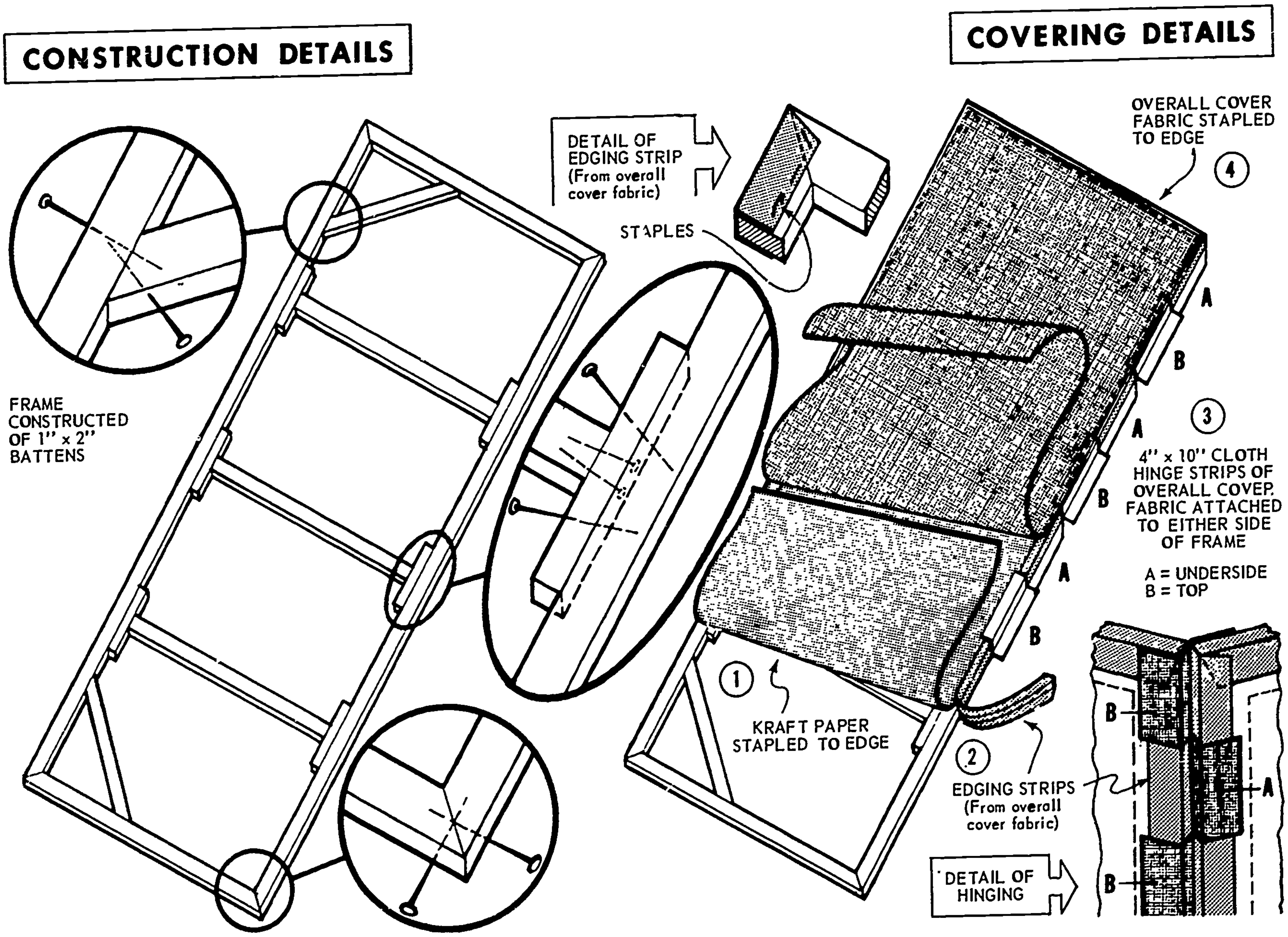


Illustration 1: How to construct the opaque folding screen set. This set consists of a series of light frames covered with textured fabric, and jointed with cloth flaps of the same fabric in the manner of the Japanese folding screen.

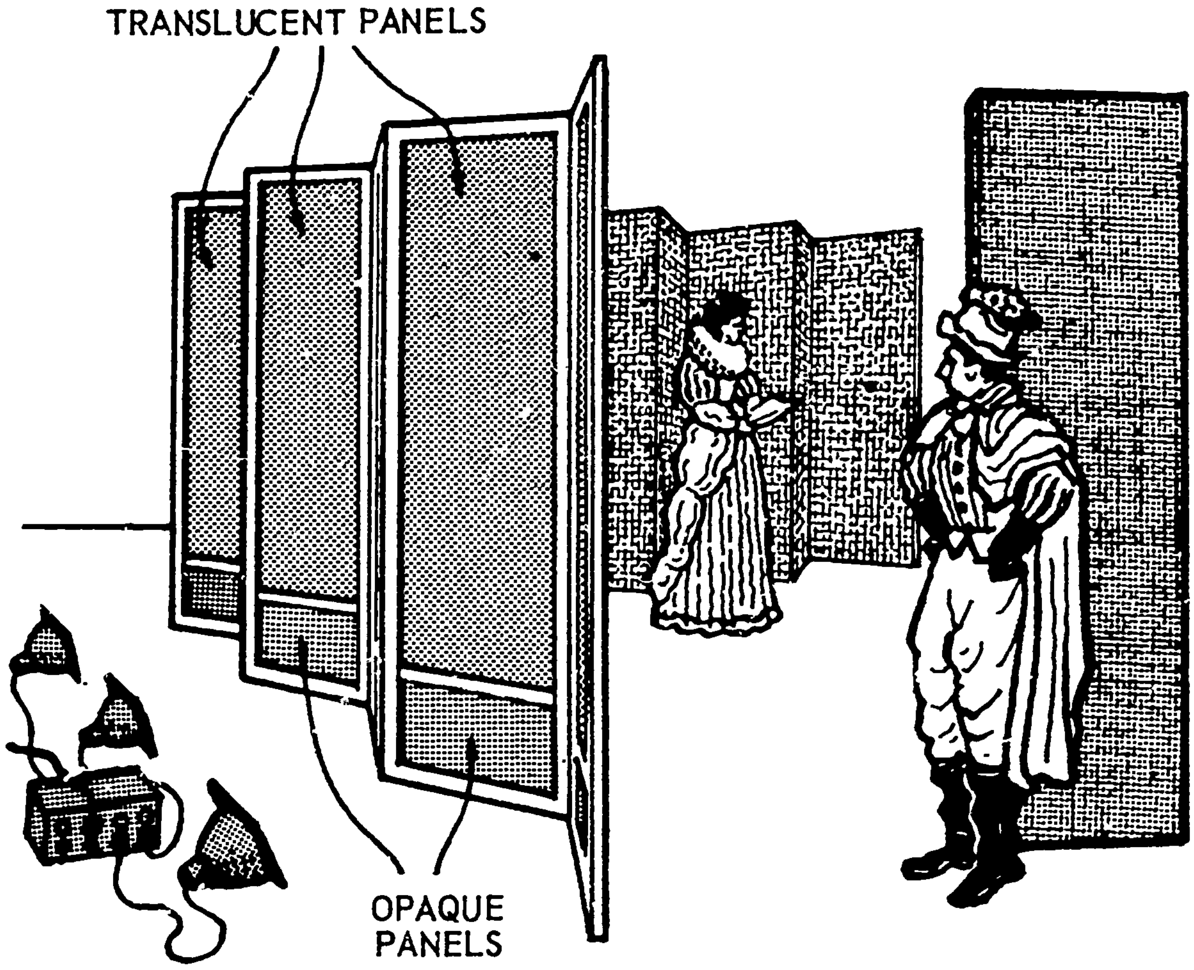


Illustration 3: Folding screens create necessary off-stage areas as well as sheltered access to the various playing areas.

Pavilions

Illustration 5 shows a simple pavilion of five arch screens, flap-hinged, with both leading edges of the set joined to themselves by means of three loose-pin hinges (not shown). Illustration 6 shows a more ambitious pavilion composed of two sets of three flap-hinged screens each, and two separate arch screens. This pavilion is assembled by loose-pin hinge joints between the leading edges of the folding sets and the single arches that are inserted between the folding sets.

Suitable loose-pin hinges for the above can be made by filing down and removing the permanent pins from ¾" by 2" narrow butt hinges and using nails of a slightly smaller diameter as the removable pins.

The rear three arches of the hexagonal pavilion have been closed with framed cotton cloth to form translucent panels for rear projection. In illustration 3 the same type of cloth is used for an illuminated color background effect.

Translucent Panels

The finest translucent projection is obtained by light passing into the fibers of a high quality cotton cloth such as Bates "Disciplined" dress fabric, or, in cheaper grades, Fruit of the Loom or Cotton d'Oro. Ivories, very light tans or winter whites are suitable tints.

By brushing the translucent cloths with lamp dips, lacquer, and other dyes it is possible to achieve some very beautiful backgrounds of a luminous quality. Avoid synthetic cloths for they rip under continued tension.

Shower curtain material and the more expensive translucent plastic screens possess a glazed quality that is not as effective as the mat surface of the cotton fabrics, and are considerably more expensive.

The opaque bottom panels shown in Illustrations 3 through 6 prevent "line of sight" to the flood lamps and the projection lamp filament placed to the rear at floor level. The translucent materials mentioned in the above paragraph prevent such lines of sight but, again, they are not as effective as cotton fabrics.

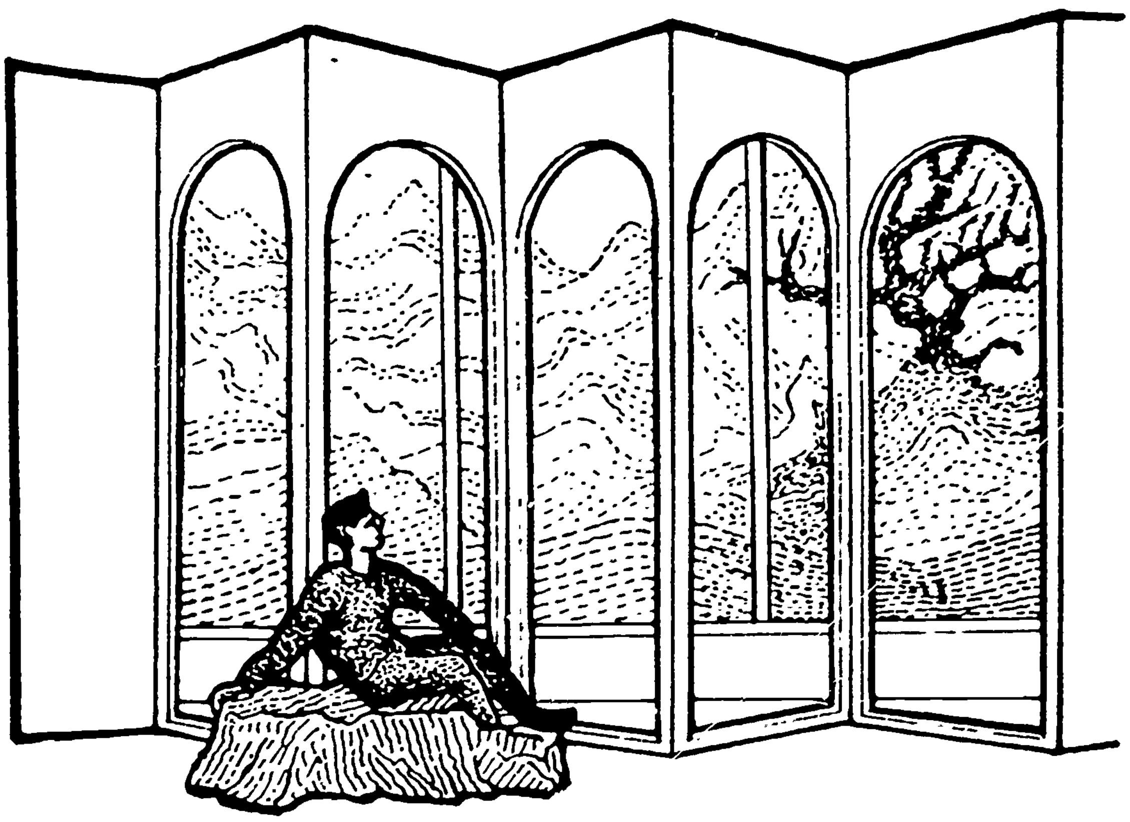
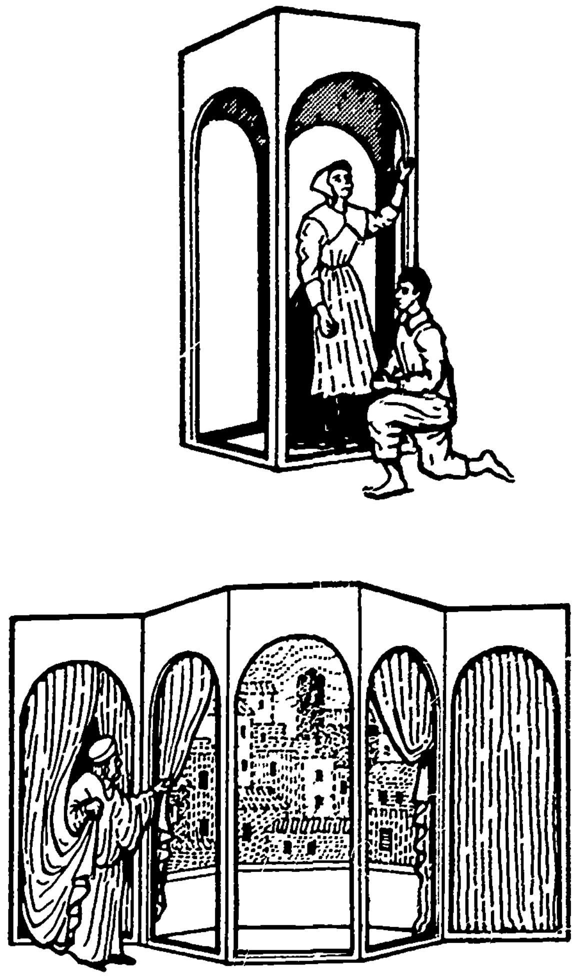


Illustration 4: Combination of opaque, translucent and open screens create temporary arcades, room interiors and building exteriors.



Illustrations 5 and 6: A series of open screens may form a pavilion — a most useful three dimensional unit of great stability.

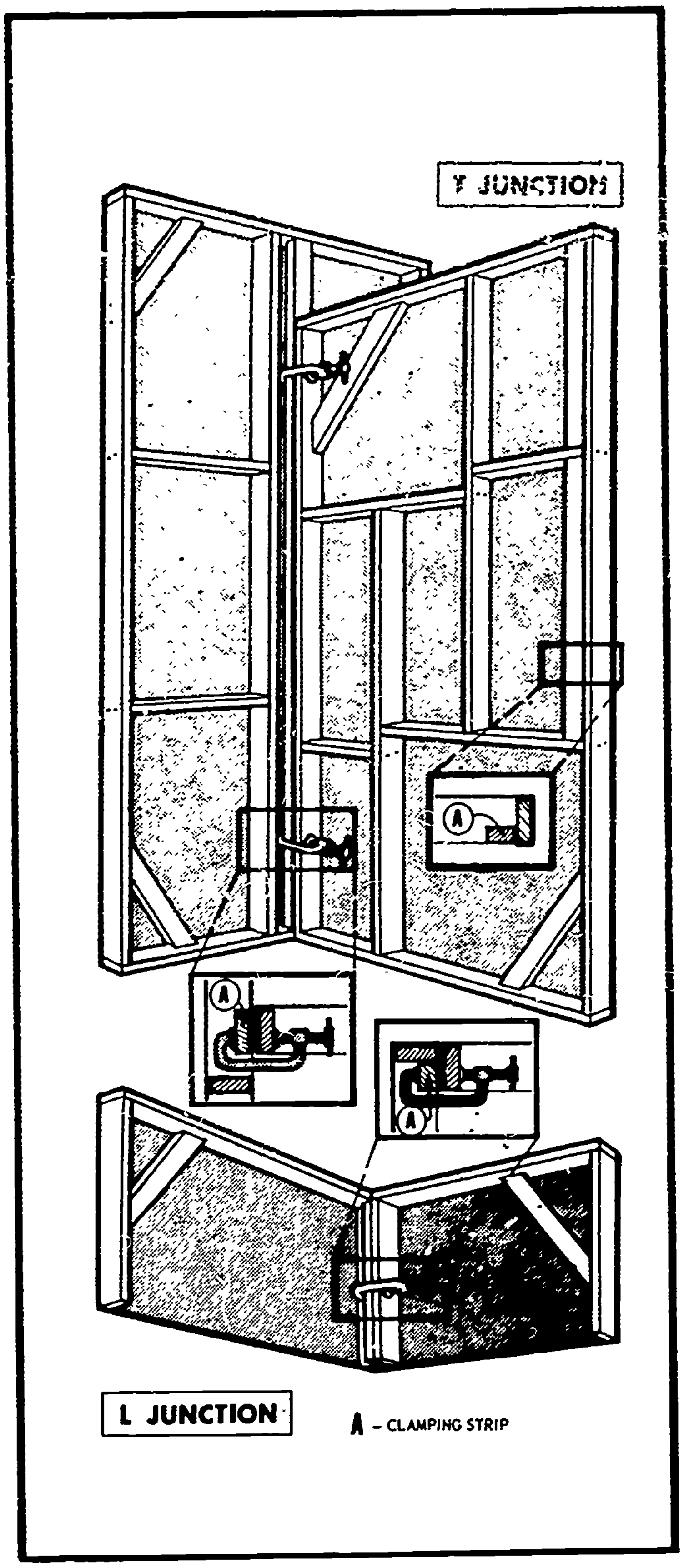


Illustration 7: Construction details of panels to be clamped together in "L" or "T" joints.

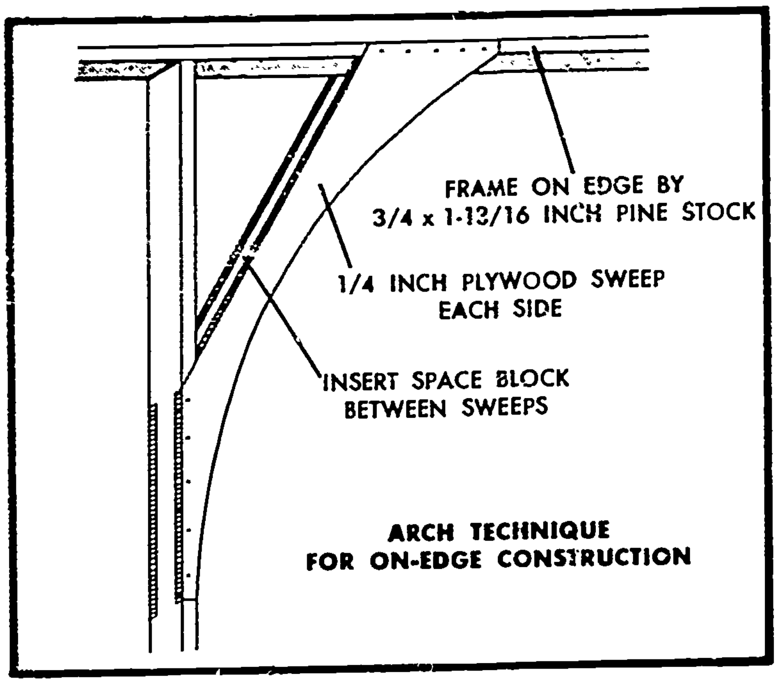


Illustration 7A: Details of the arch technique for on-edge clamp-together construction. Sweeps are recessed, flush to the surface of the frame.

Folding Screen Construction

All folding screen sets illustrated are constructed of 3/4" by 1-13/16" pine or spruce stock, fastened with lightweight 8 penny, resin-coated, box nails. The magic figure of 1-13/16" is arrived at by splitting a standard 1 by 12 inch board into six strips using a Delta 8 or 9 inch table saw with a fine tooth set.

The standard one-by-two (usually ¾" by 1⅝") is a little on the light side, but a one-by-three (usually ¾" by 2⅝") is too heavy, and also too wide for the "clamped joint" technique described below.

Clamped Joint Panels

Panels to be clamped together (Illustration 7) are built of the same 3/4" by 1-13/16" wood strips turned *on edge* rather than flat. (A consistency in batten width is obviously essential). The designer must arrange for groupings of panels using a maximum number of "L" and "T" joints as in Illustration 8.

This construction technique does not lend itself to the conventional practice of muslin coverings which are later tightened by glue size and paint as the frames will very likely warp. Besides, painted muslin surfaces are not at all suitable for the open stage. They appear artificial to the audience as they do not blend well with the architectural environment of the theatre chamber itself.

Construction of Arches

The most critical of construction techniques are those for arches. Illustration 2 shows a method of arch construction for folding screens, using the same 1-13/16" stock for the arch sweeps as is employed in the balance of the structure. While this method requires the use of a bar compass and custom seating for each of the four arch sweeps shown, the alternate use of ¾" plywood is wasteful and presents a harder surface for the seating of the numerous staples which secure the undersurface, edging strip, and final cover fabric.

Illustration 7A shows the arch technique for on-edge, clamp-together construction. Here the arch sweeps can be traced from a paper pattern based on the dimensions of the opening in the frame. These sweeps are recessed, flush to the surface of the frame.

Fabrics, Staples and Paint

Dyed fabrics or textured fabrics that are spray painted are recommended over the smoother painted surfaces for all open stage scenic coverings.

Obviously, when such fabrics are used adhesives are impractical and the fabrics must be attached by staples. The inexpensive Swingline No. 101 staple gun is good for this work. Although it does not last very long, the staples (5/16 inch recommended) are thin and the handle of the gun does not cause blisters. The Arrow T-32 is also recommended; it is more reliable, heavier, but a good deal more expensive.

If one desires to change the color, or use plain burlap, the fabrics may be sprayed without destroying the texture. A

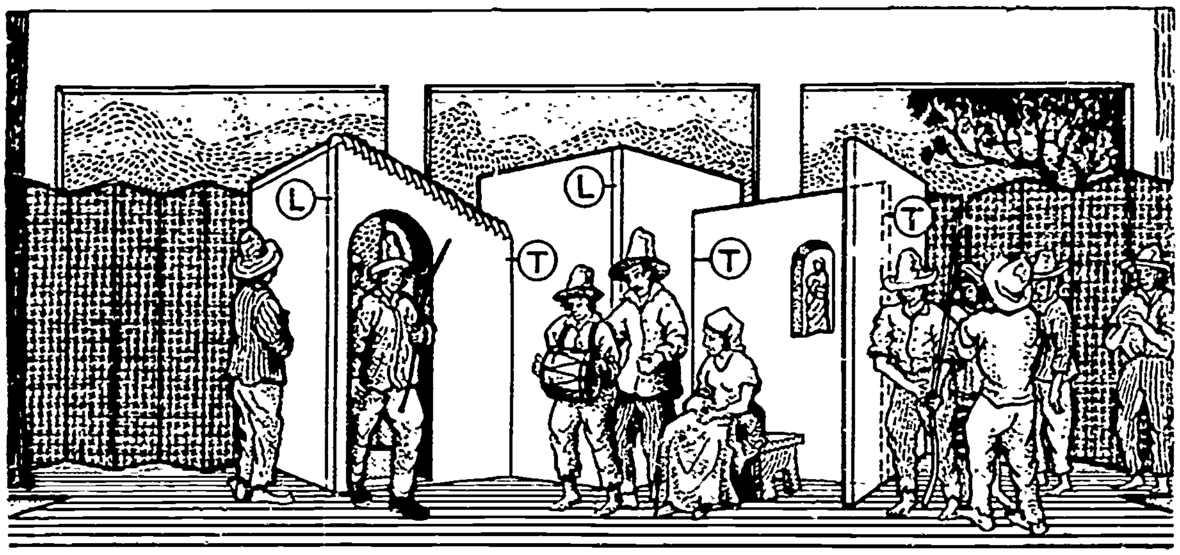


Illustration 8: The designer must arrange for groupings of panels using the maximum number of "L" and "T" joints.

good paint is masonry paint, available in many rich earth colors. In the South, the reader may be familiar with MoPaCote, an acrylic paint product of the Mobile Paint Company. The paint dries very fast and equipment can be cleaned in warm water.

Application of color by spray is particularly useful when adding detail, for example, the berry bush shown in Illustration 9. A trunk is cut into one stencil, several gnarled limbs into another, a cluster of leaves, another, and the berries themselves into yet another. With just these stencils a whole forest of berry bushes can be applied to screens and set pieces. Detail brushwork on burlap is also possible.

On Using Wallpaper

Now and then one may wish to use wallpaper itself, and this is most successful where applied to folding screen sets. A slightly different technique is required in preparing the frame and assembling the screen.

Most wallpaper comes in rolls 18 inches wide, so assuming a total screen width of 36 inches, additional framing pieces must be added down the center of the frame to receive the staples along the vertical mid-joint.

The wallpaper is applied over the Kraft paper *prior to the placing of the edging strips*. Care must be taken with the edging strip; the raw edge must be turned under and a straight guide line followed. (Illustration 10). The hinges must be stapled down carefully, and the raw edges turned under and folded flush with the strip below.

The Mist Effect

It frequently becomes necessary to introduce mist, haze, and other atmospheric effects. Proscenium stagecraft uses full stage rigged cloths known as scrims for this purpose. With the open stage and island scenery, this method is, of course, impossible. However, the effect may be created by forming open panels carrying sections of scrim, lightweight cheesecloth, or, more substantially, window screen wire.

Illustration 11 shows an arrangement of "scrim" panels, self-supporting, 4' by 9' each, of screen wire sprayed flat black, with forest appliques. The sketch is taken from a scene just before daybreak, from the children's play THE PUPPET PRINCE, by Alan Cullen (Children's Theatre Press):

Fireflies were created by inserting into the foliage circuits of the high-voltage, intermittently firing type of Christmas tree lights. As the players entered upstage of

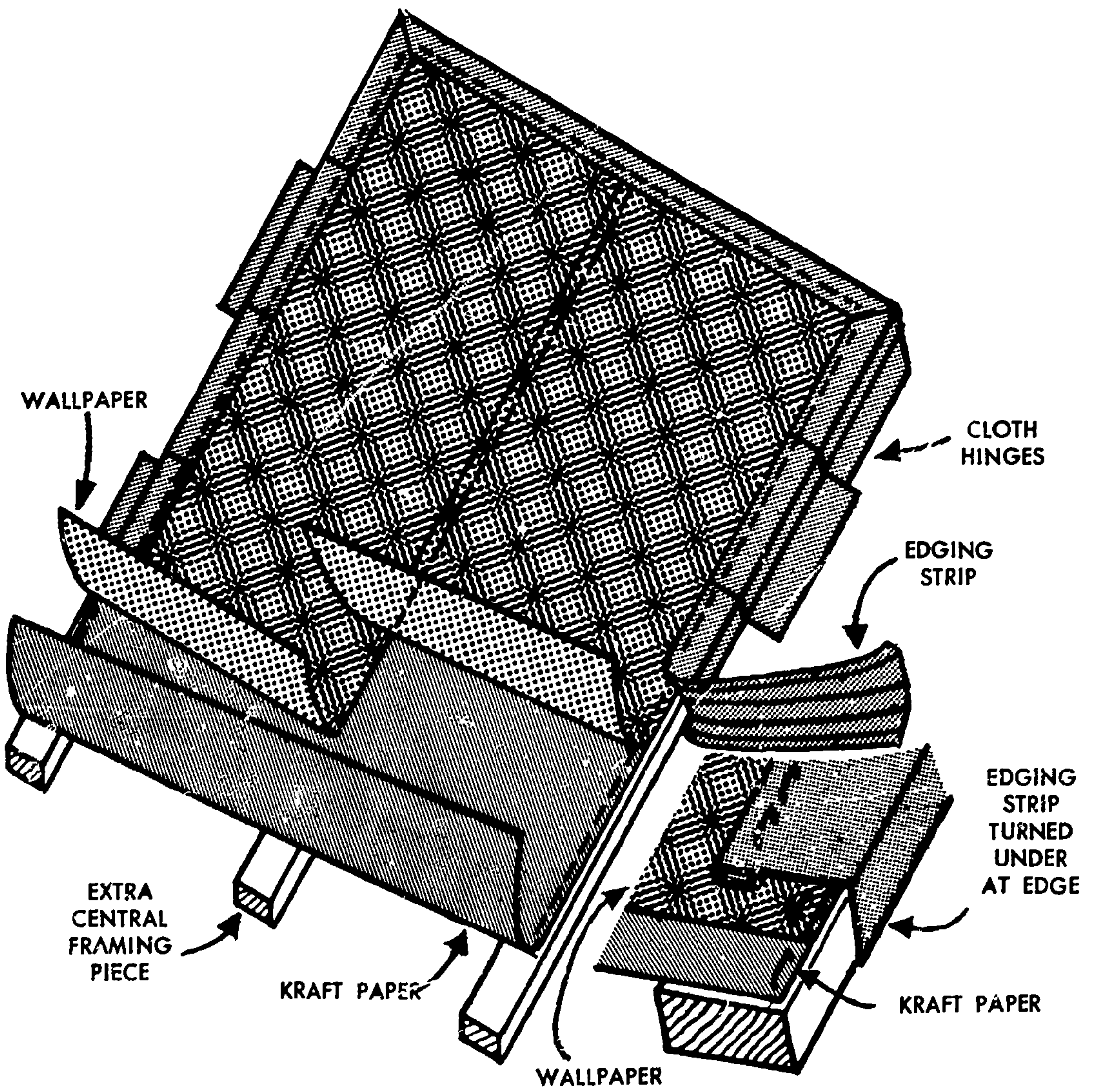


Illustration 10: Details for applying wallpaper to screens. The wallpaper is applied over kraft paper prior to the placing of the edging strips.

Illustration 9: Application of color by spray is very useful when adding detail.

DRAMATICS

Illustration 11: An arrangement of self-supporting "scrim" panels. Panels are of screen wire sprayed black, with forest appliques to create a depth or "haze" effect.

the panels, an incredibly beautiful effect of early morning mist was created; yet the panels were easily folded and removed when the scene was completed.

Open Stage Platforms

Platforms have interest to producers on the open stage, especially where the audience line of sight is at a considerably vertical angle to the playing area. In a very real sense, the stage floor itself becomes a background, and the platform may be considered a raised extension of the floor. This would be particularly true where the platforms remain rather low because of a partial audience encirclement of the playing area and the necessity to avoid obstacles to cross sightlines.

Obviously, the scenic designer has to make a decision regarding the commencement of his naturalistic decor for each play, and the inclusion or exclusion of platforms in this treatment.

Needless to say, lumpily padded platform tops, crudely joined facings, creaking construction and other faults, hopefully invisible and inaudible under the more remote proscenium conditions, must be avoided. Platform surfaces should be sheer and clean, preferably with textured fabrics cemented on. Scraps of carpet cushions stapled to the undersides of walking surfaces help absorb the sound of footsteps.

The most practical and economical surface materials in the long run are ¾ inch plywood or ⅝ inch plycord for the tops and ⅜ inch ply for the sides. Illustration 12 shows a 16 inch platform with permanently installed legs designed for production panel inserts. The flush construction permits the clamping together of several such platforms for stability. The permanent structure permits the fashioning of sockets for the support of scenery.

New Skills Required

It is apparent that new skills are required for the design and construction of dramatic environment for the open stage. Chief among these skills is the ability to conceive simultaneously the structural form and the significant design element.

With scenery frankly deployed in space, design and structure are transparently superimposed. In proscenium, one tends to erect, with accessory supports, a surface suitable for the application of a pictorial veneer. The method by which the scenery is constructed is of little importance aesthetically, and its structural form need not reflect the nature of the applied decor. Definitely this scenery has its face and rear sides.

This is rarely true with scenery for the open stage. It stands forth in space, usually deployed in angular fashion for self-support and often viewed from the many perspectives of a forward-thrust platform. Therefore its structural forms are evident and must be pleasing in their conception. Two dimensional structures of the latter type are called "screens" in contrast to the former type which are commonly called "flats".

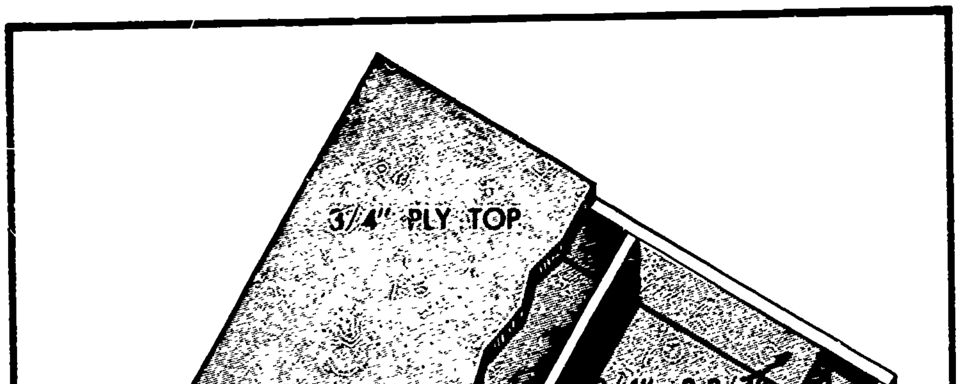


Illustration 12: Construction detail of an architectural platform for the open stage. The flush construction permits the clamping together of several such platforms.

Background Projection

Why It Is Needed . . . an Introduction

With the development of changeable scenery, especially during the eighteenth and nineteenth centuries, there was evolved a system of handling stage decor of a simplicity akin to the shuffling of a deck of cards. Areas to the sides and above the stage were reserved for the storage of the flat pieces such as wings and backdrops, and from these areas the flat pieces were easily maneuvered onto the visible portion of the stage.

By the twentieth century, the modern flyloft was perfected—with a variety of equipment such as sets of ropes and steel lines operated both manually and mechanically.

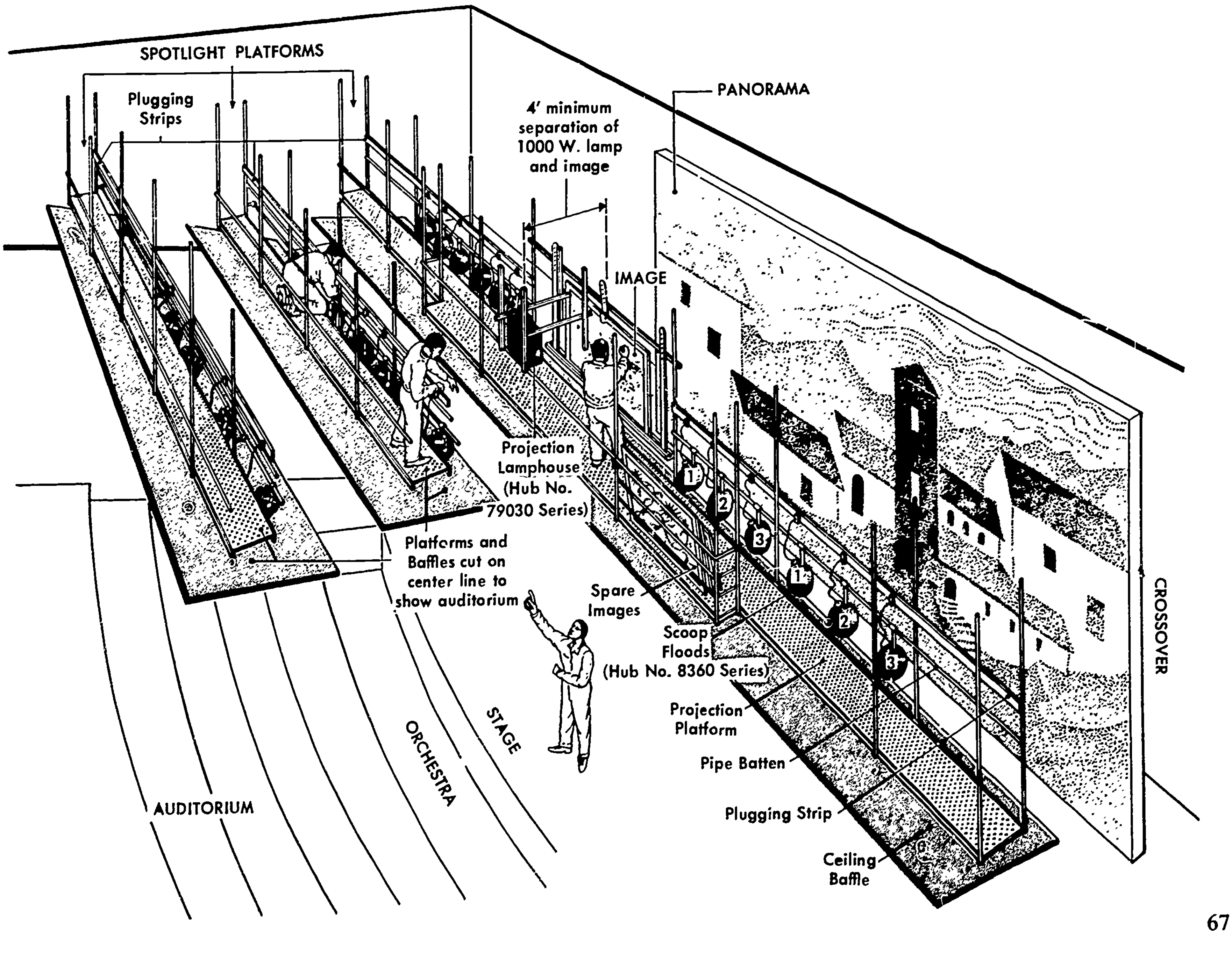
However, on the stage below, emphasis had shifted to the more three-dimensional arrangement of scenic units, frequently mounted on movable platforms, and the loft rigging was required only generally, for the suspension of the large cyclorama cloth and backdrops, curtains and masking pieces, lighting equipment and the ceiling portion of musical concert shells.

With the open stage, these loft requirements are met in the following manner:

1. Substitution of a plaster panorama wall with projection system for the cloth cyclorama.
2. Use of lateral tracks for curtains of closure.
3. Continuation of auditorium ceiling over stage, with functional breaks for curtains and lights.
4. Mounting of lights on catwalks above ceiling.
5. Replacement of a portable concert ceiling by the permanent ceiling.

Simultaneously with the emphasis on three-dimensional scenery comes an increasing enthusiasm for a playing area both larger and more freely formed than that of the proscenium. The shape and mechanics of the proscenium theatre evolved from the practice of setting one scene at a time. Now many playwrights demand a stage across which uninterrupted dramatic action may flow from scene to scene.

Along with the new requirements in scene design comes the necessity for backgrounds that are capable of changing form and color while the play continues. It is obvious that the conventional backdrop consisting of paint on cloth and controlled by rigging must be replaced by backgrounds conceived in terms of light and controlled by dimmers.



The Parts of the System

Item	*Function*	*Source*
Panorama wall	to receive color and imagery	architect
Projection platform	for the mounting and servicing of the projection system	architect, electrical and structural engineers.
The scoop floods	to wash panorama wall with color blends	Hub No. 8360 series
The lamphouse	to furnish the light which applies the imagery to the panorama wall	Hub No. 79030 series
The image	the artistic background pattern	scene designer
Auditorium-stage ceiling design	for the proper position and masking of the projection platform	architect and structural engineer

Note: In many theatres of the pavilion type it is not possible to develop the space arrangements necessary for background projection from overhead. In these theatres an arcade may be developed as an important architectural feature, the arcade forming the support for temporary translucent panels which receive their color and imagery from the rear in a manner identical to that above. In this case, the lamphouse, floods and the image consist of portable units, floor-based, as shown in detail at the end of this Section.

The Operation of the System

The HUB background projection system involves the use of a compound image, that is, *pattern,* in terms of light or shadow, superimposed upon *color wash,* as determined by the color media and dimmer settings of the scoop floodlights.

In the example of the bamboo rain forest, below, the plant and tree detail is removed from a large sheet of heavy Kraft paper. The remaining pattern is transferred to the panorama wall by the light rays from the projection filament in the lamphouse passing through the openings in the Kraft paper image.

The panorama wall is already illuminated by the scoop floodlights. The pattern, at a greater intensity, replaces the background color wash.

Let us suppose the pattern color is yellow-green, the color wash, dark green. The dynamics of the system are apparent when we move the time of the scene from day to night. The pattern is slowly dimmed out. At the same time, scoops with the dark green color medium are dimmed down as scoops with a blue-green are dimmed up.

Background projection image for bamboo rain forest. Plant and tree detail is removed from a large sheet of heavy kraft paper. The pattern is transferred to the panorama wall by light rays from the projection lamphouse passing through the openings.

It is entirely possible to fabricate the scene in a manner entirely opposite in technique. The image might consist of a framework containing silhouettes of tropical foliage. In this case, the lamphouse gate color will be dark green, the floods, yellow green. For the transition from day to night, the projection lamp and the yellow-green floods are dimmed down, the blue-green floods dimmed up.

However, working with these particular colors, the former method, the application of light upon light, rather than the application of light upon silhouette, will give better results.

There are other very distinct advantages to the first method. The image, for example, need not be as large as the panorama, only as large as required for the *pattern area* that is superimposed on the *full area of color wash.* Secondly, instead of a color medium at the lamphouse gate for the entire pattern, one may overlay upon the cuts in the Kraft pattern many separate colors, thus achieving a multicolor image that is then projected upon the color wash of the floods.

Other Methods . . . and Materials

Below are listed some other materials and methods of image construction:

1. On clear acetate sheets, use artist's brushing lacquer, felt pen transparent inks such as Flomaster (Esterbrook) and lamp dip for transparencies, or flat-black enamel for silhouettes. If vertical ribbing lines appear on panorama, the acetate has been poorly milled and should be discarded. These techniques on acetate are not as clear as are the images created by stencil knife cuts in Kraft paper.

2. Join plastic color media, mosaic style, with narrow (1/4 inch) strips of transparent Scotch tape, keeping the tape running parallel with the joints.

3. Use 1/8 inch mesh, metal hardware cloth to give effect of gray, with areas removed for white (such as a "moon" disc) and attach cutouts such as branches and leaves for silhouettes.

4. Use the frame to support natural objects, such as twigs for a forest, and transparent cutouts of plastic color media for leaves, perhaps in montage with fine threads for support.

The Case Against Lenses

The Hub projection system does not involve lenses. Apparent sharpness of detail is relative, and is achieved by the proper distance of the image from the projection lamp filament.

For example, at the maximum recommended distance of five feet, even a No. 50 thread will be discernible, though only to those eyes searching for it.

On the other hand, moving the image closer to the projection lamp introduces an effect of haze. Frequently an image is broken up into planes that are placed at different distances to achieve both clarity and haziness, such as a foreground of palm trees framing a distant isle across a body of water.

Despite the true sharpness of detail possible with lens projection, there are certain disadvantages to a lens system:

1. The maximum of one foot spread for each foot of throw would require two units for the same panorama area as serviced by the single Hub system.
2. Tilting a lens instrument introduces a distortion factor which must be corrected in each image, whereas the Hub system is inherently distortion-free.
3. There is a definite time element involved in preparing photo-reproductions or sketches or in working on miniature imagery.
4. There is a far higher cost of equipment and materials for imagery.

While it is artistically impossible to pass hard and fast judgement on any system of projection, it should be remembered that background projection systems are functional replacements rather than literal substitutes for the painted backdrop. Even the reflection of colored light itself from an off-white plaster wall, regardless of source, provides a sensation quite different from that furnished by the illumination of pigment colors applied to the surface of a backdrop.

Planning the Installation

From the examples in thé ARCHITECTS' and ENGINEERS' Section, it is obvious that there are two constants to be considered for installation of the Hub background projection system:

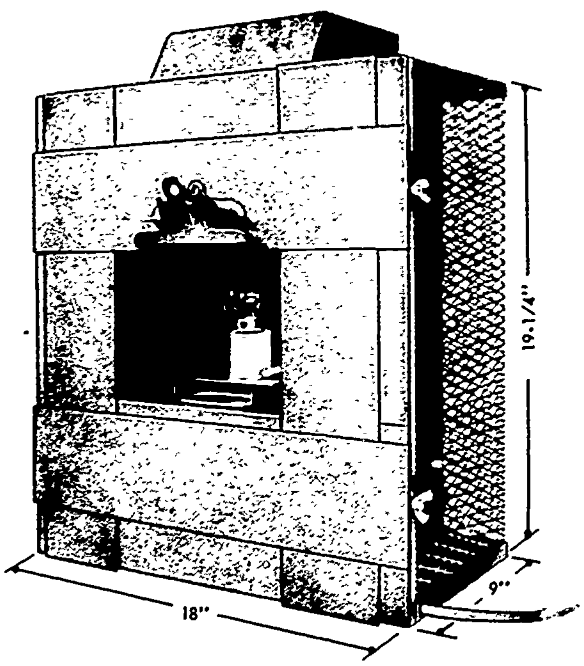
1. The angle of the projection throw to the base of the panorama.
2. The distance of the image from the projection lamp filament.

Ideally the angle is 50 degrees between the stage floor and the lower projection line, and it should never drop below 45 nor exceed 55 degrees. The 45 degree limit has reference to such practical matters as actor movement and scenery placement, while the 55 degree limit has reference to a noticeable intensity imbalance in the overall illumination.

For the greatest degree of projected image clarity consistent with such practical matters as the ceiling trim and the size of the image itself, a 4′ to 5′ filament-to-image distance is recommended for the 1000 watt (Hub. No. 79031) and the 2100 watt (Hub No. 79030) projection lamps, respectively. Certainly four feet would be considered the workable minimum.

Somewhere along the 50 degree line from the panorama wall base, the lower side of the image frame will rest, and in this vicinity the auditorium ceiling canopy will terminate. The distance from floor level at this intersection may vary according to the depth of the stage and to the ceiling trim height desired. But, in view of the capabilities of the system, this distance should not be less than 15′ or more than 22′.

A line drawn from the projection filament to the top of the panorama wall will establish the minimum clearance for upstage ceiling pieces, tracks, downlights, and the backlighting walkway.



Hub No. 79032 Lamphouse for background projection

Mounting the Projection System

The Hub No. 79030 series lamphouses must be mounted sturdily to the structure of the theatre itself rather than to the catwalk hanger system. Obviously, vibration of the lamphouse will cause the image to "dance" on the panorama wall. Suggested details for the mounting of both the lamphouse and individual images are available on Drawings No. 420 and No. 421 which may be obtained from the Hub Electric Company, Inc.

The temptation to reduce image handling to a system such as an image magazine is great, yet here are some of the obstacles:

1. The large images (often 5′ by 12′ for exceptionally large panoramas) cannot be slid sideways, for the scoops which provide the panorama color washes will be blocked.
2. There is often insufficient room overhead to raise the larger images vertically.
3. Even if there is sufficient room over head, racking the images in a magazine in conjunction with the wide projection angle prevents a standardization of image area used, not to mention the different degrees of clarity involved. For example, in a magazine 12″ deep, sufficient for a six-pack rack with clearance for gelatin appliques, a forward image of 4′ by 8′, when moved to the rearward slot, projects only 2′ 10″ by 5′ 8″ of its total area, with a 20% loss of apparent sharpness over its previous position.

By planning the production properly there will be ample time for manual image removal from an image holder in a standard position, together with the assurance that nothing mechanical can go wrong. In reality, because the projection is manually operated, in all probability a greater creative use will be made of it.

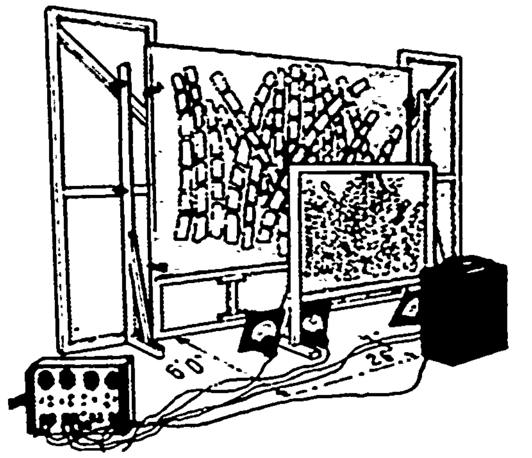
Distance of Throw and Degree of Spread

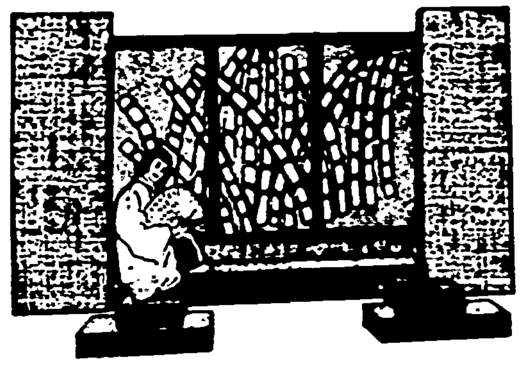
Possibly the most frequently asked questions concern the *distance of throw* (distance between the lamp filament and the background surface receiving the image . . . labeled "Operational Distance" in the chart below), the *degree of spread* (or size of the projection surface in relation to the throw), and the *sizes of images.*

Rigid specifications are not required for the Hub projection system but certain dimension limits which have been proven through experience are useful to know.

Generally speaking, one may anticipate for the projection area an effective maximum vertical dimension of 1½ times the distance of throw and a horizontal dimension of twice the throw. The actual width of the panorama or other background projection surface need not be equated with these dimensions if the image is conceived in terms of light rather than silhouette (cf. page 70) for it may then be overlaid in part upon a total field by color wash from the scoops.

By consulting the chart below, the reader may select the proper lamp intensity for the distance of throw. In the case of overhead background projection, assuming the 50 degree maximum projection angle to the panorama base, this distance of throw has been re-calculated in terms of the projection platform height (or the distance from the stage floor to the lower edge of the image).





Rear projection of scenery is accomplished by a combination of floodlights upon the panel cloth and superimposed patterns of light created by cutouts. Cutouts can be made in heavy wrapping paper which is framed and placed parallel to the cloth screens.

Unit Cat. No.	Lamp Description	Code	Lamp Base	Min. Distance: Filament to Image	Operational Distances
79032	PH/500/T-10P	CZX	Medium Prefocus	2′-6″	From 6′ to 12′ behind screen panels
				3′-6″	For fine detail from overhead platform not above 15′ from stage floor
	PH/1000/T20MP	DRS		4′-0″	15′ to 17′ projection platform height
79031	PH/1000/T20/40	DSB	Mogul Prefocus		Note: DSB lamp burns cooler and lasts longer than DRS—same filament
	PH/1500/T20/39	DTJ		4′-6″	18′ to 21′ projection platform height
79030	2100W 60 Volt T-24/8		Mogul Bipost	5′-0″	22′ and above

Finding the Image Size

A maximum image size is determined by the location of the projection platform and its relationship to the panorama and panorama area. Smaller images are determined by the amount of area to be covered by projection for any given production design.

To find the image size for a particular situation it is best to prepare a plan and section to scale showing the relationship of the projection lamp filament to the panorama or translucent screens.

Draw lines between the edges of the projection area and the filament. Then measure the recommended filament-to-image distance and establish the image plane parallel to the projection surface. By measuring this plane in plan and section, the image size is found.

For an example, refer to the illustration of the set for *The Lovers* (Dramatic Section). The arch arcade behind the low platform was 9½′ high by 16′ wide and contained screened archways whose total effective width was 14′, and whose exposed archway height was from 2′ to 9′ from the floor.

Dividing the screen height of 9′ by 1½ (maximum vertical dimension = 1½ times the distance of throw) we get 6′. However, by dividing the screen width of 14′ by 2 (maximum horizontal dimension = twice the distance of throw) we get 7′ so this latter figure, being greater, would apply. In other words, the lamphouse would be placed so that the filament-to-screen distance would be 7′.

Since there was ample space, actually a 9′ distance was allowed to obtain a more uniform intensity. Checking with our chart, Hub No. 79032 with the CZX filament is indicated.

By placing the image plane 2½′ from the filament an overall image size of 2′ by 4′ is called for (your plan and section scale drawings mentioned previously will give this exact dimension). Again, since space was not at a premium, a 3′ separation with an image size of 2½′ by 5′ was used. Since the total screen area was rather wide, each color was obtained by three Hub No. 8365 floods per color circuit, laid out in the manner shown above.

The method of positioning and calculating sizes of overhead images is similar, and some image planes are indicated in the architectural and engineering section drawings.

Production Tips

Always keep the image parallel to the projection surface, thus avoiding distortion.

Always use correct projection unit with correct lamp. Note that spotlight service filaments are proportionally larger and are *not applicable* to this projection system.

[If working with an unlisted filament, a proper image distance can be established by multiplying the filament width by 100].

If ghost images or "flares" appear on the panorama just above or below horizontal cuts or lines, tilt the projection lamp slightly until the ghost image disappears. This is caused by reflection from the glass envelope directly behind the lamp filament. The Hub lamphouse has a pivoting socket platform for this purpose.

The composite image, detail and color wash, under separate dimmer controls, may continue without a break from one image pattern to another via intermediate color washes. Unlike the backdrop, the projection system must always be regarded as a dynamic force. At the same time, the system must be manipulated with caution and subtlety, for living color creates a tremendous visual excitement.

The Projection Surface

It is not the purpose of background projection to replace scenery that has a practical relationship to the actor, such as doorways, windows, and defining walls; rather, it is descriptive of the background beyond a particular scenic island. Where an interior scene may be designated by a folding screen surrounded by furniture, the background projection can add detail descriptive of the neighborhood or town in which the room is located.

Those familiar with that proscenium background control device known as the cyclorama will notice at once that all the panorama walls shown in this bulletin terminate in space and do not attempt the encirclement of the visible stage area.

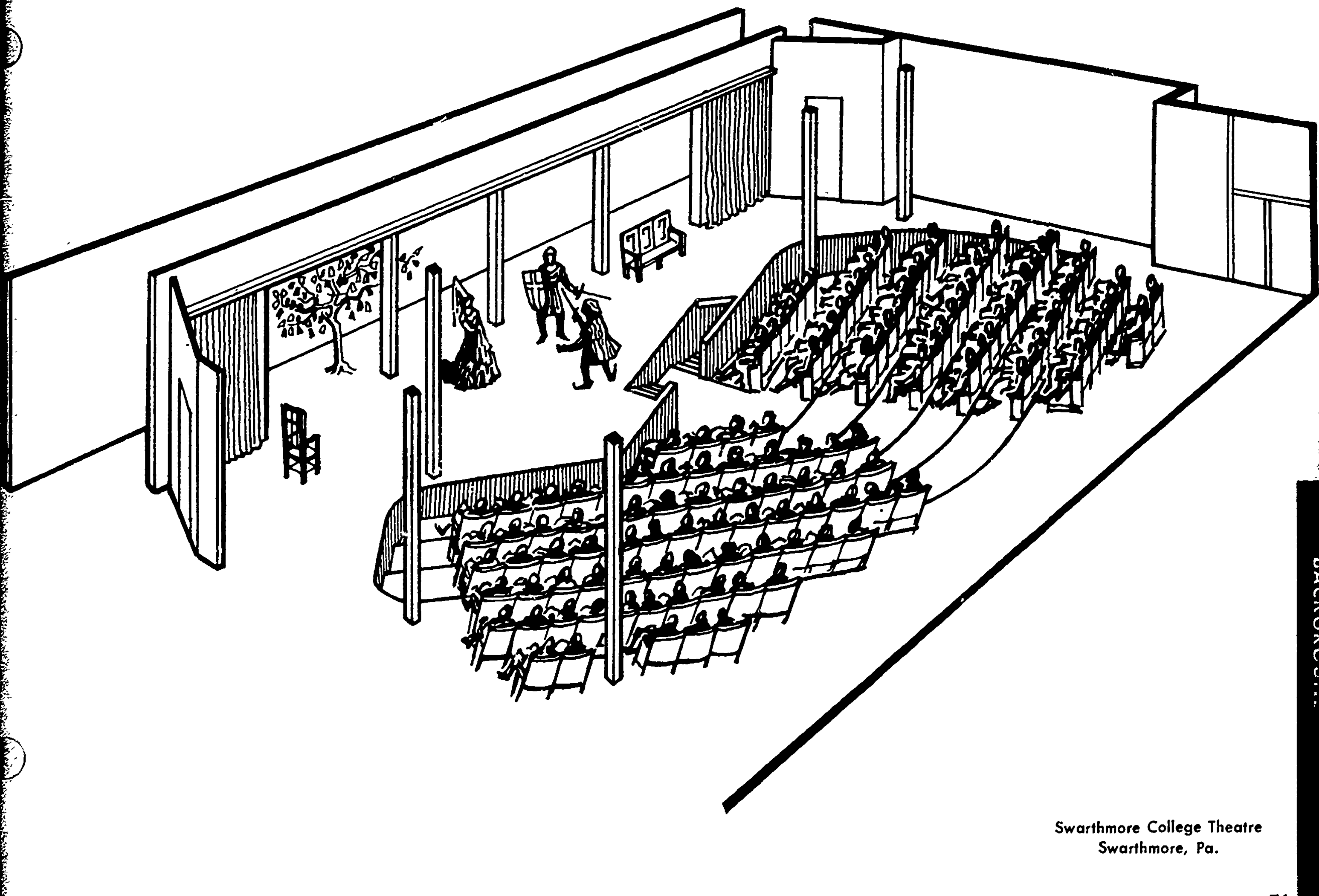
Now, one of the great visual experiences of the proscenium theatre is the unusual illusion of depth where scenery or pictorial fidelity is placed before a curving cyclorama which surrounds the scenery space. This relationship expresses completely the basic objectives of the proscenium theatre, to stage a scene pictorially correct, one scene at a time, one scene to follow another, in the same stage area!

The operation of the open stage is dedicated to principles precisely contrary to the above. On the open stage, one transcribes, in part, essential environments and places these on a stage that is suitable for various time-space combinations simultaneously apparent and used in regular or irregular order. Open stage environment is, first of all, the architectural environment of the theatre itself, to which the elements of the dramatic are added *only as or if needed.*

It is obvious that the cyclorama of the proscenium theatre must be reduced to a form that exists in space rather than embraces a space. Therefore, the more successful surfaces for background projection range from a panorama wall as a "slab in space" to the small translucent panels built into portable screen units, such as shown on pages 57, 63 and 70. For simple distortion-free projection there should be no curves in the panorama surface. Where a curve exists the image frame must be curved accordingly.

Lying between the "slab-in-space" panorama and the portable translucent scenic panels are the theatres which use background arcades. This very ancient architectural arrangement provides openings for entrances, embrasures for partially enclosed scenes, support for scenic panel inserts, and a framework for translucent screens, as, for example, the La Junta project described on page 8 and the Swarthmore College stage as shown in illustration below and in Hub Bulletin No. 107.

In many ways the permanent arcade is a device far more useful than the full panorama, for it presents in a forthright manner slices of life, using architectural justification for the arrangement of fragmentary patterns. On the larger panoramas, however, separate curtain panels on tracks immediately adjacent will assist with the subdivision of the projection surface.



Swarthmore College Theatre
Swarthmore, Pa.

. . . In Conclusion

The problems of planning the types of stages best suited to the needs of contemporary theatre are of international concern. Through constant debate solutions are being sought, with varying degrees of tolerance and success. It is hoped that this publication will prove to be a significant contribution on the subject, both in its practical and in its theoretical aspects.

James Hull Miller has a lively mind and the courage of his controversial convictions, which have developed logically from research and experiments during his long experience of professional work and actual theatre production.

He has the practical ability to test the validity of those convictions. It is a measure of his integrity that he is putting this foreword into the mouth of one who has disputed with him, on occasion, with uninhibited frankness. I am pleased to think that the frankness has not impaired mutual respect.

His own restraint is, perhaps in tolerant deference to my grey hairs which, to comparative youth would certainly proclaim addiction to orthodoxy. He will be irritated, but possibly not surprised, if I deplore, as I do, his fondness for the rather high-falutin obscurities with which he and so many of his fellow-reformers clutter up their soundest opinions.

It is part of a popular technique to erect phony Aunt Sallies, to obtain the satisfaction of bashing them about with self-righteous vigour. It is not really necessary to establish vice in the old in order to extol virtue in the new. Our earnest reformers can best plead their claims by asserting that they are better than good. While deploring any inclination to pretentious verbiage and special pleading, I can applaud the conclusions.

During my recent visits to America, Australia and South Africa, it was quite evident that the proscenium opening is generally expanding under the pressure. The opening is spreading to the side walls and to the ceiling of the auditorium. The sight lines are good. The picture frame is no longer emphasized: the acting area becomes virtually an open-end stage, with off-stage space of varying adequacy. These large acting areas demand the kind of scenic treatment which James Hull Miller describes in this bulletin.

His ideas should be studied by all scene designers whether they work on stages that are old or new, framed or unframed. Many designers have failed to realize the play-pictorial possibilities of non-realistic techniques, although there are many others who do in fact adopt space-stage techniques within the picture-frame. Even those who may regard the picture-frame as sacrosanct should study the practical guidance in these pages.

When my colleague, Frederick Bentham, and I visited America a few years ago, we found at Western Springs, Illinois, the most interesting of the theatres we examined. James Miller was closely concerned with its design, and I am pleased to note that the booklet gives some details of this delightful Community Theatre that had the additional merit, to a Britisher at any rate, of being modest in cost.

It is certain that this comprehensive examination of the planning and use of the open stage will be invaluable to all who are interested in theatre techniques. The Hub Electric Company, Inc. is to be congratulated for its service to the theatre in this publication.

Percy Corry

Manchester.
England.
January, 1964

HUB INSTALLATIONS OF OPEN STAGE THEATRES

Agnes Scott College..........Decatur, Georgia
Bethel College..........North Newton, Kansas
Bristol Valley Playhouse..........Naples, New York
Catonsville Community College.....Baltimore, Maryland
Colorado State University..........Fort Collins, Colorado
Department of Education..........Hato Ray, Puerto Rico
Downers Grove High School....Downers Grove, Illinois
Findlay Sr. High School..........Findlay, Ohio
George School..........George School, Pennsylvania
George Nelson Tramper High School
Kenosha, Wisconsin
Grand Haven High School.......Grand Haven, Michigan
Greeley Sr. High School..........Greeley, Colorado
Greeley Jr. High School..........Greeley, Colorado
Grinnell College..........Grinnell, Iowa
Hinsdale High School..........Hinsdale, Illinois
Kalamazoo College..........Kalamazoo, Michigan
La Junta Sr. High School..........La Junta, Colorado
Lamar College of Technology..........Beaumont, Texas
Le Petit Theatre De Terrebonne.....Houma, Louisiana
Lewis and Clark Elementary School..St. Louis, Missouri
Longmont Sr. High School..........Longmont, Colorado
New Mexico State University
Las Cruces, New Mexico
New Providence High School
New Providence, New Jersey
Ocean Township High School.....Oakhurst, New Jersey
Olathe Sr. High School..........Olathe, Kansas
Orange Blossom Playhouse..........Orlando, Florida
Swarthmore College..........Swarthmore, Pennsylvania
Trinity High School..........River Forest, Illinois
Valley Winds Elementary School.....St. Louis, Missouri
Western Springs Theatre of.....Western Springs, Illinois
Wydown Jr. High School..........Clayton, Missouri

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