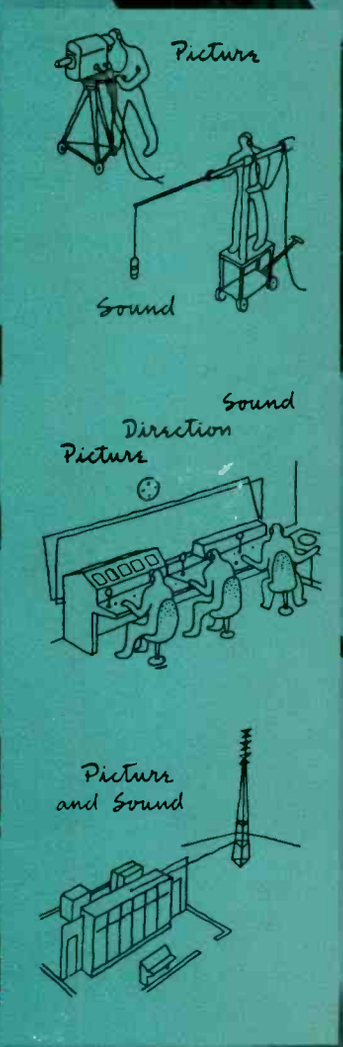
Walter J. Duschinsky

TV stations

A guide for Architects, Engineers and Management



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TV Stations

This is the first and only book dealing with the planning and design of television stations. Designing for this complex industry involves a complete understanding of program planning and production, of technical operations and administration, and of the problems arising from the use of live talent and film.

TV Stations is useful to architects and engineers because they must understand all the operations of a TV studio in order to plan the building and the facilities. *TV Stations* is useful to management because policy planning is possible only if the whole picture of TV station planning can be recognized. *TV Stations* is useful to production men because it indicates the long-range aspects of operations which will ultimately determine production.

Part I deals with the master planning which precedes construction, and Part II deals with the practical problems that arise in the operation of a TV station. The appendix gives actual examples of UHF-TV planning as well as other pertinent data. Supplementing the text are 135 illustrations, showing TV equipment of all types, station facilities, and plant layouts.

Virtually a handbook on TV station planning, this addition to the Progressive Architecture Library of building types fills an increasing need for imaginative, integrated, and functional design in this fast-growing industry.

T V STATIONS

I. A. SIGMON - Architect
Greensboro, N. C.

Walter J. Duschinsky

TV stations

A guide for Architects, Engineers and Management

Progressive Architecture Library

REINHOLD PUBLISHING CORPORATION, NEW YORK

To

Senator Karl Mundt

whose "Voice and Vision of America" program
has been an inspiration

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Contents

Foreword

The Twentieth Century is the age of communications and transportation, and our environment is being modified constantly by technological developments in these fields—especially in the field of communications.

Since television—a complex subject, involving many technical fields and social sciences—is the most effective method of mass communication, it will demand careful study. The time-lag between our technological development and its cultural counterpart, together with the time-lag between a process established and a process finally acknowledged and accepted by the human being, must be considered and estimated.

Commercial, industrial, and educational television are carriers of our cultural heritage and will, to a large extent, be responsible for the creation of a better world for us and the generations to come. Technological science and social progress must be closely knit if television, as the most powerful means of human communication, is to succeed.

There can be no doubt that in a few years we shall see a global television system connecting national and regional networks. The responsibility, then, rests with us to utilize this tremendous medium to best advantage, promoting good will in world relations and keeping faith with our heritage.

Without the active and sympathetic help of many people, it is almost impossible to produce a book of this type. I am indebted to my friends whose advice has made the publication of this book a reality. I wish to express my appreciation to Vincent Gilcher, William S. Halstead, Harriet Harbaugh, Glenn and Jack M. Mann, John Porterfield, Bob Saron, William J. Scripps, Frank E. Stoner, and my architectural associates, Antonin Raymond and L. L. Rado.

Members of the staffs of the various electronic manufacturers, television

and network corporations, individual TV stations, professional organizations, and TV publications have been of valuable assistance. I am especially grateful to all who have generously permitted me to use extracts, photographs, and drawings from their publications.

I wish to extend my special thanks to Ben Adler of Adler Communications Laboratories, L. E. Anderson and W. O. Hadlock for material from their article "Four Versatile TV Station Equipment Plans for VHF and UHF" in *Broadcast News*, William W. Atkin of Reinhold Publishing Corporation, Phad H. Brown of the National Association of Radio and TV Broadcasters, Adler N. Brugnoni of RCA, William A. Clarke of NBC, Thomas H. Creighton of *Progressive Architecture*, Murrey Crosby of Crosby Electronic Laboratories, Albert J. Foreman of *Tele-Tech*, Scott N. Hagenau of WSBT-TV in South Bend, Indiana, Art Hungerford of General Precision Laboratories, Fred Kugel of *Television Magazine*, Edward A. Laporte of RCA, Lawrence Levey of Television Opportunities, Ernest A. Marx, John W. Morrisey of Dumont Laboratories, Arthur R. O'Neill of WSBT-TV in South Bend, Indiana, H. L. Perdue of the Electronic Division of General Electric, C. W. Slaybaugh of RCA, and John P. Taylor of RCA.

At the same time, I wish to emphasize that I alone must be held responsible for any errors of fact that may have crept into the text.

I. A. SIGMON - Architect
Greensboro, N. C.

PART I

the master plan and the planning organization

site selection and plant

utilizing station space

programming and equipment

equipment usage

summary

The Master Plan and the Planning Organization

Today's effort in television station planning runs parallel to the conventional approach to other basic planning problems in industry. While such orderly ways have a definite place in our established society and the culture and civilization we have created and in which we live, they very often deter us from new and creative effort.

In previous centuries, sociological influences produced buildings which today indicate the interests and activities of the time. The castle, the cathedral, the medieval town hall, the burgher's residence show us the thinking, the state of progress and the hub of social life of a given era.

In our time, technological advancement is rapid. Today's communication centers — the telephone and cable, radio and television stations, the newspaper and magazine buildings — are one of the expressions of the character of the age.

In the planning of such buildings, we have to recognize the fact that building for a purpose demands a functional approach. Present-day builders too often create a shell and then try to fit into it the human and mechanical elements which should be its determining factors. This is neither architecture nor planning, but a process of guesswork, producing rough, unsuitable and uneconomic shelter.

Planning for a purpose must, instead, mean the conscientious approach and the careful collection of that information which will provide us with the tools needed in the planning of a functional structure. Through the process of research, the creation of planning axioms, the unceasing assembly of data and the making of final analyses, we shall obtain all the machinery essential to our planning.

Genuine, full-scale planning is a well-developed and known science. As such, it is objective, impartial and exact. Its axioms and techniques have been used for many years in the major industries — oil, steel, chemical, automobile manufacture and many others. Management in these industries knows the value of advanced planning. In all these fields, before the first brick is laid, before equipment is ordered, even before the lower echelons of the organization are aware of the development, planning has started.

The reasons are obvious. Full-scale planning will:—1. determine the soundness of capital investments; 2. indicate maintenance costs; 3. give operating expenditures; 4. provide schedules inside economic limits for production and operation; and 5. serve as a future planning scheme for the right amount of development at the right time.

This specific effort of organization we shall call "Master Planning," and the result the "Master Plan." Before it can be begun, however, a planning group must be formed. One of the qualified planning organizations may be used, or a group created by the future station owner and operating with the guidance of a professional counselor.

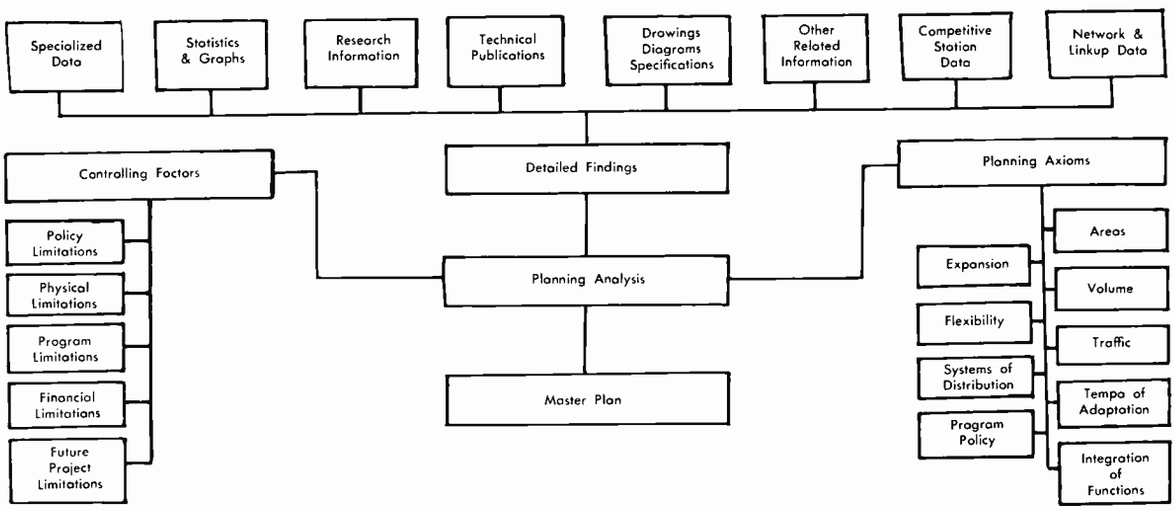
Although the men in the group must be of top-level caliber, they need not be versed in the details of engineering, operating or production procedure, as their aim will be an over-all view probably unobtainable by the technical specialist (see chart). Included in the group, however, should be the financial advisor, the top production man and the technical advisor. In many industries public relations men and sales executives are often included.

TV PLANNING LAYOUT ORGANIZATION

Vice President or Director in Charge of Coordination

MANAGEMENT	PLANNING
Survey	*Planning*
Supervision	Supervisor
Statisticians	Facility layout personnel
Calculators	Material handling (scenery, props, equipment)
Layout research	Production and program personnel
Office personnel	Statistician
	Office personnel
Functions	*Functions*
Initial contacts	Special project assignment
Analyses and appraisals	Program schedules
Development and research	Production evaluation
Problem integration	Policy discussions
Plant location	Output capacity
TV production output	Storage facilities
Current trends	Network and local program
Cost estimates	Interpretation of data
Management meetings	Tentative layouts
	Revision of layouts
	Long-range planning

If a large project is contemplated, such as a network plant, a Master Planning headquarters group — with associated field research, equipment research and independent technical consultant groups — is desirable. These subordinated groups will proceed on special research projects handed down from the top-level group, execute them, and return the results in analytical form. In all cases, however, research studies required for the production of the Master Plan can be obtained from the specialist, be he the architect, the structural, mechanical, electrical or electronic engineer, the site planner, the program and production specialist or the treasurer. Giving each of them definite direction and supplying them with essential data will guarantee integration of the total planning, as well as establish a basic comprehension of the problems and a close cooperation. The resultant Master Plan will be a guide to efficient, economic and profitable station operation.



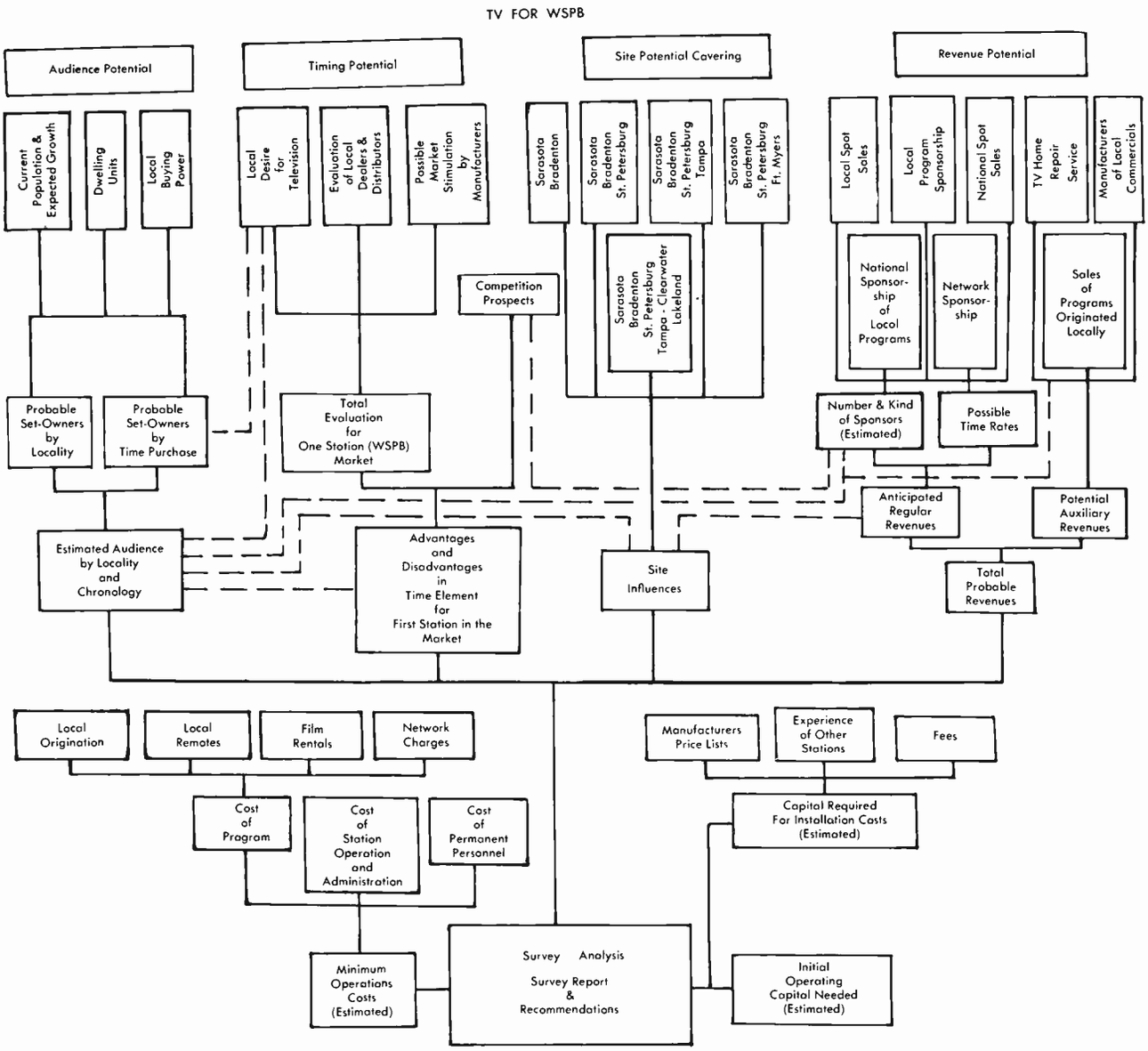
Since the scope and purpose of each station operation differ, there can be no one Master Plan applicable to all, but in the creation of each Master Plan there will be the same considerations.

First, the planning group must formulate the operational policy with which the executive staff will direct the station. It must clearly know what it wants the station to do, and this role must be borne in mind throughout all subsequent planning.

The roles of the station located in a metropolitan entertainment center with unlimited resources of talent, the station in a limited urban area where intimate community participation is demanded, and the station using only film and slide presentations are, obviously, of different character. While comparison with existing stations is possible and desirable within certain limits, the nature of each operation will determine its exact facilities and equipment and, especially, its policy. In short, the nature of operation determines the needs of the station, and the soundest policy for the station is to meet these needs by following a properly-laid-out Master Plan.

In long-range station policy planning, flexible policy and adjustable layout are a 'must'. The planning group may insist that each turn in the project be observed and surveyed through market research studies. It will provide facts on amortization requirements, earning capacity and expenditures. It will take advantage of all technological developments, market changes and extra revenue sources. It is perfectly possible for a creative planning group, with the help of specialists, to foresee, in broad outline, future technological developments and to project their demands on the final shape of the station and its personnel. In this respect, especially, TV station builders have displayed a lamentable tendency to follow the legendary habit of the ostrich.

Research will be in the direction of policy planning, market analysis, economic evaluation of investment and operation, program



planning, equipment and facility pre-design, personnel requirements, budgeting, systems and methods analysis, etc.

Surveys must be made of:

1. The potential of the region to be served.
2. The anticipated growth of the community in this area.
3. The level of business activity in the area in proportion to the national average.
4. Advantages to be derived from timing in starting the station.
5. The possibilities of non-competition in the area versus competitive broadcasting.

To make such surveys, one of the established professional market and field research organizations should be employed by the planning group. The statistical sources used must be of governmental or other accredited agency nature.

In making studies, the proportions of the community should be established. The basic unit in an audience survey may be the dwelling

unit, as opposed to families or population figures. Sets are operated and bought, to a large extent, by dwelling units. On this basis, the proportionate size of cities and sections of the entire region may be given in terms of dwelling units rather than in terms of families or population.

The business picture is found through the study of retail sales, comparing, where available, the proportion of advertising expenditures to the sales total.

Revenues may arrive from network, national spots, regional coverage, local program sponsorship and other sources. It will be necessary to study thoroughly the area's capacity and growth, its industry, manufacturing plants and appliance sales. The establishing of a rate card is a desirable step because it will indicate to what extent the rate per hour will compare with other stations.

The following expenses must be considered:

Technical: Salaries and wages. Repairs of equipment.

Program: Salaries and wages. Royalties and license fees relating to program material. Transcriptions and recordings. Cost of wire services.

Sales: Salaries, wages and commissions.

General and Administrative: Salaries and wages. Professional services. Insurance. Depreciation and amortization of broadcast investment.

Rental of property.

Taxes.

General expenses incurred in connection with each of the above.

An important point to be remembered in station economics is that it is the operational capital that is critical, and that investment in tangible property is only secondary. In breaking down expenses, one fact stands out — program expenses for TV come to over fifty per cent of the total expenditure. The use of transcriptions and recordings helps but, so far, cuts only about two per cent off program expenses.

Production, operation and maintenance will all be viewed with a purpose in mind. At every stage of the Master Plan the group will, of course, consider the financial resources at its disposal and thus determine the "tempo of adaptation."

In brief, the client will determine his goal and the planning group survey will explore the route.

Like any other craftsman, the planner will be judged by the quality of his finished product. For the builder, this is a physical product, while for the planner, the creation shall be a well-rounded, complete and integrated study, fully illustrated and self-explanatory. The station owner, the architect and the engineers should all receive from the planning group such complete information regarding policy and development considerations as to enable them to prepare, without undue difficulty, detailed design and working drawings of the station.

The value of the Master Plan can be measured by the money saved in capital investment and operational and maintenance expenditures. The reduction of unwarranted areas, the relocation of some to less-high dollar-value ones will be necessary. Much money will be saved by the preparation of the traffic studies important for long-term operation of a station. General maintenance and production expenses will be reduced to essentials — not by guesswork, but by a scientific method of eliminating the dispensables. As previously intimated, information collected by the architect or engineer is today, at best, an individual expression. Only a planning group can properly evaluate these data. The best architectural and engineering design will fail if its concept is based on assumption, conjecture or personal opinion. It is, therefore, the job of the planner or planning group to furnish the architect, the engineer or the other specialist with accurate information and to explain to him the needs of the station.

Of great help to the group would be the utilization of scale models, scale plans, films and slides which often can be supplied by manufacturers. A few hours spent on such plans and models, after visiting a station and observing its operation, frequently will result in lightening and expediting the work.

Site Selection and Plant

Placing the television station in the right location is all-important. Toward this end, a study must be made of the "geographical" limitations of the station, with an eye to future technological developments which may enlarge the area substantially. Availability of frequencies under the laws of the Federal Communications Commission must be considered, and a site to determine the best practical coverage must be selected. (Coming into consideration on the latter point will be such critical factors as tower height, antenna-gain, transmitter power and effective radiated power.)

The study will, therefore, include present market area coverage, occupational patterns, and the general trend of settlements. These studies will reflect mainly on site selection and the establishing of potential revenue, but also on the planning and final design of the station, and on ultimate programming.

In placing the station in the right location in accordance with the market and its coverage, and in selecting the right studio-transmitter relation, the planners may be influenced by:

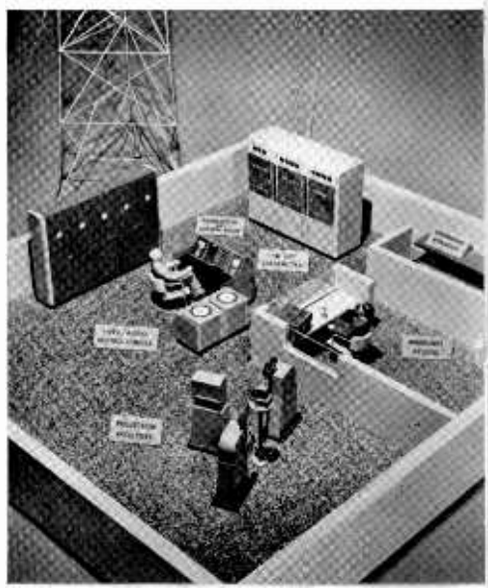
A. The possibility of combining television operations with a radio station or some other existing business maintained by the same owner.

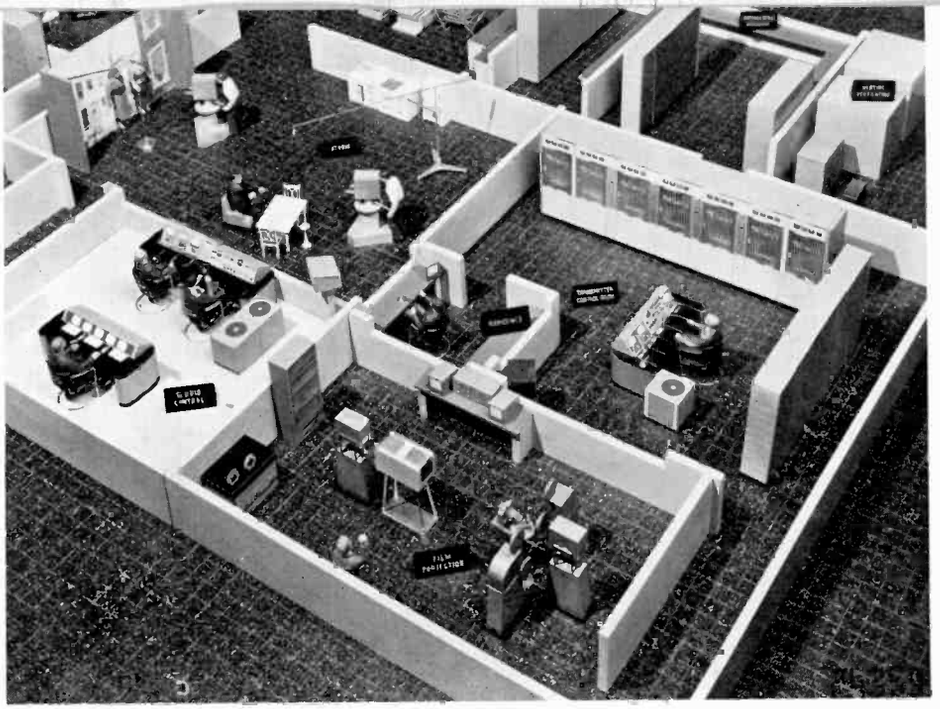
B. Land and construction costs, and the cost of needed alterations.

C. The availability of space for future expansion.

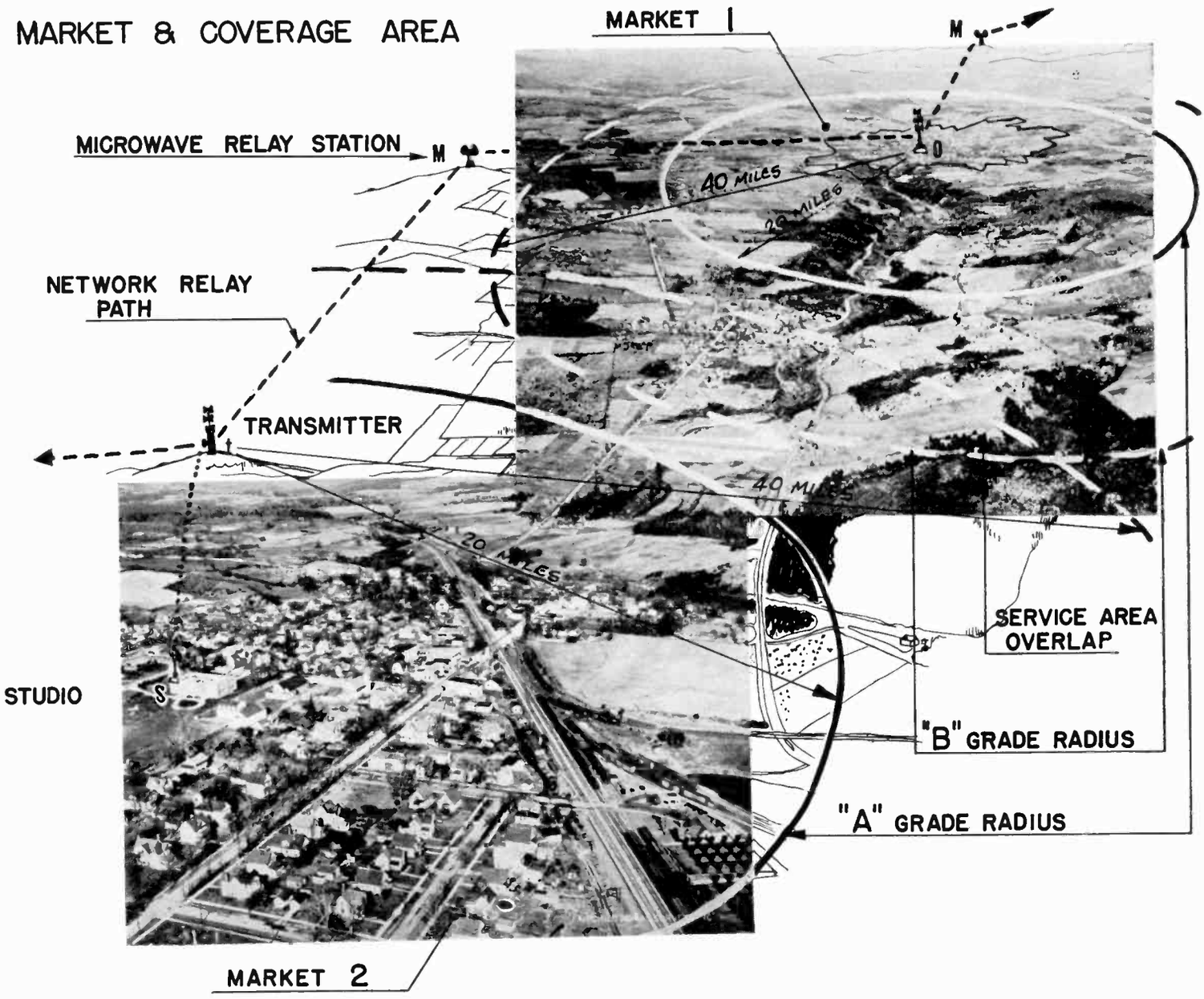
D. The advisability of selecting a central location — or, in

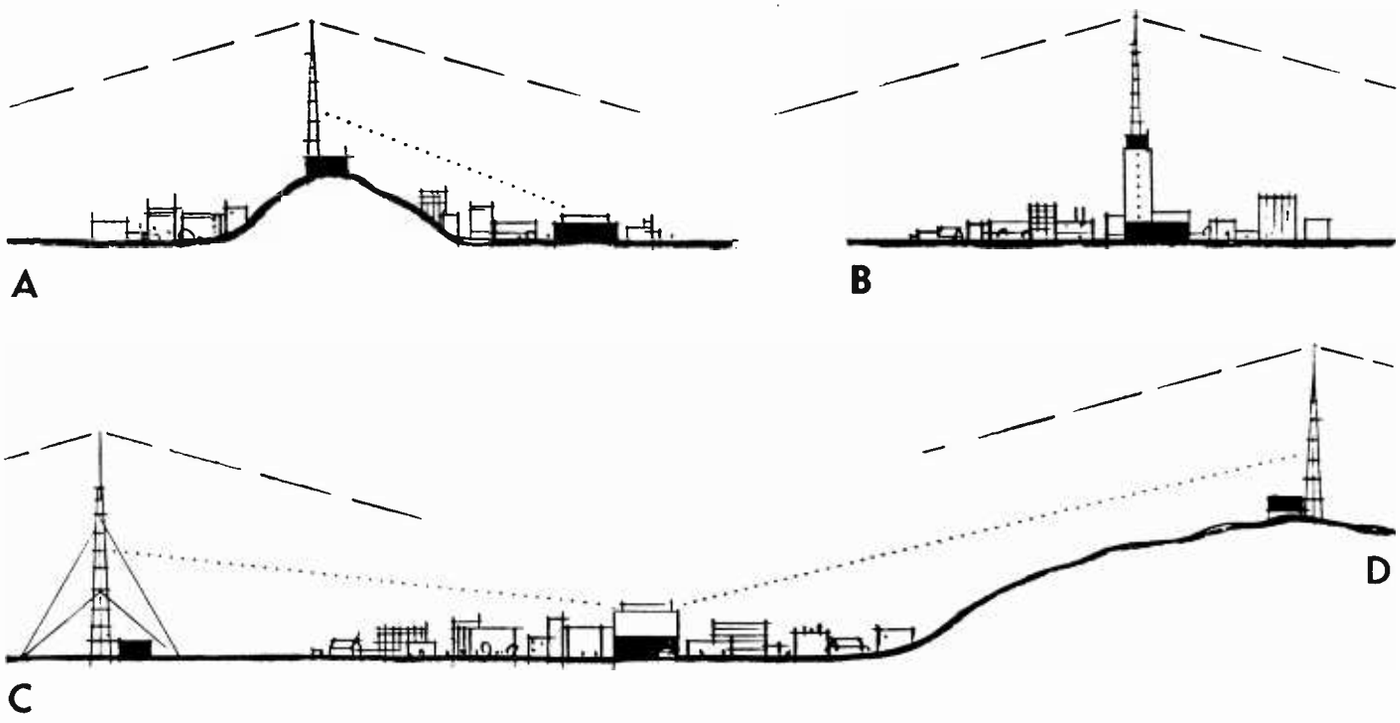
A model of RCA's "basic buy" equipment for a TV station. This equipment is limited to film and network shows only.





Model of a TV station including a small studio as well as facilities for film and network originated programs.





some cases, nearness to sources of programs.

E. Freedom from interference and noise that may disrupt program operations.

F. Access to public utilities such as transportation, electric power, water, etc., for studio, transmitter and relay buildings.

G. Actual distance between the buildings in the group, as between studio and transmitter building.

Once the site has been selected, the Master Plan makes one of its biggest contributions in determining the character of the plant layout. Scientific planning considers layout a kind of envelope for a station's vital contents — something which should be the correct size and shape and with the right compartments figured for convenience and efficiency. Layout stems from policy — it is never the other way around. It should never force policy and operation into a binding strait jacket, as has frequently been the case.

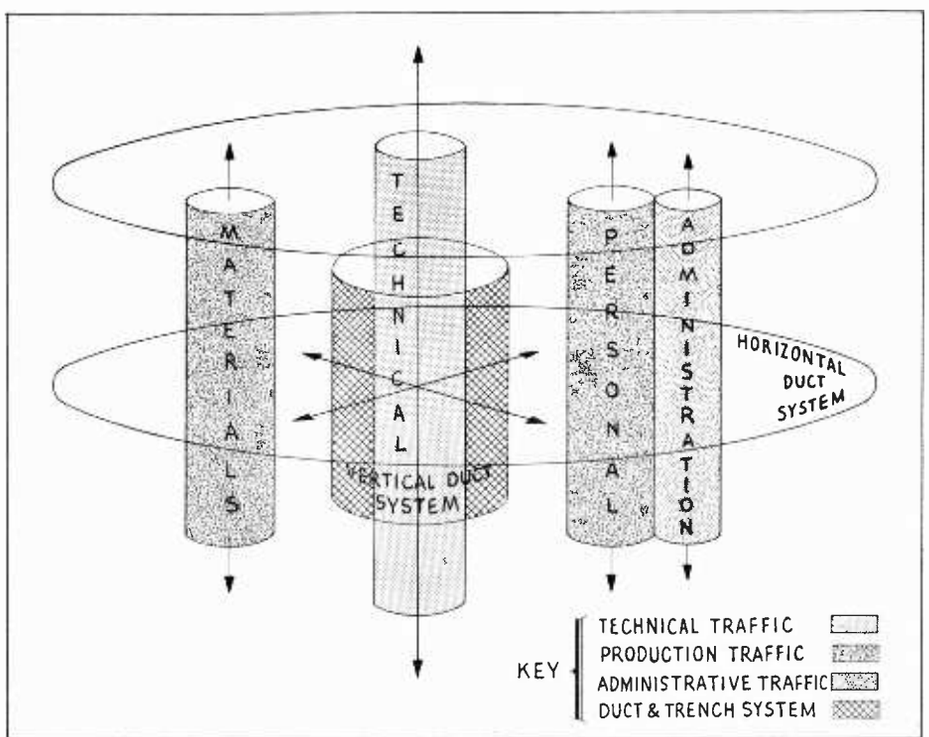
Under Master Planning, layout is among the last steps to be taken in creating a station. First, the planning organization studies the entire picture of operations for a particular locality. Then, in the light of these factors, it sets down the basic requirements for a truly functional station. After this — and not until this point is reached — a layout is developed. By this procedure, layout is co-ordinated with everything else about the station — program sources and future production possibilities, specifications for equipment housing, efficient usage of technical facilities, total services offered by the station, management policies, administrative and executive space-needs, the relationship between principal and station areas, etc. There is no set and rigid formula for station layout. Every station poses its own peculiar problems and these must be viewed in their proper perspective. But

when looked at with a scientifically-trained eye and viewed within the structure of the Master Plan, they can all be solved so conclusively that they do not crop up a few months later in a different guise. Layouts are costly to change and should be planned for performance in their major features and flexibility in their smaller ones.

To provide the needed flexibility and expansion, the broadcasting structure has to consist of a well-formulated free skeleton. The only fixed elements in the physical planning are the vertical shafts and staircases, elevators, escalators, ramps and vertical duct systems of an electrical and mechanical nature. There are no other limitations in the primary structure planning. All horizontal ducts and trenches rely on proper vertical distribution, as for the builder the column spacing decides the girder and floor construction.

The basic concerns of the planner in regard to plant and layout are the various area categories. These are his basic materials, as bricks, cinder blocks and mortar are the materials of the builder. These areas must be set down and properly tabulated if they are to have unimpaired functional use. The three basic areas and their components are:

1. *The Operational Area*
   - A. The technical traffic area
   - B. The technical control area
2. *The Production Area*
   - A. The studios
   - B. The production area
   - C. The production traffic areas

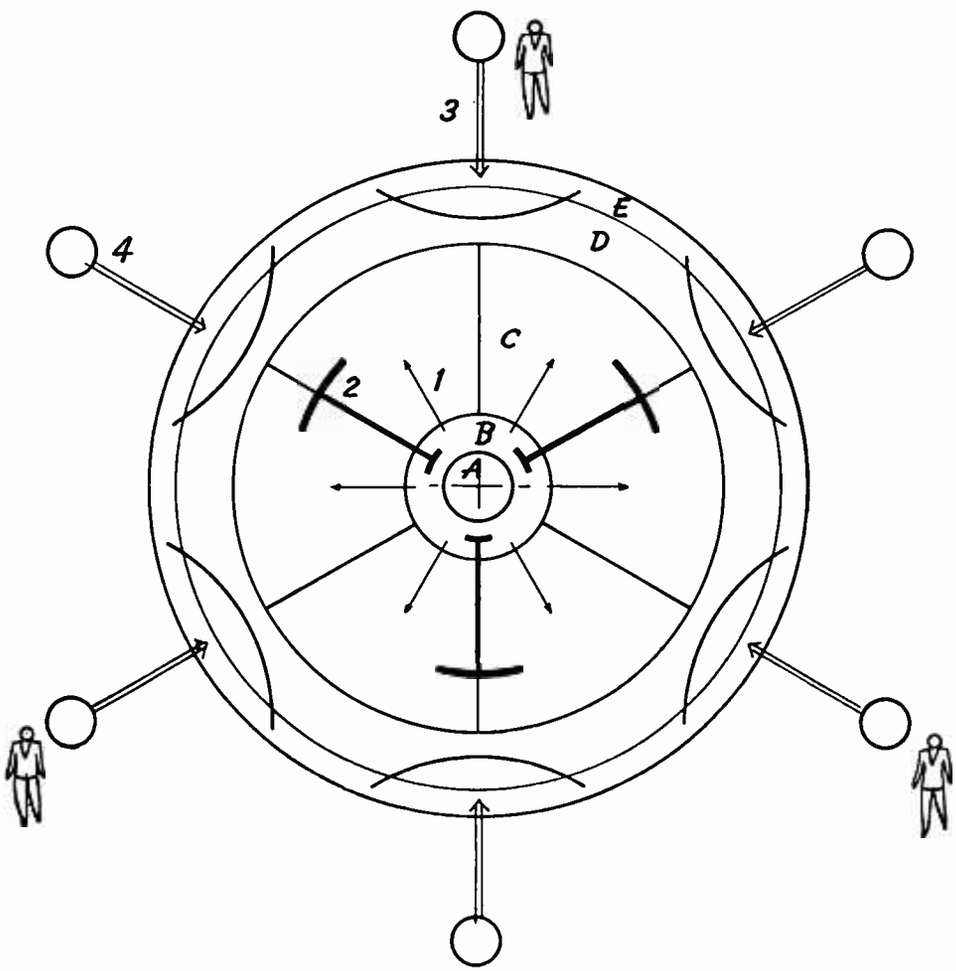


THE PLANNER'S STRUCTURE OF THE T.V PLANT DESIGN.

3. *The Administrative Area*
   A. The executive office area
   B. The program area
   C. The sales area
   D. The maintenance and utility areas

While the basic elements are the bricks with which the planner builds, the "functional chain" is the pattern he will use. Such a chain results from the coordination and interrelation of complementary elements and will read differently for each planning step. Step One, for example, would be "Studio Control Area." Step Two, which may be the next step in the progressive development of the station's facilities, might be "Production Area (storage, props, scenery), Studio, Studio Control Area, Technical Area."

The proper distribution of areas to form such chains, besides providing for functional efficiency, will also coordinate traffic and facilitate intercommunication problems. The various chains would then be linked closely together and integrated both horizontally and vertically. Once the general arrangement and pattern of these chains has been set, the planner, architect and engineer will be able to determine very quickly their proper working relation, shape and dimensions.



Planning for efficiency: 1—Sightlines for control areas radiate outward; 2—Electrical supply systems radiate outward; 3—Personnel production entry directed toward core; 4—Material production entry directed toward core.

Taking all these factors into consideration, the simplest and most efficient form for the station would be a circular horizontal plan. This plan would embody a two-level traffic pattern and would, in general, offer the following advantages:

1. Functional simplicity
2. Space economy
3. Compactness of technical areas
4. Centralization of all duct systems
5. Accessibility of production area
6. Expansibility inside practical limits
7. Flexibility of studio and production areas
8. Lowest capital investment to enclose a given space
9. Efficiency and economy in maintenance

Starting with the basic TV plant design, we can simplify it by using a half circle as our planning pattern, further modifying it by interposing a horizontal strip. This solution will still offer a well-coordinated broadcasting plant design with all the inherent advantages of flexibility and expansibility.

For new stations the sectional development may be an advantageous solution. This would permit the development of the station in easy stages suited to the tempo of adaptation. Standardization and prefabrication in structural elements can, moreover, easily be achieved by the architect and engineers.

The idea of radial and circumferential planning has to be well understood, however, before it is undertaken.

Wherever possible, new, well-planned construction is extremely desirable, but if it is necessary to use existing structures, here, too, the concepts of planning should be used in the effective utilization of space. In many cases, it will be possible to apply the principles of circular development to the existing space.

Utilizing Station Space

We do not propose here to give a specific station layout, but rather to show what basic space requirements must be considered in all planning. As in everything, the Master Plan will determine the actual limits of each area as required by its function in the specific station. The fundamental requirements are:

1. *Space must be sufficiently large.* It must be adequate not only for average broadcasting demands, but for accommodating peaks of activity. Each area and its use must be discussed, and such factors as sight lines from the various control positions, camera movements and general production requirements must be considered. Camera space must be ample, and not only at a single level, as horizontal and vertical integration is a 'must.'

2. *Areas must be functionally arranged.* The arrangement of areas is dictated by their purpose and relationship, by the character

of the station and its programming. A purely railroad arrangement of rooms will not meet the stringent requirements of a functional station. Once the purpose of each area has been analyzed, it will be apparent to the planning group which areas have to be adjacent, at what level and in what location.

3. *Traffic flow must be undisturbed.* The flow and density of traffic — always an important consideration — is vital in communications buildings, and especially in TV stations. Here the variables are both human and material. Included in the former are the public and station personnel — sponsors and administrative, program, production, operation and maintenance men. Of the latter — the material variables — there are equipment, scenery and props. While it is generally thought that a horizontal traffic pattern is more convenient for TV stations, it may be wrong to assume that this is always of value. In fact, a solution for complicated problems often lies in the employment of a multi-level traffic pattern. Effective solutions for traffic problems are important in economical station operation because of the speed and complexity of production.

4. *Space must be utilized both horizontally and vertically.* The allocation and distribution of space by function does not take into account the horizontal and vertical utilization of that space. The necessity for providing space of more than one-level height comes from the demand for linear footage on the periphery of certain areas and the requirements of lighting in studio areas. The additional space so arranged can be used for technical facilities and will often permit improved sight lines, new camera angles, better control positions, etc. Proper vertical integration will improve all cable runs for electrical, electronic and mechanical systems. Maintenance problems can often be solved at this stage because integration of areas will eliminate unneeded long service runs and complicated mechanisms.

5. *Areas and volumes must be in proper relation to each other.* Simply expressed, this means that in broadcasting structures a room may not always be of either single or multiple height, but may take setbacks, open balconies, shelves, and other irregular forms. It is important for the planning group to know that such relationships between space and volume will often provide unconventional shapes in this type of building.

6. *Space must be flexible.* Certain areas, such as the rehearsal rooms, waiting areas, storage and shop areas, etc., must be afforded maximum flexibility at the earliest stage of planning, as they are keyed to the program and development stage of the station, and changes in their requirements must be expected. If the skeleton of the building is planned to provide large enough spans, proper column spacing, freeness of certain walls from mechanical attachments to permit their later removal, etc., such flexibility will be attained. In the case of storage facilities, for example, flexibility shall be planned not only for the necessary scenery storage but also for the shops used for assembly,

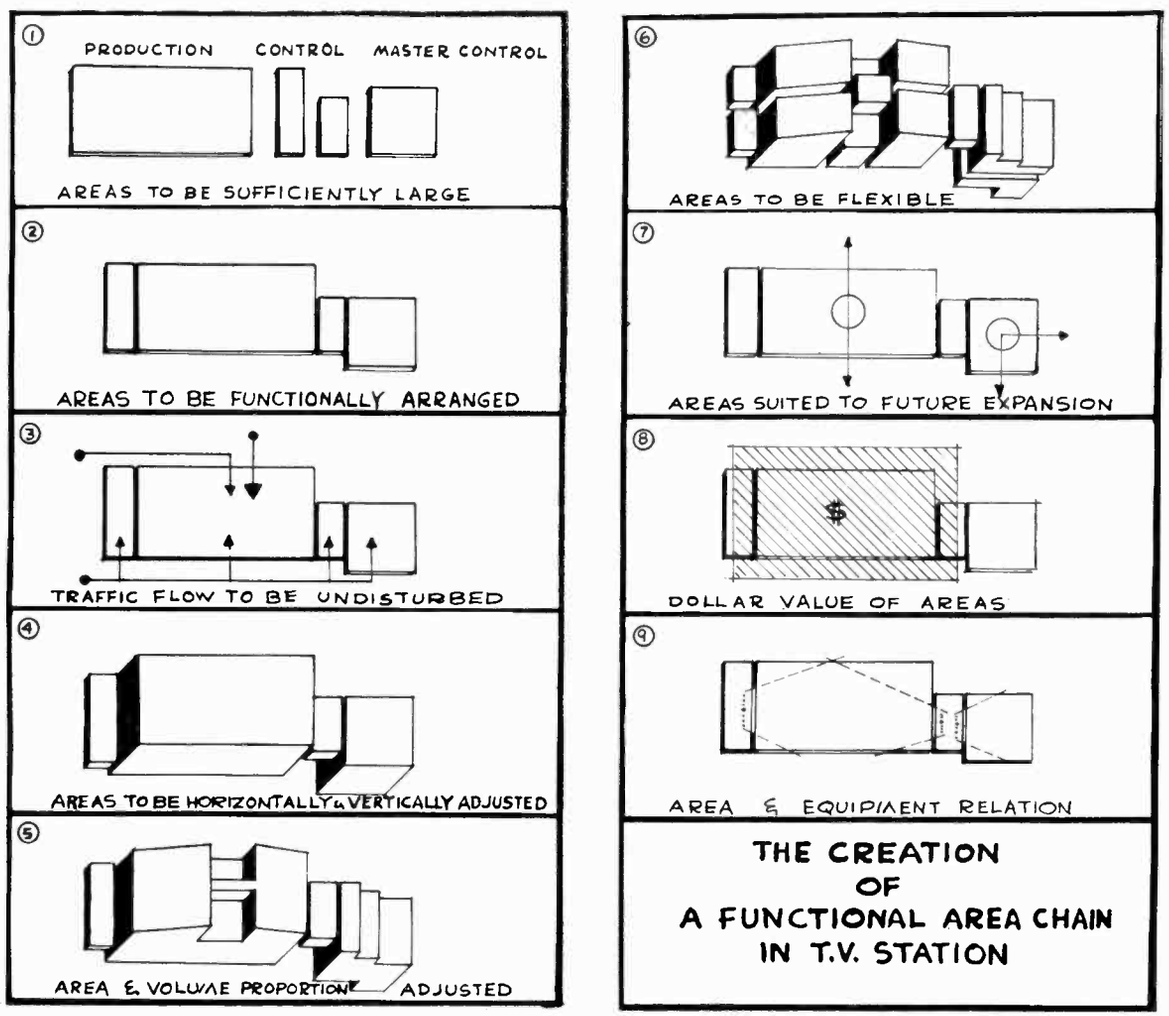
erection and production of scenery. In brief, flexibility shall permit the breaking down or building up of areas — the quick and easy conversion of spaces.

7. *Space must be efficient.* The most efficient use of space is essential because of the hectic pace set by programming. In some instances, equipment especially designed by the engineer for economy and efficiency of space will be required.

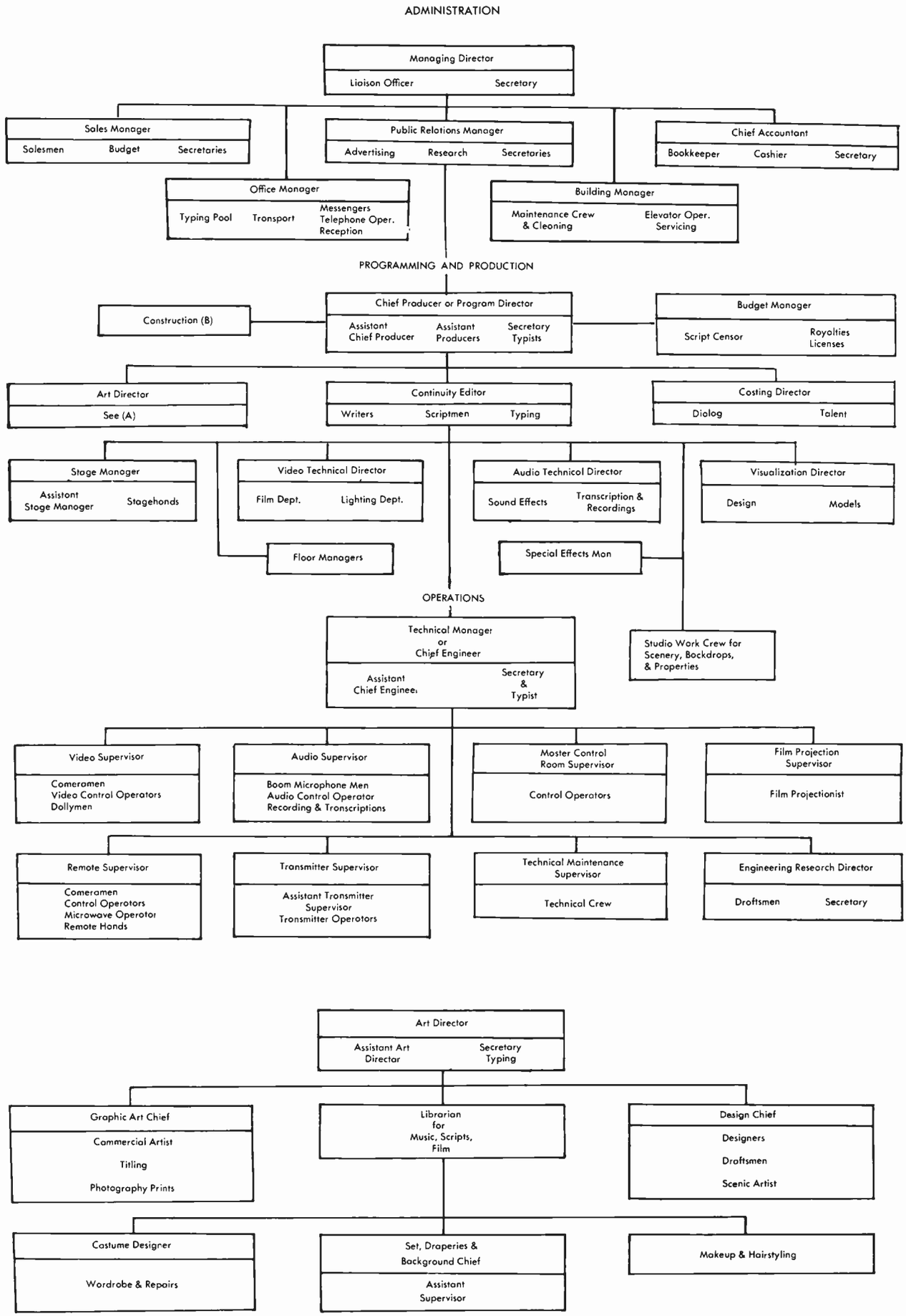
All these requirements are, of course, reflected on the three main areas of the station — the Operational, Production and Administrative.

The Operational Area. Traffic is the main consideration in this area, and the technical traffic must be separated from all others and confined to its own area in order to eliminate bottlenecks and cross traffic between operation and production. The technical traffic space should be arranged with care to provide direct access to all technical areas and be large enough to permit personnel and material movement. Space must be designed for every piece of equipment.

As operational traffic will be on a vertical as well as horizontal plane, use will be made of stairs, elevators and other vertical means of transportation. A technical core should be provided, and the technical control area, such as studio control rooms, master control room, etc.,



ORGANIZATION CHART OF A LARGE TV STATION



should be directly accessible from the traffic core at various levels. This arrangement would provide, in addition to easy accessibility, the proper interconnection and quick interchange of personnel. Intercommunication between technical areas will, therefore, be greatly facilitated.

A horizontal trench and vertical duct system should be located in the center core of the space. This system should be laid out to permit short runs radiating out from the vertical vertebra system. This core will provide efficient and convenient maintenance and operation.

The Production Area. "Efficiency" is the keyword for production areas. These must be planned to give perfect service to all operations and must be well-coordinated, with each part of the equipment used efficiently.

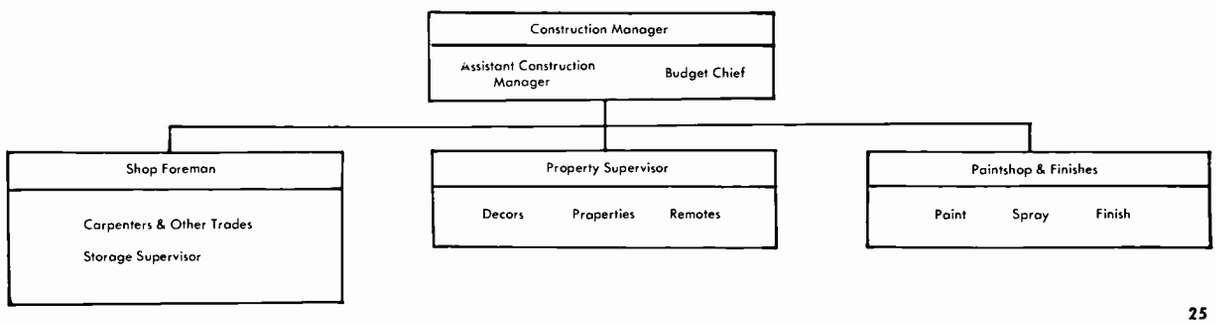
The functional separation of studios from other production areas must be realized for successful operation. The present practice of using the high-dollar-value studio area as scenery, prop and equipment storage space should be abandoned. To this end, space devoted to storage, shops and dressing rooms must be large enough to function without overflow into the actual production area.

Ideally planned and adequate studio space is important because it is here that money is made and spent. Studio space should adjoin its control areas in such a way that sight lines and access are easy and efficient. At present, practically every studio building has a more or less rectangular form — not because such is needed for live talent production, but because it is a conventionally accepted form conceived by some architect who has been as far removed from the operation of television as heaven. The use of a lightbridge or of other technical features will determine the ceiling form and configuration and may demand special forms.

Use of different floor levels should be considered in this planning stage, and is of such importance that it must be classified as a basic question.

Adjoining the studio area will be the other production areas, some of the property and scenery storage and, especially, the equipment storage. Dressing rooms, makeup rooms and other secondary areas need not, however, be in the immediate vicinity.

The Administrative Area. The administration level should occupy, in a vertical development, the highest level, well-separated from operation and production, and may be located in the structural truss spanning the studio area below. Sales and public relations offices should be easily accessible to the public.



APPROXIMATE AREAS AND STAGE DEVELOPMENT (STATION WWJ-TV)

	Existing WWJ-TV	Temporary Alternate	First Development Stage Permanent	Second Development Stage
Executive Staff				
Attached Secretariat				
Sales				
Attached Secretariat				
Public Relations				
Attached Secretariat				
Client Room with Lobby				
Accountancy				
Typing Pool	2,500	400	3,500	4,500
Reception		2,500		
General Lobby				
Conference Rooms				
Rest Rooms				
Production Executive			350	
Attached Secretariat (Programming)				
Script Writers			150	
Staff Artists		400	500	
Scenery Designers		200	300	2,000
Film Editor	150	400	400	
Cameramen				
Engineering Executive			200	
Attached Secretariat			100	
Typing			200	
Research Engineer		100	100	200
Supervisors	400		300	500
Engineers			400	700
Studios	3,200	6,800	10,800	19,000
Studio Control Rooms	600	1,300	1,800	3,800
Sound Locks and Aux. Areas	200	1,100	1,500	2,500
Camera Rehearsal Areas	(1,300)	(1,300) 300	1,700	2,500
Script Rehearsal Areas		200	300	500
Storage Scenery	(600)	600	1,800	4,000
Storage Props		300	400	1,000
Storage Equipment			300	1,000
Shops		400	500	1,500
Master Control Area	600	1,000	1,600	1,600
Test and Spare Part Area	300	600	500	500
Cable Room		100	100	100
Announcers Studio	100	200	300	400
Film Projection Area		500	900	900
Splicing and Handling Area	300	100	150	150
Film Vault		150	100	100
Editing Unit		150	350	350
Gimmick Room		200	300	500
Newsroom				100
Dressing Rooms	(200)	400 (200)	1,000	3,000
Make Up Rooms			100	200
Costume Wardrobe and Repair		300	300	800
Green Room		300	300	500
Viewing and Visualizing Area			300	500
Remote Unit Area	800	1,200	1,800	2,500
Kine Production Area			1,400	1,900
Garage Area			2,000	3,000
Air Conditioning & Climatization			1,000	1,500
Emergency Power Plant Area			600	600
Maintenance Area	100	200	400	600
Disc Library				
Film Library			150	150
Script Library			150	150
Auditoriums				(10,000)
Sponsors Area			600	1,000
Echo Chamber & Sound Effect Area			250	250
Orchestra Rehearsals				1,000
Instrument Storage			200	200
Stage Hand Area			150	150
Artist Reception			300	500
Audition Rooms & Controls			700	1,000
Approximate Total Areas	12,000	24,000 (100%)	42,000 (250%)	68,000 (466%)

Programming and Equipment

We may assume that the average person is concerned only with what reaches his TV set and has no special interest in the broadcaster's problems in supplying programs. Therefore, to build and hold an audience, TV stations must have their programming format and operational time schedules well worked out before they go on the air. Even the testing and experimental period — before commercial operations actually begin — should be planned in careful detail, not only in the interests of economy but also for the most immediate public acceptance. To comply with governmental requirements, as well as to assure good viewer relations, possible program expansion, in hours, should be charted well in advance.

Programming determines a station's character — and the Master Plan is the logical place to set the pattern for it. When planning is done at this point, there is less underbrush of petty detail to clear away and fewer stubborn obstacles to get around than is the case when piecemeal program scheduling is undertaken at a later date. When establishing contemplated air time, it becomes possible to determine realistic and economic ratios between 1. network needs, 2. local studio originations, 3. film and kinescope, and 4. remote unit production. When this has been done, there is a logical opportunity to make up schedules that intelligently fit the ratios. Establishing a weekly time schedule will give a picture of what is to be expected of the station.

Program requirements will shape equipment and facilities needs, and are a major item on the list of the planning group. There are basic types of programs with which they must be conversant— the network program, the film program, the live talent studio production, the remote and the simulcast. Any or all of these may be used, with selection dependent upon the station's budget and the character of the locale.

Besides the above breakdown of programs, production may fall into such classifications as news, commentary, simple productions, interviews and forums, round-table conferences, variety, sports, science, comedy, fiction, drama. All programs will, however, generally fall under one of the following headlines—"Entertainment," "News," "Education," "Discussion," "Talk," "Agriculture" or "Religion." The station owner will be well-advised to consider the possibility of all types of production (usually special events) which might have local appeal — i.e., cattle shows, barn dances, festivals, crownings of beauty queens, etc. The Master Plan should give an indication that the possibilities inherent in such events have been visualized in advance.

The planning group also must familiarize itself with current procedures in buying program material, with suppliers and with the problems and difficulties which may arise. Other potentials, such as local sponsorship, should be fully explored to provide a full picture of program possibilities.

As intimated above, types of programs determine the types of equipment a station should have on hand. Yet more often than not, purchases of TV equipment are made on a haphazard basis—a serious pitfall that the Master Plan avoids. Planned purchasing calls for equipment precisely tailored to program needs, expansion ambitions and the financial resources of management. A few of the questions a small station should weigh when buying equipment are:

1. What are the actual possibilities of use so that the cost can be carried and amortized at the lowest per-hour rate?
2. What is the likelihood of rapid obsolescence?
3. Is the proposed equipment easy to operate and maintain?
4. Is it suitable for the available station personnel?
5. Is the equipment standardized to work efficiently with existing or possible future units?
6. Will the equipment retain its usefulness during expansion of station operations and plant?

Naturally, the by-words in equipment purchasing are economy—in both purchase cost and operating expense—and efficiency. Few stations, however, have worked out their equipment needs on a planned usage basis. Only in the most obvious and elementary respects have buying decisions really been influenced by the consideration of programming or operational plans versus costs.

See Program Sources on page 29.

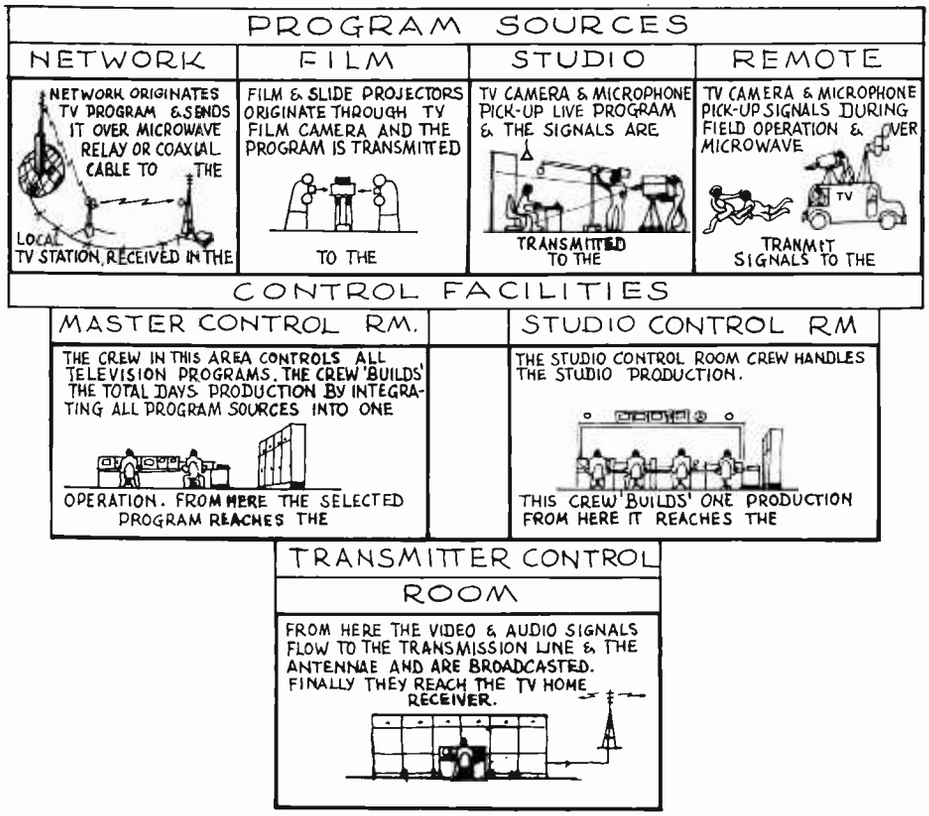
In addition, there are certain general requirements for television equipment with which the planning group should be acquainted. They are:

Equipment must be adequate for self-sufficiency. Axiomatic as this may seem, it can stand repeating in the light of the glaring inadequacies of many stations today.

The minimum requirements for any given type of station are well-defined. Efficiency of equipment chains is determined not by quantity of parts but by the relationship of each part to the whole. The major suppliers of television equipment are in a position to provide equipment which is integrated, but over-equipping is often the result.

One very important goal in planning satisfactory equipment is an engineered control system which will ensure the greatest possible variety in production facilities. If program policy is clearly defined in advance, it is often possible to provide this control facility with a minimum amount of equipment. The aim should be to engineer with imagination and to provide self-sufficiency with the lowest possible investment. Electronic effects can achieve cheaply what production often must buy expensively.

Equipment should be standardized. Equipment manufacturers are already producing certain standards in equipment. The station owner should strive for further unification within his own setup. The resulting ease and economy of operation and maintenance are obvious.



Such unification can, with foresight, be carried to a very high degree. It should take into consideration future expansion of the station as well as the initial equipment needed. Standardization should include not only primary equipment such as cameras, but also such items of secondary nature as dollies, racks, consoles, storage facilities, lighting fixtures and sound gear.

Equipment should be interchangeable. Insofar as possible, advantage should be taken of the interchangeability of equipment. Field equipment can easily be used for the studio, and for the small station it will be most economical to acquire field equipment first and gradually replace it with permanent studio installations.

Mobile equipment may be transported in special trucks which have their own control and transmission facilities. Pictures and sound may thus be sent back either by microwave relay or telephone line. Communication should be maintained between the station and mobile units. Four-wheel-drive station wagons properly equipped may do the job as well, or better, for smaller stations. For these, the mobile equipment may prove to be a good source of income. Its adaptibility to studio use makes it a good investment since it falls in with virtually any plan for later expansion.

Equipment must be expandable. Any equipment system must be designed to permit expansion within the concept of the station's Master Plan. Such planning must include not only video and audio circuits but also intercommunication systems, paging systems, facilities for network contacts. and telefilm production facilities.

The expansion of a station's operation may necessitate delayed

broadcasts, and recording facilities adequate to take care of these should be provided. Recordings and teletranscriptions may, in a few years, be important income sources.

Equipment must be economical to maintain and easy to operate. The criteria to bear in mind when specifying any piece of equipment are quality, economy of maintenance and facility of operation.

In this connection, those entrusted with the planning of the station should avail themselves of all sources and all available research studies to insure selection of the most suitable equipment for each specific purpose. For example, the potential development of lighter and smaller cameras should be analyzed very carefully and their possible effect on the studio taken into consideration.

Rapid progress in television research need not outdate equipment if the original selection is intelligently made. The industry has indulged itself too long in its indifference to the obsolescence of equipment.

Equipment Usage

pickup equipment

1. *The camera.* The value of any good camera is doubled by flexibility. Many stations, even those with the best of equipment, fail to exploit their possibilities to the fullest because of inadequate dollies or inflexible feeding lines.

The feeding of cameras by means of floor cable should be studied. Feasible future developments, such as feeding from above and the use of self-feeding, battery-operated units for special-purpose production, will be discussed later in this study. The development of remote control mechanisms for cameras used in connection with dollies offers other interesting and unusual possibilities.

An obvious point—but one overlooked or disregarded so often that it bears repeating—is that the movement of the camera inside the studio should be, within reasonable limits, unrestricted by the height or shape of the studio or by any floor obstructions (Figures 9-18).

2. *Video control.* Control equipment includes camera control, preview and line monitors, film camera control monitor and switching units. Control equipment may be used in such different locations as the studio control room, the master control room or the film production area. While control monitors will be of a standard type for most stations, switching systems should be engineered to give performance fit for local needs. Switching systems can provide a varied selection from film, slide, studio, monoscope, remote and network transmission. Also, dissolves and superimpositions may require a number of switching processes.

The physical arrangement of video control equipment can improve production and reduce cost. Clear sight lines from the video control equipment to the studio, announcer's booth, film projection

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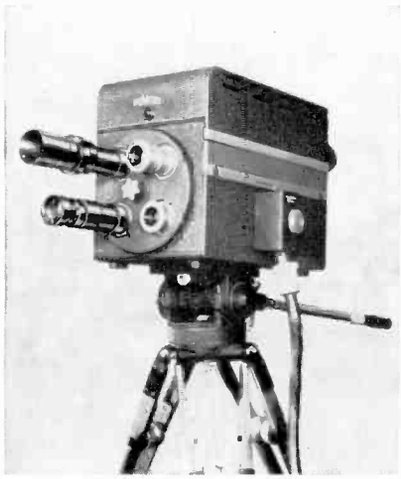

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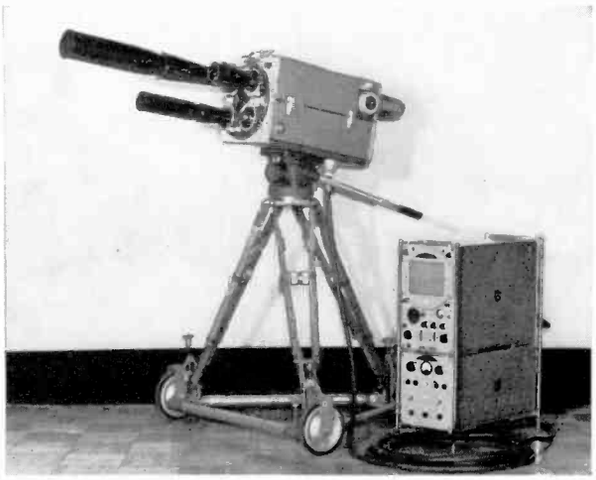

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A selection of representative TV cameras. 9. RCA camera. 10. Dumont TV camera. 11. General Precision Laboratories camera. 12. General Precision Laboratories remote control camera. 13. Dumont TV camera and studio pedestal dolly. 14. Dumont camera mounted on a light studio dolly. 15. The Dumont camera in the foreground is mounted on a crane dolly. 16. General Electric studio camera. 17. An RCA camera mounted on a Sanner crane and Fearless camera dolly and pedestal. 18. RCA "walkie-lookie" camera.

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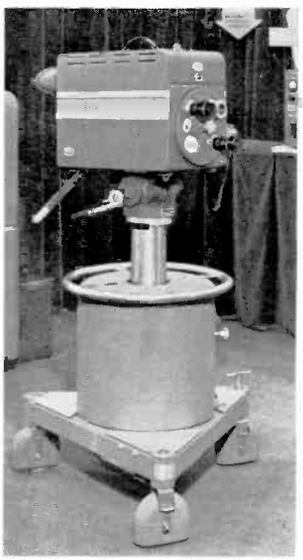

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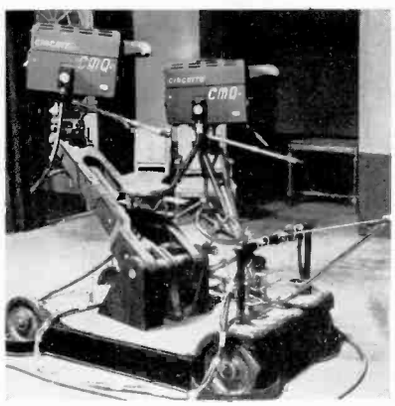

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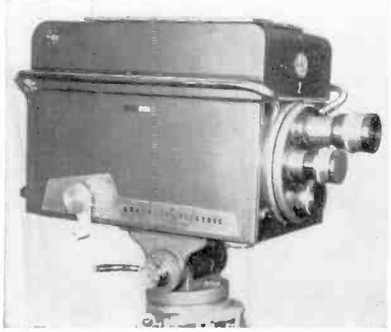

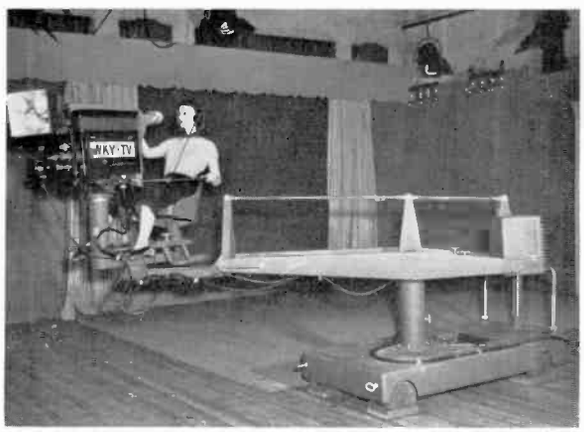

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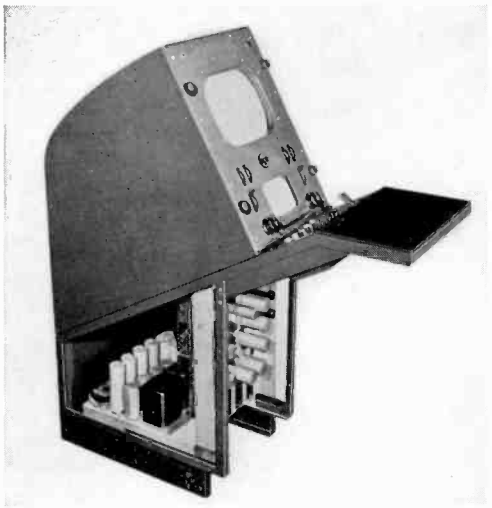
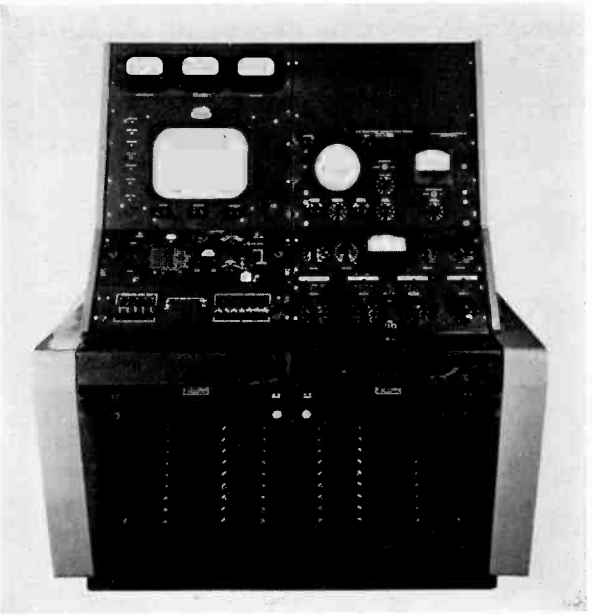
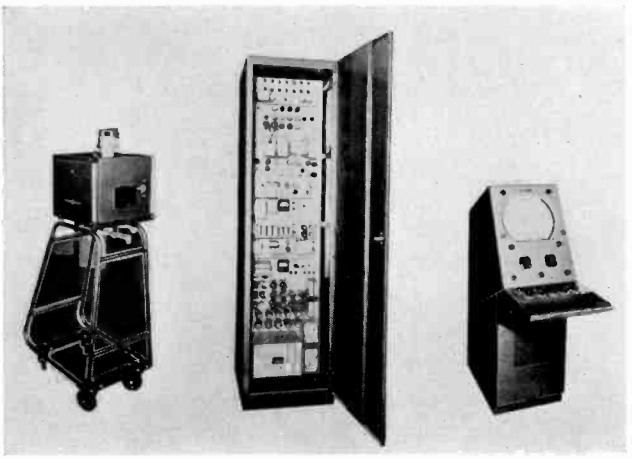


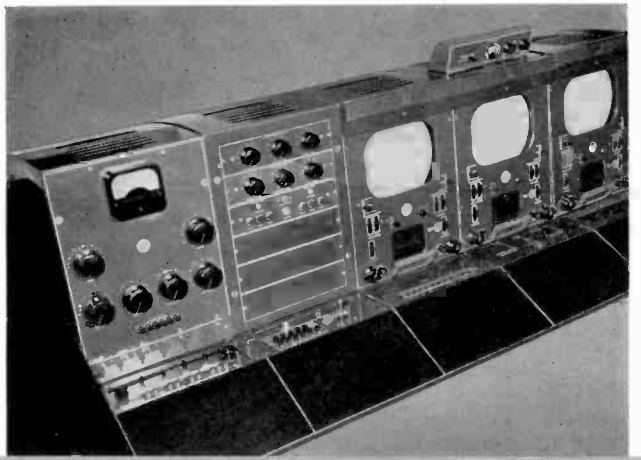
(Above) RCA camera monitor and switcher. (Right) The General Electric camera monitoring and switching combination console.

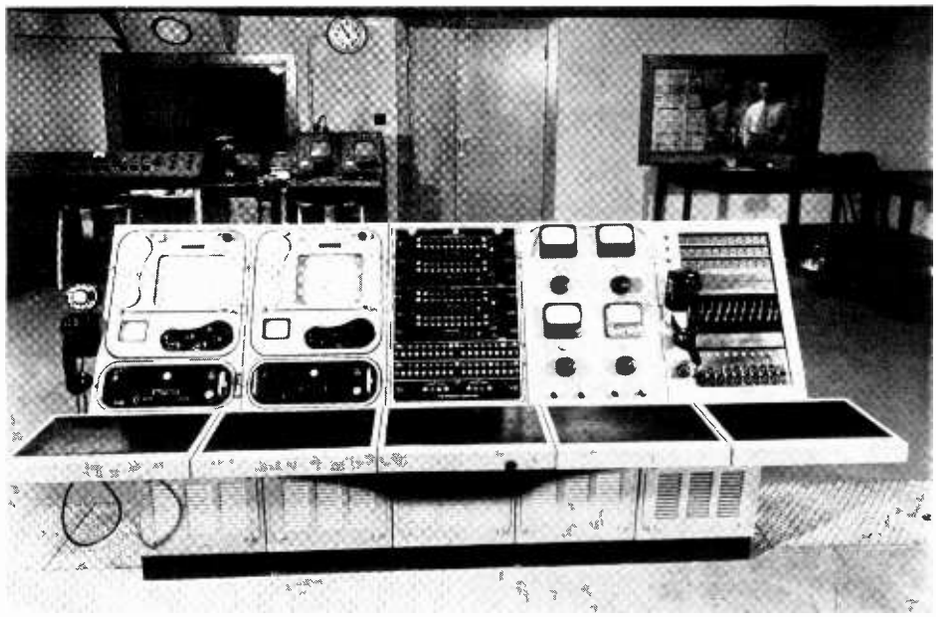


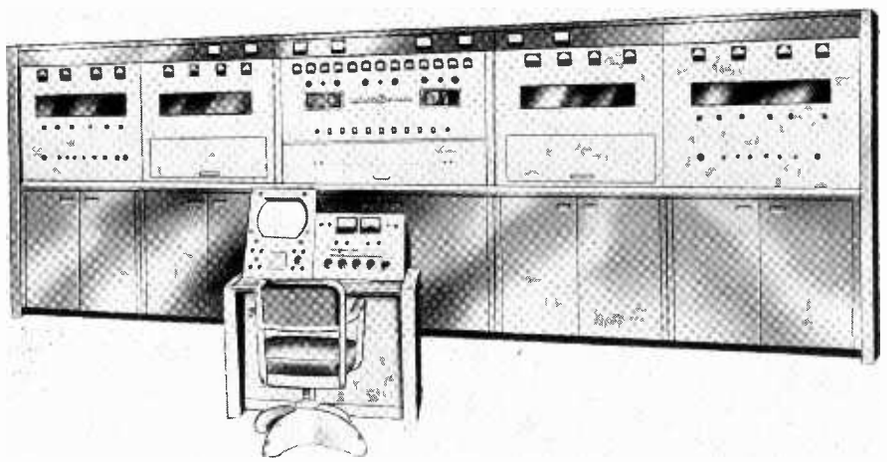
The Dumont control and switcher console.



(Above) The General Electric film camera, film camera rack and film camera monitor. (Right) The RCA "basic buy" console for a small station.







(Above) The master control room Marconi control console in the TV studio of CBC, Montreal. (Below) A 12 kw UHF transmitter control console by General Electric.

area and sometimes the master control room are desirable.

The station plan may provide central control booths which by mechanical reorientation can service more than one studio, but this economy may be provided only if planned for at the beginning. There are many planning possibilities in connection with the control location. One of the important points to determine is whether the station will operate as a decentralized or centralized unit. Decentralized studio production means that camera control monitors, technical director, producer-director and audio control operator are in the studio control room. Centralized operation means that the camera control monitors for all studios and film cameras are in the master control room area; producer-director, technical director and audio control operator remain in the studio control room. Space requirements will be greatly affected by the choice between these systems.

film equipment

Motion picture film is an important vehicle for the convenient handling of many types of program material and is the easiest way to

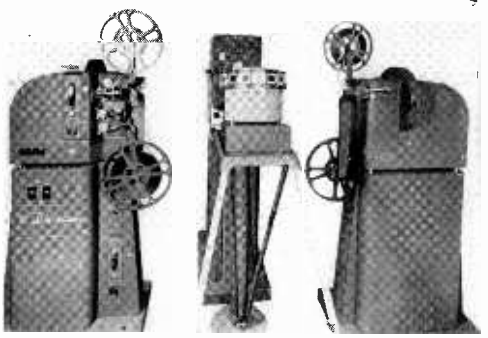
provide programs in the first stage of station development. Often it accounts for up to 80 percent of the total program time.

In the small station using 16mm film, projection equipment can be housed in the control area so that one control man will be able to handle the operation. Equipment will include one or two projectors, a film camera, a slide projector and reflector (multiplexer), and a film camera control monitor.

In larger stations, it is desirable to have a special film projection room—and this is a necessity if 35mm flammable film is used. The installation in such larger stations will include a special film production area with film vaults, darkrooms, editing rooms and preview rooms. Such materials as tank developers, enlargers, driers, cutting and splicing equipment, turntables, dubbing equipment and rewind equipment will be required. With these facilities, telefilm commercials may also be produced for the client.

As mentioned above, video monitors for the film camera should be available in the film control area. Switching for starting and stopping projectors can be by remote control. The announcer's booth should be near this area and, if possible, a visual contact should be established.

In a large station, provision can be made to record live shows, newsreels and similar events directly on film or by kinescope. A specially adapted film camera is used in such productions, and the film can be developed and stored for future use. Delayed broadcasts, rebroadcasts, recorded documentations for historical, legal or advertising purposes can be achieved by the employment of such techniques, but are advisable only for the large originating station (Figures 26-38).



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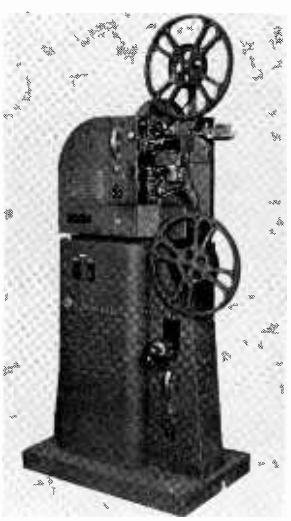

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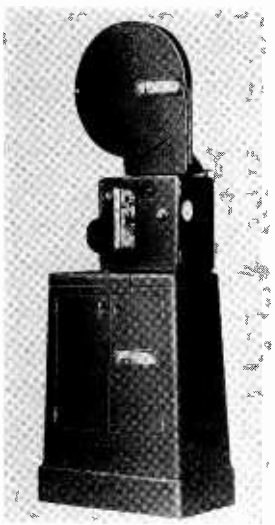

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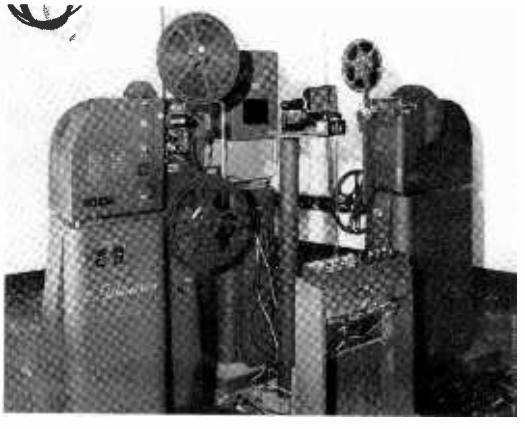

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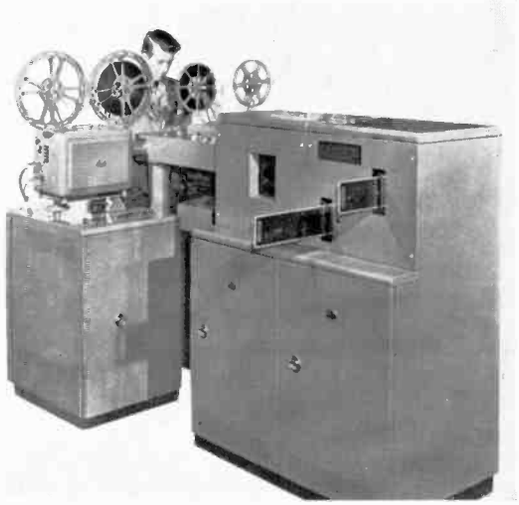
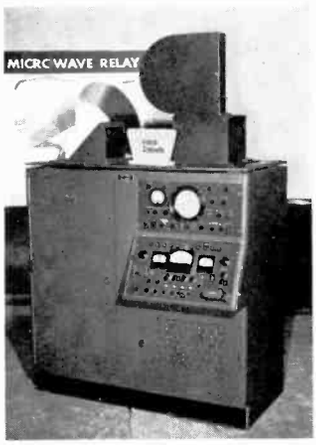
(26) RCA 16mm film projector. (27) a 35mm telecast projector. (28) The General Electric 16mm film projector. (29) A set up of RCA film and slide projectors. (30) A typical projection room setup at WDSU-TV in New Orleans, with two RCA film projectors and a small slide projector.



31

(31) The Dumont multiscanner. Scanners such as this are a new type of flexible equipment superceding the multiple projectors heretofore required. (32) The Marconi 16mm image orthicon telecine equipment used by CBC in their Montreal TV studio. (33) Dumont's video recorder for recording programs on film from the kinescope tube.



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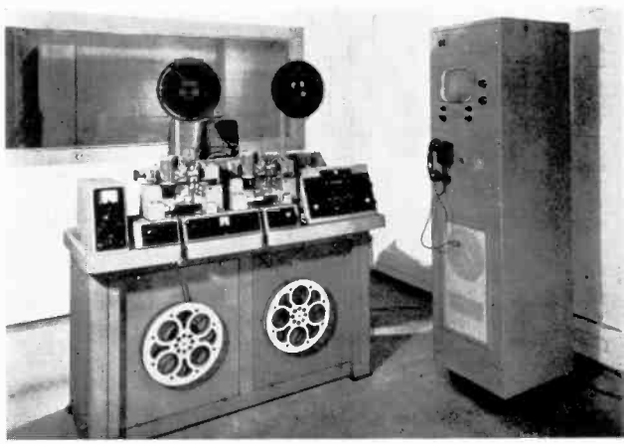

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(34) The 16mm projector built especially for television use by Eastman. (35) The General Electric TV slide projector. (36) A part of the film projection room of WOW-TV in Omaha, Nebr., showing the cabinets for filing films. (37) The film storage and editing department of KSFO, San Francisco. (38) The film projection studio at KPIX, San Francisco.

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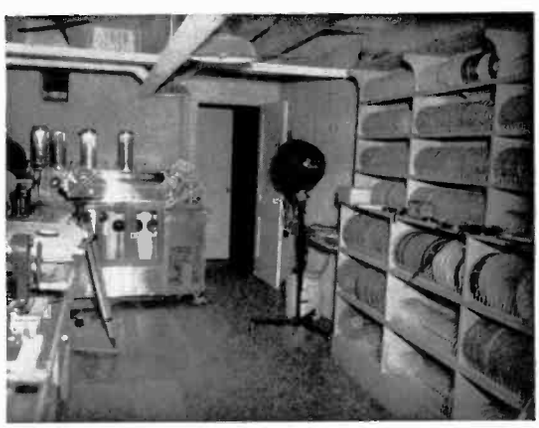

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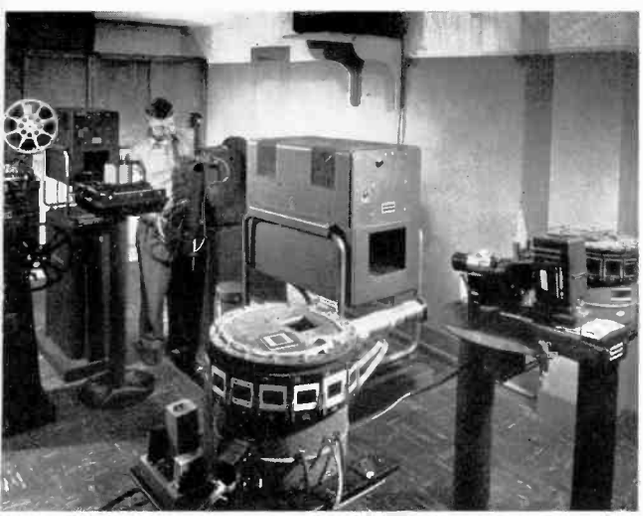

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Sound pickup, reproduction and monitoring, whether for studio production or outside pickup, should be of the highest quality in all instances. For the purposes of the planner, all audio equipment falls into four classifications—pickup, control, recording and reproduction.

The pickup equipment will include table and boom microphones or other fixed microphone installations. Microphones are used for such different purposes as picking up studio productions, newscasting and intercommunicating. Sound output is regulated by the audio control desk. Sound control, in a simple station unit, includes a number of input, output and mixing positions. Inputs come from the studio, projection room, turntable, remote or network. At least two units for reproduction are needed for the broadcasting station and may include turntables or magnetic tape recorders.

In the future, steps will undoubtedly be taken to improve boom microphones which today, like cameras, demand special operational care and constitute a major floor obstruction. Development in the larger studios may be in the direction of a combined light-sound bridge arrangement with remote control pickup equipment.

From the standpoint of acoustics and soundproofing, the television studio must be treated as a type of radio studio. Good acoustical basic design should provide complete and easily obtainable sound flexibility and prevent such faults as flutter echo, bad reverberation and resonance. The shape and volume of the studio are the main determining factors in this, and a resourceful designer on the job will eliminate the need for later expensive corrections (Figures 39-44).

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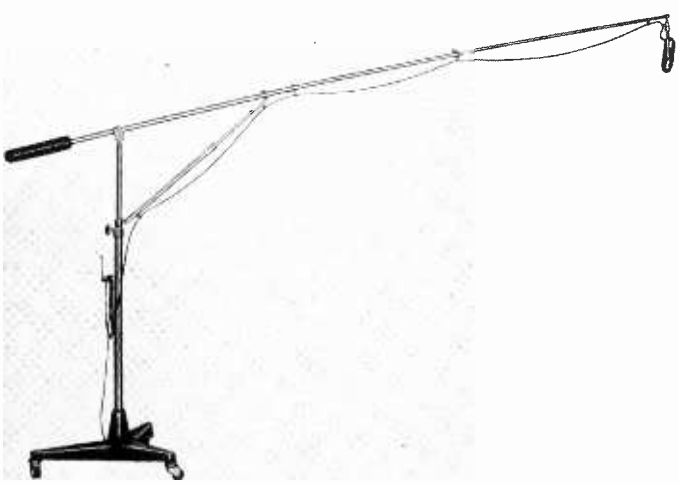
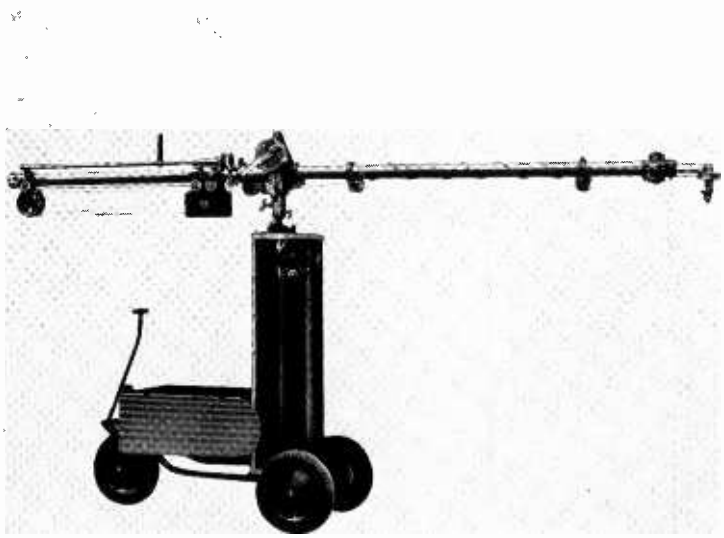
(39) RCA Microphone stand. (40) Microphone boom also by RCA. (41) Single transcription turntable by RCA. (42) The RCA console model magnetic tape recorder.





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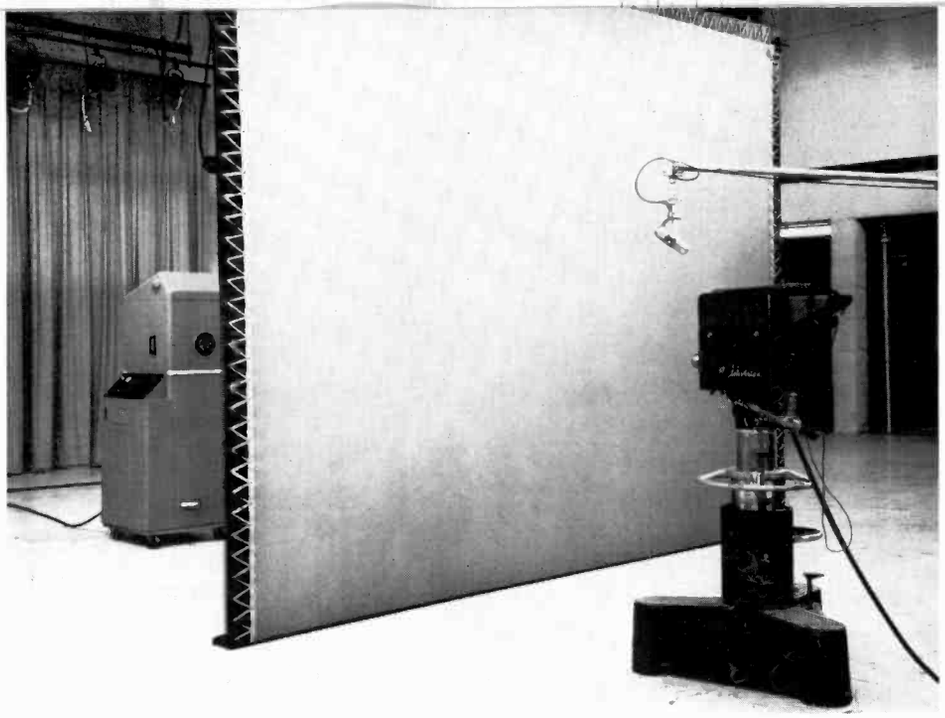


(Above) A Translux screen is used in station WTVJ, Miami, Florida, for backgrounds and special effects. To the left, behind the screen, is the rear screen, Translux projector. (Below) The recording and transcription library at KPIX in San Francisco.

general remarks on lighting

Television studio lighting and proper light distribution are constantly improving. However, in appraising any such improvement, consideration must be given not only to the photographic impression on the pickup tube, but also to the effect on performers and the operational crew. Therefore, the planning group will need some knowledge of the function of lighting in television production. A mere general knowledge will, however, suffice as the design of suitable light bridges, controls for directing lights and intensities, etc., should be left to the specialist. In planning, it must be remembered that floor and ceiling lighting in studios will demand generous space allotments and that facilities for plug-in lights must be provided.

The eye's color response under varying illumination conditions must be considered. The light source decided on will, to a certain extent, determine the design of the studio and some of the structural

requirements, so it is advisable to plan and integrate lighting techniques in advance.

Both incandescent and fluorescent lighting are commonly used in TV production. Incandescent lighting has certain definite advantages: maximum beam candle power, accurate beam control in distribution and pattern, and facility in color adjustment due to the wide range of the spectrum course. Its excessive heat radiation, however, results in considerable discomfort to operating personnel during extended periods of use.

Fluorescent lighting is efficient and radiates little heat. By coating tubes with various phosphor mixtures, a wide range of color responses can be obtained. Certain disadvantages still exist in the undesirable length of tubes, the hum of ballasts and the weight of transformers.

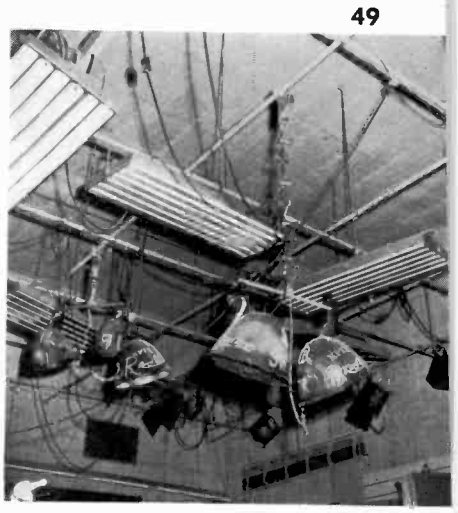
Spot arc lamps are another source of light, and their usefulness in specific installations should be investigated.

A combination of light sources will probably be the most desirable solution in any given station. Factors to consider are cost of installation, maintenance, length of useful life, facility of lamp replacement—and the role each of these plays in successful performance.

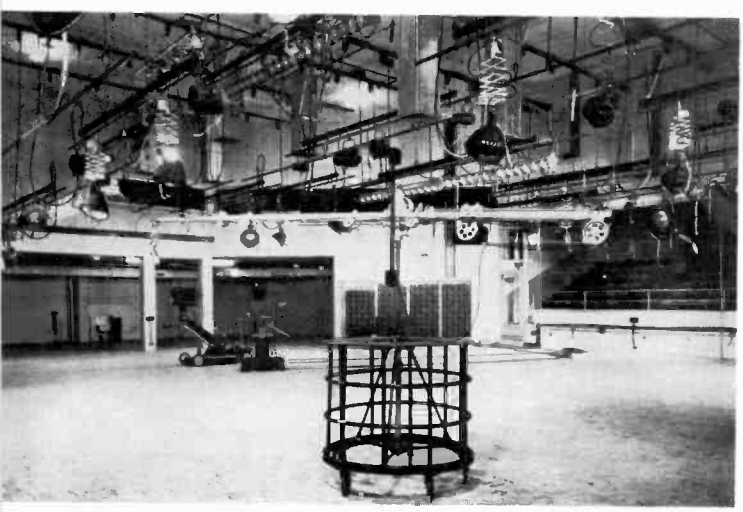
Light requirements should be very carefully studied, and design should aim at preventing the obstruction of floor area. Detailed studies directed by the planning group should be prepared, showing light behavior from every fixed light installation, its brightness as it varies at different heights, and the angles at which light will strike the production area. A central light control should be provided at a strategic point.

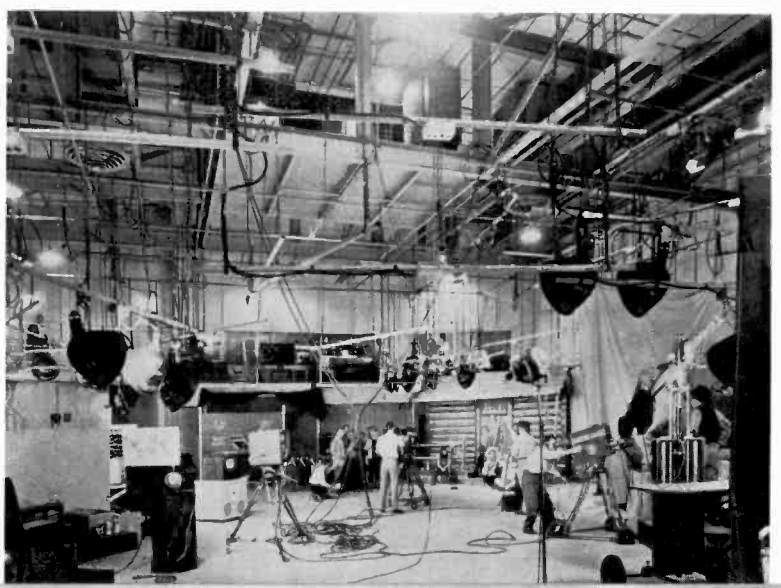
The general types of lighting required by present-day sets are commonly divided into: foundation light, front lighting, background lighting, modeling and display lighting. All these categories will be subject to revision with the appearance of new cameras, improved pickup tubes and, of course, color television.

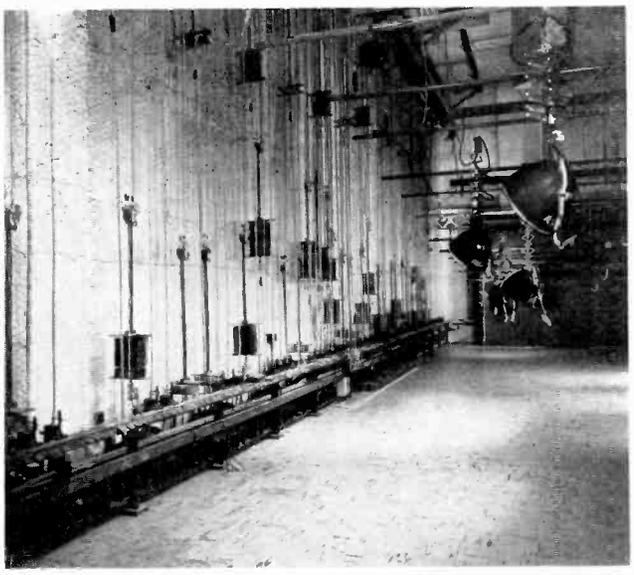
Electrified tracks for lighting, as currently installed in some studios, are saving valuable man hours in the mounting, adjusting and maintenance of cables. Improvement in this direction can clearly be expected.

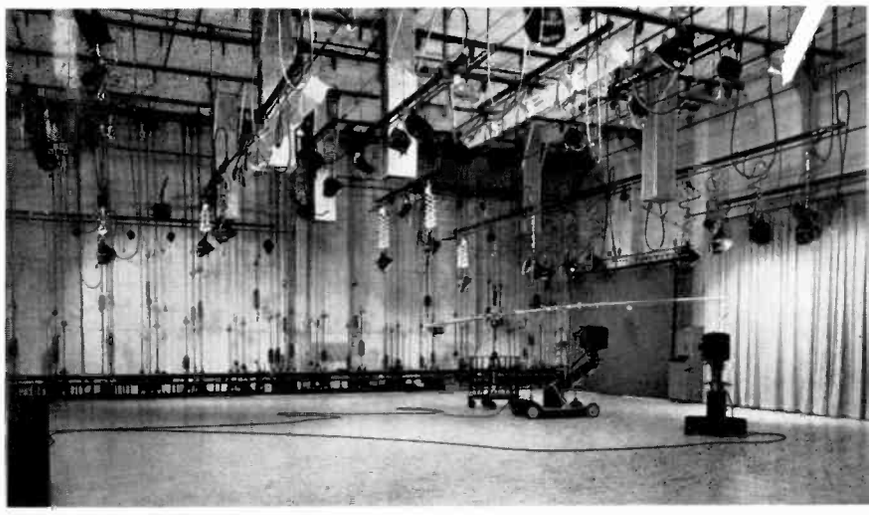


(Left) The studio of WTVJ in Miami, showing the arrangement of lights suspended from pipe battens. In the foreground is a birdcage type microphone stand. (Right) Another example of studio lighting in a large studio. This one in WCAU-TV, Philadelphia. (Above) From the 22-foot ceiling in the studio of KPIX, San Francisco, hang the pipe grids which support lights and scenery.









Two views of the studio floor of station WTVJ, in Miami. The system of counterweights makes for flexibility of lighting arrangements and facilitates maintenance of lighting units. Also note the air conditioning ducts extending from the ceiling.

(50) Set lighting in the studio of WAAM, Baltimore, Maryland. (51) In the main studio of WAGA-TV in Atlanta, Georgia, both fluorescent and incandescent lamps are used for set lighting. (52) At the Lime Grove studio of the BBC in London banks of lights provide the principal illumination of the sets. (53) A studio lighting control panel at WWJ-TV, Detroit.

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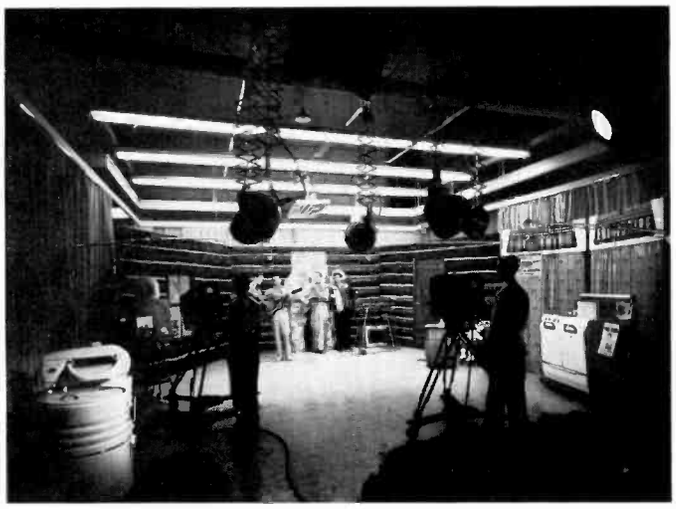

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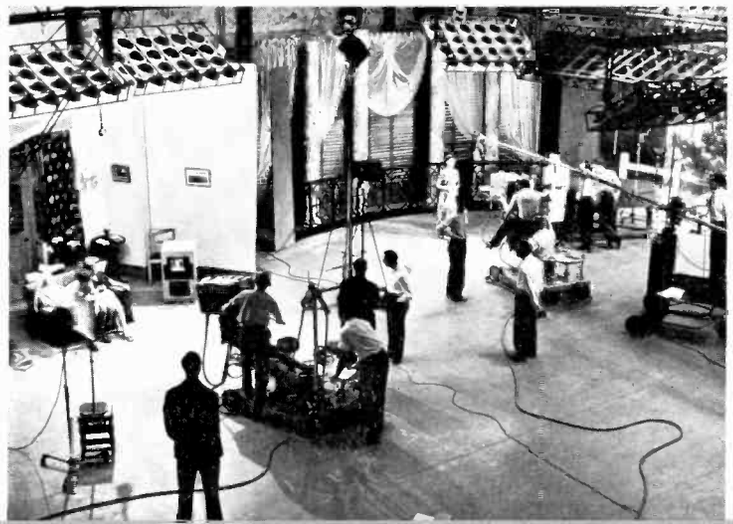

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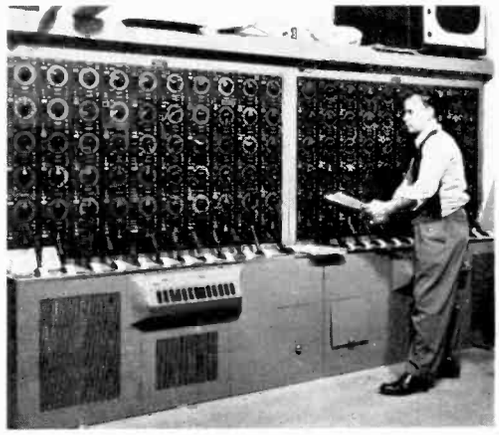
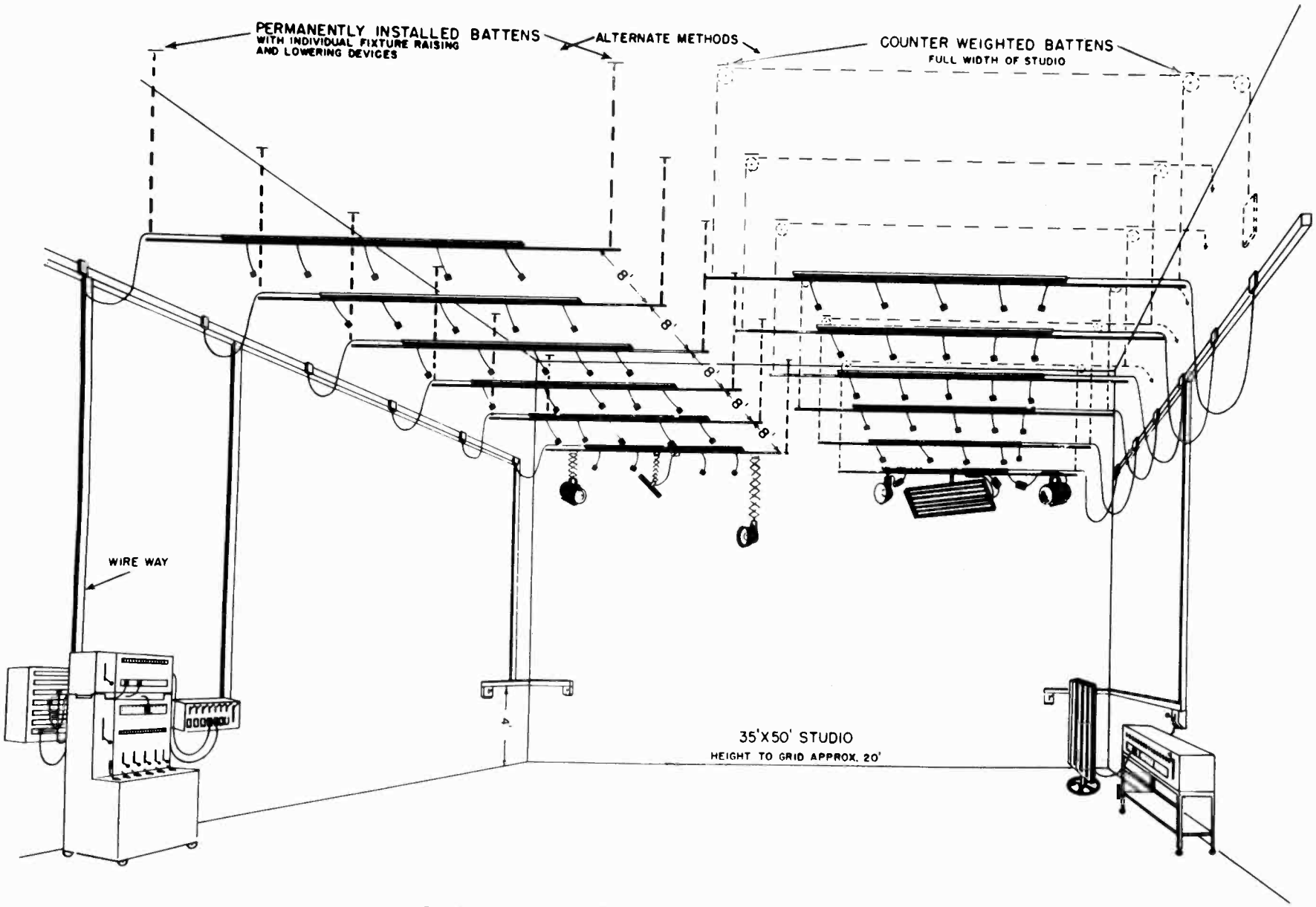
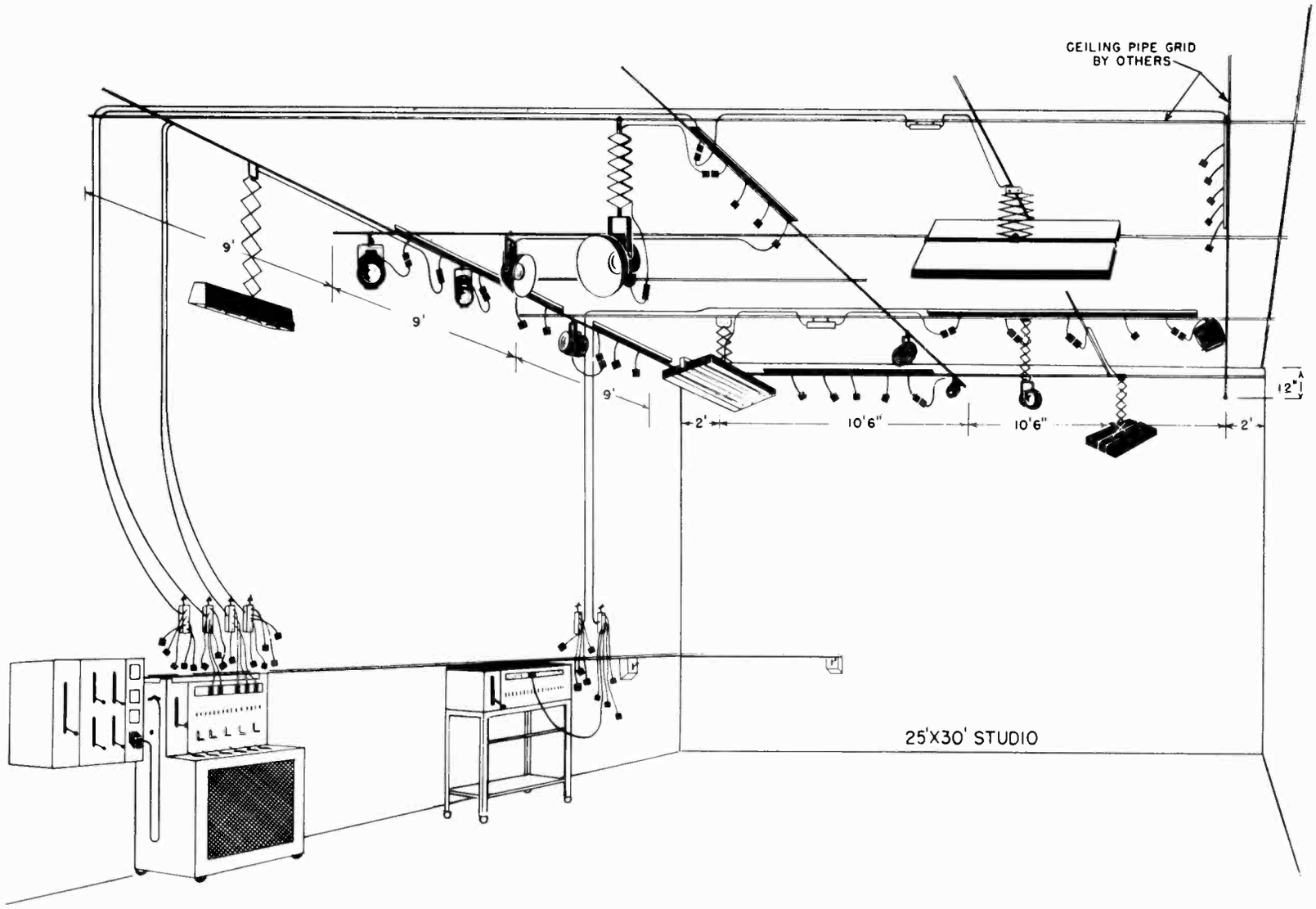




On these pages are illustrated two lighting setups, the one above for a studio of medium size, the one below for a small studio. Systems such as these allow for flexible and economical operation. (Kliegl Bros.)


CEILING PIPE GRID
BY OTHERS
9'
9'
9'
12"
2'
10'6"
10'6"
2'
25'X30' STUDIO

intercommunication equipment

The producer must at all times have facilities for direct communication with technical personnel on the studio floor. During rehearsal he may use a loudspeaker system and address individuals on the floor through his microphone. The use of earphones, however, enables floor and production managers, camera and dolly men, and most technical floor personnel to receive their instructions with a minimum of confusion. The floor production manager should, of course, have facilities for speaking back to the control room. Direct communication to maintenance and to workshop should also be provided.

During the actual performance, the producer can communicate with the performers only through the floor production manager, so the equipment for such communication is of the most telling importance. The employment of an instantaneous screen process for instructing actors has come into use in large originating stations. Teleprompters are already employed in network productions and on special event remotes.

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The master control room, the nerve center of the station, should have direct communication with administration, operation, production, mobile equipment and the transmitter control room. In addition, if the station is part of a network, it is desirable to have direct contact—perhaps a telephone line—between the master control room of the station and the network originating center.

A linkup should be established between administration and production, and administration contact with technical areas is desirable. In large stations, a loudspeaker call system can be established between administration and those areas devoted to the public.

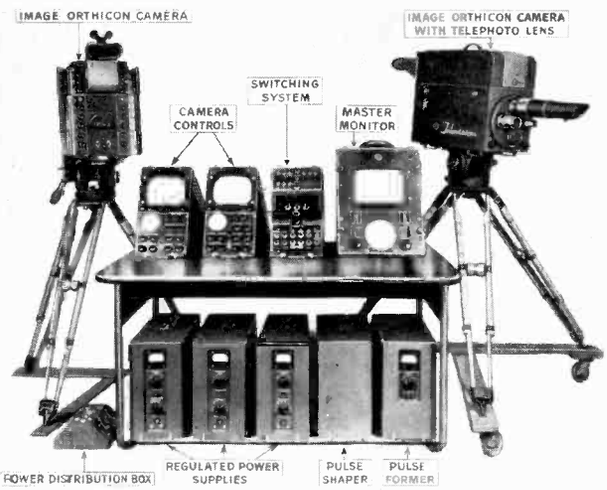
Dressing rooms, washrooms, workshops, scenery and property storerooms as well as the mobile unit area can best be reached by loudspeaker call and talk-back system.

mobile & field equipment

Field equipment, because of its flexibility and adaptability to studio use, is usually one of the first items on the purchase list. Field equipment is designed to operate as a self-contained unit, and generally includes cameras, camera monitors, a master monitor, a field control console, a power pack (power distribution, power supply, pulse-shaper and pulse-former equipment), and a lightweight mobile microwave relay transmitter.

Trucks are available which are now specially designed to house the pickup equipment and with a rear compartment for the control units which affords unobstructed views to the operators. Storage space for tripods and the microwave and communications equipment is provided. These trucks are proof against all rigors of climate and weather. Nevertheless, as stated above, the use of a simple station wagon altered for the purpose may, for the small station, be preferable.

Since field equipment is often used for the station studio, the space relationship of studio and the mobile unit storage space and maintenance facilities must be carefully planned (Figures 56-62).



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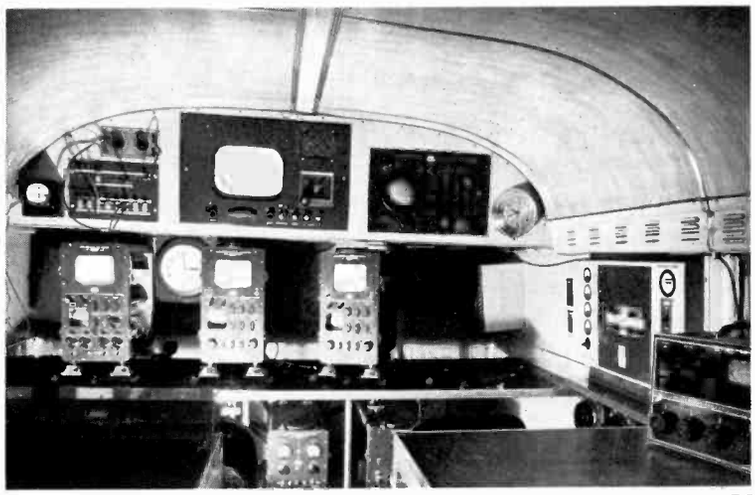

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61

(56) The crew of a mobile unit gets set up on location. (57) Portable RCA equipment for use in the field. (58) The interior of Dumont's Telecruiser. (59) The BBC used the two cameras shown here mounted on a launch and two shore based cameras to cover the 1952 Oxford-Cambridge boat race. (60) A small mobile unit such as this makes possible the quick coverage of spot news and other special events. (61) This RCA mobile unit has been superceded by later models, but it is typical of many still in service.

ventilation and air conditioning

Air conditioning must operate effectively at all times, and must be planned to take care of heat radiation in the studio, control room and associated production areas. For economy of operation, the air conditioning should be in units supplying a series of areas rather than in one plant supplying the building as a whole. A low velocity system for the production area and a high velocity system for administration and other office space is desirable.

The air conditioning duct system must prevent sound transmission and must not create excessive air friction or other noises in sound control areas. Possible sources of noise are: fans producing a turbulent air stream, mechanical vibration of air friction noises in the ducts resulting from improper design of the duct itself, return or supply outlets, rotating or reciprocating machinery causing vibration (i.e. pump compressor fans). Air velocities in the main duct supply and return outlets have to be calculated to handle maximum heat loads.

The planning group can leave these details to the engineers, but should be aware that the air conditioning system for a TV station will occupy large areas and demand extremely large spaces for duct inlets and outlets.

There are many elements—for example, the proximity of air outlets to microphones—which must be borne in mind in installing air conditioning for a studio, and all point to the retention of experts for this very important part of the planning. Though the fundamentals of air conditioning will remain the same, research may change present concepts and applications considerably.

tv transmitter

The selection of transmitter equipment must be left to a specialist. The transmitter and the associated transmitter equipment makes it possible to send out a clear video and audio signal covering, if possible, the total television market area.

In the United States the TV transmitter generates an amplitude modulation (AM) signal of the picture and a frequency modulation (FM) signal of the sound. Both signals together occupy a 6 megacycle channel the larger part of which is used for the video signal. By a special process called site band suppression, 6mc's are safe to use without interference or overlapping occurring between sound and picture or between adjacent television channels.

(62) The rear view of the transmitter room of WHIO-TV, Dayton, Ohio, showing the ventilator ducts. (63) A typical transmitter installation, the transmitter room of WJAC, Johnstown, Pennsylvania. (64) The standby transmitter and its control desk in an annex building of BBC's station at Holme Moss, Yorkshire.

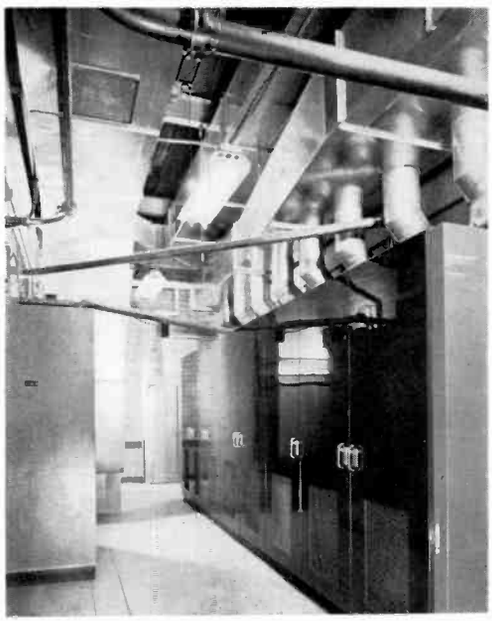
Both VHF and the newer UHF transmitter are comparatively expensive items in the equipment list. At present a limited number of electronic equipment manufacturers in the United States are producing television transmitters. All these firms have produced equipment which has operated successfully in the commercial VHF-TV field.

Basically, transmitter equipment should be divided into VHF and UHF types. In both groups transmitters are available from as low as 100 watts up to 50 kilowatts. The selection of the right transmitter power depends on many factors which must be analyzed

by the technical specialist before selection is made. Special factors are coverage demanded, elevation of antenna, antenna type selected, etc. The size of the units which make up the transmitters vary with their power output, but standardization of the cabinets and racks housing the equipment facilitates for the planner the layout of transmitter facilities. Besides power rating differences and the breakdown into the VHF and UHF field, transmitters differ in the way they are cooled, either by airflow or by water.

If the transmitter and studio are housed in one structure, no specific difficulties arise for the planner. The architect must be aware that transmitter equipment is comparatively heavy and floor loads must take care of this fact. Power to the transmitter is normally provided by a feed from the local electric utility company. In remote locations, and as a general safety measure in case of a power failure, emergency stand-by power is supplied. Such auxiliary power sources are in the form of Diesel motor generators. In this case a special area for sheltering this emergency equipment and fuel storage tanks must be provided.

62



The associated transmitter equipment such as transformers, circuit breakers, voltage regulators, etc., should be housed behind the transmitter proper. The transmitter console should face the transmitter for the easy supervision of the equipment.

The relationship between the transmitter and all other areas must be very carefully planned, with particular attention to procedure in the event of an emergency. Special transmitter buildings, besides housing the transmitter equipment, should include emergency studio facilities. Transcribed programs, for example, should be readily available in case of any operational failure. In some cases it will be possible for transmitter buildings to include space for emergency power supply, workshops, garaging, and living quarters for personnel. Proper lighting and air-conditioning is, of course, a necessity.

For the planner, transmitter power, times antenna gain, less transmission losses indicate the effective radiated power of the TV station (Figures 49-51).

64

63

Summary

In planning a proper plant for TV operation, a reasonable procedure must be established to join the various divisions of management, production and operation. (This is called, in planning terms, "the scientific appraisal of relevant facts.") Certain relevant facts influence layout and, in turn, are influenced by it.

Such facts are: Physical limits of plant, sales requirements, production activities and uses, capital investment, operating expenditures, and many more.

An example of such an appraisal is the selection of a TV camera chain where we must weigh the following facts:

1. The hours in which the cameras will be in operation singly or as a chain.
2. Hours when used as standby only.
3. The volume of work they can handle.
4. The combined cost of the TV camera chain, of the supporting control equipment, and associated master control equipment.
5. What amount and use of associated sound and other auxiliary equipment will be needed.
6. Operating cost of personnel, power, maintenance and depreciation figures.
7. Overhead on areas used in conjunction with the TV camera chain.
8. How many of such facilities are involved if the camera chain is used.
9. Ways to reduce costs in using the TV camera chain.

All points have to be considered before an intelligent reply can be expected. Any one of the 9 points may carry as much weight as the other.

hidden losses

Hidden losses hurt most. Management often does not realize the amount of savings which could be realized from an efficient plant layout. Savings often may justify the building of a complete new TV plant. This is especially apparent in the originating stations of the networks. A practical example is shown in the fact that one TV network has shown a gross of over 80 million dollars annually, with a net of less than one million. Hidden losses in network operation are enormous and occur because of badly-planned network facilities and unorganized production efforts. The fallacy is that too often modern buildings for TV origination are not functional because of the lack of proper station planning before design and construction. Hidden losses are not restricted by the size of the TV facilities. Plant layout advantages in turn are not restricted by the physical size of facilities.

Badly-planned TV facilities invariably are the result of improper layout. Common indications of inefficiency in such planning are:

Production: Congestion at the receiving end of scenery, props and equipment.

Delay and difficulties in loading and unloading.

Damage during handling.

Handling of scenery, props and equipment outside building where they are exposed to the elements.

Difficult handling of materials due to bad egress and lack of planning.

Narrow and low freight elevators.

No planning for handling of heavy and bulky items.

Storage: Overflow from storage into other areas, due to insufficient space.

Overflow into passages and traffic lanes.

Damage in storage.

Difficulty in controlling items during storage.

Unnecessarily large stock of scenery and properties due to unregulated storage conditions.

Time lost in search of items.

Higher ratio of scenery and prop-handling personnel than otherwise needed.

Frequent rehandling and transportation.

Shops: Insufficient space and machinery.

Demand for expensive outside help.

Constant demand for overtime.

Lack of shop auxiliary facilities and tools.

Poor quality of work due to lack of adequate facilities.

Every function of the TV originating station can be analyzed in this fashion, and will indicate that badly-planned facilities will result in inefficiency and waste. These situations will, in turn, influence employees' morale, which in TV operation must be of the highest order.

UHF coverage and performance

The new UHF station, a recent report of measurement executed by Mr. J. P. Taylor, Editor of *Broadcast News* (published by RCA) and made in the Portland area where the commercial UHF station has been erected, analyzes the following points:

1. Generally, antenna height in UHF is of more importance than in VHF. Height over average terrain should be as great as permissible and at least over 500 feet. This will reduce UHF shadows which are roughly half the size of the 'line of sight' shadows. This is a rule of thumb approximation.

2. Flatness of the terrain is beneficial to UHF coverage, while hills and mountainous terrain produce shadow areas. The signal in the valley areas does enlarge in the direction of it but is kept in by the surrounding hills.

3. Low frequencies in the UHF field are better for coverage than higher ones, but how low is difficult to say at present.

4. The distribution of population must be studied before the antenna site is determined. Shadow areas should fall into thinly-

A "population distribution" map of the city of Portland, Oregon. Each dot represents 40 people according to the 1950 census. "A," "B," "C," "D," "E," "F" are areas of poor or no reception and by counting the dots in these regions it was possible to determine the percentage of the population unable to get good reception. With an increase in power of the transmitter and improvements in receivers it is probable that these areas would be substantially reduced in size in the future.

populated regions.

In Portland, measurements and estimates executed immediately after the start of a UHF station operation are shown in the table below.

1 wk transmitter power, 20 kw effective radiated power	Total Population	% receiving good signal	# receiving good signal
In city	383,700	95%	364,500
Outside city	355,700	80%	284,600
Total in Trading Area	739,400	88%	649,100

While this may be an optimistic assumption, we can certainly estimate that 80 percent of a total market area is good and reasonably fair for coverage.

To minimize shadow areas we can, before actual construction of the antenna, use the following methods:

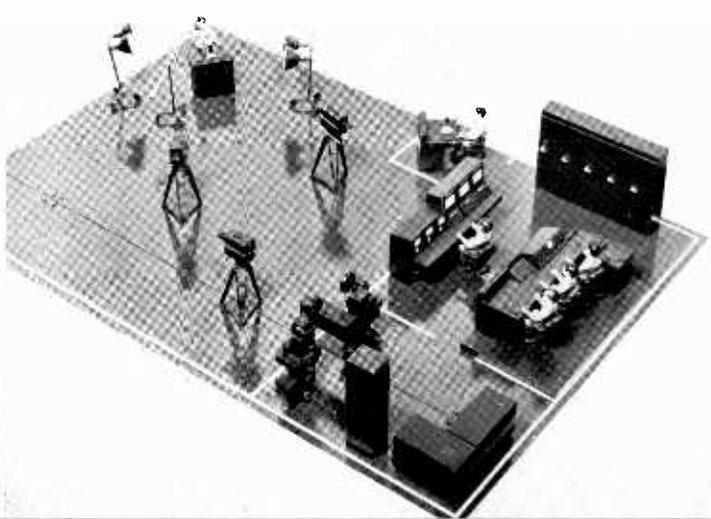
1. Study topographical maps.
2. Make sectional cuts along the path of the sight through the questionable hilly terrain.
3. Use shadow metering on relief models of the coverage area and of the terrain in question.

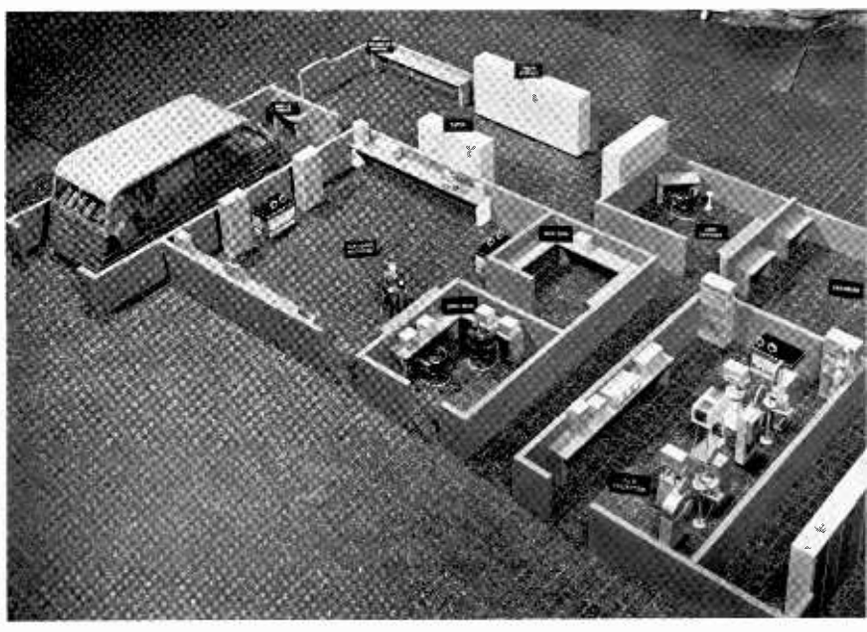
An example of good presentation of small or large TV facilities is the cutaway perspective. Such a presentation can be made up by any skilled draftsman.

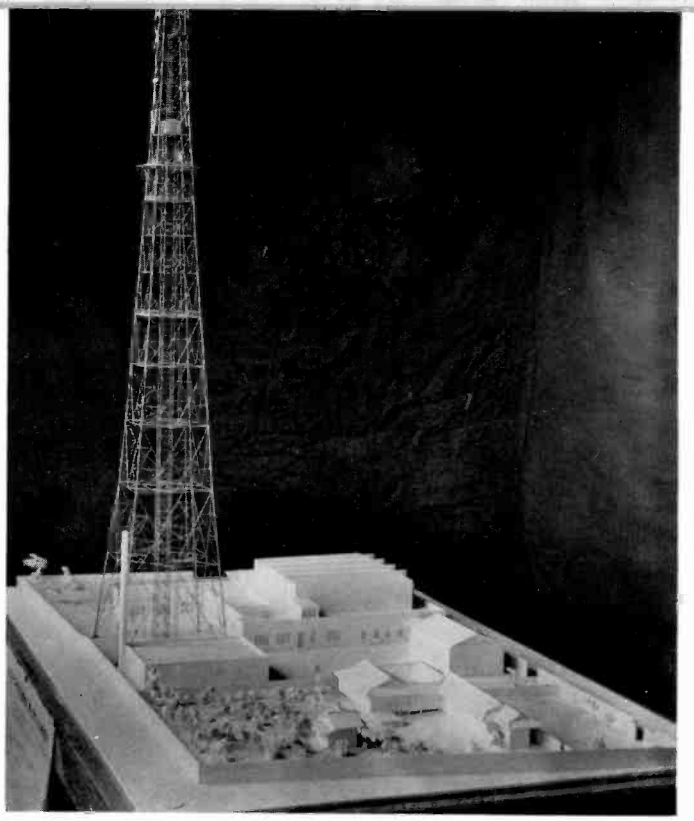
Architectural renderings will be more closely related to the conception of the planner, but follow more rigid rules and are less life-like in appearance.

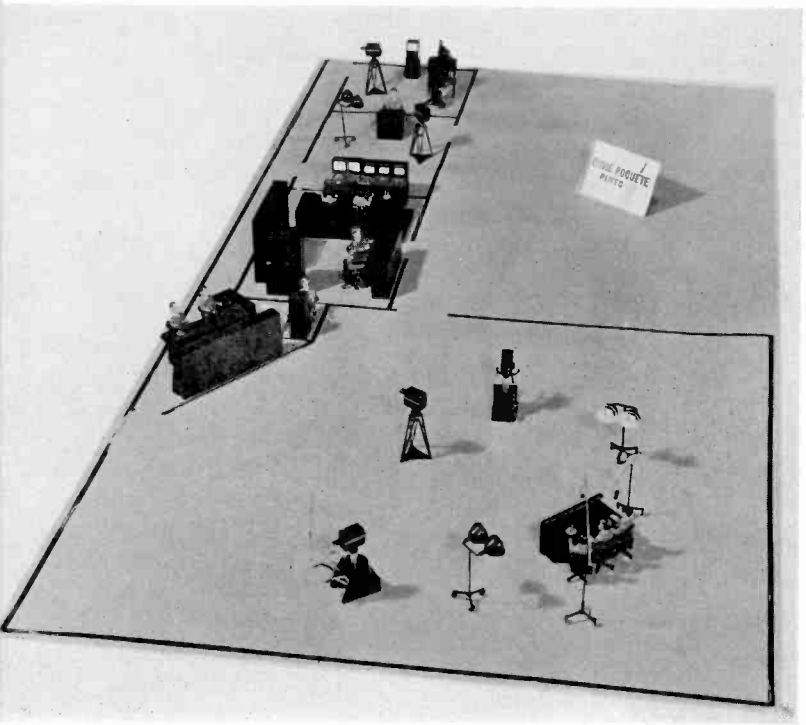
Miniature models, if well-executed in detail, seldom fail to arouse the enthusiasm of management. Scale models in three dimensional planning are extremely useful for equipment-arrangement checks, and to present a true picture of occupancy.

(Below) A model of a single studio station by Dumont. (Right) A model of part of a station plan by RCA showing particularly the film departments and the mobile unit.

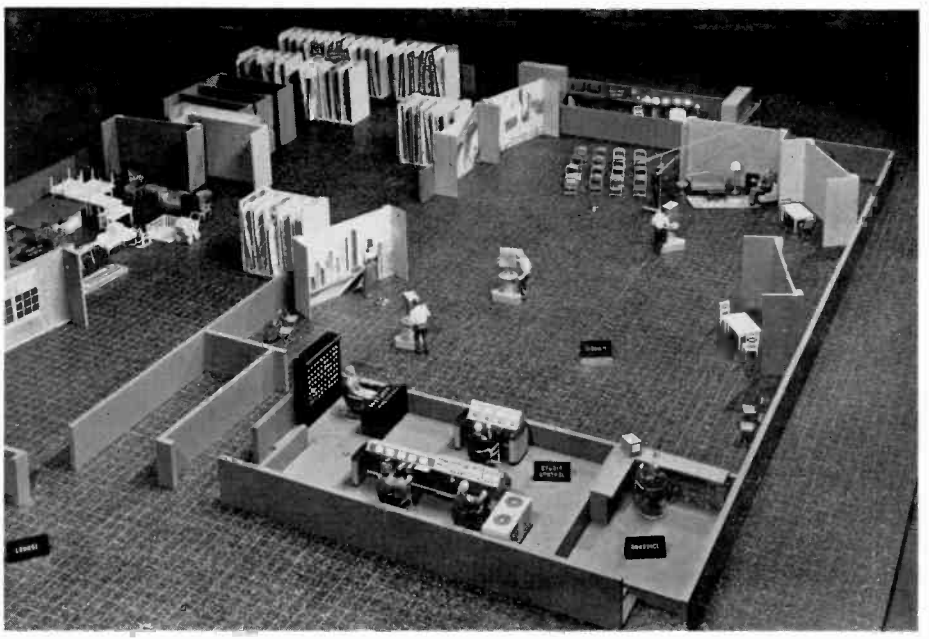








(Above) A model of a completely self-contained TV station, JOAX-TV, Tokyo, including studio, transmitter and antenna. (Left) A model of a one-studio operation made by Dumont for a Brazilian station. (Below) Another model, prepared by RCA, of a single-studio originating station. Note the ample space provided for storage of scenery and properties.



PART II

Personnel
Television site and facility planning
Antenna tower structures
Programming
Film
Live talent show
The technical center core
The large live talent studio
The studio floor area
Studio lighting
Special effects
Audiance participation
Auxiliary areas
Acoustics and noise control
Simultaneous cast
Remotes
The use of microwave relay
UHF proclems
Capital expenditures
Operating expenditures
Equipment
Auxiliary revenue potentials
Industrial television
Educational television stations

The following pages will provide the television station applicant and the new television station operator with a guide for planning the station and for controlling its operation.

Equipment manufacturers are in the habit of providing fixed check lists of equipment and fixed facility plans. We, however, believe that each station has its own character and its own problems. While without doubt many stations will fall into general groupings determined by their coverage area and the program sources which are available, each station will be different enough in detail to demand individual treatment.

With a very few exceptions, the existing network originating centers have shown through their years of operation a lack of imaginative and original planning and design. The fact remains that if you want to see inventiveness and originality, you must turn to the small or medium-sized television plants outside the networks. That is exactly what we recommend if the new applicant is eager to observe television operation.

personnel

Network originating costs are large because there is no doubt that at present the waste in program production is staggering. A list of professional workers employed in television network origination in the city of New York would include:

Stage supervisor(s)
Stage carpenter(s)
Stage property men
Stage electricians
Cameramen
Dollymen
Microphone men
Sound effects men
Video effects men
Technical director(s)
Page messengers
Production manager
Film director
Audio receiving director
Video receiving director
Editors
Maintenance engineers
Transmission engineer
Installation engineer electrician
Costume designers
Property room men
Script proofreaders
Script acceptance (censors)
Music composers
Music librarians
Makeup artists
Lawyers
Sales director
Station relations men
Accountants
Ushers
Secretaries
Elevator operators
Receptionists
Porters
Air-conditioning operators
Scenery truck drivers
Executives
Video control operator
Audio control operator
Lighting director
Staging director
Producers
Assistant producers
Musical director
Musicians
Announcers
Performers
Traffic manager
Program director
Technical director
Assistant technical director
Film projectionists
Film processing men
Master control operator
Design and research engineer
Set designers
Scenery painters
Wardrobe supervisor
Scriptwriters
Script librarians
Film librarians
Music copyright experts
Playwrights
Hairdressers
Account salesmen
Statisticians
Press relations men
Tour guides
Clerks
Special officers
Dressing room attendants
Cleaning personnel
Mobile crews supervisors
Mobile unit service men
Telephone operators

Network personnel differs from that of the medium or small stations. Personnel for these latter consists of the following:

1. *Station Manager.* The Station Manager is in complete charge of the station. He is responsible only to the Board of Directors or the owner. He has under him all departments, including administration, production and operation.

2. *Program Director or Chief Producer.* He reports directly to the Station Manager and in some cases to the sponsor. He is responsible for the entire production including live, film, remote; and he directs the production going on the air. His duties are manifold. He chooses the script and directs the visualization of the program. In smaller stations he plans camera action and determines the length of the show. A Program Director or Chief Producer must be able to prepare his own cue sheets to achieve precision timing of the show. He also must be able to direct the technical crew and must know their jobs thoroughly. It needs a man who has extensive background in the dramatic art with knowledge in the technical and organization phases of television.

3. *Program Director's Assistant.* He is directly responsible to the Program Director or Chief Producer and he is normally in charge of most of the supervision during rehearsal. He must take most of the detailed work off the Program Director's shoulders. In larger stations the Program Director often has two or more assistants, one directly in charge of rehearsals of live talent shows, a second in charge of films, and one or more in charge of remotes and other miscellaneous productions.

4. *Budget Manager or Comptroller.* He is directly responsible to the Station Manager but works closely with the Program Director. It is his task to determine the exact estimates for each production and prepare daily and weekly budget forecasts for the station. He also should have a statistical assistant who will supply him with exact figures of past program expenditures to help him to keep his figures as close to reality as possible. His job is one of the most important in the station.

5. *Script Censor and Clearance Man.* He is responsible for the clearance of all scripts, and his department should also handle all clearance problems in connection with music, recordings, films, and other copyrighted material. He reports directly to the Program Director.

6. *Sales Manager.* He reports directly to the Station Manager, and in smaller stations both jobs are combined. He directs salesmen and in smaller stations also directs advertising, research, and polls.

7. *Public Relations Manager.* In smaller stations the Managing Director, Sales Manager, and Public Relations Manager are one person. In larger stations it is desirable to separate these functions. He can constructively contribute to good relations between the station, the sponsors, and the general public inside the telecasting area. He reports

to the Station Manager.

8. *Chief Accountant.* He obviously reports to the Station Manager and has under his control bookkeepers, cashiers, and the accounting staff. In smaller stations he also acts as Office Manager and Building Maintenance Manager.

9. *Office Manager.* The Office Manager reports to the Station Manager and is in charge of all the staff for administrative offices and very often acts as Personnel Manager. He directs and controls the typing pool, the transportation and communication staff, and the messenger services.

10. *Building Maintenance Manager.* In the larger stations the Building Maintenance Manager is a qualified architect or engineer. Building maintenance is a misleading title for his office because maintenance is only the routine part of the job. In a television station he must at all times be at the disposal of the operational and administrative staff as there is a constant demand for small changes and larger alterations in the building and the site to adapt them to improvements in telecasting. He also will be in charge of scheduling operations for all building maintenance personnel for all buildings connected with the station, nearby and remote.

11. *Video Technical Director.* He is directly responsible to the Program Director. He is actually the liaison officer between the Producer and the technical crew and is responsible for all that goes on in the live talent studio and in the studio control room. The Technical Director normally is a well trained technical man who knows all video and audio operations and can interpret the Producer's view. He is directly responsible for keeping the show on the air in case of an emergency and for improvising if anything goes wrong. He manipulates the switching of the cameras.

12. *Audio Director.* He is in charge of all audio operations and is directly responsible to the Program Director or Chief Producer. He is a technical man with experience in the sound part of show business. He controls all sound pickup operations and is in charge of transcriptions and sound effects.

13. *Film Director.* Often called the Film Editor, he is responsible for the buying, and often the production, of film programs. He must be well versed in the film business, both in the sales field and in the production field. He is responsible directly to the Program Director and is in close touch with the Budget Manager.

14. *Lighting Director.* There is a constant question under whose authority, program or operations, he falls. A wise move is to make him responsible for all lighting arrangements and put him directly under the Program Director or Chief Producer. He will have responsibility for basic and dramatic lighting in the studio as well as for remote pickups. He will have under him a production lighting crew and the operational personnel in charge of all switchboard operations.

15. *Art Director.* He is responsible to the Program Director and has under him all employees executing any form of art work for the station. He must, himself, be able to execute art work and must be able to determine exact costs. He works in close cooperation with the Budget Manager and the Construction Supervisor.

16. *Continuity Editor.* He is responsible to the Program Director, but for practical purposes in larger stations he reports to one of the program director assistants. He checks scripts, times dialogue, and is responsible for the over-all timing of the production. He has an important job and must have had previous experience in this field.

17. *Costume and Property Supervisor.* In large stations this is two jobs. The Costume and Property Supervisor is responsible to the Program Director but for the sake of convenience often reports to the Assistant Producer. He secures costumes and properties and is responsible for their storage and repair.

18. *Stage Manager.* He is responsible to the Program Director and manages and supervises the handling and securing of all properties, scenery, draperies, and calls during production. This is an important job which demands stage experience.

19. *Casting Director.* He reports to the Assistant Program Director and is responsible for the engaging of actors, understudies. and in fact, all talent. The Dialogue Director, who is responsible for the dramatic interpretation of roles, is under him.

20. *Construction Supervisor.* He is in charge of all construction for live talent shows and the building, maintenance, and repair of all scenery and properties. He reports directly to the Chief Producer and works close by with Art Director and Budget Manager.

21. *Chief Librarian.* He should be in charge of all three libraries: music, film and scripts. He must be able to organize his three units efficiently to meet the constant demand for material and to adapt to changes which are a daily occurrence. He reports directly to the Program Director.

22. *Chief Engineer or Technical Manager.* He reports directly to the Station Manager. His is the top technical job in the station. As the technical executive, he is responsible for all technical operations as well as the planning of technical services. He must have a sound knowledge of both video and audio broadcasting and must work closely with the Chief Producer or Program Director. He is also in close contact with the Budget Manager.

23. *Video Supervisor.* He reports directly to the Chief Engineer and is responsible for all video operations and personnel in the studio area. He supervises cameramen and video control operators.

24. *Audio Supervisor.* He reports to the Chief Engineer and is responsible for all studio audio operations. He controls all audio operators and is responsible for the quality of the pickup and outgoing sound.

25. *Master Control Room Supervisor.* He reports to the Chief

Engineer and is in charge of all control operators in the master control room area.

26. *Film Projection Supervisor.* He is responsible to the Chief Engineer for the technical quality of the film and slide output. He also supervises background projection.

27. *Remote Supervisor.* He reports to the Chief Engineer. He is in charge of remote location pickups and special productions. His crew is comprised of cameramen, video and audio control operators, and micro-wave equipment operators.

28. *Transmitter Supervisor.* He reports directly to the Chief Engineer. He is responsible for the final outgoing signal, the performance of the video and audio transmitter, and all equipment linking up the studio with the transmitter and/or the network.

29. *Maintenance Supervisor.* He is directly responsible to the Chief Engineer and his job is to take care of the maintenance of the station electronic equipment. This demands a man with a versatile engineering background.

39. *Technical Research Director.* He is responsible for keeping up with the latest technological developments in the electronic field and their application in the TV station. He reports to the Chief Engineer and also presents the Chief Engineer's view to management in conferences. He must have had experience with one of the top-grade electronic equipment manufacturers.

employees' morale

The station planner must be familiar with complaints received by employers in TV station operations. Generally these complaints are in connection with the following conditions or items:

1. Ventilation
2. Air conditioning
3. Heating
4. Congestion of space
5. Wash and rest rooms
6. Common hazards
7. High turnover of employees
8. Constant overtime
9. Accident rate
10. Salaries and wages
11. Vacations
12. Tension between the production and engineering departments

By planning proper layouts and utility requirements to take care of overloads in studios and the associated facilities, points 1, 2, and 3 can be taken care of. Proper design of facilities and traffic studies will take care of points 4, 5, 6, and 9. Program planning and pre-time scheduling can take care of points 7 and 8. Points 7, 8, 10, and 11 should be carefully studied by management. Point 12 needs special attention as the total efficiency depends on good relationship between these departments.

For a small station to operate efficiently and economically, its master planning must guard against copying too rigidly. One must calculate the amount of capital investment and the amount needed to operate the station. Such a process will permit an economical development and a proper tempo of adaptation.

market surveys

While market surveys produced by private companies are available, the most reliable data are those that come to us through the agencies of the Federal and State Governments. A few of such surveys are:

1. Federal Reserve Bulletin
2. U. S. Department of Commerce—"National Income and Prominent Regional Trends"
3. F.C.C. Analysis of Annual Statements

For determining market areas, it is advisable not only to consider the factors which are obvious to all of us, but to indulge in the luxury of inquiring behind the general scene. Inquiry as to the number of dwelling units, households, should be checked for existing radio and television set distribution.

The importance of such detailed research is especially a "must" for the future UHF station licensee, as this will be the only way for him to establish a future rate card and his future revenue potential. For more information on this subject, see the chapter on UHF problems.

Other figures important in the establishment of station revenue potentials are current retail sales in the coverage area, appliance sales, and money spent by local, regional, and national advertisers. The money spent on local newspaper, radio, and other forms of advertising may give a good indication of future revenue.

If the area has an established television station, its rate card should be studied. Obviously, it will be impractical for the new applicant—especially the new UHF applicant—to start at the rate of the estabished VHF station. A portion of a typical network station rate card is illustrated.

NBC

TELEVISION NETWORK
RATE GUIDE
APRIL 1, 1954

TOTAL COSTS	52 Basic Stations Interconnected
A Hour	$57,675
A ½ Hour	34,605
A ¼ Hour	23,070
B Hour	$43,256
B ½ Hour	25,954
B ¼ Hour	17,302
C Hour	$28,838
C ½ Hour	17,303
C ¼ Hour	11,535

COVERAGE OF U.S. TV HOMES
March 1954
(approximate)

	% U.S. TV HOMES IN STA. AREAS	#TV HOMES IN STA. AREAS
52 basic live stations	84%	24,100,000
128 basic & optional live stations	98%	28,100,000
174 stations all affiliates	99%	28,400,000
Total U.S. TV Homes	100%	28,700,000

Issued by NBC Sales Traffic Operations
March 15, 1954

Television Site and Facility Planning

Coverage of the potential market area is the most important point in site selection. From the theoretical point of view, we should select the center of the market area for the most effective coverage. More often than not, however, such a location is unavailable as a site for the antenna tower either because of zoning or because of the high price of property in the region. In some locations the television station applicant may be able to find a building whose structural skeleton either can well stand, or can be stressed to carry, an antenna tower. If the building is in an elevated location, still better coverage will result because over-all height of terrain is one of the most important factors for good transmission.

Accessibility and nearness to general utilities must be consid-

ered when choosing the site, and a check must be made to assure freedom from such interference as high radio frequency field strength, signals of other stations nearby, or high (audio) noise levels from other sources.

Before any site is definitely selected, it is advisable to consult the communication engineer on future coverage for a contemplated site and conditions of ground conductivity. An architect should also be consulted as to whether the site is suitable for the economical erection of a transmitter building and antenna tower. Road approach and foundation problems will also have to be analyzed.

For scientific site selection, whether one or several sites are being considered, it is a good idea to prepare a site evaluation list such as the one below.

EVALUATION
1 — Excellent
2 — Good
3 — Fair
4 — Bad

SITE 1	SITE 2	SITE 3	
			Availability of land
			Cost of land
			Approaches
			Nearness to center of coverage
			Height over average terrain
			Condition of soil
			Landscaping needed
			Electricity {Power / Light
			Sewerage
			Water
			Public transportation
			Desirable neighborhood
			Site (permits) expansion
			Zoning law
			Miscellaneous
			TOTAL

An important decision the planner must make is whether to unite the studio, the transmitter building, and the associated antenna tower structure. Operational economy can be achieved by such unification. When, however, local origination is planned, immediately or in the future, and much live production is contemplated, central location of the studio may be so desirable that, if the transmitter is to be removed from the center of civic activities, the studio building and transmitter site will have to be separated.

transmitter and studio housed in the same building

The station transmitter should be so located as to permit the shortest possible transmission line from the transmitter proper to the antenna tower to prevent transmission power losses. This is especially important in UHF stations. For economy of operation, the studio should be at the ground level. The administrative level can be at the ground floor or above. Access to utilities such as power, steam, water, gas, electricity, sewerage, etc., must be studied. Expansion of the station should be considered.

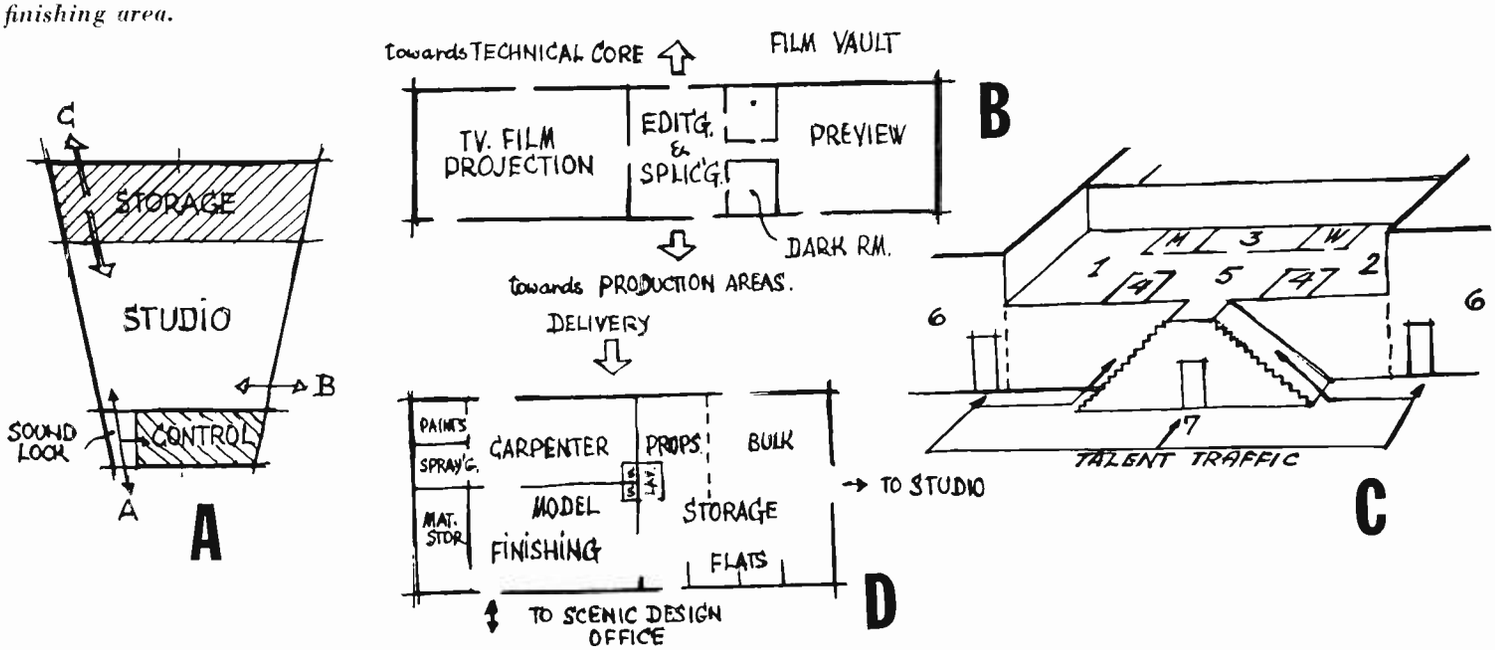
If expansion is contemplated, the following facilities will take most of the expansion:

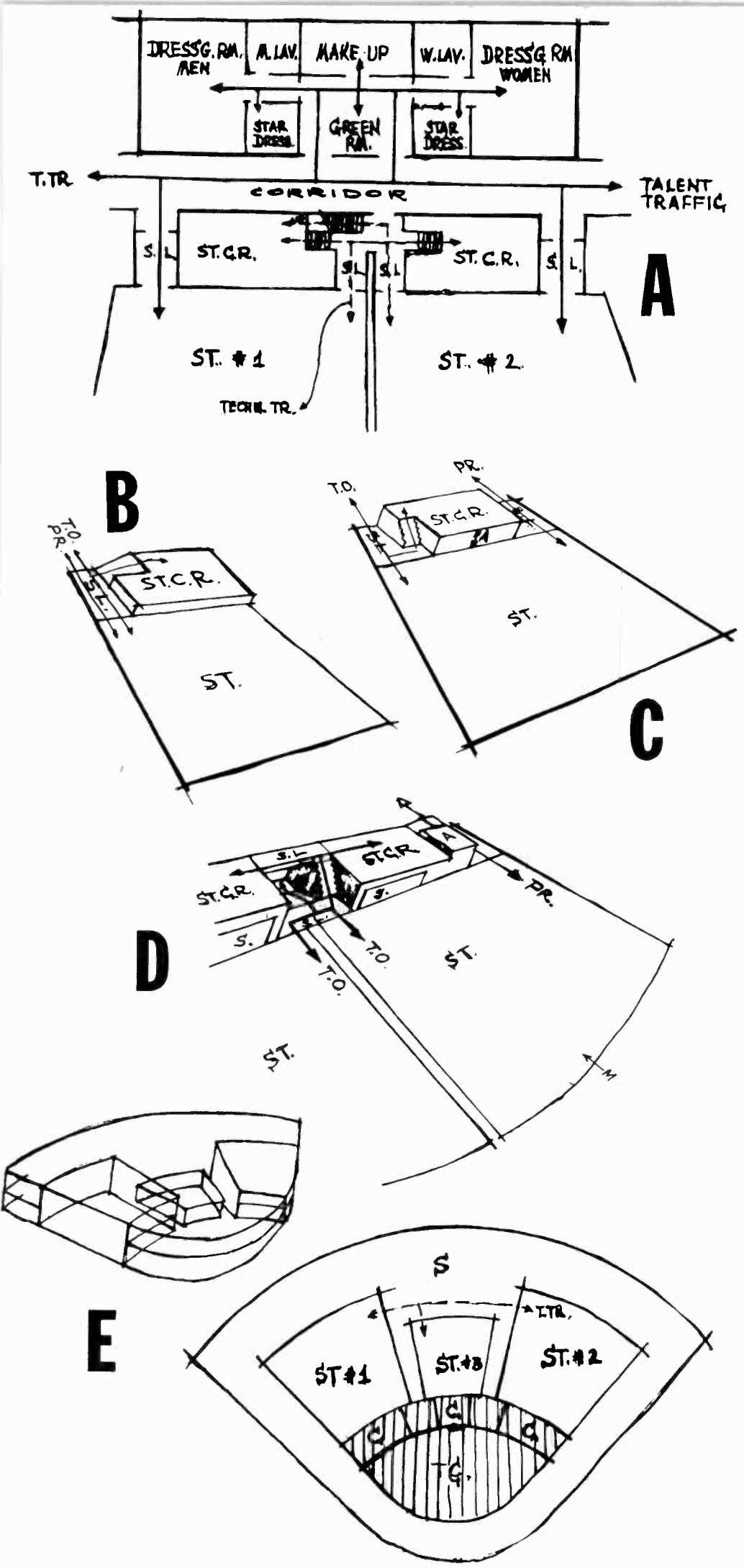
1. Studio—Live talent shows may be increased; therefore, either the studio may be enlarged or other studios may be

added. This especially may happen in "A" and "B" markets. If the studio is enlarged, the studio control room will have to house more camera monitors and related equipment. Minimum floor space for any control room—is 200 square feet.

2. Dressing Rooms—At least two dressing rooms for group dressing should be provided. If the studio has been enlarged, 130 square feet is a minimum per group dressing room.
3. Rehearsal Area should be added per enlarged studio. Minimum floor space should be 300 square feet.
4. Storage Area should be enlarged for prop and scenery.

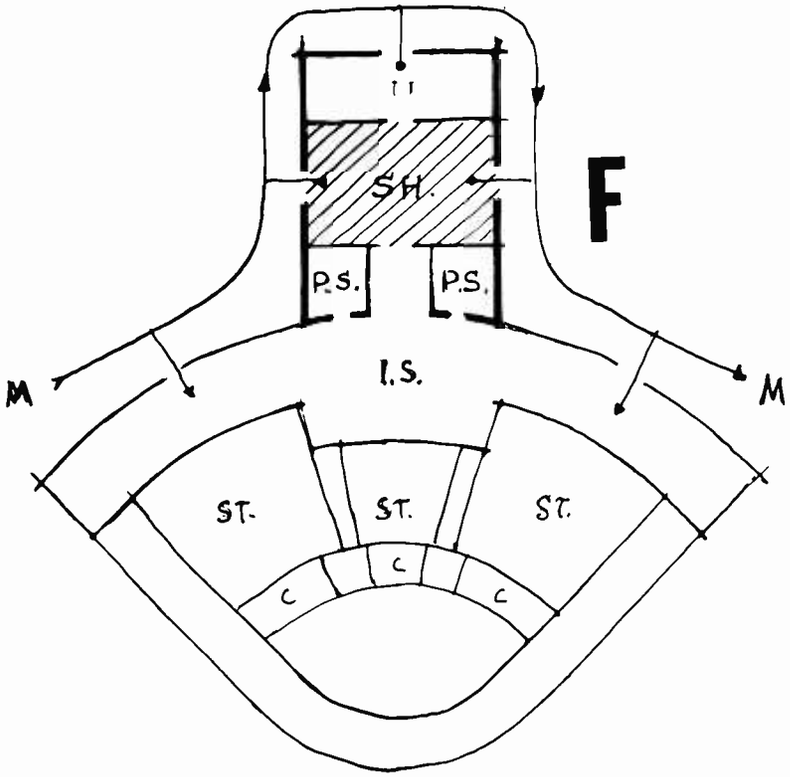
The sketches below show how special areas of a studio relate to their surroundings. A *indicates roughly the relative size of these areas as well as their relationships.* A *is basic technical traffic between the control room and studio through a sound lock;* B *is the talent and production access to the studio; and* C *is the material traffic between the studio and storage areas.* B *locates elements of the film area in relation to other areas of the station. (Note: Where the use of 35mm film is contemplated the film vault should be thoroughly fireproofed and be located on an outside wall of the building.)* C *relates the dressing rooms and studios. Elements shown are:* 1 *men's dressing room;* 2 *women's dressing room;* 3 *makeup room;* 4 *stars' dressing rooms;* 5 *green room;* 6 *double height studios;* 7 *entrance to small, single story interview studio.* D *show the relationship of shop and storage areas to the studio. In this sketch no permanent storage of sets or properties is contemplated. If such permanent storage is warranted, additional storage space should be provided near the finishing area.*





On these pages are sketched layouts of areas which contribute to efficient operation and production. A *shows how talent traffic may be routed so as not to cross or interfere with technical traffic between control rooms and studios.* B. *For a basic, small interview studio one sound locked means of egress may serve both technical operations and production personnel. A larger, live talent studio,* C, *should be provided with two sound locks, one an entrance for production, the other limited to technical operations personnel. The floor of the control room of the smaller studio should be elevated a minimum of two feet and the live talent control room elevated a minimum of five feet above the studio floor to assure adequate sightlines. A multiple live talent studio setup demands that basic facilities be integrated into efficient units. In* D *the adjacent studio control rooms form one "control level" area. Beneath this control level area is important storage space for chairs (for audience participation programs), cameras, dollies and similar equipment.* E *shows the basic relationship of elements in a multiple studio setup making it possible to move equipment quickly and easily from one studio to another and providing storage space for settings and properties. Dressing rooms and other talent facilities are provided above the one story studio 3. Shop and storage facility areas must also be*

integrated with the studios as shown in F. *A general area for utilities is grouped with the shop where stage sets are maintained and produced and the permanent storage rooms. These latter open directly on the area where sets and props for current productions are stored. In* G *is graphed a breakdown of the varied types of materials used in live talent productions. It is important that one central check in-out point be established for all materials used by the station. The top sketch of* H *is a cross section showing the height requirements for various elements of studios. The key for this drawing is: A—scenery, B—drop, C—cable from permanent grid and counterweighted battens, D—lights on hangers, E—interview studio height, F—large studio height. The lower sketch shows the sight lines from the control room and is keyed as follows: A—8′ between floor of upper level of control room and ceiling, B—3′8″ eye level of producer, C—5′ between finished floors of upper level of control room and studio, D—3′8″ eyelevel of video operator, E—2′ between finished floors of lower level of control room and studio, F—camera working level and window sill, L—lights on hangers and height of scenery, X—program console line of sight, Y—video control line of sight, Z—Observation booth line of sight (unfavorable).*



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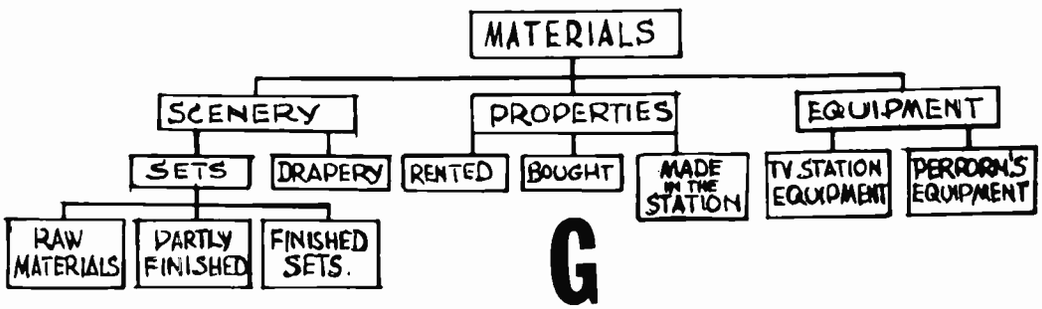

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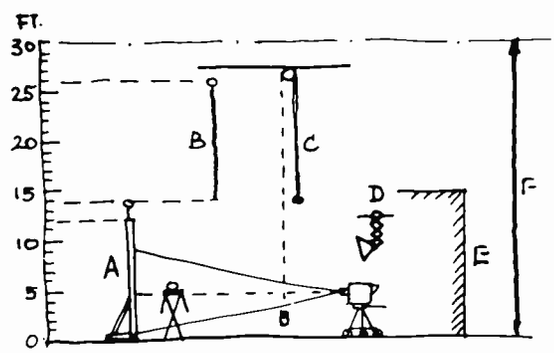

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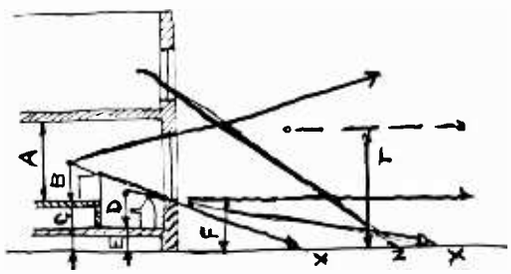


transmitter separated from studio building

Separation of the studio and transmitter normally means slightly increased capital investment and often increased operational costs. Although the increased capital investment in transmitter studio link equipment and building expenditures is important, operational expenses are more serious. This is because a remote transmitter location demands a special transmitter crew rather than one crew that can double up in operation of both the transmitter and the station. For medium-sized and larger stations, this is not as serious. Generally, the following alternatives are available:

1. Transmitter facilities and antenna tower located at the top of a high building in town, and the studio and associated facilities nearby at a convenient location in the center of the town. This is an alternative which demands that the building structure be such that it can easily accommodate the antenna tower and that the space for the transmitter in the top floor of the building must be available at a reasonable figure and on a long term lease. Connection between the transmitter and the studio can be maintained by cable or by microwave relay. In the case of relay linkage, proper unobstructed sightlines must be available. Costs and operational expenses will determine what system shall be chosen.

2. Transmitter located in an existing AM or FM radio transmitter building with the antenna installed on the existing tower and the studio located in the radio studio building. The consulting engineer can determine if the existing tower structure is able to support the new TV antenna and can also gauge the local interference problems. Often the transmitter building will have to be expanded. Linkage between transmitter and studio will again be possible by cable or microwave relay. In a case like this, there is an obvious advantage in using existing structures, both for the building and for the tower. Very careful consideration must be given to the tower structure to adapt it to TV use. The increased structural demand is important. The length of transmission line or wave-guide used will determine if the existing height overground can be utilized or if alteration is warranted.

3. Separate transmitter building and antenna tower to be constructed in remote location and the studio building and associated facilities to be placed in the center of town. As there is the task of producing a complete new structure for the transmitter, two questions will immediately come to mind. First, what is the best available site as determined by the site evaluation list prepared; and second, is there any reason to plan a future transfer of the studio facilities to the transmitter site. Development in the program character of TV may permit this at a later date. For the small station this may point to construction of a unified transmitter and studio building at the remote location at a future time. A Federal Communication ruling permits the use of a remote transmitter site inside the county limits but demands, at present, that the main originating facilities be located in the town to which the TV channel has been allocated. It may be found that in certain cases it is desirable to plan to house film projection

facilities at the transmitter site and maintain in town facilities for restricted live talent studio productions only, interview programs and forums. This will reduce rental or building costs for the main originating facilities.

Note: Where high elevations are used for transmitter sites, we must consider beforehand the question of transportation as well as the above-mentioned availability of public utilities. Climatic conditions may be severe and in isolated locations this will often create a critical problem of transportation of both supplies and personnel. Capital expenditures often rise steeply with the rise in elevation, diesel powered generators and other auxiliary equipment will have to be provided to keep the transmitter in a remote location in operation at all times. The building of approach roads, construction of large fuel tanks and many other items may be so costly that they forbid the use of a site which would otherwise be attractive from the point of view of elevation and full coverage of the market area.

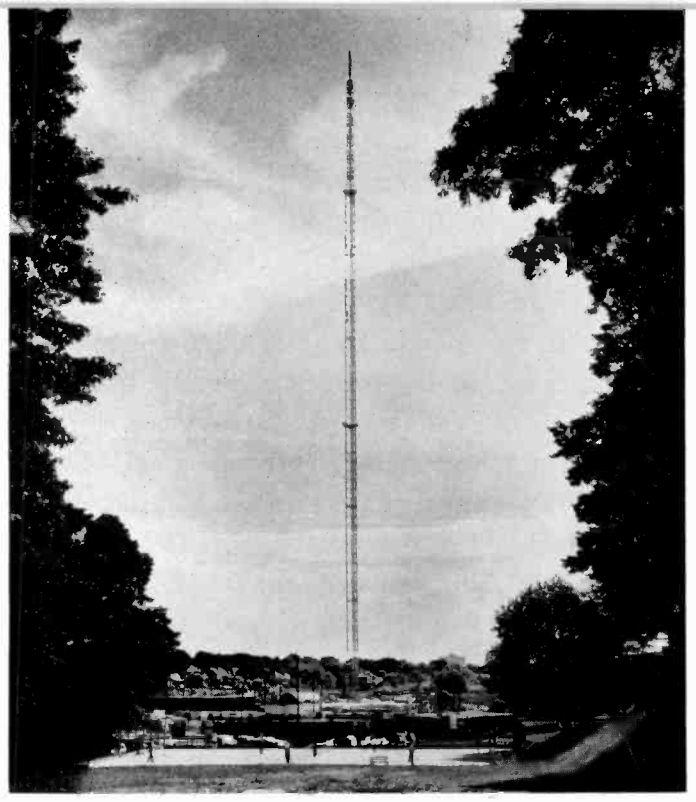
It would be most desirable in the case of mountaintop stations if remote control of the transmitter could be accomplished from a centrally-located studio building. This has not yet been accomplished although remote control of microwave relay stations in the coast-to-coast A.T.&T.T.V. relay system has been achieved to a very large degree. Remote control of TV transmitters at mountaintop locations would be an economical procedure.

Antenna Tower Structures

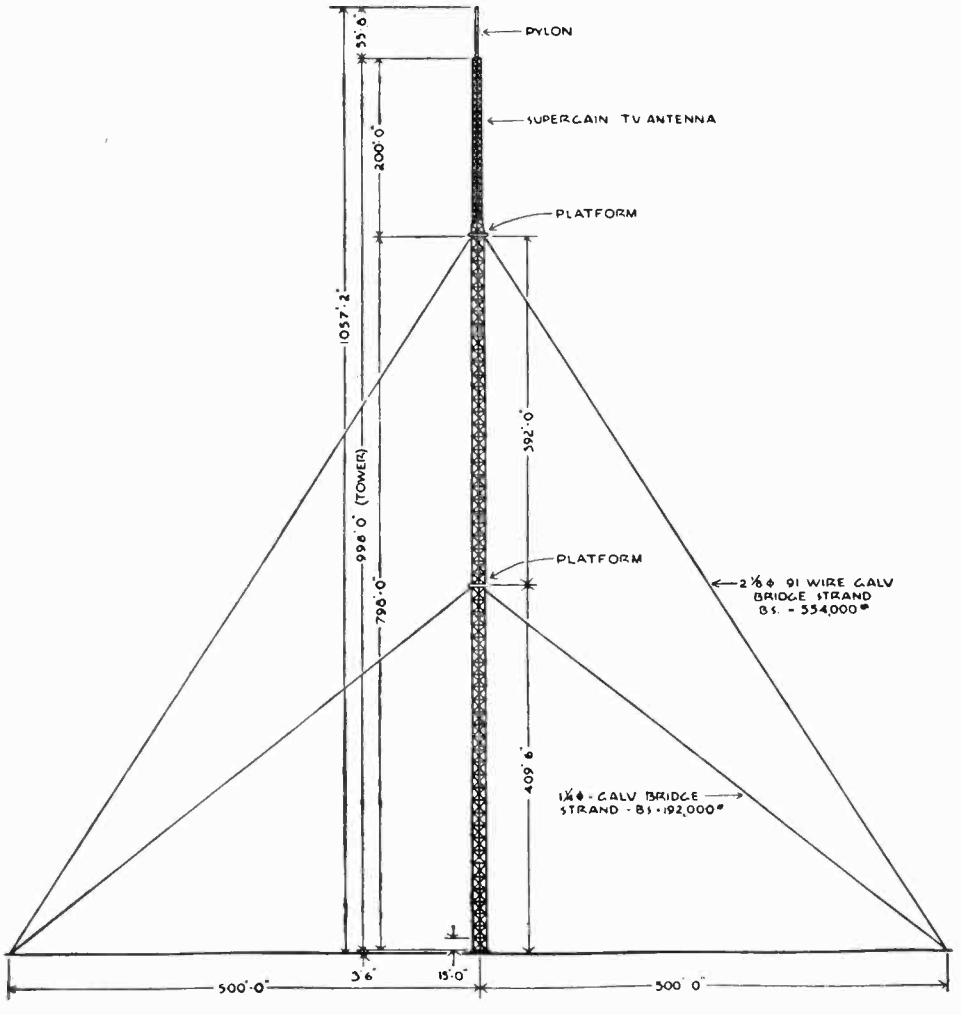
Tower structures to support TV antennas (VHF or UHF) are no different from AM and FM radio towers. We generally distinguish between the guyed tower and the self-supporting tower.

the guyed tower

The guyed tower is a wire-supported structure. The principal frame, therefore, can be comparatively light with the guy wires taking most of the stresses. It can be used on all locations where space permits. To estimate guyed tower space requirements roughly, the following formula can be applied: About the tower base inscribe an equilateral triangle within a circle having a radius of half the height of the tower. The triangle corners now become the foundation points for the guy cables. The guys are connected to the tower at two or more points depending upon its height, with the highest guy normally connected at a point 80 percent of the total height above the base. If the top guy connects at a lower point than this, the tower structure must be stronger and, therefore, more expensive. A small plot may also make extra strengthening necessary. Guyed towers are cheaper to build than self-supporting towers. But where equipment such as microwave relay receiver dishes, transmitter studio link equipment, etc., must be serviced and maintained at regular intervals, the cheapness of the guyed tower is not always the decisive factor in the selection. There is no indication that the guyed tower has less sway than the self-supporting structure. Sway restriction is especially important for UHF antennas,



The one thousand-foot guyed tower of WCON-TV in Atlanta, Georgia.



The locations of connecting points for a typical guyed tower are shown here.

An antenna tower located as this one is in a city must usually be self supporting. Self supporting towers are more costly than the guyed type, but usually permit easier inspection and maintenance.

for rigidity of the antenna contributes to better reception. Both guyed and self-supporting tower manufacturers claim minimum sway for their towers.

The self-supporting tower

Self-supporting towers must be employed where some space restrictions are imposed. Although they are more expensive than guyed towers, they have, in other respects, many advantages over the guyed type. One is the ease of inspection of the antenna installation and any microwave or other auxiliary equipment installed on the tower. Maintenance and equipment inspection can be done not only by a technical maintenance crew but also by the engineer himself. Self-supporting towers obviously demand less plot area than guyed ones. A 600-foot tower structure demands an average of 6.25 acres for a self-supporting tower and 12.5 acres for a guyed tower.

shared tower structures

In those communities where the Federal Communications Commission has granted more than one TV station construction permit, the licensees should, if possible, cooperate in sharing a common tower structure. Some of the advantages of this are:

A. One tower structure instead of two or more reduces the risk to aircraft traffic.

B. One tower shared by all stations reduces maintenance cost both for antennas, microwave equipment and transmission lines.

C. Power supply to one tower site will be more economical and reduce risk.

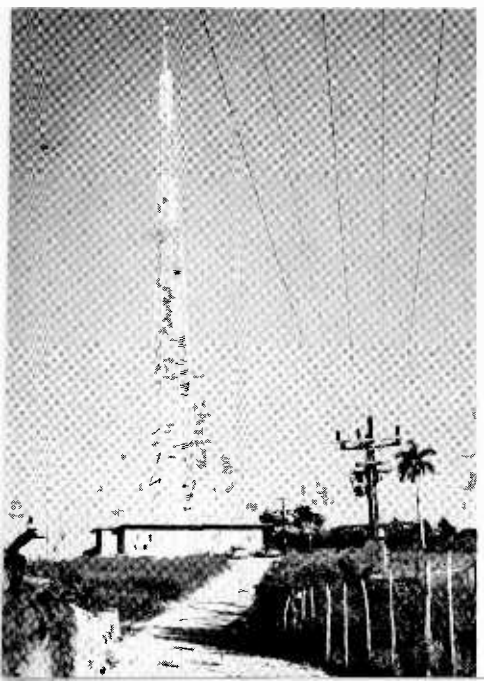
D. One transmitter building can be shared by the operating stations and, therefore, the capital investment for each station is reduced.

E. Operational personnel may be shared, thereby reducing operational expenditures.

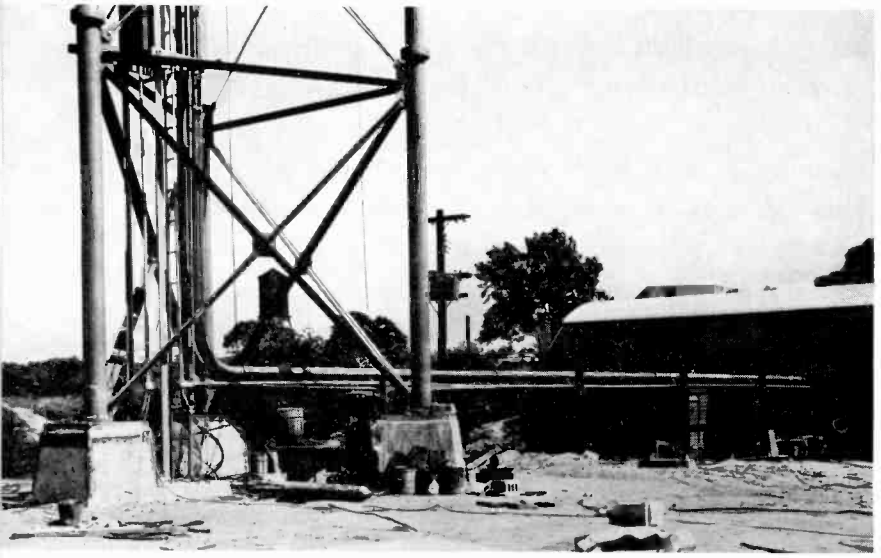
F. Insurance for antenna tower and transmitter building is reduced considerably.

G. TV home receivers in the total coverage area will greatly benefit by this procedure. Because all home antennas will be lined up with one transmitter site, good reception can be expected from all channels.

While the installation of multiple television antennas on one site and on one tower will require special investigation, there is no reason why such a procedure should be either forbiddingly costly or ineffective. Directional antennas, high gain antennas, and multiple television antennas, for two or more channels on one tower, demand careful engineering and research.

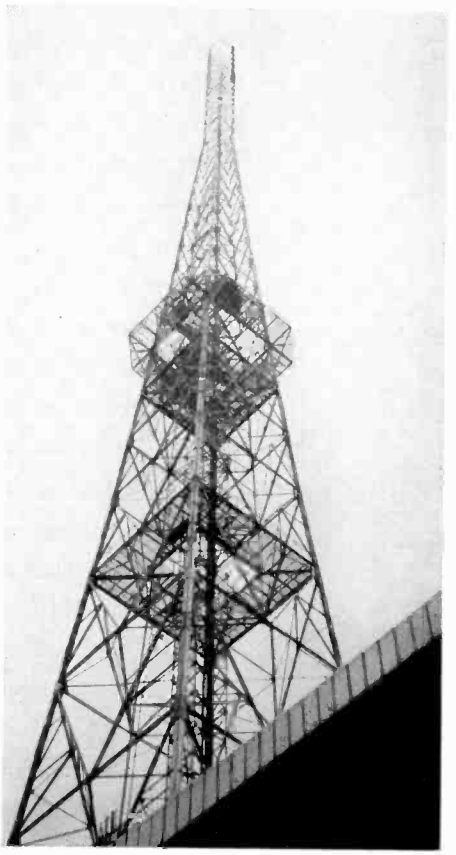


The transmitter site of a TV station at Matanzas, Mexico.

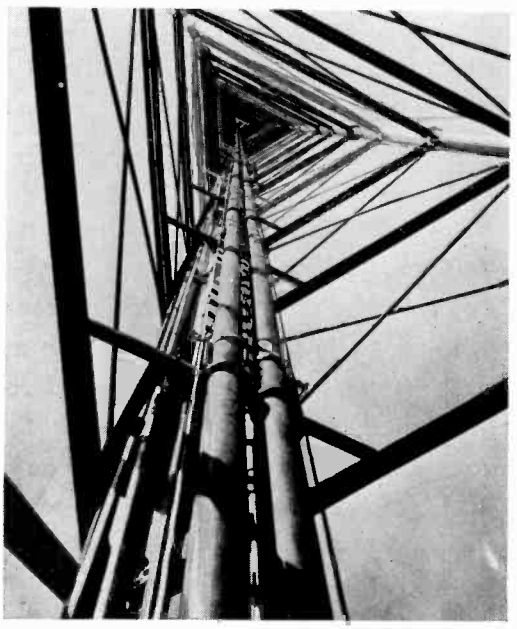


The antenna tower foundation of station WCON-TV in Atlanta, Georgia.

The 550-foot self-supporting tower of JOAX-TV, Tokyo, is attached directly to the studio building and contains an elevator to the 280-foot level.



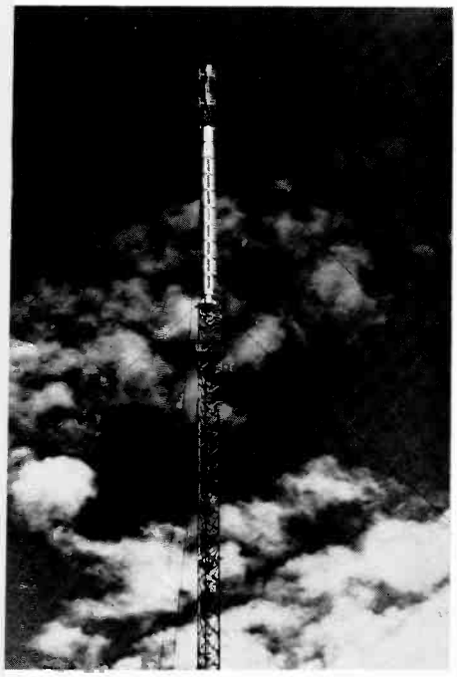
The coaxial transmission lines stretch upward in the guyed tower of WCON-TV.



Station CMQ's Radiocentro in Havana. The center is equipped with two transmitters, a theater and TV and sound studios.

general notes
on tower structures

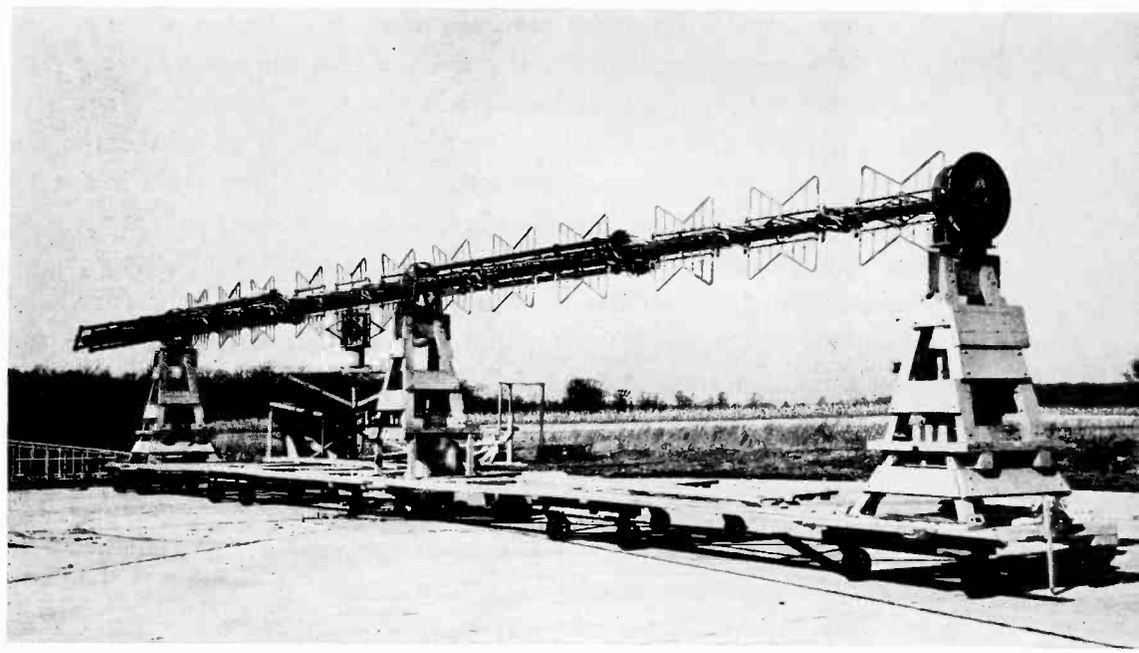
The 750 main mast of the BBC-TV transmitter at Holme Moss, Yorkshire. The slotted tubular section at the top permits use of the antenna for VHF sound broadcasting should BBC adopt this system in the near future.



The station chief engineer and the company bidding for the antenna tower structure have ample opportunity to use standard structures with imagination. Where mountaintop TV stations are created, building and tower structure may be integrated to form a compact unit. (Photo left). In this case, the use of unit construction and prefabrication will be a most economical step. Where conditions are severe and auxiliary power will be provided on the site, building and tower should be climate-proofed. Servicing of the tower under icy conditions is a hazardous operation and ladders or stairs should be carefully designed, otherwise insurance rates may prove to be excessive. Often it may be found desirable to make the stairwell or ladder a structural part of the tower in order to stress the structure and permit easy maintenance of the transmission line.

Whatever type of tower is contemplated, a qualified engineer should be called on to determine local conditions such as wind velocities, icing and snow conditions, foundation problems, etc. The use of standard tower designs, either guyed and self-supporting, is most economical. Where special tower structures are necessary, the cost is generally high. Once the type of structure has been agreed on, the height over terrain has to be established — at an economical figure — and the proposed tower height, and the exact coordinates, have to be submitted for approval to the regional office of the Civil Aeronautics Administration. The planning group should know that tower structures will only get approval if they fulfill certain conditions: Tower height must be kept under 2,000 feet over average terrain, must not infringe on established airlanes, and must not be in the approach pattern of an airfield. Quite obviously, all towers must be properly lighted during certain hours and must be painted in an established, easily-recognizable pattern.

The parts of this super-turnstile type of TV antenna are given a thorough field test before final installation.



antenna gain

The term "antenna gain" is important for us because the effected radiative power is, to a large extent, dependent on the multiple power gain of the antenna. In the UHF field, "antenna gains" in the neighborhood of twenty-five times the input power are common. The "antenna gain" is dependent to a certain degree on the channel that is used. Antenna arrays can concentrate a radiation into flat angles, thus creating a larger coverage. The direction of radiation and pattern is achieved by employment of super-turnstile, super-gain and beam-tilting. These methods permit concentration and radiation of the signal into a specific area demanded by market concentration and necessity for its coverage. Directional antennas are more costly and should only be used where they are absolutely needed.

The transmission line loss is a power loss along the line. Obviously, keeping the line as short as possible, with a minimum of bands, is desirable. This is especially important in UHF television transmission. In such a case, wave guides may be used to reduce losses. Not too much experience with wave guides has been accumulated. Because wave guides are largely produced from thin-gauge metal, their erection and fixing into the tower structure is not an easy task. Needless to say, windload and icing will have to be taken into consideration if wave guides are used.

FCC ruling on transmitter power

The term "effective radiated power" (ERP), as defined by the FCC for TV application, is the product of transmitter power, minus transmission line losses, times antenna gain. Effective radiated power and average elevation over the surrounding terrain determines the coverage to a large extent.

coverage

The FCC has allocated frequencies and maximum and minimum Effective Radiated Power figures (see table on page 69).

The Federal Communications Commission has provided us with graphs giving the coverage area with antenna height fixed to 500 feet. Effective radiated power from 1 to 1,000 kw is employed. The radius given in miles provides the ideal coverage area. It is important to realize that these curves are theoretical only, and that the real coverage may vary considerably from the predicted one. Other factors are involved, which are not reflected in the simplified graphs. One of them is the increase of receiver signal strength within the area with increased power to about 200 kw. Another is that different channel frequencies will provide different data. The graph illustrating "Coverage Vs. Antenna Height" provides us with channel frequency variations. The Final TV Allocation Report (Sixth Report and Order 52-294) provides us with most of the needed data.

Programming

The first decision facing any television applicant is one which will be most decisive in determining his future revenue potential. It is whether or not to be affiliated with a recognized television network.

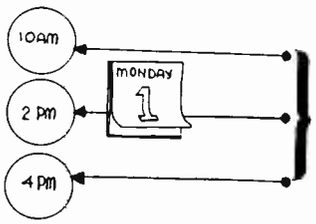
TABLE 3

Population of city, excl. adj. areas— (1950 Census)	Minimum Effective Radiated Power in db above one kilowatt (9 dbk for the antenna height shown)		
1,000,000 and above	17 dbk (50 kw) for 500-foot antenna tower		
		Antenna Height*	
250,000 to 1,000,000	10 dbk (10 kw)	500 feet	
50,000 to 250,000	3 dbk (2 kw)	500 feet	
Under 50,000	0 dbk (1 kw)	300 feet	

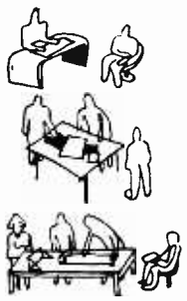
*No minimum antenna height is specified. Antenna height not in excess of 2,000 feet above average terrain.

Channel Numbers		Maximum Effective Radiated Power in db above one kilowatt	
VHF	3— 6	20 dbk	(100 kw)
	7—13	25 dbk	(316 kw)
UHF	14—18	30 dbk	(1,000 kw)

A calendar of planning and production for a simple, interview studio show.



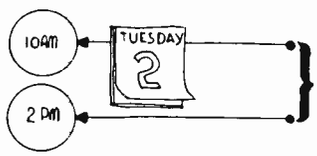
Discussion with sponsor, selecting the theme of the show. Planning of presentation and decision regarding type and length. Script and continuity: preparation of shooting outline and script.



Sales manager
and
Client (or Client's Agency)

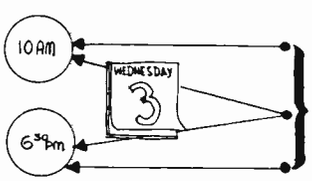
Sales manager
Producer
Traffic Controller

Producer
Chief engineer
Script writer
Artist



Technical planning: camera shots, sequences, light cuing, special effects. Production: floor plans, sets, props, costumes, etc.

Producer
Chief engineer
Artist
Camera and lighting supervisors



Rehearsal: setting story and action, line reading, dry camera run. Performers preparation: costumes, make up.
THE SHOW GOES ON THE AIR.
(15 minutes air time)

Talent
Stage manager
Camera and sound men
Technicians: light crew, Stage hands, control operators, etc.

At present there are four major networks in existence in the United States. These four networks distribute their programs from points of origination usually in New York or Los Angeles by means of coaxial cable and microwave relay systems to affiliated stations all over the United States. The coaxial cable and microwave relay are not owned by the networks but are, to a very large extent, owned by the "common carrier companies" authorized to operate in the U.S.A.

As the situation stood in March 1953, there were 143 television stations on the air, operating in 94 cities. Of these, 103 are interconnected stations, linked either by coaxial cable or microwave radio relay, and 41 are in interconnected cities. At present there are about 40 non-interconnected stations and a dozen more non-interconnected cities. In the next few years the Bell System will connect most of the important cities in the United States. Of future television station applicants, some will undoubtedly have to decide whether or not to link up with the nearest common carrier system in order to be able to provide network originated programs to their viewers. If the distance from the common carrier network system is not great, such programs are an economic necessity. The general ruling on the right to operate a private interconnecting link states that if the common carrier is unable to supply the individual operator with the needed service at the time requested, permission will be given by the Federal Communications Commission. Such decisions have been handed down in many cases. In the long run, it may be more economical to operate your own microwave relay link than to pay common carrier charges for using such a link.

As the Federal Communications Commission has allocated 12 VHF channels (Channels 2 to 13, from 54 to 216 mcs.) and 70 UHF channels (Channels 14 to 85, from 470 to 890 mcs.), there are a total of 2,053 television stations, in 1,291 communities, available throughout the U.S.A., its territories, and possessions. Of these, about 242 communities have received allocations of VHF and UHF stations for non-commercial, educational use.

At present, the station share of the rate paid the network by the advertiser amounts to approximately 30 per cent and sometimes as little as 25 per cent. With more stations coming—an estimated 1,000 television stations on the air in the next few years—income from the network paid over to individual stations may decrease. Right now, stations are making roughly 25 to 45 cents more on the dollar by selling their time for local-level television programs. The tendency, therefore, is for the individual station to sell as much available time as possible to local sponsors.

Spot television can be considered a market-by-market buying of television time programs, announcements, participation, and station breaks that does not involve network facilities or go through network sales channels but which operates at the local level.

This quotation from the magazine *Sponsor* is a pretty accurate evaluation of the spot: "As the total U.S.A. television network distribution costs are prohibitive for most sponsors, today's spot television can fulfill an important need."

The standardization of spots, especially station identification (ID) breaks, of eight to ten-second length has been accomplished. This sale is valuable to the television station, as 75 percent of the screen is available to the sponsor for his commercial. It is also important to realize that the local sale of spots immediately before and after high-rating network shows may compensate for the low rate the network pays the station for time.

ratings

The acceptance of network shows is judged by what is commonly called "ratings," and certain companies have specialized in this field. Some of the leading audience—rating organizations currently operating in the field are:

The Meter — by A. C. Nielsen
The Confidential — by C. E. Hooper
The Diary — by Videodex
The Aided Recall Interview — by The Pulse

The station operator, and more especially the sales department, must be conversant with the characteristic ratings which are used today by these organizations. As to the "rating muddle," there is no single rating and audience measurement service which is perfect. They all have good and bad features. Some have facets such as audience composition, socio-economic sampling, speed, etc., which others lack. As it has developed, practically each network has its favorite rating service — the one which shows the best results for it.

origination

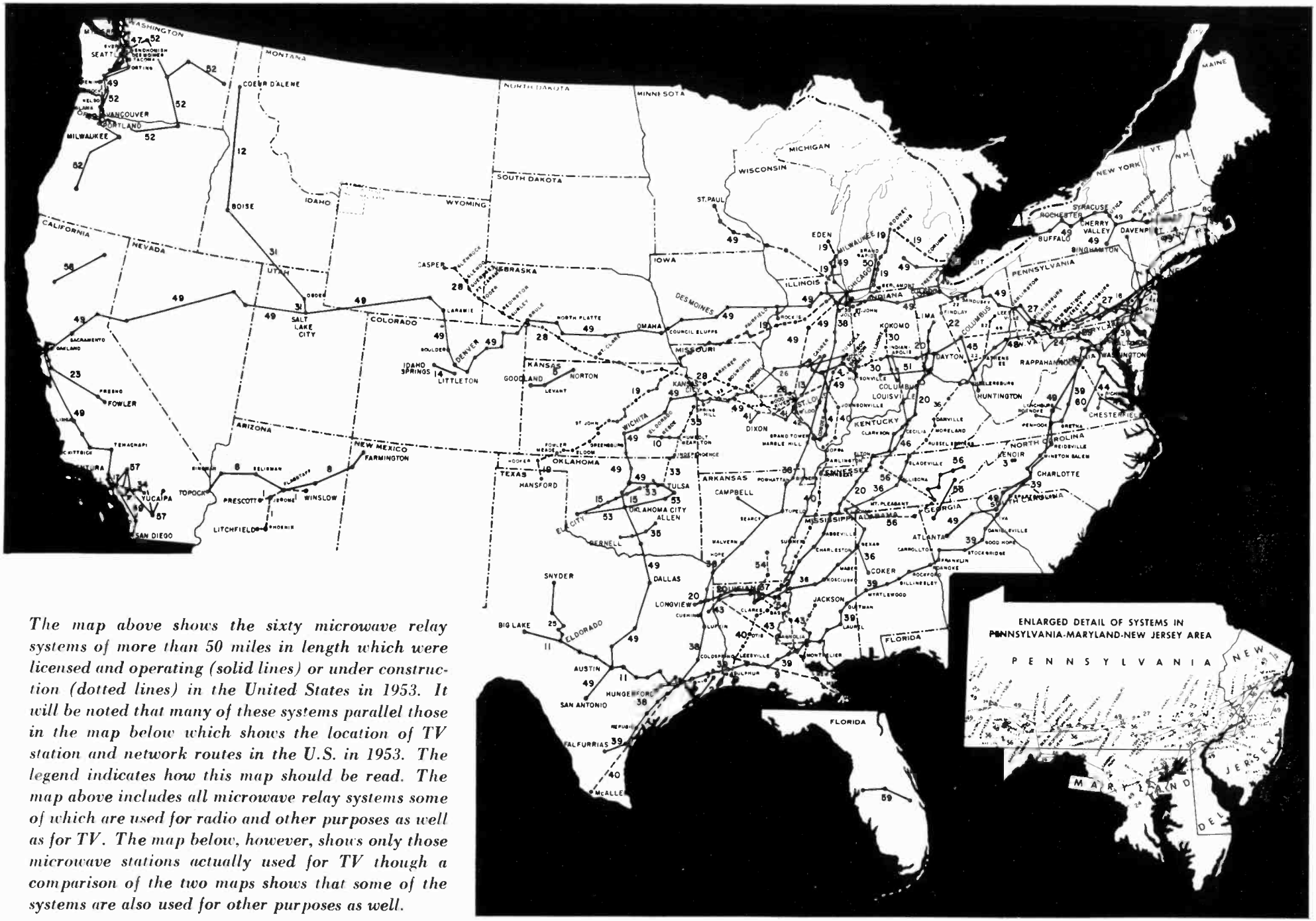
Most network programs originate at present in New York, with two networks — CBS and NBC — also having large originating centers in Los Angeles and the third network announcing their plans for construction. Sometimes large cities, such as Chicago or Washington, D. C., are used as points of origination. The programs distributed by these originating centers are relayed by coaxial cable, or by the newer and more efficient method of the microwave relay.

The applicant should discuss his future plans of network connection not only with the networks, but also with the local and regional offices of the common carrier.

The common carrier companies operate the system of coaxial cable and relay stations for the network companies and charge the networks for the use of these common carrier lines. "Line charges" for program transmission from the point of origination are charged to the sponsor by the network corporation. The amount of these charges depend on the amount of time used for the program and the number of affiliated stations that receive and broadcast it.

advantages of network

Although income from network sources is not the most substantial part of station revenue, network affiliation is welcomed by the individ-



The map above shows the sixty microwave relay systems of more than 50 miles in length which were licensed and operating (solid lines) or under construction (dotted lines) in the United States in 1953. It will be noted that many of these systems parallel those in the map below which shows the location of TV station and network routes in the U.S. in 1953. The legend indicates how this map should be read. The map above includes all microwave relay systems some of which are used for radio and other purposes as well as for TV. The map below, however, shows only those microwave stations actually used for TV though a comparison of the two maps shows that some of the systems are also used for other purposes as well.


WASHINGTON
SEATTLE
SPOKANE
PORTLAND
OREGON
IDAHO
MONTANA
NORTH DAKOTA
MINNESOTA
SOUTH DAKOTA
WYOMING
NEBRASKA
IOWA
WISCONSIN
MICHIGAN
MINNEAPOLIS-ST. PAUL
MILWAUKEE
GRAND RAPIDS
LANSING
DETROIT
TOLEDO
SOUTH BEND
DAVENPORT
ROCK ISLAND
PEORIA
ILLINOIS
INDIANA
INDIANAPOLIS
DAYTON
COLUMBUS
CINCINNATI
BLOOMINGTON
LOUISVILLE
KENTUCKY
WEST VIRGINIA
HUNTINGTON
VIRGINIA
RICHMOND
LYNCHBURG
ROANOKE
NORFOLK
TENNESSEE
NASHVILLE
MEMPHIS
GREENSBORO
CHARLOTTE
NORTH CAROLINA
SOUTH CAROLINA
ATLANTA
GEORGIA
ALABAMA
BIRMINGHAM
MISSISSIPPI
JACKSON
MOBILE
JACKSONVILLE
FLORIDA
NEW ORLEANS
LOUISIANA
BATON ROUGE
MIAMI
ATLANTIC CITY
PHILADELPHIA
BALTIMORE
WASHINGTON
WILMINGTON
HARRISBURG
PITTSBURGH
JOHNSTOWN
ALTOONA
WILKES-BARRE
BINGHAMTON
SYRACUSE
UTICA
ROCHESTER
BUFFALO
NEW YORK
TORONTO
MONTREAL
VERMONT
N.H.
MAINE
BANGOR
BOSTON
SPRINGFIELD
HARTFORD
NEW HAVEN
MASS.
SALT LAKE CITY
UTAH
NEVADA
CALIFORNIA
SAN FRANCISCO
LOS ANGELES
SAN DIEGO
TIJUANA
COLORADO
DENVER
COLORADO SPRINGS
PUEBLO
KANSAS
KANSAS CITY
LINCOLN
OMAHA
MISSOURI
ARIZONA
PHOENIX
TUCSON
NEW MEXICO
ALBUQUERQUE
OKLAHOMA
OKLAHOMA CITY
TULSA
ARKANSAS
TEXAS
DALLAS
FORT WORTH
LUBBOCK
EL PASO
AUSTIN
SAN ANTONIO
HOUSTON
MATAMOROS
HAWAII
OAHU
HONOLULU
PUERTO RICO
Legend
Cities with TV Stations in Operation
Coaxial Cable or Microwave Relays in Service, Equipped for TV
Privately Owned Microwave Relays Used for TV
Coaxial Cable or Microwave Relays in Service, Not Equipped for TV
Coaxial Cable or Microwave Relays Under Construction or Planned
SCALE IN MILES
0 50 100 150 200 250

ual station for a variety of reasons:

1. High quality, prestige-building programs.
2. The ease with which the program material is available.
3. Steady income for the television station.
4. Simplicity of equipment required to telecast network programs.
5. Reduced facilities required for transmission of programs.
6. Reduced staff requirements.
7. Round-the-clock programming.

The new television applicant, therefore, is well-advised to consider network affiliation as a desirable step in his procedure. The approach to the networks should be made prior to the application. Networks will judge the affiliate's desirability by the applicant's ability to cover large audiences; *ergo*, large local coverage, good technical equipment and facilities, substantial financial resources.

future regional networks

In view of the Federal Communication Commission's decision to permit a large number of new stations to cover the U.S.A. and territories, there is little doubt that regional networks will develop. The basic reason for such regional networks is that expenditures by a small station must be kept low because its income is always limited by the relatively small area of coverage. If, on the other hand, several stations covering a regional area cooperate in producing a substantial portion of their program time from one point of origination, considerable operational economy would be afforded and the coverage area greatly extended.

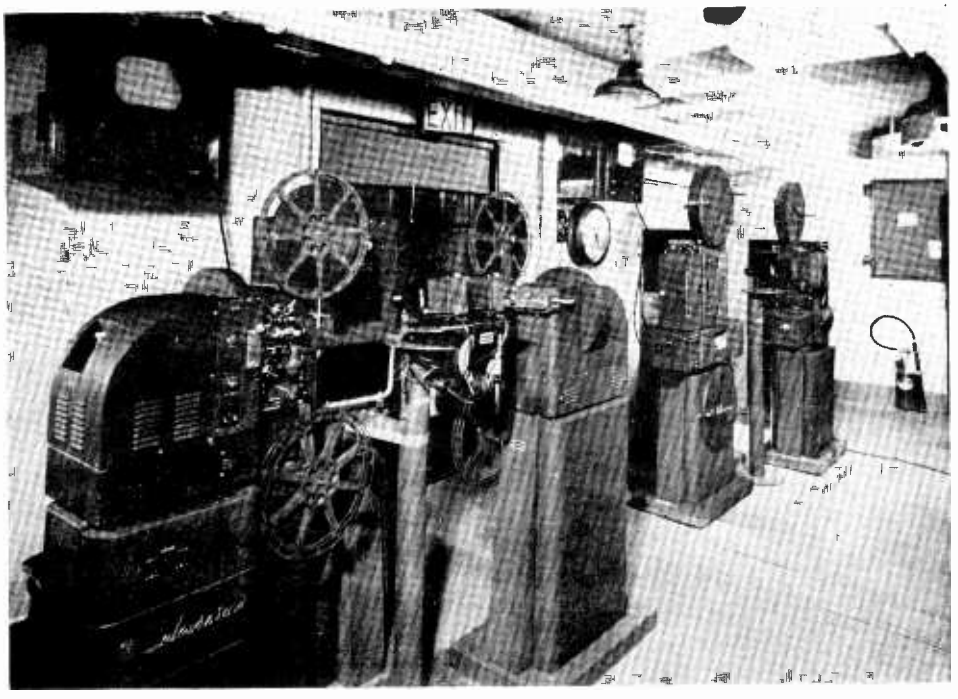
The time-buyers of the big national advertising agencies frequently do not have the time to acquaint themselves with each individual small market. When, however, several small stations band together into a network, they often become a major market which no national advertiser can afford to overlook. In the case of securing affiliations with the big networks, the same applies.

The costs of film and other program material may also be reduced by common buying.

Film

The use of film has established itself strongly in the television field. In fact, it has become so important that there is now a tendency to forecast that film will, to a large extent, replace live talent origination. Many stations have their own film director who is responsible for film buying, renting, and projection. For the planning group, "film" can be broken down into two main divisions:

1. *Film Projection.* TV station programming facilities include a projection room for film and slides. For telecasting, films are projected directly into a television camera. Films may be purchased outright but usually they are rented. Educational films and industrial films are sometimes available free of charge except for postage or shipping.



The projection room of WENR-TV. In the foreground are two RCA 16mm projectors, between which are mounted a multiplexer and a film camera. In the background is a similar set-up employing two RCA 35mm projectors. On the wall above each projector grouping is a monitor which allows the projectionist to see the picture transmitted.

Both 35mm and 16mm films are used for televising today.

Network origination centers still use 35mm film to a very large extent because of the superior definition of the picture and the better quality of the sound. However, 35mm is not without disadvantages. It is appreciably more expensive than 16mm, and sponsors, therefore, appear more and more to prefer the smaller film for telecasting rather than the larger 35mm size. The base film stock used for 16mm is no more flammable than paper, but professional, 35mm film is made on a very highly flammable, cellulose nitrate base, and special fireproof storage facilities are required for it as well as fireproofed areas and safety equipment for projecting, handling, and editing it.

The particular advantages of 16mm film include lower cost for the film itself as well as for projection, processing and storage equipment. No special fireproofing of facilities is required. Most individual TV stations use 16mm film as their main vehicle for film programming are "Feature Films." They take up in the vicinity of from 50 quality of 16mm films has been improved and this is especially true of 16mm sound.

The largest group of films now being used in film program-

The films presented by the stations either may be rented by to 60 percent of New York's film programs on all networks. Filmed comedy variety shows, audience quizzes, dramas, children's programs, and mystery shows take up a large portion of the time slots. Westerns and film shorts have increased their share on local time programs at the individual stations.

The films presented by the stations may either be rented by the management and the program sold to the local sponsors, or may be supplied to the station by the sponsors.

In all cases it is important that the physical handling of the film be done with the utmost care, because to produce a good and clear picture — and this is especially essential for 16 mm film — cleanli-

ness in the film projection and associated areas is a "must." Each projection room will have its special area in which the film is previewed. Previewing, also called "screening," is now an accepted procedure in practically all television stations. Once the film is on the air, correction is out of the question. Besides obvious editing, mistakes such as commercials left in by another station, pictures printed in the wrong sequence or upside down, sound tracks reversed, or the wrong sound track put to the right picture, may be corrected. Also, more mechanical errors such as poor splicing, broken or badly-damaged sprocket holes, etc., may be detected. To be sure that the program is prepared in an orderly fashion, a preview report sheet should be kept. The projector and screen for the preview can be left in permanent position, but should be a portable type. Screening should be done near the film projection area.

2. *Processing Facilities.* Processing facilities needed for small television stations will include splicing, editing, and storage facilities.

One of the auxiliary sources of income for the television station is the preparation of slides and 16mm film for commercial use by the local sponsor. More often than not, local sponsors cannot afford to produce their own commercials, which, when done by professionals and companies in large cities, may cost, for a one-minute commercial film, anywhere from $500 to $5,000.

The television station equipment for processing 16mm film and slides of all sizes should include the following items: film splicers, rewinders and viewers for editing already processed film, processing equipment, an editing bench, and slide files for all sizes of slides. Storage racks of 16mm films for small, medium and large film reels, able to hold from 100 to 2,000 feet, a screening projector and associated screen, and a dark room with developing equipment for still photographs and 16mm film are also required.

Generally, film processing facilities should be as near as possible to the film projection area, but if film production facilities are restricted, only the editing, splicing and storage spaces need adjoin the film projection.

kinescope

The term "kinescope" (which is sometimes referred to as teletranscription recordings) is applied to the recording on film of a picture produced by the television camera on a TV receiver tube, and the simultaneous recording of its accompanying sound. Once the kine has been produced, it easily lends itself to editing and copying.

Up to now the use of kine has been restricted because the quality of kinescope has not been up to the standard of films. Another reason for the restricted use of kine is the rules imposed by trade unions regulating re-use of television programs.

This term refers to a live talent show which is telecast and at the same time put on film by the regular kinescope process. It is processed at high speed and the program may be retelecast shortly afterwards. It is a suitable vehicle for overcoming time differentials. For example,

hot-kine is used when network origination is done in New York, but the program is to be telecast in Los Angeles. The hot-kine is an important development and will increase in importance as the number of programs originating in different global time zones increases.

Live Talent Programs

The production of live studio programs is the most costly of all program sources—at least for those at network origin. The prohibitive costs of elaborate live talent shows are diverting the efforts of the networks more and more to the use of film. Nevertheless, the spontaneous medium of live talent production is the most impressive to the viewer and has the greatest impact for news, information, special events and entertainment programs. It is useless to theorize on the exact size, shape and location of the live talent studio from which a program originates, but there are definite and established program types which dictate the size and shape of the area required.

We believe that the following pages constitute the first conscious attempt to evaluate scientifically the problem of studio space — based not on arbitrary data, as it has been done in the past, by most television stations, but formulated on the real program need.

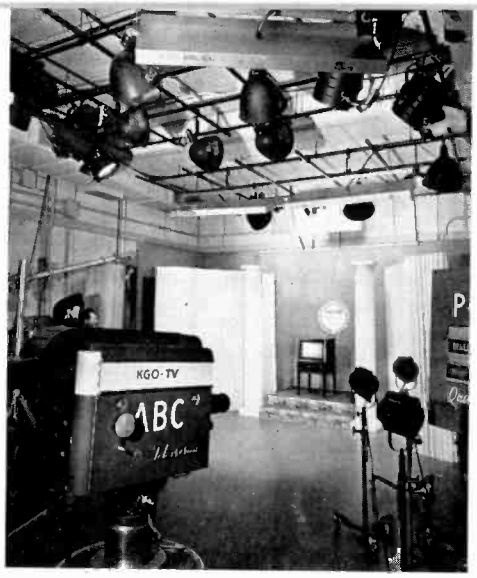
The television studio is the area where technological developments must be coordinated with human effort. Only carefully designed facilities and the establishment of critical physical requirements can guarantee that the human element will receive the attention it demands. The efforts of creative talent, the artist and the producer, will then be properly utilized.

the interview studio

One important type of studio that has been in great demand is called the "interview studio." It provides production space for certain types of programs which are keyed to the economy of limited station personnel, space, and equipment. This studio type is most desirable for small station television programming and is useful as well in medium and large stations. The following live talent programs may originate from the interview studio:

1. Interview: Local personalities, visitors, group interviews.
2. Discussion: Small groups and lectures.
3. Forums: Round table conferences for civic and educational use, quiz programs.
4. Commercial demonstrations and sales: Sales exhibits and demonstrations, sales discussions, and merchandising.
5. Entertainment: Chamber music, single musical performers, singers, puppet shows.
6. News: Weather maps and explanations, news, news discussions, agriculture forecasts, and sports reportage.

The interview studio is a comparatively small area of 1,000 square feet. It need be neither square nor rectangular in shape, for its shape is determined by its function. The main function of such a



(Above left) Four dollies in use at Station WFIL-TV in Philadelphia. Three are being televised by the camera mounted on the fourth. (Above right) A studio of KGO-TV in San Francisco. (Right) A studio set-up at WTAR-TV in Norfolk, Va.

(Left) An interview studio. (Below) A kitchen set-up in a studio of KPIX in San Francisco.

studio is to serve for a three- to five-set arrangement. Sets, sound pick-up, and control room location will determine the shape for the studio.

The following equipment should be used in this type of studio to guarantee an effective, but also inexpensive, production:

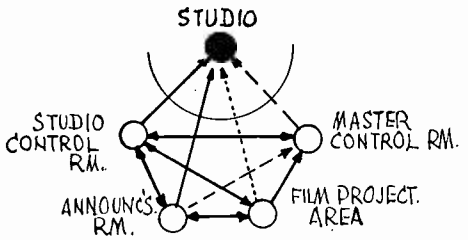
2 Television studio cameras (one of them with a remote control pedestal).
1 Boom microphone
1 Table microphone
1 Suspended microphone
1 Set box, with built-in rear projection screen
3 Fixed light set positions

A rear projection set for slides is useful (at present there is no reliable 16mm movie film available for rear projection). The studio space will be used for production only and, therefore, will include the staging area (inclusive of its acting sector), the camera movement area, and auxiliary technical space. An adjacent storage area will provide property and scenery storage. The latter should be approximately 400 square feet.

control room for interview studio

The control room will include all necessary video and audio control equipment and provide space for operating and directive personnel. It should be as compact as possible. The interview type of studio will

The master control audio room and announcer's booth and a small studio set-up for kitchen demonstrations with audience participation. Both are located at WMAR-TV in Baltimore.



Unobstructed sightlines between all components are a requirement for efficient production.

require that the control room level be elevated to permit an unimpeded view of the studio area.

Small television stations will use what is called "the basic buy" TV equipment which permits control of the live studio by one or two operators. A single control room, in this case, often serves in the dual capacity of a master control room and a transmitter control room. The control operator is in charge of the total program resources, which may include network programming, films, and some live shows. Thus, a single control operator is used at those times when simple programs. which do not need complicated program production techniques, are telecast.

While the single control operator in charge of transmitter and studio control is able to operate efficiently without any auxiliary help for network and film programs, it would be very difficult for him to do video and audio control of live productions, including shading and switching operations, thereby acting as a TV producer.

While the "basic buy" operation indicated by the manufacturer is a "basic buy" from the equipment point of view, it does fall short in connection with needed live talent programming. We, therefore, advise, once larger live talent productions are contemplated, the use of a special control room for the interview studio which will allow the use of a producer's console, a technical director's position and an auxiliary audio desk. Such an arrangement will permit the station to put on all types of programs adaptable to an interview studio.

In small TV stations the control booth should provide a direct and unhindered view onto the studio floor area, with free sightlines to:

1. The staging area
2. The camera movement area
3. The light control board
4. The transmitter control desk
5. The film projection room
6. The announcer's room. For small-scale productions it may be suitable to have an announcer's desk directly in the studio control room. Nevertheless, it is advisable to partition off this area which should be large enough to house a copy desk and television camera monitor.

In planning a layout comprising a studio control room, transmitter room, film area and announcer's booth, care should be taken

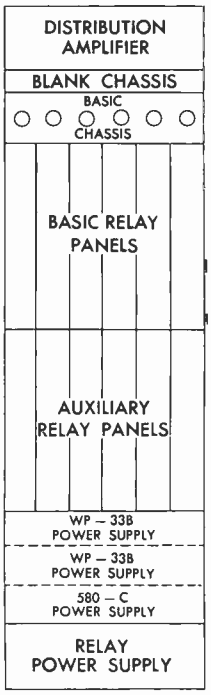
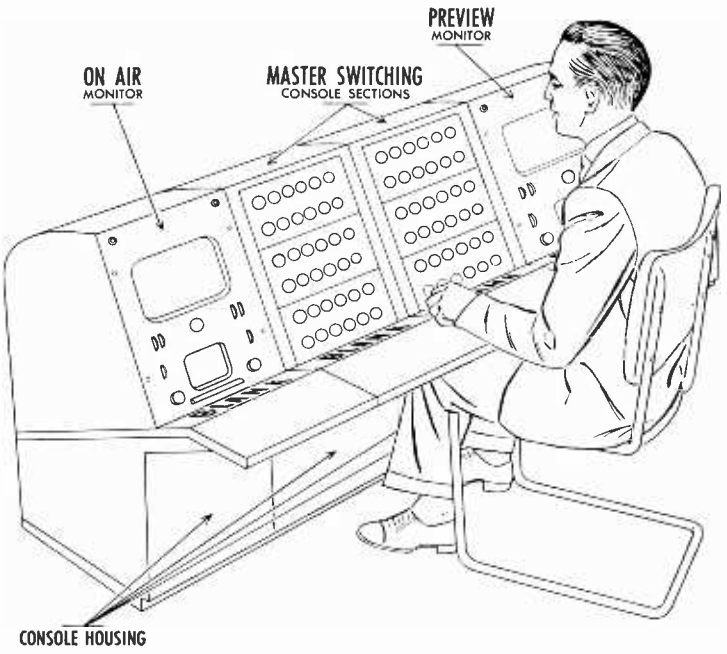
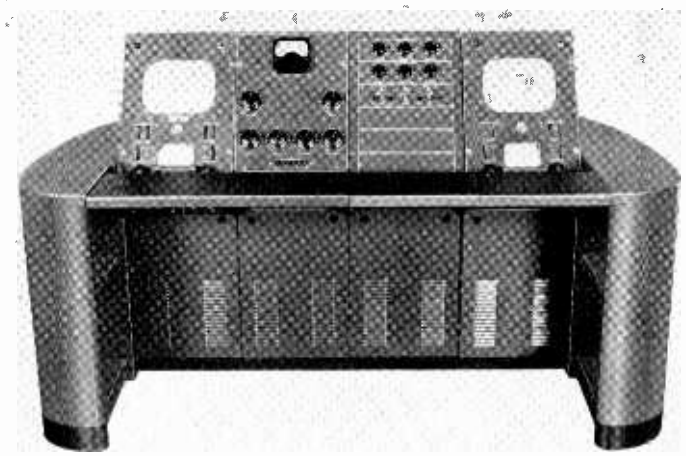
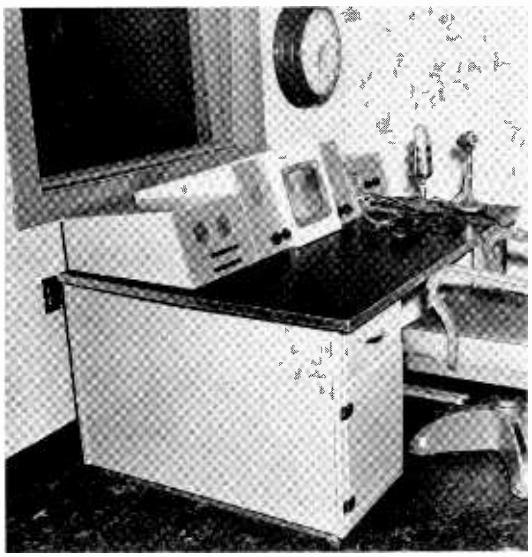


Diagram of the RCA basic TV control unit.

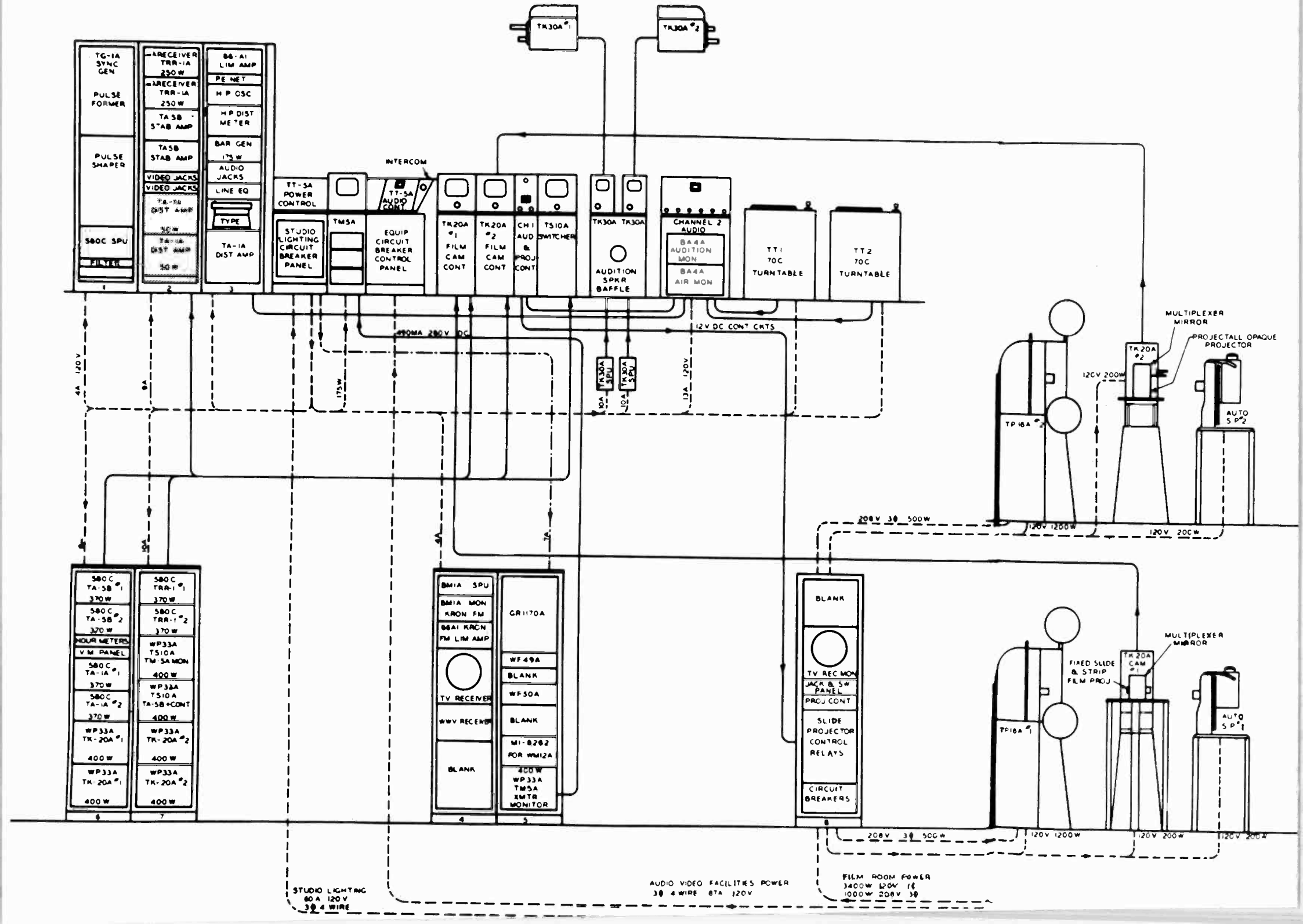






(Above) The RCA "Basic buy" control unit suitable for an interview studio. (Right) A custom-built announcer's console installed at Station WAAM in Baltimore, Maryland.

that clear sightlines be provided for the entire area. The simplest and cheapest intercommunications system is the eye, and because it is the most effective, we should plan for it. A simple sign language is already in existence in the TV field between the control and operative production personnel. Electrical intercommunications systems will be used for direct verbal contact during rehearsal and production staging.


TK30A #1
TK30A #2
TG-1A SYNC GEN
PULSE FORMER
PULSE SHAPER
580C SPU
FILTER
RECEIVER TRR-1A 250 W
RECEIVER TRR-1A 250 W
TA-5B STAB AMP
TA-5B STAB AMP
VIDEO JACKS
VIDEO JACKS
DIST AMP 50 W
DIST AMP 50 W
86-A1 LIM AMP
PE NET
H P OSC
H P DIST METER
BAR GEN 175 W
AUDIO JACKS
LINE EQ
TYPE
TA-1A DIST AMP
INTERCOM
TT-5A POWER CONTROL
TT-5A AUDIO CONT
STUDIO LIGHTING CIRCUIT BREAKER PANEL
TM5A
EQUIP CIRCUIT BREAKER CONTROL PANEL
TK20A #1 FILM CAM CONT
TK20A #2 FILM CAM CONT
CH1 AUD & PROJ CONT
TS10A SWITCHER
TK30A TK30A
AUDITION SPKR BAFFLE
CHANNEL 2 AUDIO
BA4A AUDITION MON
BA4A AIR MON
TT1 70C TURNTABLE
TT2 70C TURNTABLE
4A 120V
8A
175W
490MA 28V DC
12V DC CONT CKTS
TK30A SPU
TK30A SPU
10A
10A
13A 120V
MULTIPLEXER MIRROR
PROJECTALL OPAQUE PROJECTOR
TK20A #2
120V 200W
AUTO SP #2
TP16A #2
208V 3Ø 50OW
120V 1200W
120V 200W
580C TA-5B #1 370W
580C TA-5B #2 370W
HOUR METERS
V M PANEL
580C TA-1A #1 370W
580C TA-1A #2 370W
WP33A TR-20A #1 400W
WP33A TR-20A #1 400W
580C TRR-1 #1 370W
580C TRR-1 #2 370W
WP33A TS10A TM-5A MON 400W
WP33A TS10A TA-5B+CONT 400W
WP33A TR-20A #2 400W
WP33A TR-20A #2 400W
8M1A SPU
8M1A MON KRON FM
86A1 KRON FM LIM AMP
TV RECEIVER
WWV RECEIVER
BLANK
GR1170A
WF49A
BLANK
WF50A
BLANK
MI-8262 FOR WM12A
400W WP33A TM5A XMTR MONITOR
BLANK
TV REC MON
JACK & SW PANEL
PROJ CONT
SLIDE PROJECTOR CONTROL RELAYS
CIRCUIT BREAKERS
MULTIPLEXER MIRROR
FIXED SLIDE & STRIP FILM PROJ
TK20A CAM #1
AUTO SP #1
TP16A #1
208V 3Ø 50OW
120V 1200W
120V 200W
120V 200W
STUDIO LIGHTING 60A 120V 3Ø 4 WIRE
AUDIO VIDEO FACILITIES POWER 3Ø 4 WIRE 87A 120V
FILM ROOM POWER 3400W 120V 1Ø 1000W 208V 3Ø

(Left) A schematic diagram of a typical small station.

Combination studio and master control room in WHBF in Rock Island, Illinois. The equipment is by Dumont.

master control room

As previously indicated the master control room, which takes care of the outgoing picture control, can be combined with the transmitter control unit in small stations. The master and transmitter control rooms should adjoin the studio control room, the studio itself, and be easily accessible from the film projection area.

It is advisable to elevate the floor of the master control room slightly above the studio area. This will permit a clearer sightline for the master control operator, should he also be in charge of studio operations, and will also facilitate the employment of a trench-grid for cables throughout the master control room area. Control windows should be provided so operators may have a direct view into all adjacent areas such as the studio, studio control, and film projection rooms. The master control room will require the following equipment:

A master control console for video and audio programs, with an outgoing and line monitor and a single switching panel and monitors for TV and film cameras.

the video and audio master equipment, such as synchronizing generators, distribution equipment, phasing equipment and switching units.

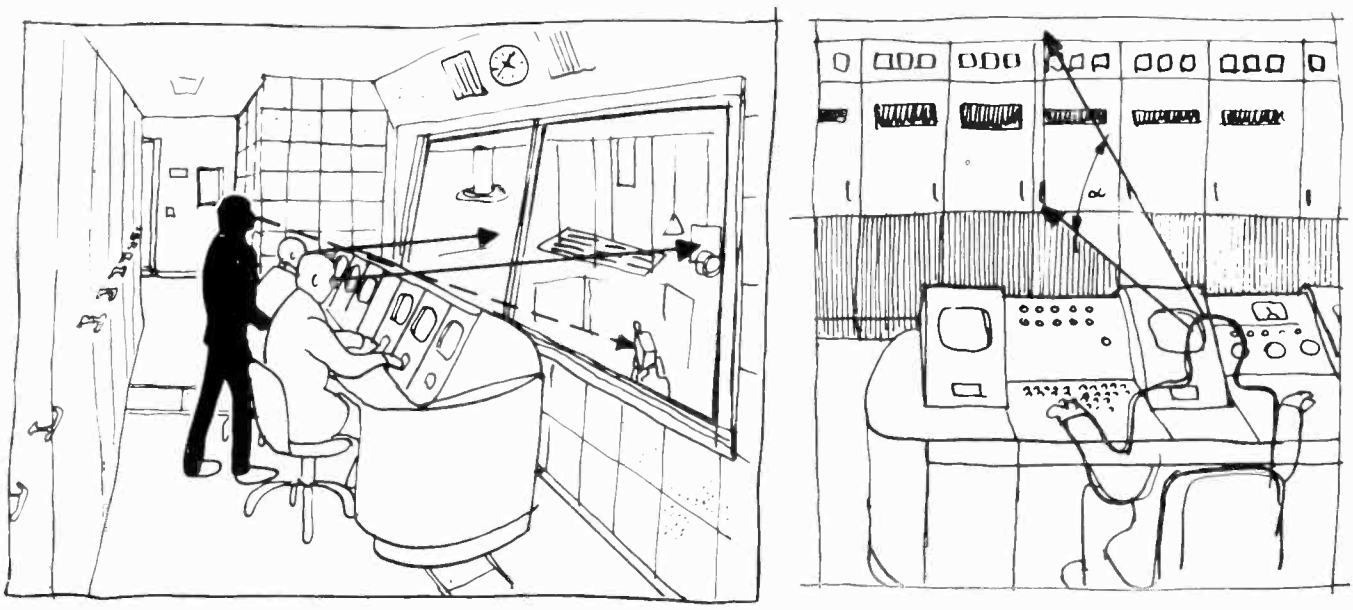
the minimum of floor area needed.

If transmitter and master control rooms are combined the control console will include control position for the transmitter, and one wall of the master control room should be formed by the video and audio transmitter.

It is important that the control console for the master operator be set at the right position and location so that he can view not only the studio, but also can see all of his equipment. The lighting in all control room areas should be studied carefully to prevent glare and reflection from the observation windows.

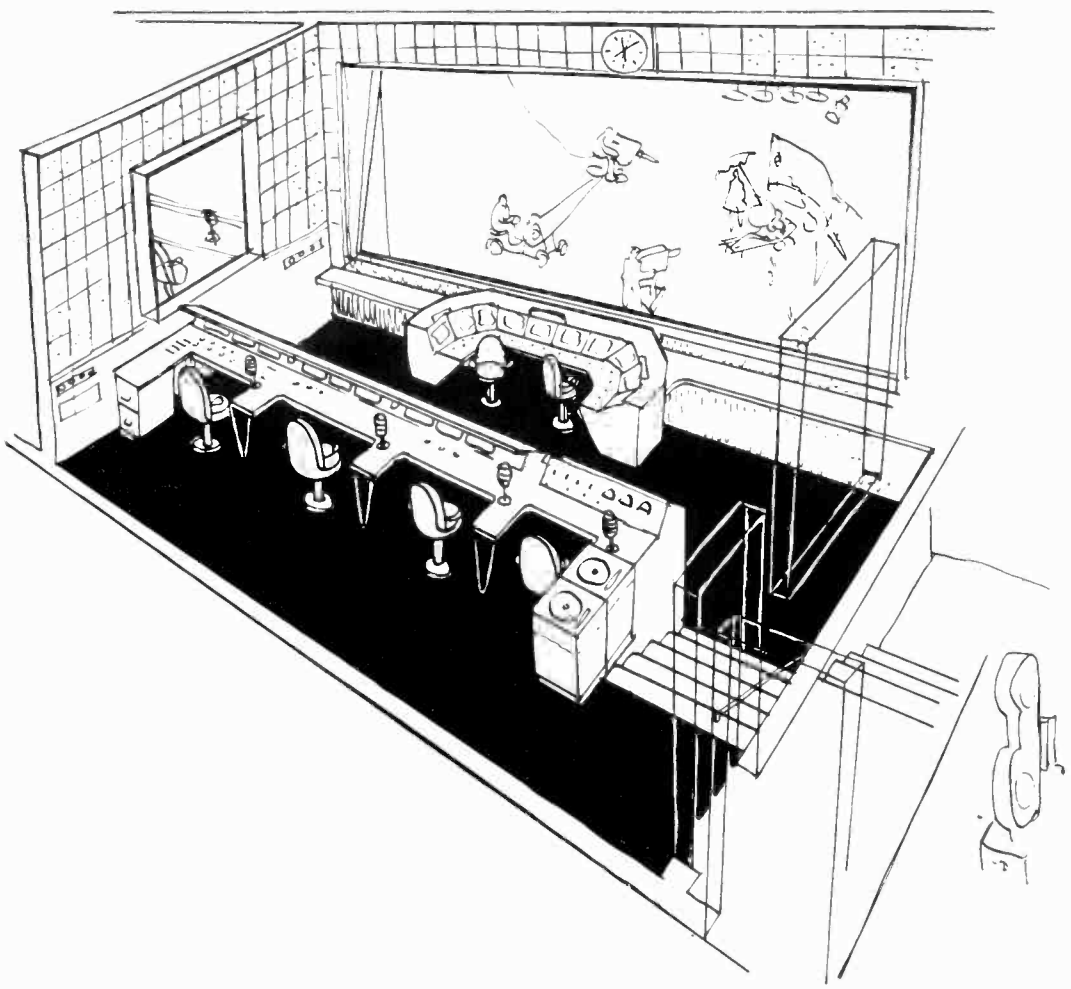
From the control room of WHIO-TV in Toledo sightlines to the studio, announcer's room, and film projection area are unobstructed.

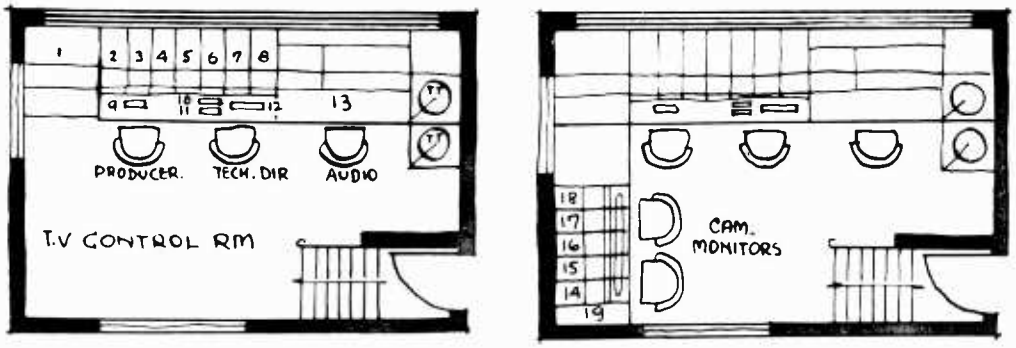
The sponsor's room overlooks the control room and also provides a clear view of the studio.



Proper placement of equipment is essential for efficient control operations. In the sketch at the left, it is impossible to see the production areas from a seated position behind the console. On the other hand, the technician in the sketch at the right has an unimpeded view of control panels and other equipment from his position behind a transmitter console, which is just as high as the studio console in the sketch at the left.

Proposed layout providing efficient sightlines and control for a large studio.





The Technical Center Core

technical center core planning

It should be remembered that the more compact and closely-knit the technical core is for a small station, the more efficiently the station will operate.

Close coordination of technical facilities is a 'must' to reduce the need for operating personnel, for centralizing maintenance, and for the elimination of complex intercommunications and traffic problems. Besides placing all technical facilities close together (master control room, transmitter room, studio control room, film projection area, amplifier room, technical workshop, announcer's room, etc.), horizontal grouping should be attempted. This will permit the employment of proper sightlines between the different control positions. Close grouping will allow the use of a standard trench-grid throughout the technical area — as assurance that expansion and flexibility will be available for all future types of equipment arrangements. Duct dimensions and space will, in turn, permit efficient placing of equipment and guarantee proper space utilization and accessibility inside the minimum of floor area needed.

Concentrated technical facilities will save capital because of the elimination of unnecessarily long corridors, long cable runs, and wasted headroom. Concentrated technical facilities will permit easy air conditioning and a minimum of expensive acoustical treatment while eliminating elaborate auxiliary areas.

Although the site available for the station will actually shape the technical center core, certain minimum conditions must be maintained. Generally stated, these are:

Width of the live talent studio—not less than 30 feet

Length of the control room—not less than 16 feet

Elevation of control room above studio floor—desirable 4 feet, 6 inches

operational procedure at the interview studio

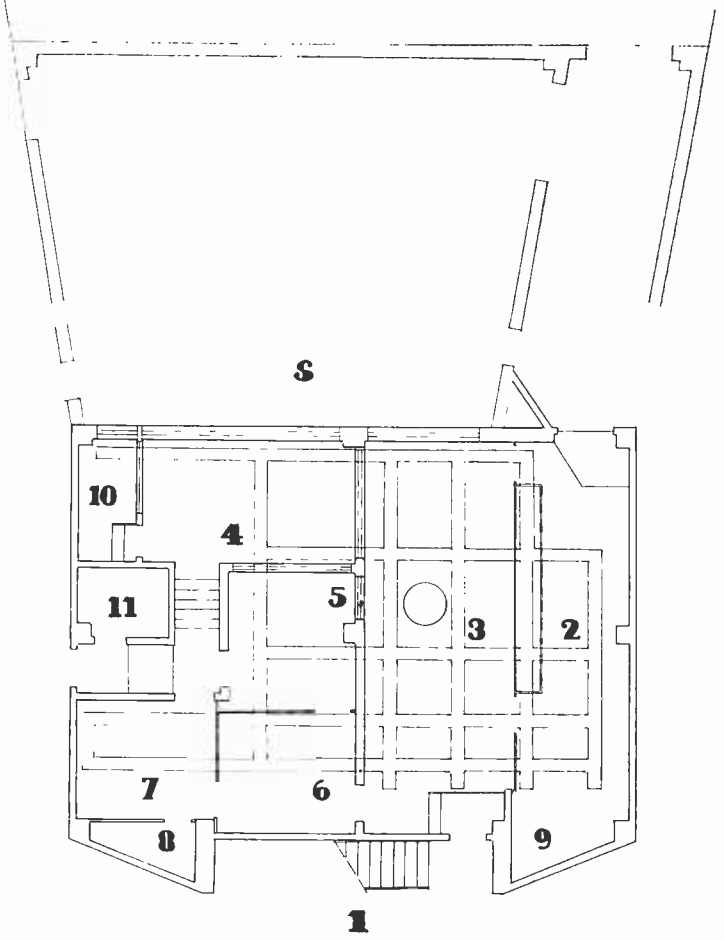
Because the interview type is a two-camera studio, with one remote control camera, the operating crew could consist of:

1 Camera man

1 Floor manager

1 Stage and lighthand (the latter also manages rear projection screen)

The studio control room may be decentralized as at left with camera monitoring and shading operations handled in a separate master control area, or operations may be centralized as at right with producer, director and monitoring operations grouped together.



The technical core of a typical station. The several elements are: (1) lobby, (2) transmitter room, (3) master and transmitter control, (4) studio control, (5) film projection, (6) editing, (7) recording and amplifying, (8) tube storage, (9) shop, (10) announcing, (11) engineers' lockers, (S) studio.

Plan of a well laid out technical center core.

1 Boom microphone man (although sound *should* be picked up by hanging microphone)

Control operation from the studio control booth should be directed by:

Video operator—acting as technical director

Audio operator—acting also as microphone switcher producer

The remote control camera can be handled either by the producer himself, the video switching operator or technical director, or the announcer. Production personnel can consist of the following:

The announcer

Film projection man (who also acts as editor and handles film production)

In addition to the above crew, the transmitter operator, who also acts as master control room operator, will handle outgoing programs. Simple presentations, such as weather forecasts, news programs, talks, etc., require only the following operators:

Announcer—operating the remote camera himself

The transmitter control room operator—in charge of outgoing programs also acting as studio control operator

Stage and lighting hand

In this type of presentation a fixed cyclorama background is used with fixed microphone and lighting arrangements.

The Large Live Talent Studio

In another type of studio, which may be classified as the "large studio," all types of complex live talent productions take place. Such a studio may be as large as 15,000 square feet in area and is sometimes three stories high, with provisions for a "fly gallery" and "gridiron" for fly scenery. Often it has an adjacent auditorium with seats for as many as 300 or more spectators.

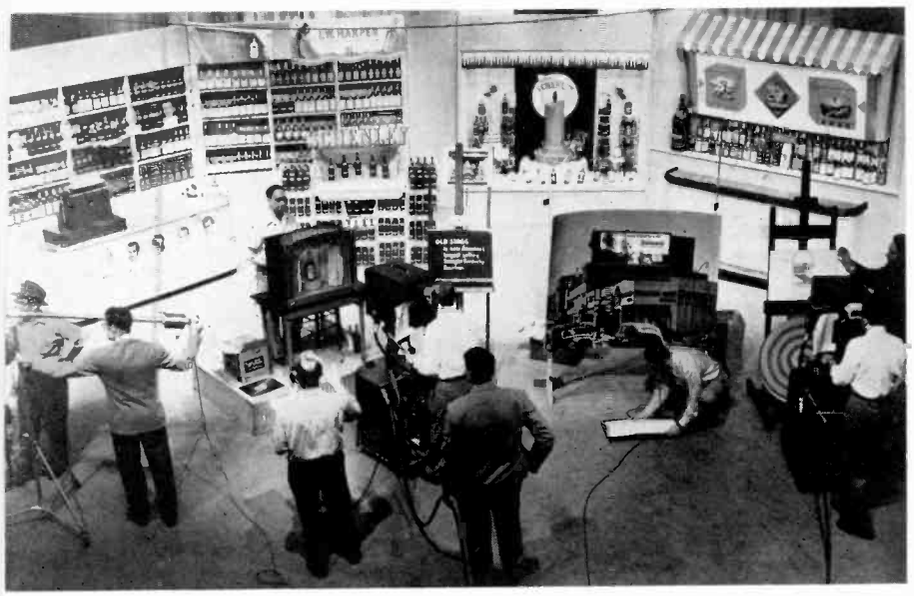
Such studios permit practically any type of production and may be as complex as film studios insofar as their auxiliary equipment is concerned. Studios of this type will only be used where extensive live talent production is contemplated.

The large floor space is needed to provide ample room for multiple set arrangements. Production proceeds in a clockwise or counterclockwise direction. Often more than a dozen sets are used.

The large talent studios are to be held responsible for most of the loss of money in live talent productions. Indeed, such studios have proved uneconomical, but this is probably because so very few have been designed for this purpose. As a result most large stations have used converted factories, warehouses, or other types of buildings as substitutes for large live talent studios. With few exceptions, all attempts to date to design and plan these large studios have failed. Since the shape of the studio dictates to a large extent the kind of production possible for the creative producer, who wishes to use sets and employ the electronic camera to best advantage, the possibilities of shapes other than the presently popular rectangle should be seriously considered. Limitations of the rectangle are:

1. Distance from the studio control booth to the scene of the production is too great and close supervision, therefore, is difficult.

2. Because the producer is far away from the sets, he has to



Live talent productions may be very complex, requiring large floor space and numerous sets. Shown here are two typical large studio productions. Dumont equipment is used in both of these.

be in an elevated position so that his sightline is not obstructed. This will automatically place other obstructions such as lightbridge, flys, and other ceiling obstructions within his view.

3. Distances in large studios are so great that cable runs from cameras, microphones, and other auxiliary equipment are very long and the costs of maintenance and use is tremendous; in addition, floor confusion always results.

4. Rectangular spaces and large spans require the use of deep trusses which automatically either reduce the free studio height or waste cubic area in unused space overhead.

5. Corners are either unused or, more often than not, used as makeshift prop and scenery storage areas and are, therefore, non-productive, wasted areas.

Most of the leading producers in the major networks have recognized that an ideal live talent studio should be composed of the following:

1. A central studio control position—possibly two of them—to observe studio production from a convenient distance.

2. The employment of four or more studio cameras to be used in a circular movement, switching from set to set and back, with a minimum of movement by the camera crew and its assisting production personnel.

3. Unobstructed sightlines from the central control position without obstruction by trusses, light-bridges, flies, air-conditioning ducts, and other auxiliary ceiling-hung equipment.

The centrally-located studio control positions in the form of a tower, with a circular studio floor area surrounding it, may be the most functional approach. The distance from the tower to the studio wall will thus be equal at any given spot and this distance can be calculated by adding camera movement area, staging area and background area. No space will be wasted and every area will be fully utilized.

staging and acting area

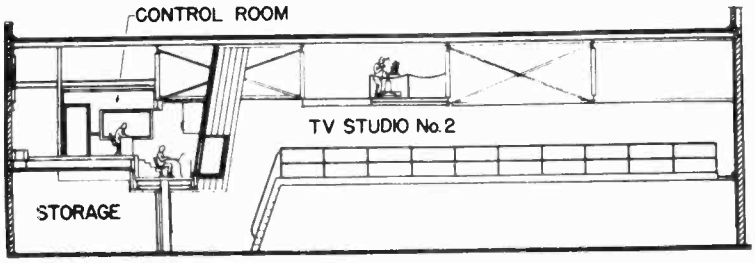
The television planner should create for the producer an ideal staging and camera pickup area. Creative planning and design of the live talent studio by architects is one of the most neglected points in the present studio plant. The large live talent studio is a factory responsible for the creation of highly complex productions.

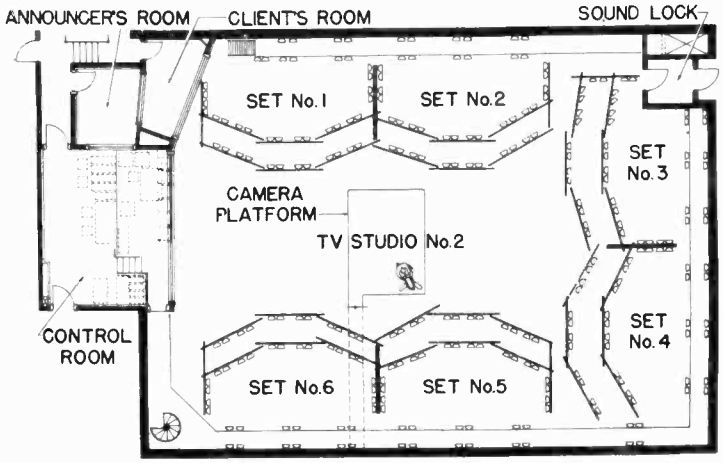
The staging area should include the area used for the setting up of scenery — some of it permanent, some of it of an incidental nature — and the space needed for acting which must be in front of the scenery. It must also include appropriate side and rear aisles, large enough for the unhindered passage of production personnel.

To facilitate camera movement and expedite production, certain staging arrangements have been accepted as basic. These are generally classified as clockwise, counter clockwise and nesting systems.

Floor plans for sets should be well-planned in advance; not only for simplicity of camera movement and sequence of shooting, but also for total utilization of the studio floor space.

Sets may be either put together on the studio floor or prepared in outside shops or in the station studio workshop. Set size and character will determine the procedure. Television production should emphasize the simplicity of sets, not only in a material way but also in line, form and color. Sets are backgrounds only and should not distract from the actual acting, the main attraction of live talent productions.





(Above) Cross section of a large studio showing the control room, catwalk and an overhead camera position. (Below) Plan is of a multiple set arrangement permitting 'round the clock production. The basic lighting setup shown is typical of a large studio.

(Left) Adequate dressing room facilities should be provided for actors and actresses. This is in station KPIX in San Francisco. (Below) View from the catwalk of the large studio of WCAU-TV in Philadelphia, showing the multiple set arrangement.

As mentioned previously, studios may include provision for the flying of scenery, but this practice should be used only if it accelerates the process of fast, efficient production.

For the planner and the planning group, it is important to realize that large live talent studios should only be used when they will produce revenues. The depreciation of the large live talent studio and its operation both demand full use of the area. The employment of multiple crews, not only from the technical and operational point of view but also from the programming standpoint, is expensive. A complex live talent production requires the necessity for a team of writers, producers, visualizers, and artists before actual production is undertaken.

Rehearsal times for large-scale productions and multiple-set productions are staggering. The ratio of 20 hours of rehearsal to one hour of actual air time is quite common.

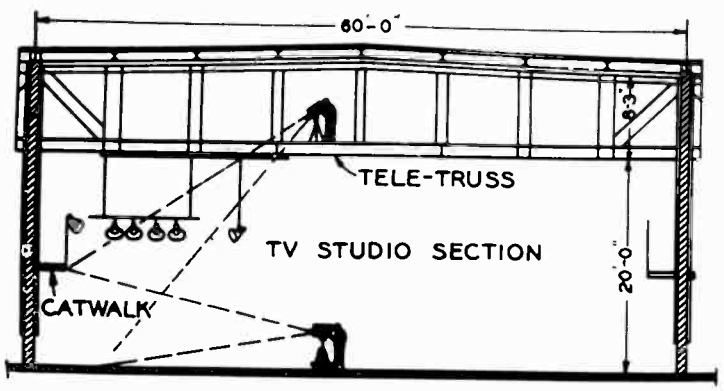
The Studio Floor Area

camera movement area

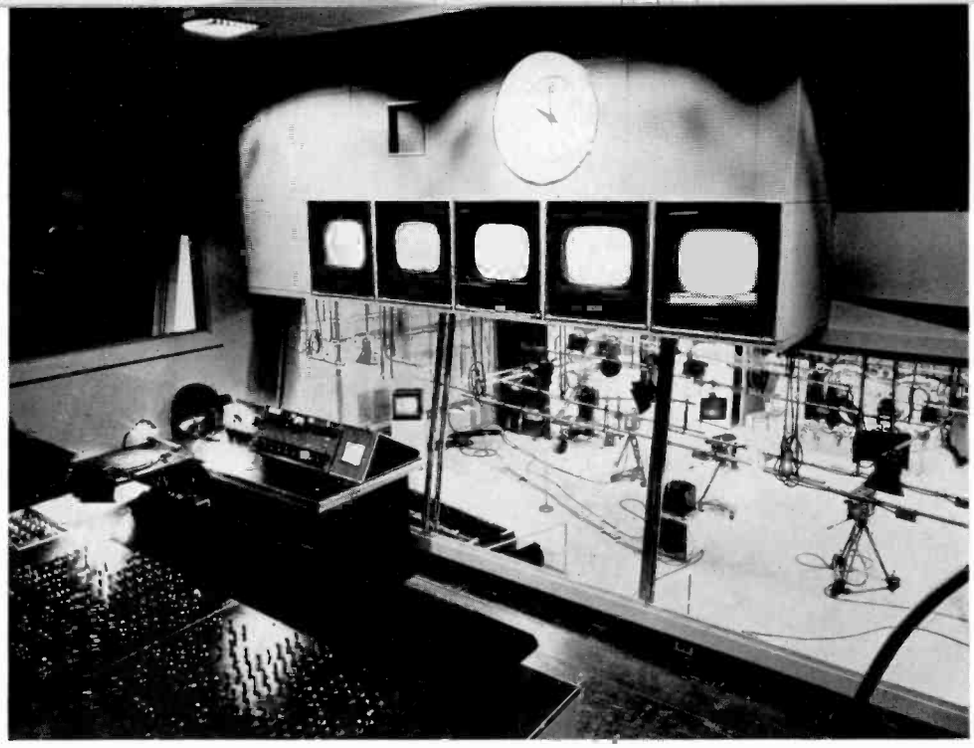
The camera movement area in front of the set is that space. The electronic camera is employed to pick up the set, actors, and action. In this process the camera men will move back and forth and sideways. The camera follows the actions of the cast; therefore, its manipulation may be complex. In large productions camera cranes are employed which are used in the same way film camera cranes are used in large film studios. The boom microphone man also follows the action and must move the microphone to follow the sound source.

At present camera movement around the floor is not a free one because the heavy coaxial camera cable does not permit complete maneuverability. For large studios the use of overhead-supported coaxial camera cables (supported by "V" shaped rubber cords) is one way to free the floor. In the giant studios of the networks, the use of a cable-free camera—operated by batteries sending its signals by wave to the control equipment — is being considered. Boom microphones can be fed from ceiling fixtures.

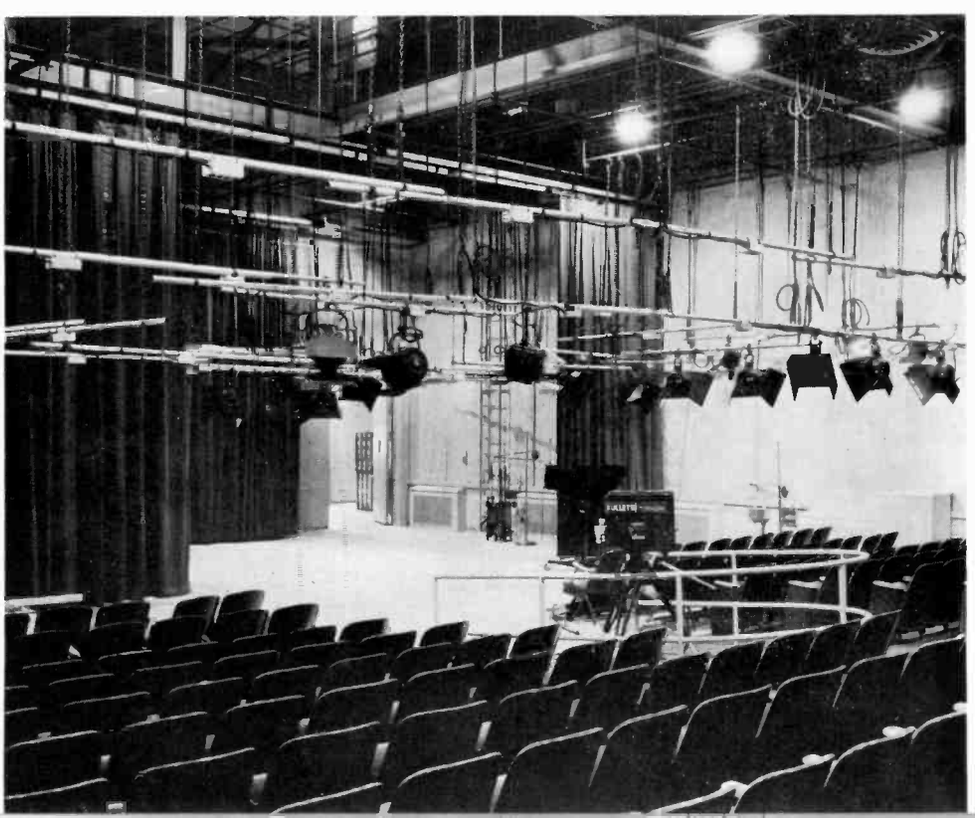
If the circular studio, with its central control tower, is used, camera cables will have short runs and the central column supporting the control tower will act as a main duct and plug-in point for all equipment.

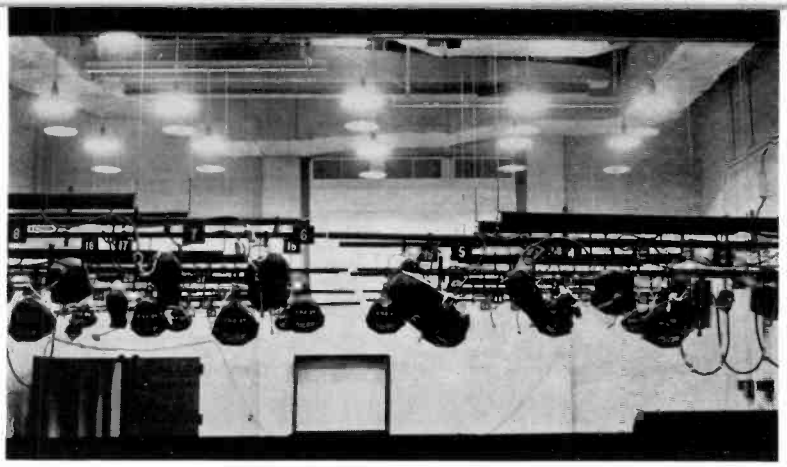


Traverse section of a large studio showing catwalks, trusses and overhead camera.



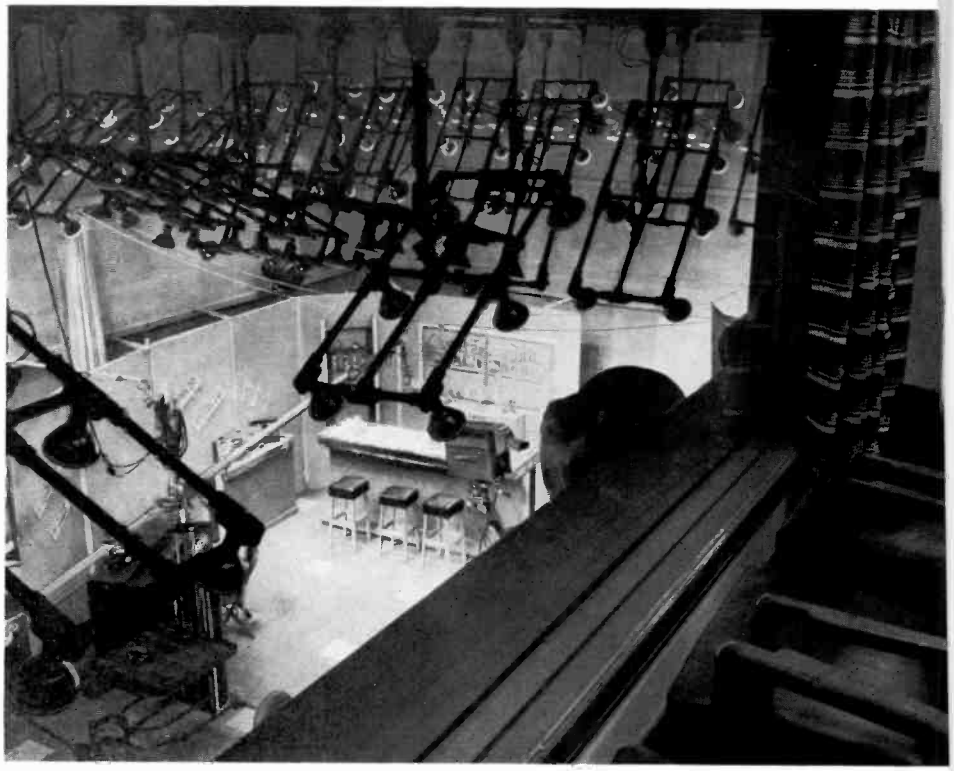
(Left) Typical mid-day audience participation show in progress in a studio of WBAL-TV in Baltimore, Maryland. (Above and below) The studio at WCAU-TV in Philadelphia. A general view of the studio from the control room is shown above while below is shown the seating arrangement for audience participation programs, the general lighting setup, and the drapery backdrops.





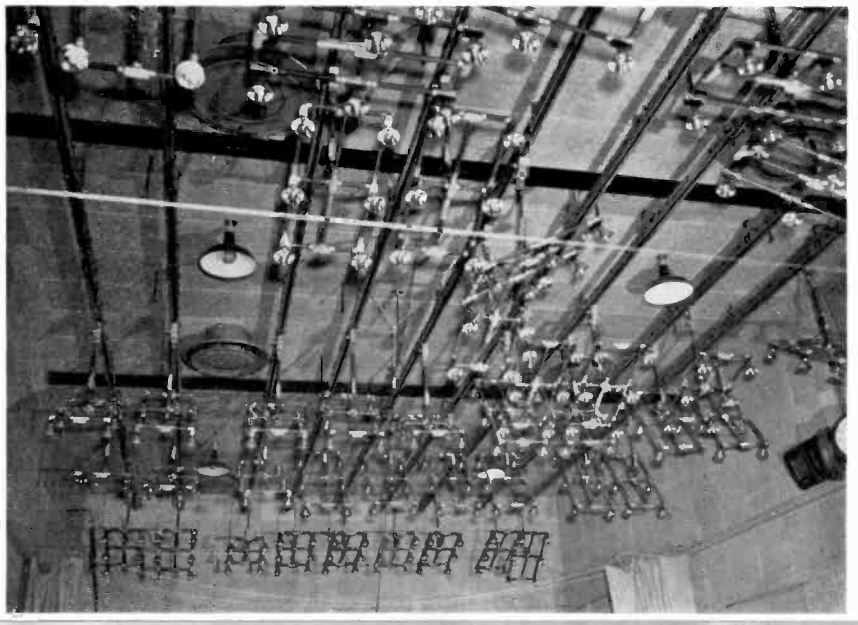
(Left) Self-propelled studio lighting at WWJ-TV in Detroit.

(Right) The sponsor's booth of WFIL-TV in Philadelphia provides a closeup view of the ceiling lighting fixtures as well as the acting area of the studio.



(Below) The studio control room of WCAU-TV in Philadelphia with, from left to right, the producer, technical director, lighting technician, and audio man.

(Below) A general view of the studio lighting set-up of Station WFIL-TV in Philadelphia.



Studio Lighting

lighting in the large television studio

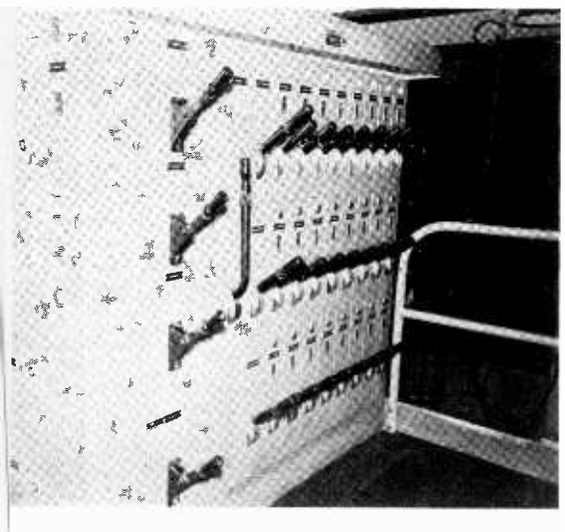
Up to the present time, lighting has been television's problem child. The planning group need know the important facts about lighting in a very general sense.

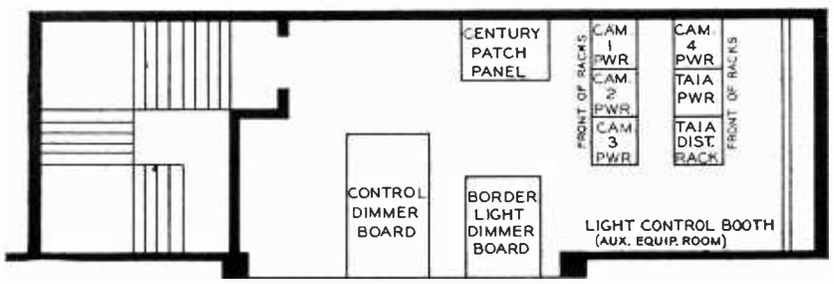
Set lighting design is the task of a specialist. Provision should be made to separate the main lighting from the ceiling trusses. Automatically-controlled movement of lights — up, down, and sideways — is a desirable feature for the large live talent studio. For smaller studios a simply-designed Cyclorama light-frame can be used to provide the basic light intensity needed for proper camera pickup. Highlights and footlights can be added at will. All lighting cables should lead from the ceiling, to free floor space.

Important, but always neglected, is the proper lighting of the studio control room. Reflection problems in the glass windows are common. To avoid this, desk lighting and pinpoint lights should be utilized, and lighting over each control position should be studied carefully.

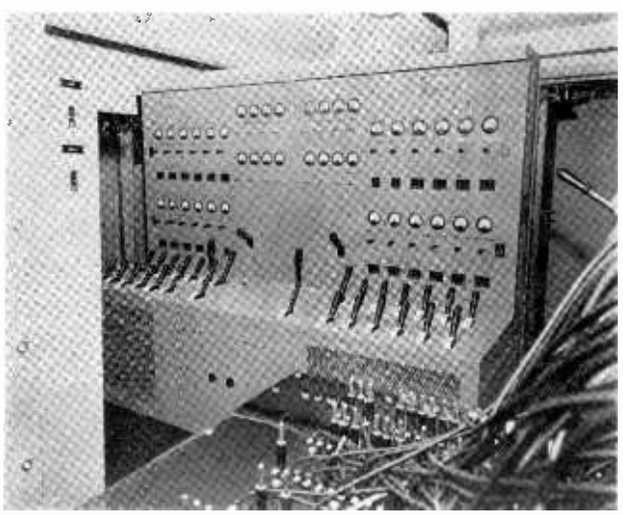
The planner should not neglect calculation and inquiry into the number of light and light control consoles needed. At present, large studio lighting is controlled from a pre-wired wall console, manipulated by a single operator. The operation of lights from this control console permits the use of each and any light group, and makes possible easy maintenance, repair, and part replacement of lights. Associated with the control console is a pre-set panel to allow for the cueing of lights ahead of the production. As labor union regulations are strict in this field, lighting of the studio should be planned to prevent future operational troubles.

(Right) This plan shows the arrangement of facilities in the lighting control booth of NBC in Hollywood. The lighting control booth is located above the main control booth at stage right. (Below) The borderlight dimmer board may be mechanically interlocked to permit simultaneous dimming of borderlight units. It is installed at NBC in Hollywood.





(Right) The main lighting control dimmer board allows the simultaneous dimming of all stage lights. It is installed at NBC in Hollywood.



Special Effects

rear projection and special effects

As mentioned in the prior section on the interview studio, the rear projector to perfect and stabilize the movement of a picture on the screen must be stressed. The studio should provide fixed installation points for rear projectors; the screen can be "flown," if necessary.

The use of special effects, a characteristic feature of television, is one which has been developed only recently. The fact is that the electronic camera and the switching circuits permit innumerable varieties of trick presentation.

Generally, we distinguish between optical, electronic, and electro-mechanical effects. The effects can be operated by a switching unit placed in front of the technical director. Such optical effects as background projection and the rotating prism are often used. If there is a stationary object to be multiplied, the shadow box and the translucent "Diorama" permit trick presentation. The electro-mechanical special effects include such simple things as the tilting box, black light filters, black backdrops, and the split screen as well as such things as the "Zoom," which is a special camera lens.

The electronic special effects enable us to have a variety of more complex trick movements. We have, for example, the keyed insertion, the film and slide insertion, and the montage amplifier; the latter gives a composite picture made with a television camera and a film camera operating together on one screen. Actually, all stations, and especially the network stations, work out their own effects, often uniting optical and electronic effects.

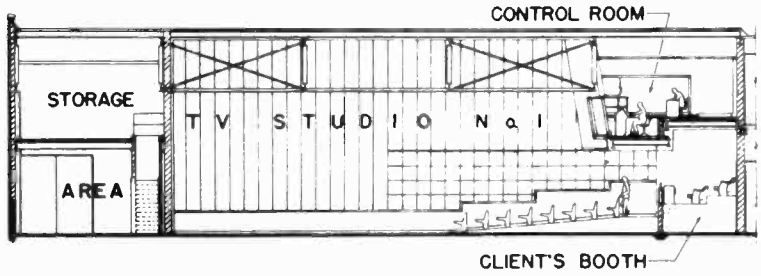
The smaller station doubtless could, by the exercise of a little imagination, use special effects to good advantage without difficulty. They are not too expensive, are easy to operate, and provide the producer with a variety of dissolves, fading, and special shots to make productions more interesting.

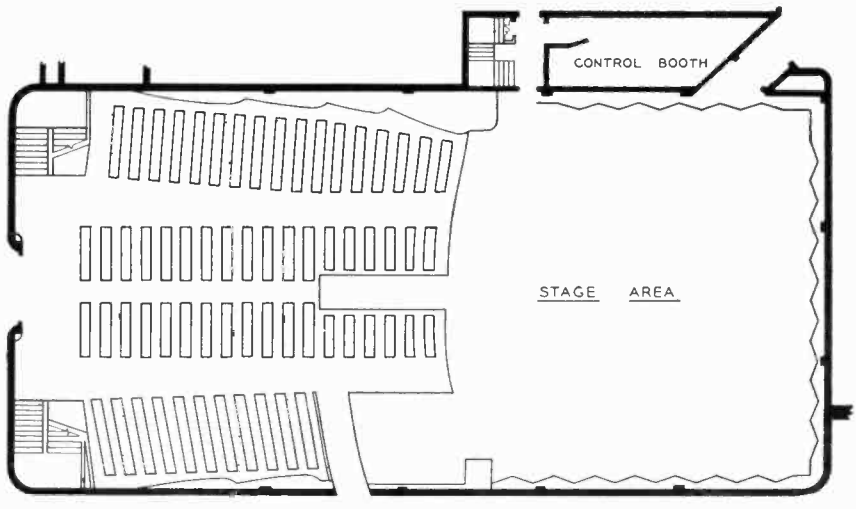
Audience Participation

For production in the interview type of studio, audience participation can be handled by using a movable scaffolding bleacher arrangement which will accommodate from 15 to 25 persons. This is an economical solution, utilizing the studio space without wasting the floor area with permanent seating. Audience participation is a desirable factor, for it encourages the actors in their efforts and gives the viewer a larger sense of participation.

For large live talent studios, a large bleacher arrangement or simple collapsible and easily-stored benches or chairs can be set up temporarily on the studio floor. This is not too good an arrangement in this case, however, because the audience may be comparatively large and the setting up and storing of seating facilities will demand a full complement of stage hands and helpers. A small elevated gallery

(Right) Section of Philadelphia's WCAU-TV studio No. 1. The elevation of the audience section, the open client's booth and the two-level control room are shown in this drawing. (Below) The stage area, as seen from the seating section, and the main floor of NBC's Hollywood studio D. The control booth at stage right houses the audio, video, and production control facilities. The 50′ by 45′ studio working area includes a 50′ by 32′ stage area.





or small auditorium may prove more efficient. If this is contemplated, the studio must be arranged so as to permit the audience to view the studio floor area and the camera pickup. The camera should also be able to pick up the audience if desired.

For the comedy variety type of show, audience participation is practically a "must," for the performer demands it.

There is considerable difference of opinion among station owners on the subject of viewing galleries, sponsor booths, and public areas. Visitors should not be allowed to obstruct operation and production in the studio area or be admitted into the studio control room proper. It is, therefore, advisable to provide small participation and viewing areas just for the purpose of keeping production and technical traffic free of all obstruction. In such a case it is desirable for the stage area to be separated from the public areas and any other traffic. To help the observation of television productions and to interest the visitors, it is desirable to have large screen receiver sets in such public areas as reception rooms and the lobby.

Auxiliary Areas

Auxiliary areas that must be included in a large live talent studio are rehearsal rooms, adequate dressing rooms and related facilities—closet space, toilets, washrooms, showers, etc.—a "greenroom," scenery and property storage, and a scenery and prop shop.

Since studio areas should be used for actual production and camera rehearsals, most other rehearsals should be carried on in special rehearsal rooms.

rehearsal rooms

The most economical place for rehearsals is a large area with movable partitions to permit the use of the rehearsal area for any type and size of group.

Rehearsal areas should be provided with magnetic tape recorders and replay loudspeakers. If areas are large enough, camera rehearsals can take place here. It is advantageous to have one of the walls mirrored so that this space can act as a ballet or dance group rehearsal area.

Rehearsal rooms should be apart from the immediate production area, but easily accessible to both operational and production personnel. In planning the space, each large live talent studio should have at least two rehearsal rooms assigned.

For large studios, associated dressing rooms are essential. Two types of dressing rooms should be included. The first is the group dressing room suitable for accommodating musicians, dance groups, and other groups of performers. There should be two of these dressing rooms. Besides these, it is useful to have at least two star dressing rooms for the top performers. Costume wardrobe rooms and costume repair shops are also necessary and they should be located conveniently close to the dressing rooms.

dressing rooms

In addition to the above, it is important that a "greenroom" be provided. The greenroom should be located either near the studio proper or, if there is more than one studio, between the studio and dressing rooms. It is the traditional waiting room for talent and will be equipped with telephone facilities, a public address system, and outgoing network monitors. The greenroom must be large enough to prevent talent from dispersing or overflowing into other areas. If possible· dressing room and greenroom entrances should be near one another or adjacent, but should be separated from technical and operational traffic.

Since the purpose of scenery is to create an illusion the set designer is sometimes privileged in his work to give free rein to his imagination. More often, however, the designer works within limitations imposed by considerations of economy and this dictates the use of standard flats and units in the planning, construction, storage and use of scenery. Standard scenery flats are designed as modular units in two regular sizes; five feet nine inches by ten feet, and 3 feet by 10 feet.

scenery and prop storage

In large live talent studios the complexity of production will require constant changing of scenery and props. Experience, however, has shown that it is advisable for a studio to keep on hand a basic stock of backgrounds and props. This permanent stock should be properly stored away and protected against damage, as it may have to be put to use at a moment's notice. The area used for storage should be of extra height; the minimum is a free height of 18 feet.

The storage area for flats, architectural trim, backdrops, draperies and bulky stage properties should also include space for special-effect devices often used in productions such as mirrors, silhouettes, mats, shadow boxes breakaway props, etc. The property storage room should be located near the general scenery storage. The door to this room especially should be provided with locks.

An important substitute for expensive scenery is the background projector. With a capable artist to prepare slides and a large background projection screen the small station operator can create the illusion of expensive and effective scenery. If a projection room can be located between two studios and equipped with a background projector mounted on a turntable, this special effect can be produced in either studio at will.

Storage areas must be directly accessible from the trucking platform or the freight elevators in order to permit efficient loading and unloading of scenery, props, equipment, and materials with a minimum of labor and noise.

the scenery shop

In planning a large studio TV plant, the need for a large workshop is apparent. As a rule, the workshop is used to manufacture, repair, and put together sets and often to repair and improve props. In addition to woodworking, practically every craft should be provided for in this shop; equipment, therefore, will have to be diversified.

The shop should be planned away from the studios and should

be well-insulated because, obviously, there will be a great deal of noise. Facilities for water, sewage, and vacuum equipment for spray booths must be planned. Enough power must be available to drive the various machines. talent

The processing of scenery normally involves movements from shop and storage areas into the production areas. This must be borne in mind when the plans for shop facilities are drawn up. The simplest way "in and out" is the most desirable, and access by truck should be considered.

In planning auxiliary areas, it must be kept in mind that the good will of talent will improve production. Facilities used by talent should, therefore, be designed to be as nearly perfect as possible. To this end it is a good idea to prepare diagrams and tentative schedules in order to visualize how the talent will move and how it will be used.

Talent facilities can be arranged as perimetrical units or as an upper-level integrated part. In addition to the areas described earlier in this chapter, these facilities will include telephone booths, rest rooms, and, often, makeup rooms, wardrobe rooms and a script distribution area.

Small interview studios will not demand such elaborate facilities. Two small dressing rooms and a small area serving as a greenroom should suffice.

Acoustics and Noise Control

Acoustical design should be integrated into the basic planning. The following points should be borne in mind:

1. Select, if possible, quiet surroundings.
2. Make a noise survey. See how much noise is to be expected so you can calculate sound insulation.
3. Consider the arrangement of facilities within the building.
4. Take into account noise control inside the building.
5. Plan and construct for sound insulation.
6. Consider the shape and the size of the studio.
7. Study the requirement of sound-absorbing materials.

The planner's basic understanding of the principles of architectural acoustics and noise control is essential. In the following pages only the fundamental principles are set forth.

Some of the sound waves which hit against the floor, walls, or ceiling are reflected; others are absorbed into the wall and lost. Another part is transmitted through the boundaries. The reduction of sound intensity within an area is due to the losses within the pores of the material, but the vibration of the material itself may attenuate the intensity. Most sound transmitted from one room to the other is through vibration, and rigid, heavy-material walls are better isolators of sound than those of flexible and lightweight material. Experiments have confirmed the fact that the best insulation is a combination of rigid walls and porous matter. the decibel

noise control

Noise has to be kept away from the building and the noise created inside has to be insulated and contained inside its own area. The layout of the building, the grading, landscaping, and situation will determine outside noise penetration. The average level of street noises varies considerably with the locality and the time of day.

Inside noise is created mostly by heavy machinery such as air conditioning units, elevators, etc. The acceptable noise level within a television building is 25 to 30 decibels.

Acoustical phenomena with which we are most concerned in studio design are echo, sound-foci, dead-spots, and room-flutter. Generally expressed, square rooms or rectangular spaces with parallel walls are bad for echoes and often provide us with bad reverberation. Large concave and hard-surfaced walls are responsible for accentuated echo effects. Poorly-designed auditoriums and room corners are responsible for dead-spots. As the planner is generally concerned with preventing obvious design mistakes, his basic sketches should try to obviate parallel studio walls, bad reverberation, and echo effects. A small play in the walls to prevent them from being parallel may correct basic mistakes in acoustical planning and prevent later need for expensive corrective treatments.

Since the television studio is not as sensitive to the reflection, absorption, and scattering effects of sound as the radio studio, it does not usually require such things as independent foundations and floating construction for the studio. Likewise, the ceilings of studio and control rooms in radio broadcasting building facilities are heavily insulated and separated from the general structure, but in the television studio building this is not as critical. Nevertheless, should the television building be located near a railroad track, streetcar line, or heavy operating machinery, care will have to be taken to prevent vibration from entering into the television building. In such a case, special foundations and floating construction may have to be employed. The introduction of scenery and props will provide the studio with absorptive surfaces. Nevertheless, in final planning an acoustical expert should be called in before the structure skeleton is frozen for detail design.

Simultaneous Cast

This procedure, usually called simply "simulcast," has been used by some network originating stations. It is merely the broadcast of the sound part of a television program over the radio transmitter while the television program is broadcast over the television transmitter. It is practically a cost-free radio program.

Difficulties arise out of the fact that production techniques over television and radio are different in character and television can, to a large degree, dispose of elaborate script techniques. Quiz programs, dramas and comedies adapted from the stage and fiction are best used for simulcast. The accompanying sound effects in this type of presentation must be well-studied to enliven the radio part of the program.

For the new UHF television station which provides local programs, simultaneous casts can be considered if the station has an associated AM and FM radio station. Nevertheless, simultaneous casts should be the exception to the rule because the media are essentially different in their technique of presentation, and one of the media will suffer.

In considering simultaneous presentation, the planner should keep in mind that expenses may be shared between television and radio budgets. The recording of the sound part could be made with the existing audio part of the television equipment, or the existing audio equipment of the AM or FM station. As a recording medium, both records and magnetic tape are suitable.

Remotes

The use of electronic pickup cameras away from the studio, indoors or outdoors, is called "remote" production. Remotes are not always field productions, for often permanent field locations are used to permit fast operation. Such is the case where, week after week, football, baseball, hockey games, or other sports events are telecast from the same location. Permanent camera positions are then established and power and microwave relay location fixed. This is an exceedingly good practice, as the setting up of field equipment for remotes and the establishing of the microwave connection between the field and receiving equipment on the antenna tower or studio building may take upwards of three hours. Pre-established locations and procedures will reduce the setting-up time.

The "Field Remote" is a field operation mostly used for special events. The truck or station wagon with remote television equipment may be required to go anywhere at a moment's notice.

The "remote" is an expensive way of programming in the United States. It is used as rarely as possible for this reason, but its audience impact is tremendous and can never be overestimated. The telecasting of special events in the past, such as demonstrations, riots, disasters, political campaigns, etc., has shown the validity of the foregoing statements. Remotes are expensive for the following reasons:

1. The equipment has to be complete and extremely well-maintained to permit efficient picture transmission. Cameras will require a complete range of lenses, often expensive, to allow for emergencies.

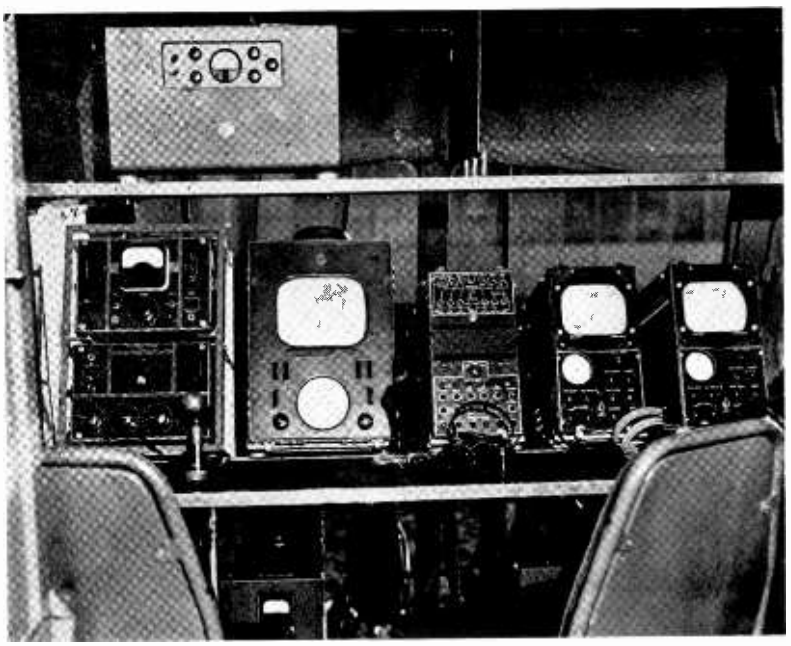
2. A large and well-trained crew is needed for present-day television field equipment, which is still rather cumbersome and heavy to operate.

3. The station crew must work closely with the field personnel to establish good connections and transmission of the picture and sound.

4. Expenses are involved in obtaining permission from local,

field remotes

An old mobile unit in operation illustrating a typical field pickup with the camera and microwave transmitter mounted on the roof of the truck. Though their functions differ, the microwave transmitter and receiver are similar in appearance.



(Above) The control position in a mobile unit by RCA.

(Above) This RCA microwave relay receiver is used at the studio or transmitter for the reception of TV signals from a mobile unit. (Right) A microwave receiver mounted on the transmitter tower of Station WCAU-TV in Philadelphia.

regional, and state authorities to receive a permit, tapping power, and other services needed for proper transmission.

With the design of a new type of field equipment on the boards of the TV equipment manufacturers—some of it has already been shown experimentally—expenses for remote production should be reduced considerably and field pickup will then really come into its

own. The use of field telecasting will at that time become more desirable and an accepted practice. If small and relatively inexpensive mobile equipment should become available, the small TV station may find ready revenues for the use of field equipment. The sponsors of local programs often desire the use of remotes, but at present this cannot be achieved on an economical basis with the existing equipment.

For the planner, it is important to know that the most common way of transmitting the picture from the field to the transmitter is by use of a microwave transmitter and receiver. The transmitter is normally located at a high point in the vicinity of the pickup camera and its control equipment. In most cases, the microwave receiving equipment is placed on the station's transmitter site. The receiving dish for the microwave receiver is placed at the antenna tower. This location should be high up, to permit signal pickup as far away as possible. Tower structures can be fitted with an attachment so the antenna dish can be rotated by its own motor from a remote control position.

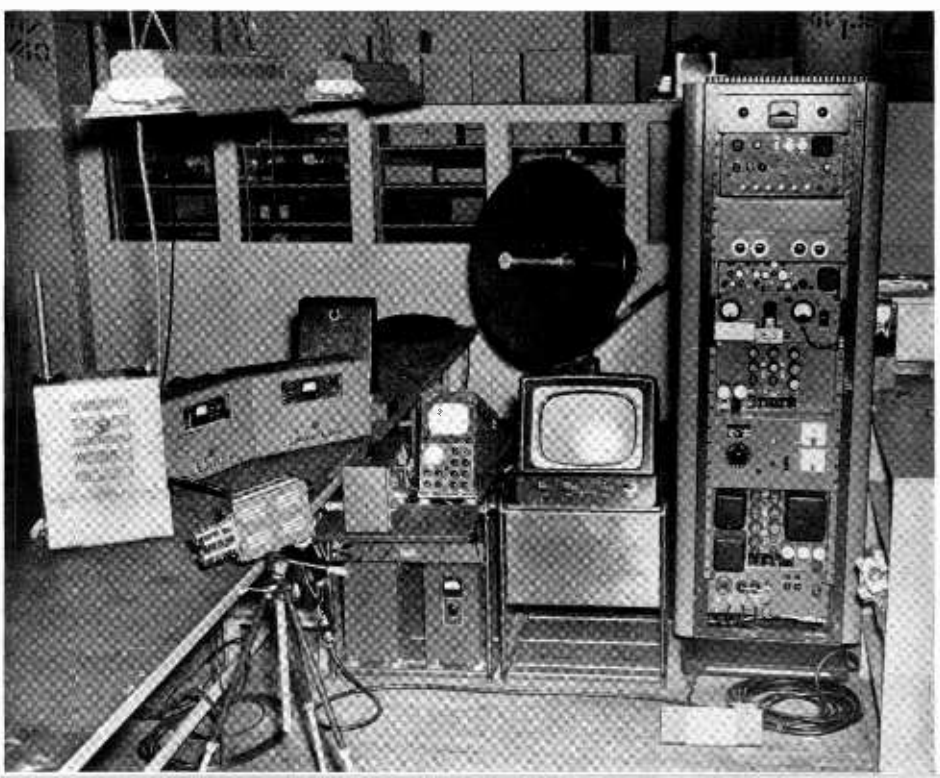
Facilities to be planned for remote unit production are:

1. Garage to house mobile unit
2. Adjacent maintenance shop area
3. Special locker space for removable mobile equipment

film remote

The film remote is an expedient way to cover special events for delayed telecasting. In practice, the film remote will work efficiently as long as the television station has the film equipment to handle this type of production. The basic equipment is as follows:

1. One or two 16mm sound film cameras of professional type
2. A small station wagon, equipped with magnetic tape record- and auxiliary lighting, and mobile communications—equipment of the walkie-talkie type
3. Film processing equipment



The RCA "walkie-lookie" TV equipment.

Immediately after the field film take, the film is rushed to the station, processed by rapid developing equipment, and edited. For simpler editing, the take and processing is done by the same crew. The film is then projected and picked up by the television film camera.

The total time from the filming of the special event up to the time of projection on the air can be short. New television stations may find this type of remote most economical. The 16mm sound cameras and the processing equipment can be used, also, for the production of commercials for local sponsors and can, therefore, be written off in a relatively short time.

The Use of Microwave Relay

studio transmitter link

Studio Transmitter Link is commonly called S.T.L. It is an important part of equipment where studio and transmitter are separated and in remote locations. The topography between studio and transmitter building has to be studied so that there is a clear sightline between the microwave receiver and transmitter equipment.

The program from the studio passes through the master control room and reaches the microwave transmitter dish placed in an elevated position — normally the roof of a building. From there it enters by radio transmission to the microwave relay receiver dish located on the antenna structure associated with the transmitter building. The height of the microwave receiver dish over grade is determined by:

1. The clear sightline between the studio and transmitter.
2. The distance between the studio and the transmitter.
3. Accessibility of microwave dishes on the antenna tower for ease of servicing and maintenance.

Plots and buildings located directly in the path of a microwave relay must be surveyed so that the erection of a new and permanent

(Above) Using "walkie-lookie" equipment. Here the camera is mounted on a lightweight tripod. (Right) "Walkie-lookie" and "walkie-talkie" equipment in use at the 1952 Republican National Convention in Chicago. The rucksack transmitter gives the "walkie-lookie" equipment great flexibility and mobility.

building, or temporary structures, will not impair the line of sight.

microwave network connections

As explained in the chapter on programming, wherever the common carrier companies are able to provide a linkage with the passing television network trunk line, or with terminal facilities, the television station must use such services by a ruling of the Federal Communications Commission. Where the common carrier cannot provide such services, the station owner may ask for permission to effect its own microwave relay facilities.

Most microwave relay stations can operate unattended, and are comparatively cheap to maintain.

While there are a number of manufacturers producing microwave equipment, it is important, before ordering equipment, that a survey be made to determine terrain conditions. Distances to be bridged by existing microwave equipment, quoting average terrain, are between 20 and 50 miles. It is desirable for a station owner to share costs of such a relay, if possible, with others. Opportunities for such common operation are:

1. Other television station in the same town or on the same path.
2. Stations not far away from the direct path who would share in a slightly larger routing.
3. Civil and military defense organizations.
4. Oil, gas and other pipe lines, or industrial groups, eager to use the microwave facilities for their own communications system.
5. Independent turnpike, State or Federal authorities wanting to use it for their own interests.

UHF Problems

planning and the television home receiver set

The new UHF station owner must proceed cautiously. The income potential of the UHF station will be, in large part, determined by the number of sets able to receive its signal. If there are existing VHF receivers in the area (with one or more VHF stations on the air), the UHF owner must calculate the rate at which existing sets will be converted for UHF reception, as well as future sales of sets equipped to receive UHF signals. If no VHF station exists in the area, only the future sale of UHF sets will be calculated.

To promote television home receiver sales, there are established mediums which can be used efficiently:

Newspaper advertising
Radio commercials on existing VHF television stations
Cooperative advertising with television set retailers
Department store advertising
Billboards
Sandwichmen

Distribution of leaflets at special events
Exhibits of new UHF sets at the station
Mail advertising

One or more of these methods may be tried under the guidance of an advertising agency or public relations firm. For the planner, it is advisable that in his first year's operational expenses a very definite amount be set aside for such a promotional project.

UHF vs. VHF programming

While technologically there is no apparent reason for differences in programming between the two types of stations (VHF and UHF) from the policy point of view of the station management, there is, and will exist, a pronounced difference. For clarification we will cover, point by point, the reasoning.

A. *An Established VHF Market with Two or More VHF Stations Already in Existence.* If a new UHF station owner enters this area, he will be faced with the reality that there are already a large number of VHF home receivers in existence that, at this time, are unable to receive a UHF signal. Also, he will be faced with the fact that the major networks are associated with the existing VHF stations.

If he therefore competes with the existing VHF stations which have established relatively high time rates, he may proceed as follows:

1. First, to attract the sponsor, he must have a low time sales rate. This because at this stage he has practically no viewing audience able to receive his signal.

2. If he is unable to associate with a TV network which can give him program time and pay in part for it, he will be unable to compete in the number of broadcasting hours with the existing VHF stations which may program as many as 14 hours daily. As programming is always expensive, whatever material is used — whether live, film, or remote — he will be forced to restrict his broadcast hours to an economical limit which will be below that of the existing VHF station.

3. The acceptance of his UHF signal by the audience demands that he induce television viewers to buy UHF converters, tuning strips and antennas for their existing VHF sets. He also must make sure that enough new sets, capable of UHF reception, are available. Most important, his program will have to be outstanding. It will require careful planning to produce a *high-quality program.* This is the only way, as far as we can see, to attract people to invest in the new appliances necessary for UHF reception.

B. *One Station VHF Market and One or Two UHF Stations Will Move In.* The situation here is not as difficult, as very often the home receiver market is far less saturated. Also network affiliations should be available for the new UHF station.

The UHF television station owner, therefore, will be able

to compete in telecasting time reasonably well with the existing VHF station. His coverage will soon be as good as that of the VHF station, as the Commission's rulings on his power and antenna height will compensate him for other UHF propagation disadvantages. His programming can be good quantitatively and qualitatively and must only be favorably compared with the existing VHF station.

C. *Single UHF Station or Multiple UHF Station Only.* The opening up of a completely new market with UHF coverage will not put undue difficulties in the way of a new station. Networks will be freely available and, therefore, broadcast hours can be keyed up to the single denominator of developing the station in stages and competitive market operation. As there are few, if any, receivers in the area, there will be no problems in connection with set conversion. The quality of the program will be of far less importance, as the public will not yet have been initiated in television viewing. The programming character, thus, will compare with that in a competitive VHF market.

Capital Expenditures

1. Application for construction permit; engagement of plan-
the first planning stage. The following list of items will give general figures for estimating purposes:

1. Application for Construction Permit; engagement of planner, engineers and lawyer.
2. Cost of site.
3. Cost of landscaping.
4. Cost of survey.
5. Cost of equipment — electrical, mechanical.
6. Cost of transmitter and studio equipment.
7. Cost of construction of studio, transmitter building, tower.
8. Expenses for travel on research visits to manufacturers, television stations and networks.
9. Cost of financing.

Many of the items on this list can be approximately determined, and will indicate the necessary capital investment. One item, however, that must be checked carefully is studio equipment, as the programming will determine to what extent equipment will be needed. This, in turn, will determine what facilities will be needed to house the equipment and its operating personnel.

It is important that the proper amount of capital investment be determined, as over-investment in equipment and facilities will be costly and will be reflected in a large operational budget.

	in Years Depreciation
Television camera chain pickup equipment	4
Camera dollies	4
Field synchronizing and switching equipment, field master monitor, studio synchronizing generator	4
Film slide projectors 16mm, including multiplexer and slide projector	10
Film camera equipment, flying spot	4
Studio audio equipment	6
Studio lighting equipment	8
Microwave link	13
Transmitter equipment, with input and monitoring equipment	10
Antenna equipment	12
Test equipment	10
Studio air-conditioning equipment	10
Construction on new transmitter building and studio building	20

Operating Expenditures

The cost breakdown of Operating Expenditures should generally be done in the following way:

A. *Administrative*

1. Salaries and wages.
2. Expenditures for professional services, such as attorneys, architects, auditors and engineers, exclusive of salaries.
3. Telephone and telegraph.
4. Office supplies.

B. *Sales*

1. Salaries and wages, commissions to staff salesmen.
2. Travel.
3. Promotion.
4. Entertainment.
5. Telephone and telegraph.
6. Supplies.
7. Transportation.
8. Station representatives.

C. *Programming and Production*

1. Salaries and wages.
2. Talent expenses.
3. Royalties and license fees.
4. Film, slides, kinescopes, recordings and transcriptions.
5. News wire services.
6. Costumes.
7. Scenery.
8. Props.

D. *Operational and Technical*

1. Salaries and wages.
2. Transmitter maintenance.
3. Tubes and spare parts.
4. Maintenance and repair of technical equipment.
5. Consultants.

E. *General*

1. Depreciation and amortization expenses of broadcast equipment and building (or rental of facilities).
2. Insurance expenses.
3. Taxes.
4. Supplies.
5. General maintenance.

In the Appendix, a sample sheet of operational expenditures for small and medium-sized television stations is shown.

Equipment

There are communications equipment manufacturers in the United States who can offer a full range of equipment. These are:

Allen B. DuMont Laboratories, Inc.
Federal Telecommunication Laboratory, division of I.T.&T.
General Electric Co.
General Precision Laboratory, Inc.
Radio Corporation of America.

Other firms which can provide part of the equipment are:

Collins Radio Co.
Gates Radio Co.
Motorola, Inc.
Philco Corp.
Raytheon Manufacturing Co.

European firms which are now selling television equipment are:

Philips — Holland
Marconi — Great Britain
Pye — Canada and Great Britain

There are smaller firms in Germany and France which are also producing television transmitting and pickup equipment.

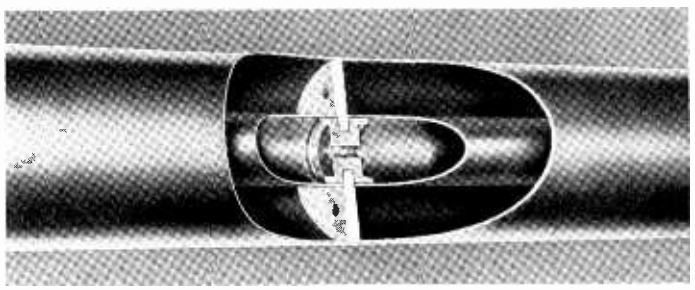
The selection of equipment is the task of the station's chief engineer, who should be advised by an independent consultant. In connection with the selection of equipment, the planner should not only be generally familiar with the function of the various items as pointed out in Part I under "Equipment" but should likewise have a general idea of the dimensions and assembly characteristics of the more important and essential parts. This will make it possible for him to visualize the facilities needed and the vertical and horizontal demands on space. For the purposes of more visual planning, it is desirable to have a small scale model of the equipment made, which then can be

arranged as planned. This is an accepted procedure in factory planning and can be applied in television fields. If the television station owner is converting existing facilities, scale models will often be more illustrative than sketches.

It is important to remember that most of the apparatus should be operated in air conditioned rooms, and it is an accepted fact that studio and studio control rooms are, in all cases, air conditioned. Dimensions of air conditioning units should be supplied by an air conditioning specialist. This will permit the planning group to allocate the necessary space for this equipment.

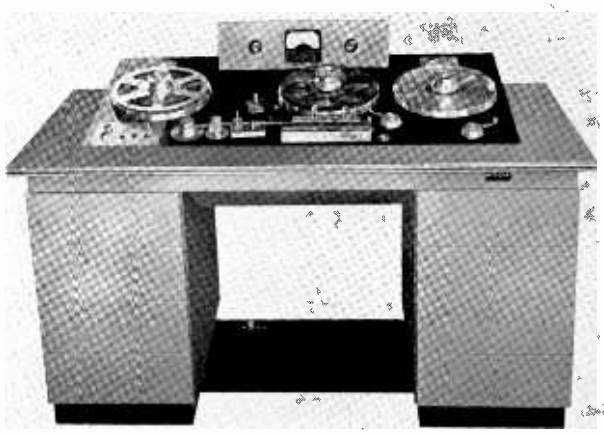
In connection with all types of equipment, a general inquiry into the amount and type of electrical current needed has to be made to be sure that operational requirements can be fulfilled.

Typical switching unit console by RCA.



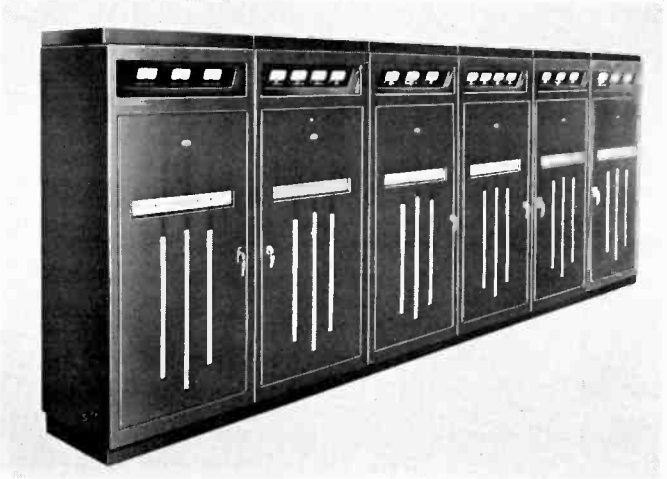
(Above) An RCA producer's mirror console for relay switching. (Right) Cutaway view showing interior construction of a typical UHF coaxial line.

(Below) A magnetic tape editing machine manufactured by RCA.

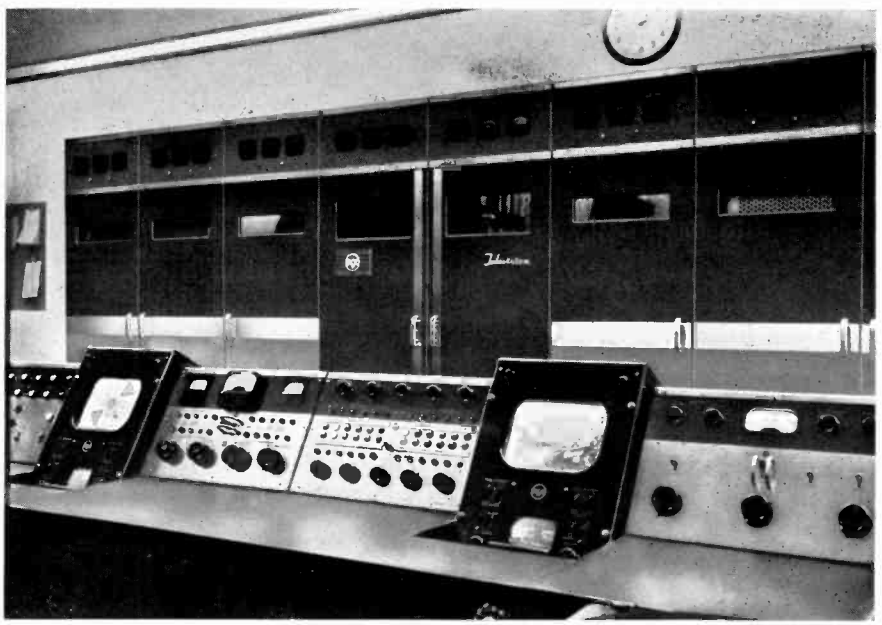


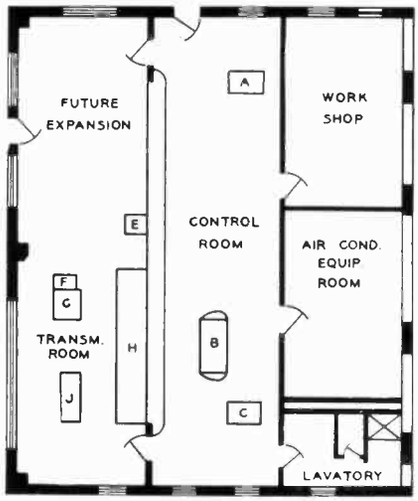
A custom-made program console by Dumont.

(Right) A five kilowatt ultra high frequency transmitter by Dumont. (Below) A view of the master control room at WOR-TV in New York showing the monitoring section.

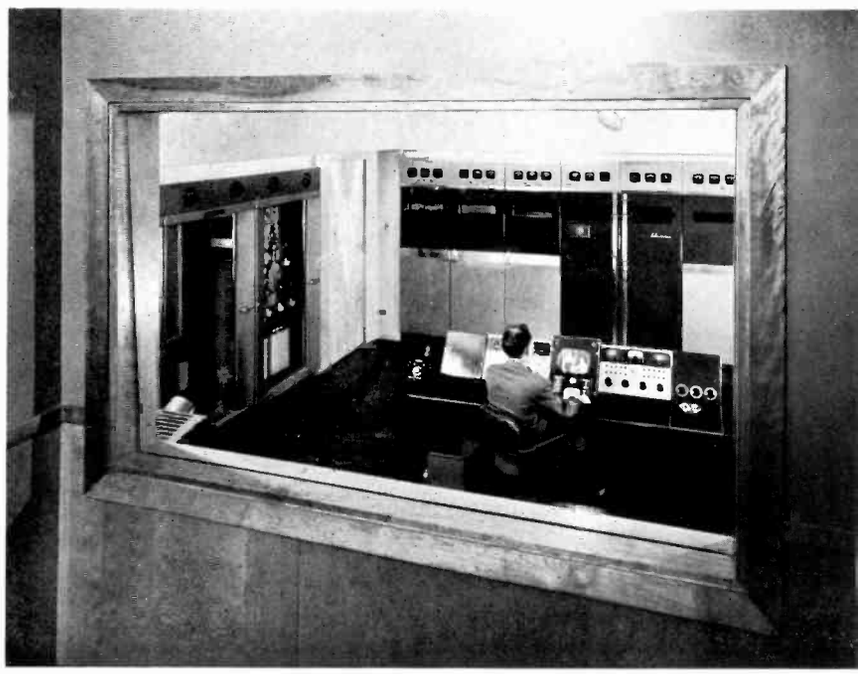


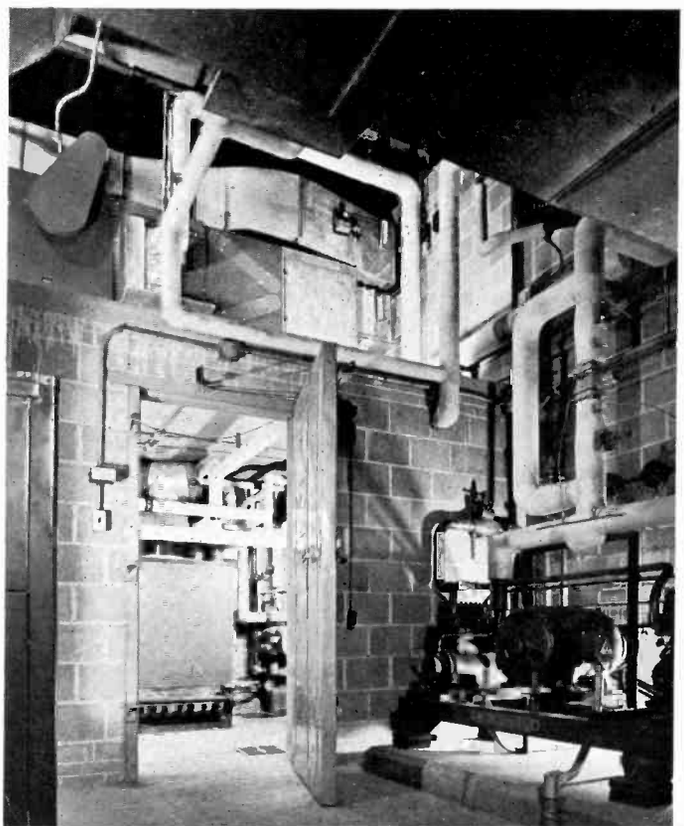
(Left) Another section of the WOR-TV master control room showing video and audio master equipment for centralized operation. (Below) The switch console and transmitter control units which are used in the transmitter room of WJAC-TV in Johnstown, Pennsylvania.





The supervisory control console, equipment racks and flush mounted RCA transmitter in St. Louis' KSD-TV transmitter room (plan shown above right). Key to the floor plan of the transmitter room is: A & C— equipment racks, B — TV console, E — tube rack, F — diplexer and dummy load, G — sideband filter, H — TV transmitter, J — water circulation pump. At right is the transmitter room of WHIO-TV in Dayton, Ohio.



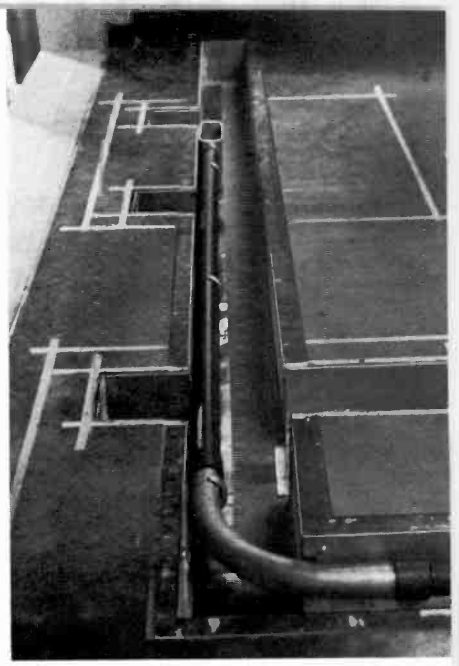


(Above) Some of Dumont Television Network's new transmitter equipment on the 82nd floor of the Empire State Building showing the main control console. In the background to the left is the regular transmitter, the spare transmitter is at the right. (Right) A section of the utility area at WHIO-TV in Dayton, Ohio.

Auxiliary Revenue Potentials

Practically no television station has yet been able to gain any revenue outside of its time and program sales to the sponsor and the network. It is important to find other revenue sources which may contribute to keeping the station alive. There is no doubt that such revenues may be available, especially in smaller communities where no television at the present time is in existence. While wholesalers and retailers may be able to distribute television sets, there may not be in existence a proper and well-organized television repair service. Service contracts and repair service properly handled can be good income sources. We would think that the television station is the organization most able to conduct such a repair service. The cost of adding a television clinic and repair service station equipment is small, and the income may be considerable.

There are other income sources which should be considerable and which vary with the locality. A special analytical research study should be made and possible revenue should be put down. It is often possible to originate locally for networks and such programming is lucrative.

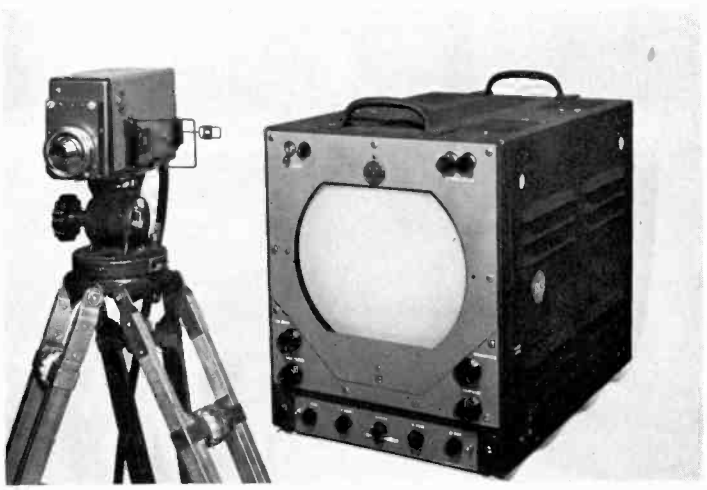


A typical floor trench installation.

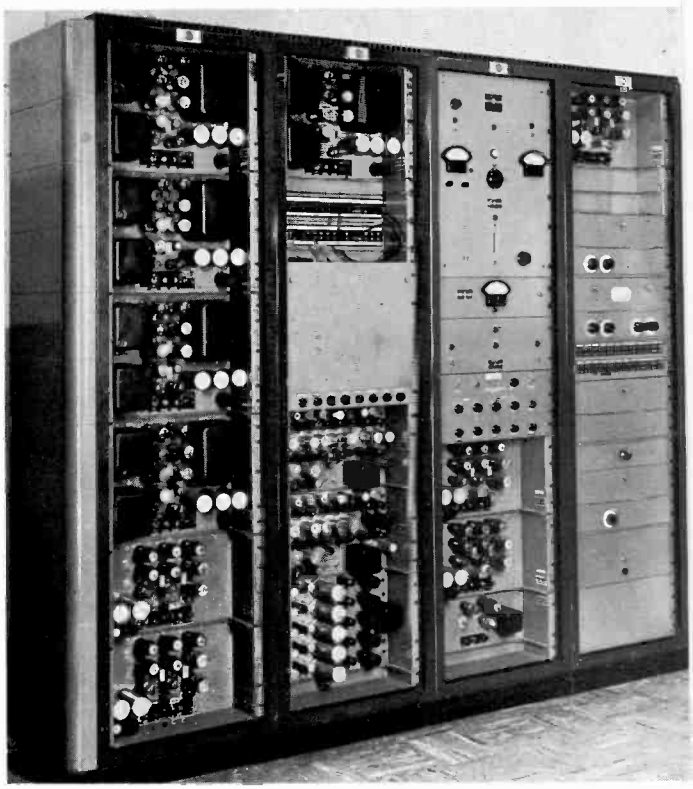
Industrial Television

In this treatise we are not concerned with industrial television as such. Industrial television includes the application of television in the industrial field and, generally speaking, we have only just begun to realize its importance.

(Below) An interior view of rack equipment. This is manufactured by RCA.



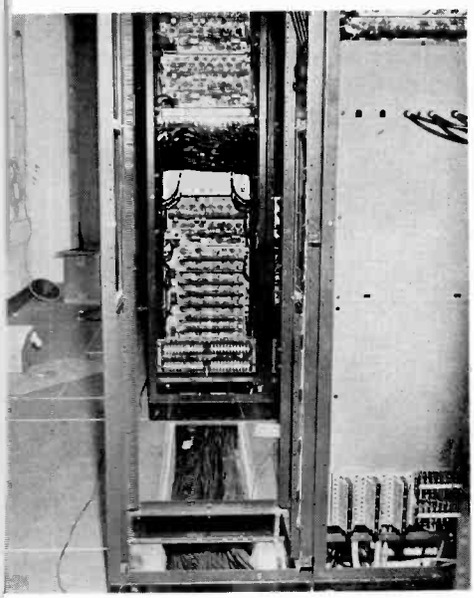
(Above) Miniature camera and compact control monitor — standard equipment for industrial television.



The equipment designed for industrial use is of a rather rugged type—smaller in size than commercial television, but equally as efficient.

Industrial television on closed circuits has been established in some factories and is widely used in the atomic plant field, steel manufacturing and dispatching.

Nevertheless, there has, up to now, been little attention paid to industrial television in the smaller manufacturing plants. The local television station may help to introduce industrial television into local manufacturing circles, and the television station could operate and maintain the equipment on a contract basis. Such a closed circuit television system could be expanded by the originating station to include conference systems and instruction for the whole region.



Inside view of equipment installation and floor ducts.

Educational Television Stations

The FCC describes an educational station as a non-commercial station operating on a non-profit basis. This simply indicates that program time cannot be sold. Nevertheless, the educational station is free to receive money contributions from Federal, State, and other Governmental agencies, from foundations, institutions, industries, and private individuals. Everyone agrees that it is desirable to allocate as many educational channels as possible. But it is also reasonable to assume that only a small number of channels will be used because of the expense in operating a television station, commercial or educational. Most educational organizations do not possess the money to operate a TV station.

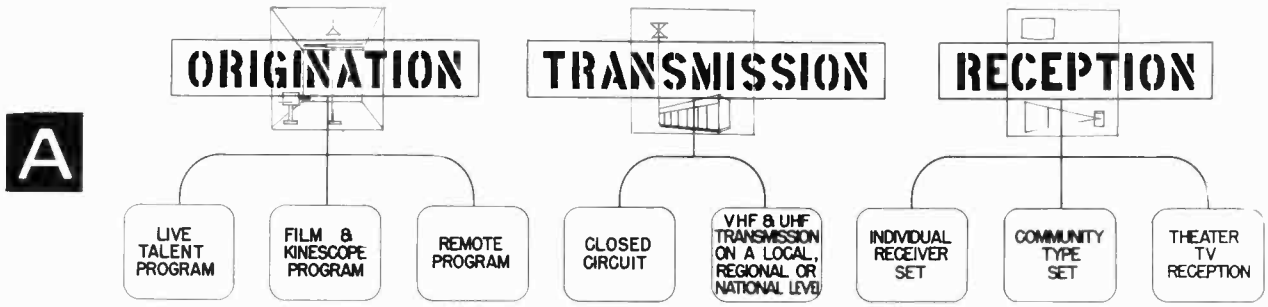
Lately, the thought has been expressed that the only effective solution for educational television would be for the local educational stations to act purely as regional outlets of an educational nationwide network. The transmitter equipment could be operated in some instances under lease agreement with existing local commercial television stations. Also, it would be possible to house the transmitter equipment in the existing commercial transmitter television building and locate the antenna on the same tower the commercial station uses. This obviously would reduce operating expenses because five to ten well-designed educational originating centers staffed with educators would be able to take care of all programming requirements.

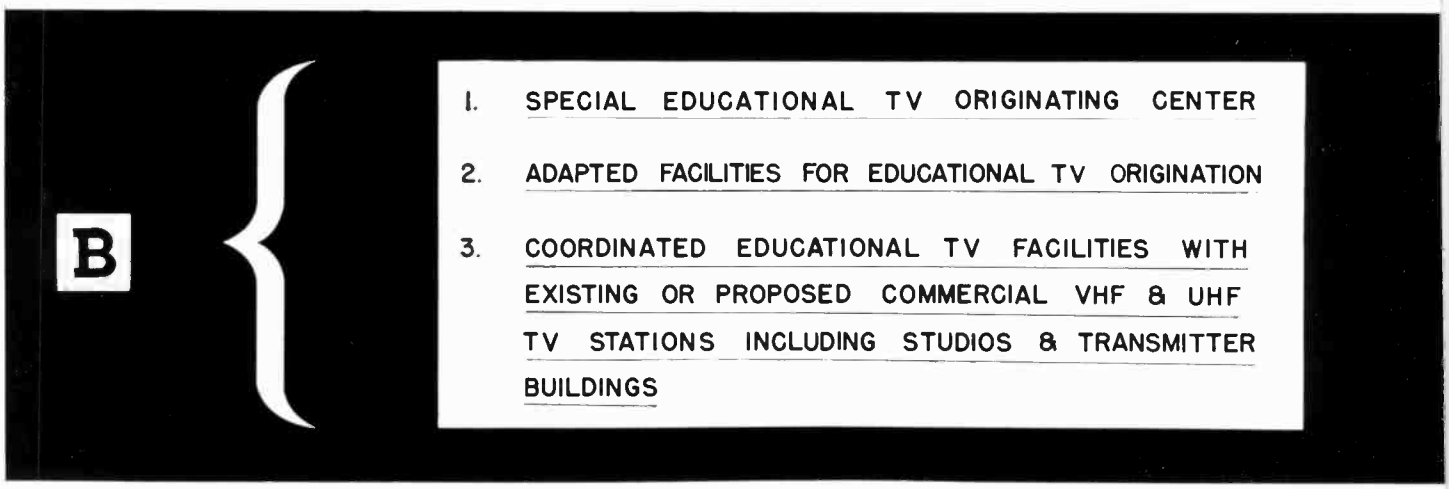
Commercial station management may be able to share expenses with educational authorities; both would benefit greatly. It is considered feasible that a Federal or State-wide educational network could telecast approximately three hours daily, thereby reducing the burden of long hours of telecasting for smaller commercial television stations. It may also be assumed that the line charges for such an educational network might be regulated by the Federal Gov-

ernment to a minimum charge, permitting the common carrier to charge only expenses but no profits. Should the common carrier be unable to supply or agree on such a system, the educational network would be forced to install in certain regions its own microwave relay system which, in such cases, could be shared by other commercial television stations, industry, or other Federal, State and military agencies using the relay.

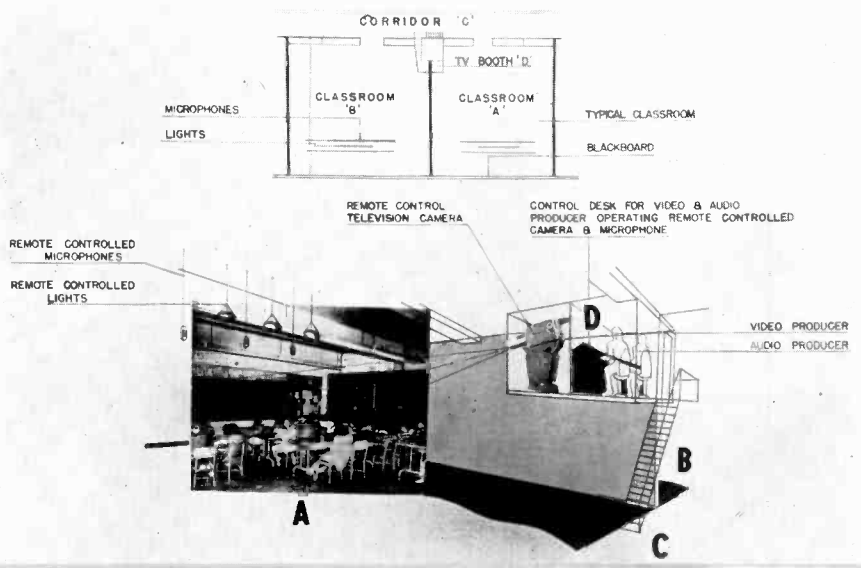
For the planner of commercial television stations, it is important to realize that the educational medium is not a competitive medium. He should welcome the educational television station because it broadens public opinion and enhances television as a medium of enlightenment. If he is prepared to facilitate the television operation of educators, he may be able to handle their transmitter and studio facilities and get fair rental for the use of his facilities and equipment, which may contribute to carrying his overhead.

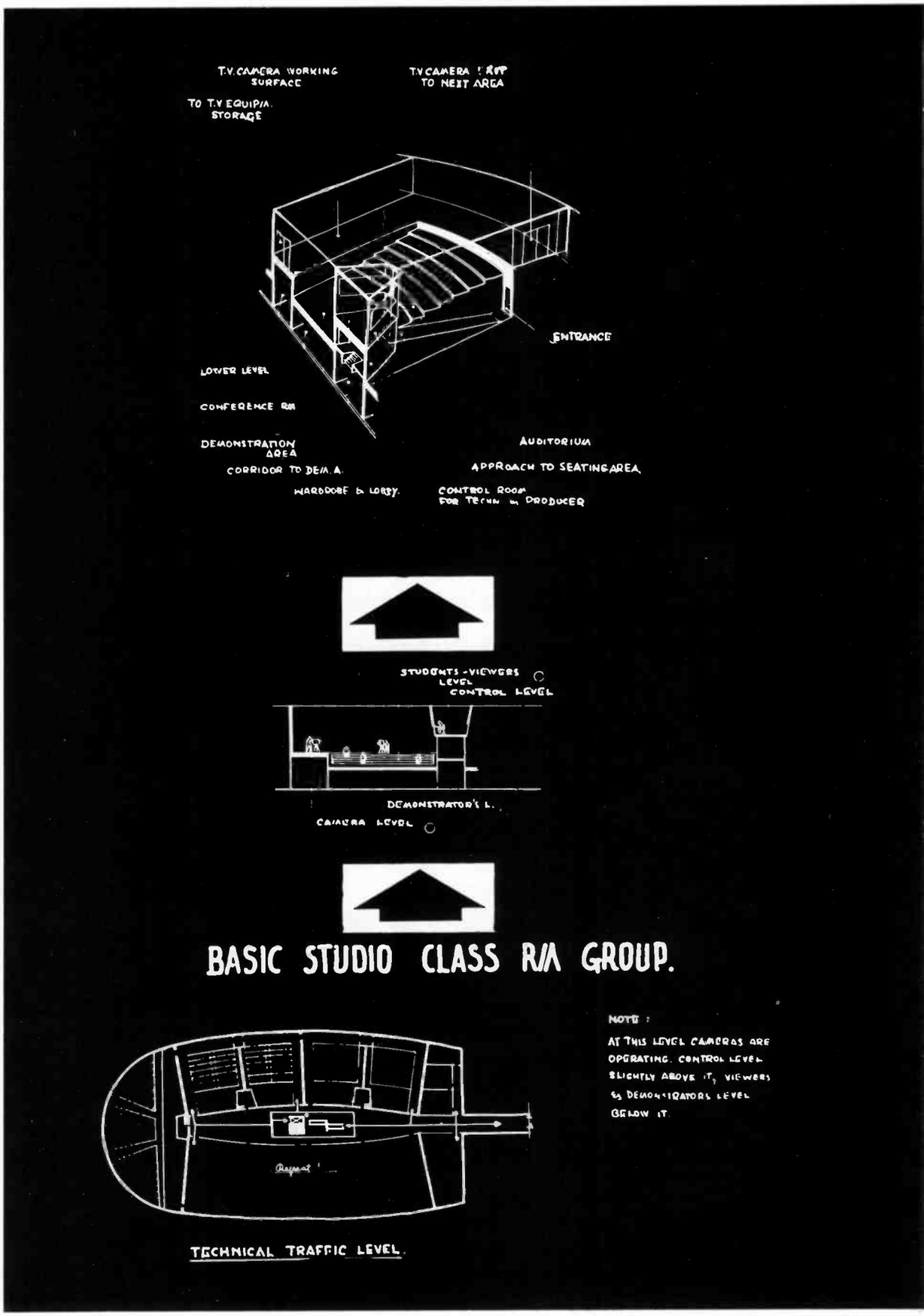
(Below) A chart indicating possible ways of using TV for education.





Educational television plan for a school using existing classrooms for TV program origination. Key is as follows A — 1st classroom, B — 2nd classroom, C — connecting corridor, D — elevated TV booth.

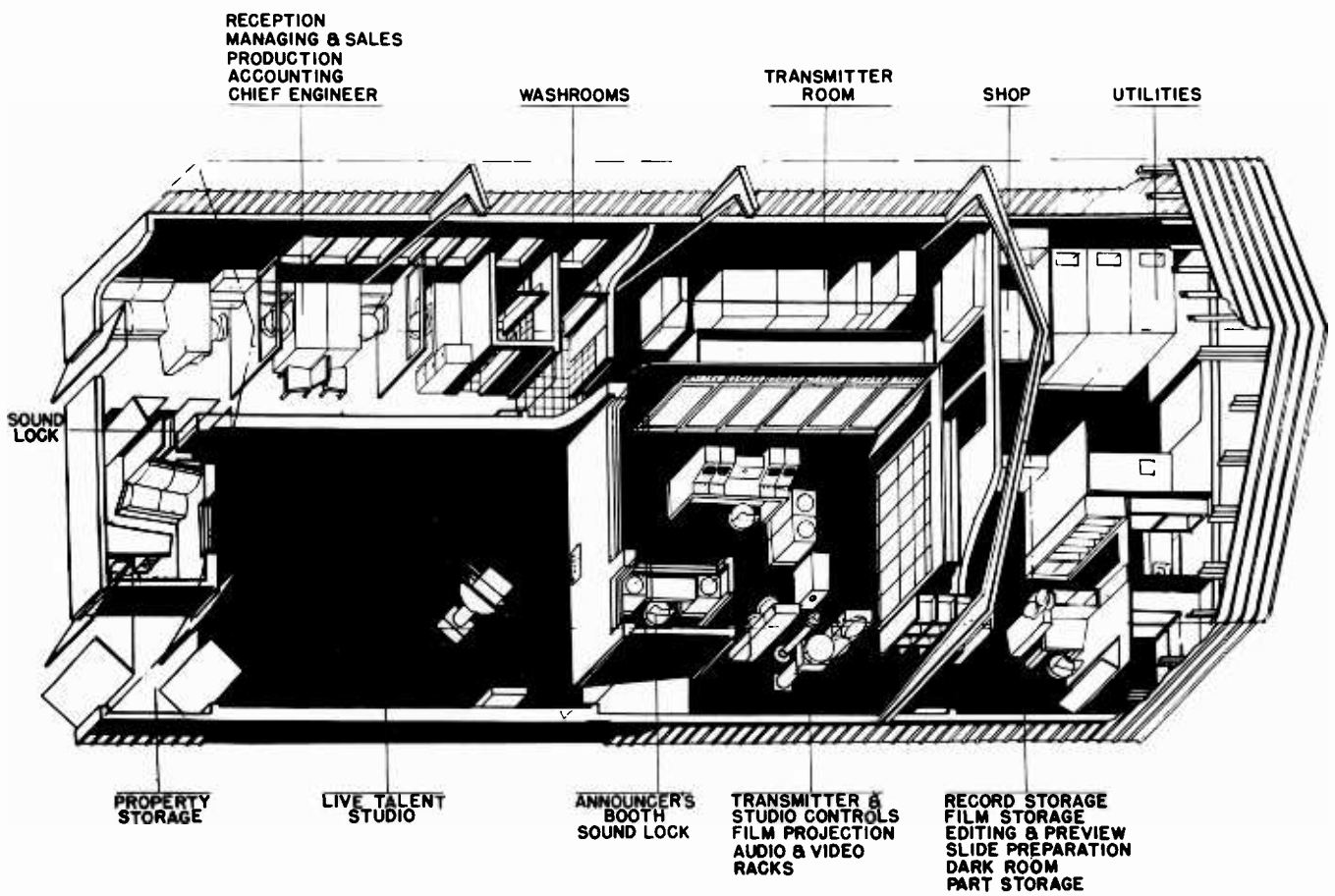




Sketch for a proposed TV studio-classroom.

APPENDICES

1. Typical example of a master plan study for a new UHF station
2. TV film operation
3. Antenna-Transmitter combinations
4. Color television
5. Union directory



1

Typical Example of a Master Plan Study for a New UHF Television Station *

The Black River Television Corporation has engaged a competent engineer and an attorney to represent them before the Federal Communications Commission in their application for a construction permit for a TV station in Black River. The Corporation has decided to round up these services by using our organization as a planning consultant for preparing a report which will supply the engineer and the attorney with the neeessary and more detailed briefing material. We shall furnish them with a complete study if the necessity for a competitive hearing before the FCC should arise. Otherwise this will act as a Master Plan.

The Black River Television Corporation as an applicant has decided to apply for a UHF channel. This decision is based on the reasoning that competitive applicants will fight, rather, for the available VHF channel; the other VHF channel is already reserved for educational television. Nevertheless, the applicant should not lose sight of the fact that only *one* of the applicants will receive the available VHF channel, while the rest may file on the other UHF channel. As the first definite applicant for UHF in the locality, the Black River Television Corporation will be in a slightly better position but may have to go through competitive hearings before the FCC before assignment of the channel is made. (The engineer will determine what channel will be best to apply for, and will make all remarks and recommendations to this effect.)

From a Master Plan Policy point of view, the Black River Television Corporation, in applying for a construction permit, will have to put its best foot forward: ergo, it will have to present to the FCC, with its regular application, certain supporting facts to impress on the Commission their sincerity and suitability as an applicant. As the basic purpose of the Commission is to protect the public against misuse, these facts must be well presented, authoritative in quality, and in an acceptable form so that they can be rapidly assimilated. Some of these facts can be included immediately as an enclosure with the application. Others may be kept for use as reference material, should future hearings be demanded.

*For reasons of space the text of the study has been reduced drastically and only some parts are reproduced. The client's name and the name of the city are fictitious. The study has been made for a "C" market—where 80,000 VHF receiver sets already are in use.

Program Analysis

Program planning for the TV Station of the Black River Television Corporation will have to be based on:

1. An analytical study of the present VHF-TV station XYZ-TV, and its programming schedule in connection with the character and type of program televised.

2. An appraisal of the future effort of Station XYZ-TV, and of other future VHF and UHF stations which will be competing in the same market.

3. The future network affiliation and the connection of XYZ-TV by microwave with the major networks.

4. An appraisal of VHF versus UHF programming in the future.

Programming policy, in turn, will provide the executive management of the Black River Television Corporation with an economic picture, permitting them to evaluate approximate future revenues and expenditures and presenting them with an estimate of sound capital investment and operating expenditures to be expected. During this process we will discover that a *stage development* for a TV station of the Black River Television Corporation is the most suitable way to proceed, especially as the TV station is operating in the new UHF field.

From our programming needs and production schedule, breaking down our figures into network, film, studio and remote, we will determine what equipment will be needed to do effective programming without over-investment. While "basic buy" TV equipment tables supplied by the manufacturer are appropriate for a rough estimate, and will suffice for disclosure to the FCC, discrepancies discovered between program policy and equipment specified are undesirable during a hearing. We have therefore followed our program policy with a definite recommended list of TV and auxiliary equipment to permit efficient telecasting of programs specified in the application.

Facilities are envelopes to house equipment and staff to permit efficient operation. Hence we have included general planning sketches of the housing of proposed facilities and the staff to operate them. Obviously, other considerations are involved in this basic facility planning because transmitter and studio building are combined in one plan. The an-

tenna tower structure must be included, too.

Staff is duscussed and general requirements are given. These are followed up with conclusions and some recommendations, and an expedient program schedule for the future station.

Program Planning

To be competitive in the Black River Market—until now a one-station stronghold—the present TV station XYZ-TV's operation should be analyzed to provide us with some data on future programming.

1. XYZ-TV's present program policy.

2. Future efforts of XYZ-TV and other competitive TV stations in the same market.

The future policy of XYZ-TV is indicated by certain programming facts, by opinions expressed by the top executive staff, and by circumstances which force XYZ-TV to act in certain ways.

The fact is that XYZ-TV actually has ample physical facilities in its present quarters to operate effectively in the next few years. The present facilities are ample, if utilized properly, and the conversion of the present live talent studio (which is never used to its full capacity, either with audience participation or in the employment of multiple sets) will give the station a much-needed large rehearsal area. It was indicated to me by the producer and also by the chief engineer that the large studio area would be subdivided. There are ample areas to provide necessary dressing rooms and makeup rooms. There is an indication that the film production area is on the way to being enlarged and that, at some future date, the rapid processing of 16mm film will be included in the operation. Artist and design space is in the process of being doubled. Competition, such as local coverage of events, may force XYZ-TV to enlarge somewhat the present 16mm film camera equipment. At present they use one Orticon camera, and it is a one-man operation. The future effort of XYZ-TV, therefore, may be directed towards:

1. Providing better studio production facilities, improving studio lighting and increasing the use of background projection.

2. Increasing use of "Remotes" to cover local Black River events (news, sports, special events, political and social events, exhibitions, etc.). Such remotes can take the form of direct TV camera reportage—a pretty expensive way of immediate coverage (directly "on the air" for immediate viewing), or the less expensive form of 16mm sound film reportage—a "delayed" technique (delayed from one hour upwards). We feel that XYZ-TV will attempt to make use of TV camera mobile reportage to a greater extent than at present, will restrict 16mm sound film reportage and will use film cameras for the production of commercial film for sponsors.

3. Trying to keep at least one of the important networks—possibly one of the larger ones such as CBS, NBC or ABC, as its main connection. While at present the station only makes use of the celluloid network, with linkage completed in the near future (microwave), it will be apt to adjust its program times to network schedules. This, in turn, will lead to a larger network time schedule and leave less time for local events. A definite network affiliation will dictate to XYZ-TV more rigid network telecast hours and diminished choice in the selection of local coverage (studio production). Reduction of network availability to XYZ-TV (because of competitive stations in Black River) will decrease the amount presently earned from the networks.

Other Competitive Stations

Other competitive stations will make an effort to get network affiliation and at least one of them, because of being a VHF station, may succeed in getting one of the major networks. Networks are inclined presently to consider VHF affiliates more lucrative and important than UHF. This is because VHF coverage is greater (a certain number of VHF receiver sets have already been sold in the market) and will, therefore, bring in larger revenues from sponsors. This reasoning may not hold up in a few years' time, but it certainly will for the immediate future.

We conclude, therefore, that the Black River Television Corporation will have to face competition sooner or later with all other VHF stations affiliated with a major network, once all construction permits are issued for this market.

VHF versus UHF Programming

The present chief advantage of VHF over UHF programming is, for the most part, technical in nature, but also is reflected in the ease with which strong network affiliation, together with program origination, can be obtained for the VHF station. A station applicant receiving a VHF license will, therefore, be able to get good prestige programs supplied more easily. We believe, however, that this may be offset to some extent by the fact that the smaller and weaker networks will be most eager to enlarge their affiliation and stronghold and will, thus, be ready to give UHF affiliations. Programs transmitted by smaller networks (such as DuMont or ABC) are more easily available to UHF stations.

Program character for UHF production will not vary at present from the VHF established program character. At some future date it may vary considerably, as the establishment of UHF regional networks may come with regional originating centers. The possibility of this development should be carefully weighed because it may increase revenues for the UHF station acting as such an originating center.

From the foregoing, we may conclude that UHF programming will not lack in origination and character, but it will not be as intense nor as ample—and consequently not as lucrative—as large network VHF affiliated station programming in the near

future, especially in this particular market.

Station Economy and UHF Home Receivers

One of the critical questions concerning UHF is: Will there be enough UHF home receivers and converters available when the station goes on the air? Obviously, sponsors will spend money only in a well-defined market, i.e. with a definite audience. There are all indications that UHF will not be FM. UHF equipment manufacturers, both in the transmitting and receiver market (DuMont, General Electric, RCA, etc.), are much too interested in developing this large potential market. The changing of existing VHF sets to UHF reception is not a difficult technological problem. However, we have suggested elsewhere in this report certain steps to be taken in order to guarantee to the applicant that a UHF home receiver and converter will be available in his area when the UHF station goes on the air.

Indirect Sources of Revenue for the New UHF-TV Station

If the town of Black River has not developed a dependable TV receiver service organization, there is a good source here of available revenue. During my visit to XYZ-TV, I was informed by their chief engineer that TV service to home receivers was at his opinion, UHF receivers would be handicapped present very unsatisfactory. He also stated that, in in Black River because of such inferior home receiver TV service. The providing of a good TV home receiver service, which will furnish a yearly contract service to UHF home receiver buyers, is indirect insurance for successful UHF operation. The establishment of such a maintenance organization may be a profitable move for the first UHF station to go on the air in this market. Profits realized in the first year may be large enough to carry part of the station program expense.

Potential Revenues

There is little doubt that the five counties surveyed are able to support three television stations. Retail sales and advertising expenditures, as a percentage of sales, and total television advertising as a percentage of total U.S. advertising, will present us with a guide to establish some form of estimate of potential future revenues. Figures on retail sales in the counties have been taken from the statistical publication of the Department of Commerce Retail Trade Census and the Department's continuous study of retail sales in these counties. The Federal Reserve Board's study of department store sales in the principal town has also been used.

Over-all advertising was 4% of the total retail sales. Total advertising expenditures in the region was approximately twenty millions and TV receipts from this should be an average of 7% of the total (and steadily rising). As a round figure this is $1,400,000 per annum.

These figures for TV advertising include national advertising placed with the TV networks and local advertising. Nevertheless the figures do give an indication of what general revenues may be expected. Local spot sales are definitely increasing and there is room for the enlargement of revenues. Also the total national TV advertising revenue is growing steadily and is sure to break even with the present 15% for total radio advertising revenues on the grand total for all advertising media.

The Black River Television Corporation could expect to share at a future date the established one-third of the total regional TV revenues. Approximately 350 to 450 thousand dollars annually can be expected once an equal sharing has been reached.

Obviously certain *musts* are needed for keeping revenues current and they are:

1. High level of business advertising with taxes at approximately the same steady level.
2. Aggressive salesmanship on local level.
3. Automobile production on 1952 level.
4. No severe cutback in TV home receiver production.

Through our local survey, we have established the fact that the next year will considerably increase revenue prospects as there is a general movement of industry and department stores into the market. Chain stores of local, regional and national organizations are entering the county. Public utility companies are increasing their institutional advertising budgets.

Number of Interviews		Wanted TV Personally		Interested in Spot TV #1		Interested in Program #2	
		Yes	No	Yes	No	Yes	No
Area 'A'	60	60	0	32	28	9	51
Area 'B'	20	19	1	6	14	10	10
Area 'C'	28	28	0	10	18	9	19

Competitive XYZ-TV's present program schedule indicates the following breakdown for a typical week in June, 1952:

#1—Spot Rate quoted net $30, plus production cost
#2—Program time plus production cost

Population of city, excl. adj. areas—(1950 Census)	Minimum Effective Radiated Power in db above one kilowatt (9 dbk for the antenna height shown) Antenna Height*
1,000,000 and above	17 dbk (50 kw) for 500-foot antenna tower
250,000 to 1,000,000	10 dbk (10 kw) 500 feet
50,000 to 250,000	3 dbk (2 kw) 500 feet
Under 50,000	0 dbk (1 kw) 300 feet

*No minimum antenna height is specified. Antenna height not in excess of 2,000 feet above average terrain.

Channel Numbers		Maximum Effective Radiated Power in db above one kilowatt	
VHF	3— 6	20 dbk	(100 kw)
	7—13	25 dbk	(316 kw)
UHF	14—83	30 dbk	(1,000 kw)

General Advertising

Affiliated with.....TV Network. No contract to exceed one year's duration. Rates include music copyright fee. All telecasts placed with station for the advertiser for consecutive telecasting within one year from date of the first telecast shall be combined for the purpose of calculating the total number of frequency discounts earned, provided, however, that announcements cannot be so combined with five minute or longer programs. No contract to exceed one year's duration. Rates guaranteed for 26 weeks from date of first broadcast, provided continuous weekly schedule is maintained.

Length of commercial copy:

	News	Programs	
	Day & Night	Class "A"	Class "B"*
5 minutes	1:00 min.	1:00 min.	1.15 min.
10 minutes	1:45 min.	2:00 min.	2:10 min.
15 minutes	2:15 min.	2:30 min.	3:00 min.
25 minutes		2:50 min.	4:00 min.
30 minutes		3:00 min.	4:15 min.
45 minutes		4:30 min.	5:45 min.
60 minutes		6:00 min.	7:00 min.

*For programs and announcements not requiring use of studio camera, regular rates include transmitter and film facilities, services of one announcer, and theme music. For live programs and announcements requiring use of studio camera, additional talent, production, and technical facilities: rates on request.

U. S. GENERAL ADVERTISING BASIC RATES

Class "A"

(7:00 P.M. to 11:00 P.M., Sunday through Saturday)

	1 time	26 times	52 times	104 ti.	156 ti.	260 ti.
1 hour	250.00	237.50	225.00	212.50	200.00	187.50
½ hour	150.00	142.50	135.00	127.50	120.00	112.50
¼ hour	100.00	95.00	90.00	85.00	80.00	75.00
5 minutes	75.00	71.25	67.50	63.75	60.00	56.25
1 minute or 20 seconds	35.00	33.25	31.50	29.75	28.00	26.25
8 seconds	17.50	16.63	15.76	14.89	14.02	13.15

Class "B"

(5 P.M. to 7 P.M., Monday thru Saturday; 12 noon to 7 P.M. Sundays)

	1 time	26 times	52 times	104 ti.	156 ti.	260 ti.
1 hour	187.50	178.13	168.76	159.39	150.02	140.65
½ hour	112.50	106.88	101.26	95.64	90.02	84.40
¼ hour	75.00	71.25	67.50	63.75	60.00	56.25
5 minutes	56.25	53.44	50.63	47.82	45.01	42.20
1 minute or 20 seconds	26.25	24.94	23.63	22.32	21.01	19.70
8 seconds	13.13	12.47	11.81	11.15	10.49	9.83

Special features: News Service—INS, INP, ACME. Rates on request.
Political: Regular rates apply; cash in advance; not commissionable.
Talent: Rates on request.
Remote control: Details on request.
Transcriptions: Vertical and lateral.
Service facilities: For studio shows: Two Image Orthicon cameras (dolly mounted). Film and slides: One Iconoscope camera, two 16mm television projectors, each equipped for over 90 minutes continuous operation. Slide projector: 2" x 2" glass slides & 36mm slides. Movie production: Orticon camera with complete lens complement. Facilities available for sound pictures, still pictures and film processing. Complete 16mm equipment available for cutting and editing.
Closing Time: All commercial copy either script or film, must be received by station at least 72 hours before telecast time.
Personnel: General Manager, Program Director, Chief Engineer.
Representatives.

Stage Development

Recognizing, therefore, in a general way that revenues for the first UHF station will be limited for a certain period of time, we recommend that the development of the station be done in stages. This should reflect in programming hours, equipment, facilities and staff. All these should be developed in easy stages, maintaining controlled capital investment and low operational expenditures. These steps may be outlined roughly as follows:

1. Five hours daily programming in Class "A" hours for the first 26 weeks, using basic equipment for network, film, and studio production.

2. Seven hours daily programming in Class "A" and "B" hours for the next 26 weeks, employing network, film, and enlarged studio productions, with careful use of "Remotes" for local events.

3. Twelve hours daily programming after one year or more, with full coverage of local events by TV camera and 16 mm sound film remotes, with special emphasis on a well-rounded program which should indicate that the station, as affiliated with the city's leading newspaper, gives the best coverage of local and international news.

Programming XYZ-TV Program Breakdown

Competitive XYZ-TV's present program schedule indicates the following breakdown for a typical week in June, 1952:

Type of Program
(According to FCC Designation)

1. Entertainment	76%
2. Religion	3
3. Agriculture	1
4. Education	6
5. News	3
6. Discussion	4
7. Talk	3
8. Miscellaneous	4
	100%

'Y's' Average Weekly Time on the Eighty-three (83) Hours

	Opening Time	Closing Time
Weekdays	*10:00 A.M.	11:30 P.M.
Saturdays	2:00 P.M.	12:30 P.M.
Sundays	*10:00 A.M.	11:30 P.M.

*(11:30 A.M. Program Sheet)

Breakdown for Classes of Programs* Presently Used by the Competitive Station XYZ-TV

	Program Log Analysis			
	8 A.M.-6 P.M.	6 P.M.-11 P.M.	All Other Times	Total
1. Network Commercial (NC)	28%	55%	....	59%
2. Network Sustaining (NS)	28	9	....	3
3. Recorded Commercial (RC)	9	7	....	8
4. Recorded Sustaining (RS)	5	5	....	1
5. Wire Commercial (WC)	....	....	....	....
6. Wire Sustaining (WS)	....	....	....	....
7. Live Commercial (LC)	8	10	....	10

8. Live Sustaining (LS)	22	14	....	19
9. Total Sustaining	55%	28%	....	23%
10. Total Commercial	45%	72%	....	77%
11. Complete Total	100%	100%		100%
12. Actual Broadcast Hours	5½	6½		83
13. Number of Spot Announcements (SA)	133	133	....	266
14. Number of Network Commercial Spot Announcements (NCSA)	10	10	....	20

*Network programs are film-distributed at present, as network linkage by microwave has not been completed.

From this information, we may evaluate a program breakdown which the new Black River Television Station shall adopt to be competitive with XYZ-TV. It must also present to the FCC a program which will show better community service.

Programming for Black River Television Corporation

The applicant will seek affiliation with one of the major networks. No contract or understanding with any network has been negotiated, but from conversations with responsible network executives, information that is current throughout the industry, and a study of network programs that are not being released in the Black River Market due to the inability of the present single TV station to serve four networks, it is confidently believed that such affiliation will be forthcoming.

For the purposes of this application, affiliation with one of the top TV networks is assumed (called "A" TV network). The reason for such assumption is that the applicant anticipates no public hearing on its proposal for a license, and believes that authorization may be received promptly so that the proposed station may begin program service sometime in 1953. It is, therefore, assumed that this TV network would be desirous of securing the facilities of the proposed station in view of the relatively small number of its available programs released presently over the single TV station. Ratings on reports for June 1952 indicate the following number of "A" network programs being broadcast in Black River, where presently a single station is in operation, and in other cities where multiple TV stations are in operation:

City	*"A" Programs*
Black River	21
Los Angeles	65
Chicago	76
New York	84

If affiliation with the "A" TV network were unobtainable, the proposed licensee would seek affiliation with one of the other networks and make suitable changes in proposed programs of network origin.

If, for example, affiliation with "B" is obtained, the number of network commercial hours indicated in the following analyses would be decreased and the number of studio commercial hours be increased proportionately, if so possible, or the number of sustained hours would accordingly be increased.

It will be the policy of the proposed station to present a balanced program structure, both with respect to the type of program offered and to the interests of the viewers throughout the area to be served. Particular effort will be made to provide a choice of program type during each period, so that the viewer may select a program suitable to his mood.

Initially, in the first 26 weeks, a broadcasting schedule of 5 hours each weekday and 5 hours Sunday is contemplated, in order to operate to the largest extent possible with a single operating shift per day, and in order to select and train a staff suitable for future increase in hours of operation when available program sources and revenue make expansion possible. After the first 26 weeks, a 7-hour daily telecast schedule for weekdays and Sundays is visualized. After one year, a 12-hour daily schedule weekdays and Sundays is proposed.

The proposed program structure is based on production facilities available with basic minimum studio equipment and one complete studio, but without mobile TV pickup equipment for the first 26 weeks of operation. On-the-spot and remote pickups are, therefore, not planned initially, but may be done by 16mm professional sound film camera.

The proposed program structure does not mention specific titles and sources of programs to be presented by film, as availability and source of such material change constantly and are increasing in variety and quality at a rapid rate. Furthermore, titles and types are largely determined by the sponsors, with the consent and acceptance of the station. The proposed TV station applicant would exercise due consideration for all elements of good taste and industry recommendations in such selection, on acceptance of film material.

With respect to carrying programs in which public issues are discussed, in addition to such programs obtained through network affiliation, the station will regularly schedule suitable programs in preferred time for presenting a well-rounded discussion of issues in which the public has an interest. In addition to such regularly-scheduled broadcasting periods, additional time will be provided by the station when an event of transcending public importance occurs, even when such a program requires cancellation of previously scheduled commercial programs. Attention is directed to community forum programs—interviews with public officials and others concerning current questions, and interviews concerning agricultural problems.

The proposed program schedule is based on tying in with programs on the "A" TV network, as reported in *Broadcasting Magazine* for the month of June 1952.

BLACK RIVER TELEVISION CORPORATION

1. Programming for the First Year of Operation

Type of Program	
1. Entertainment	59%
2. Religion	3
3. Agriculture	3
4. Education	10
5. News	12
6. Discussion	7
7. Talks	5
8. Miscellaneous	1
	100%

Average weekly time for the first 26 weeks.....35 hours
Average weekly time for the second 26 weeks....49 hours
Average weekly time thereafter.....84 hours

2. Breakdown for Classes of Program (First 26 Weeks)

Proposed Program Log Analysis

	8 A.M.-6 P.M.	6 P.M.-11 P.M.	All Other Times	Total
1. Network Commercial (NC)	....	45%	....	45%
2. Network Sustaining (NS)	....	15	....	15
3. Recorded Commercial (RC)	....	10	....	10
4. Recorded Sustaining (RS)	....	5	....	5
5. Wire Commercial (WC)	....	....	....	....
6. Wire Sustaining (WS)	....	....	....	....
7. Live Commercial (LC)	....	5	....	5
8. Live Sustaining (LS)	....	20	....	20
9. Total Sustaining		40%		40%
10. Total Commercial		60%		60%
11. Complete Total		100%		100%
12. Actual Broadcast Hours		35 hours		
13. Number of Spot Announcements (SA)	....	60	....	
14. Number of Network Commercial Spot Announcements (NCSA)	....	20	....	

On the air 6 P.M. to 11 P.M. Weekdays and Sundays.

3. Breakdown for Classes of Programs (Second 26 Weeks)

Proposed Programs by Analysis

	8 A.M.-6 P.M.	6 P.M.-11 P.M.	All Other Times	Total
1. Network Commercial (NC)	12%	57%	....	40%
2. Network Sustaining (NS)	10	5	....	8
3. Recorded Commercial (RC)	13	14	....	14
4. Recorded Sustaining (RS)	....	9	....	5
5. Wire Commercial (WC)	....	....	....	....
6. Wire Sustaining (WS)	....	....	....	....
7. Live Commercial (LC)	30	8	....	15
8. Live Sustaining (LS)	35	7	....	18
9. Total Sustaining	45%	21%	....	31%
10. Total Commercial	55%	79%	....	69%
11. Complete Total	100%	100%	....	100%
12. Actual Broadcast Hours	14 hours	35 hours	....	49 hours
13. Number of Spot Announcements (SA)	50	50	....	100
14. Number of Network Commercial Spot Announcements (NCSA)	20	20	....	40

On the air 7 days (Monday through Sunday)
Opens 3 P.M. until 5 P.M., sign on, then 6 P.M. to 11 P.M.

4. TYPICAL WEEKDAY PROGRAM: TUESDAY

Time	Title	Description	Type	Origin	Class
3:00- 3:15	Test Pattern	Video Test Pattern	....	FL.SP.	
3:15- 3:30	Video News	News Reports	NEWS	N	NC
3:30- 4:00	Princeton	Educational Film (A distinguished documentary)	ED.	F	RS
4:00- 4:30	Charm and Home	Demonstration of Products	DISC.	ST	LC
4:30- 5:00	Sport of the State	Edited Sport Film	ENT.	F(EDIT)	LC
5:00- 5:15	Fashions	Women's Fashions	ENT.	N	NS
5:15- 5:45	Children's Serial	Space Adventure	ENT.	F	RS
5:45- 6:00	Test Pattern and News	Spot and News	NEWS	N	LC
6:00- 6:30	Oklahoma Music	Musical Entertainment	ENT.	ST	LC
6:30- 7:15	Announcer for AM	Religious Film	REL.	F	RS
7:15- 7:30	Variety Show	Variety and Songs	ENT.	N	NC
7:30- 8:00	Adult Education	Educational Film and Local Commentary on Education	ED.	ST(F)	LS
8:00- 8:30	New TV Film	Featured Film Part II	ENT.	N	NC
8:30- 9:00	Drama	Network Presentation	ENT.	N	NC
9:00- 9:15	News	News Report	NEWS	N	NC
9:15- 9:30	Health Talks	Interview with Local Doctors	ED.	ST	LS
9:30-10:00	Comedy	Comedy—Local Talent Show	ENT.	N	NC
10:00-10:30	Our Film Theatre	Mystery Film	ENT.	F	LC
10:30-10:45	Latest News and Weather	News and Weather Reports	NEWS	ST(SL)	LC
10:45-11:00	Televespers	Film with Local Pastor Introduction	REL.	ST(F)	LS

SATURDAY

Time	Title	Description	Type	Origin	Class
2:45- 3:00	Test Pattern	Video Test Pattern		FL.SP.	
3:00- 3:30	Video News	News Reports and Weekly News Roundup	NEWS	N	NC
3:30- 4:00	Magic Empire Farmer	Nitrous Demonstration, News from County Agent, 4-H Clubs, etc.	AGR.	ST(LS)	LS
4:00- 4:30	Film Theatre	Drama	ENT.	F	RC
4:30- 5:00	This Week in Schools	Discussion, Demonstration by High School Teachers, PTA, and Students	ED.	ST	LS
5:00- 5:30	Pet Parade	Featuring Children's Pet Dogs, Cats, Birds, in Demonstration	ENT.	ST	LS
5:30- 5:45	Test Pattern & Sports Reports	Sports Report and Slides	ENT.	ST(SL)	LC
5:45- 6:00	Green Thumb	Lecture, Demonstration, Gardens & Flowers	ED.	ST	LS
6:00- 6:30	The Champion	Network Show	ENT.	N	NC
6:30- 7:00	Glee Club	Misc. Songs	ENT.	N	NC
7:00- 8:00	Variety	Variety Show	ENT.	N	NC
8:00- 8:15	News	News Reports	NEWS	ST(SL)	LC
8:15- 8:30	Stuff for Stuff	World Traderoutes Film	ED.	N	NC
8:30- 9:00	Film Theatre	Drama	ENT.	F	RS
9:00- 9:30	Tulsa Showcase	Talent Serial featuring local talent	ENT.	ST	LS
9:30-10:00	Safe Travel	Travelog by Local Personality	TALK	ST(F)	LC
10:00-10:30	Musical Show	Musical Rendition of Broadway Show	ENT.	F	LC
10:30-11:00	Film Theatre	Adventure	ENT.	F	LC
11:00-11:15	News & Weather	News & Weather Reports	NEWS	ST(SL)	LC
11:15-11:45	Televespers	Religious Film	REL.	ST(F)	LS

SUNDAY

Time	Title	Description	Type	Origin	Class
2:45- 3:00	Test Pattern	Video Test Pattern		FL.SP.	
3:00- 3:30	Weekly Video News	Weekly News Report	NEWS	N(F)	NC
3:30- 4:00	Drama	Film Production	ENT.	F	RS
4:00- 4:30	Merchandising	Discussion of Local Business	TALK	ST	LC
4:30- 5:00	Teleforum	Discussion Panel on Local & Community Problems Featuring Tulsa University Professor as Spokesman and Mediator for Controversial Issues	DIS.	ST	LS
5:00- 5:30	Man of the Week	Discussion	DIS.	N	NS
5:30- 5:45	Telenews	Weekly News & Sports	NEWS	N	NC
5:45- 6:00	Children's Feature	Space Adventure	ENT.	F	RC
6:00- 6:30	Musical Show	Review & Songs	ENT.	N	NC
6:30- 7:00	Comedy	Network Comedy	ENT.	N	NC
7:00- 8:00	Variety	Variety Comedy	ENT.	N	NC
8:00- 8:30	Sunday Quiz	Quiz Panel	ENT.	N	NC
8:30- 8:45	News	News and Weather	NEWS	ST(SL)	LC
8:45- 9:30	Film	Feature Film	ENT.	F	LC
9:30-10:00	Adult Education	Educational Film	ED.	F	RS
10:00-10:30	Sports	Weekly Sports Review	ENT.	ST	LC
10:30-11:00	New Headlines	Announcer's Local News Reports	NEWS	ST(SL)	LS
11:00-11:15	Our Boys	Report from Korea	TALK	F	RS
11:15-11:30	Televespers	Film Introduced by Local Pastor	REL.	ST(F)	RS

Statement of Policy

"The station management shall exhaust all reasonable effort to maintain the various types of viewer tastes in programs. Every attempt shall be made to keep these data current in order that the changing interests and tastes of the community may be speedily detected. Viewer tastes shall be broken down so far as is practicable, into types and subtypes. In this manner, the station, in addition to bringing to the viewers of Black River the best in televised programs that can be obtained by the station from outside sources, shall become a better outlet for the local public expressions that are of interest to the viewers of the community.

"In order that the station will be used to the greatest advantage as an outlet for public expression, it shall be the duty of the management to maintain, through competent and adequate personnel, constant liaison with the various civic, religious, charitable and educational organizations of the community, and to devote to the production of their programs sufficient time and effort to present the highest quality reasonably attainable.

"In reliance upon the information and data on the variety and indentity of viewer tastes that exist in Black River, the station management shall constantly strive to perfect a balanced program schedule that is responsive to the above-mentioned viewer tastes. The term 'balanced program schedule' is defined to be a schedule that throughout an appropriate period (that is—day, week, or month) responds equitably to the various tastes that have been determined to exist in the community.

"In selecting and obtaining talent and material for use on all programs, every effort shall be made to obtain the most capable talent available. The station shall strive to develop potential talent for use in the station's programming, but this objective shall not be permitted to substantially deteriorate the quality of the program from the standpoint of the viewers.

"In accomplishing a balanced program schedule to meet the objectives stated above, the management in choosing and selecting from the programs that are available from time to time shall select the program from those that are offered that contribute the most to this objective, without regard to the saleability of the time to a sponsor or the existence of sponsors who would purchase the time for less appropriate types of programs.

"The station management shall not permit the interruption of any program for telecasting of commercial copy where that interruption would be in conflict with the spirit or purpose of the program, or would substantially deteriorate its value to the viewers. Except where the primary purpose of the program is to give information to consumers on the market for merchandise and services, not more than an aggregate of fifteen minutes of commercial copy shall be included in any one hour of telecast time.

"Where, in carrying out the program objectives stated herein, the management determines that a particular type of program is necessary to obtain those objectives and said program can be obtained only on a sustaining basis, the station shall nevertheless telecast the program.

"Programs produced by and for organizations devoted primarily to the rendition of civic, charitable, religious, educational, patriotic and social service shall not be available for any type of sponsorship by a commercial advertiser.

"The station management shall not hesitate to terminate time devoted to commercial sponsorship where it is necessary to use the time to obtain the objective of over-all program balance, or when, in the opinion of the management, it is desirable to experiment with certain new and different types of programs and talent, the commercial sponsorship of which is not assured.

"The station management shall devote time at regularly scheduled periods in the good viewer hours (morning, afternoon and evening, depending upon the audience the program is designed to reach) for the telecast of local public service programs.

"It shall be the duty of the station to obtain for telecasting to its viewers a discussion of controversial issues of general public interest. Equal opportunity shall be offered to all significant sides of a controversial issue, both with respect to the terms and conditions under which the time is offered and to the quantity and quality of the time used. The station shall adhere strictly to Section 315 of the statute providing for equal opportunity for legally qualified candidates and to the Commission's rules and regulations promulgated thereto.

"Time shall be sold solely on the basis of the content of the program to be offered and without regard to the race, creed, religion, color, social or political status of the one seeking to buy the time."

Television Program Plans (General Notes in Support)

The TV station proposes to offer a well-balanced program structure, and will employ all available sources of television program material: local live production material and talent will be used insofar as warranted for good program balance. Emphasis will be placed on local coverage—all special events, civic activities, spot news coverage, sports events, and such other public interest activities which lend themselves to television broadcasting.

The proposed programming, in addition to live program material, expects that network programs from one of the four major television networks will be available to it, either through coaxial cable or microwave relay by the time the proposed station is in operation. Toward this end, preliminary conversations with one of these networks have been held.

These conversations have been exploratory; no commitment, agreement or contract of any kind with respect to network service or affiliation, has been entered into. However, applicant would, if the proper opportunities arise, avail itself of a network affiliation in order to better serve the public interest in this community.

In addition to live and network programs, the proposed programming will include the use of films, particularly those which will include an adequate proportion of educational and instructive material.

Particular emphasis will be placed on those segments of the population and those special interests within the area to be served which are not now being adequately served by the one television station now in operation in Black River. In this connection, efforts will be made through careful analysis of competitive program structures to present programs in each segment which will provide the viewer variety of choice as to type of program content between the presentations of the respective stations.

It is the plan and purpose of the station management to keep a well-balanced program plan not only as to material but as to the percentage of commercial and non-commercial programs. The Board of Directors of the station corporation adopted and approved the above operating policies, which will be used in the operation of the proposed television station.

Equipment Needs

Basic equipment will be designed to include the following:

A. Transmitter
B. Live Talent Studio Production
C. Film Production
D. Remote Coverage

A. Transmitter equipment will be determined by the engineer and will include the transmitter (UHF channel), antenna, transmissional line and all accompanying and auxiliary equipment, as control frequency and modulation monitors, test equipment. etc. It is suggested that equipment should be bought on a special purchase arrangement:

1. To take care of changes in UHF equipment.
2. To take care of increased Effective Radiated Power at a future date.
3. To be able, at a later date, to act as point of origination in a future UHF regional network. if so warranted.

Transmitter equipment should include a flying spot camera (Monoscope) for economic employment of periods when no program is put out by the station.

B. Live Talent Studio Equipment should include one TV camera chain (2 cameras) of field equipment type. Fixed control console position in the studio should be provided with excellent switching facilities. The studio console should include camera, line, program and film monitors.

C. A film chain consisting of two 16mm film projectors, an automatic slide projector, a multiplexer and the TV film camera. Full set of editing, splicing and processing equipment should be added. (Processing equipment for film and still will be available through the use of existing facilities which are the property of one of the partners in the application.) Background projection set should be designed to utilize slides and short film strips.

A full range of audio equipment will be included, including boom microphones, turntables, tape recorder, etc. Studio lighting equipment will include ceiling and floor lights. Announcer's booth to be equipped with monitor, microphone and intercommunications equipment. Newsroom will hold all equipment for efficient operation.

D. Remote Coverage. Two different types of remote equipment are warranted. For delayed remotes a professional 16mm sound film camera should be employed. For direct remote, the TV camera should be used. In this case, a TV remote field truck with associated microwave and mobile intercommunications equipment will be used.

Facilities

The development of facilities will be in easy stages. Facilities are planned to act as a functional "envelope" for equipment and staff. In our planning, transmitter and studio buildings will be united in one structure. As a good site is available in the metropolitan area, this is a desirable solution.

In UHF transmission, transmission losses are comparatively high for high tower structures (800-foot tower) and it is, therefore, desirable to run transmission lines as straight as possible with the least amount of bends. The best way to do so is to locate the antenna tower on top of the transmitter area and run the line directly through. Two obvious alternatives are available:

1. If a guyed antenna tower is selected (which may be cheaper but not so suitable if the tower should act as community antenna tower for another or more TV stations), a central reinforced concrete column may carry the base socket of the antenna tower. The guy wires will be attached to specially designed concrete anchorage which will give a definite architectural feature to the site.

2. If a free standing tower is chosen, a reinforced triangular concrete base will carry the steel tower and also act as a part of the studio skeleton. The other facilities are grouped around the triangular base of the tower.

Both solutions provide for well-integrated planning of facilities with a technical center core. A trench grid is servicing the live talent studio, studio control room, master control room, film projection area, transmitter room and remote facilities.

The general arrangement of the areas is, therefore:

1. The technical core area
2. The production area
3. The administration area
4. The utilty and general service area

There is a clear traffic separation for administration, public, sponsors, production (talent and staff), and technical operation. There is also a clear separation between personnel and material traffic.

I. A. SIGMON - Architect
Greensboro, N. C.

STAFF REQUIREMENTS*

Staff Requirements of the Black River Television Corporation

Administrative and General Staff

1 General Manager and Sales Director
1 Auditor-Bookkeeper
1 Receptionist-Stenographer
1 Maintenance Man (Building)
4 ..... $ 25,000

Programming Staff

1 Program Director and Film Manager
1 Traffic Manager and Continuity Man
1 Producer
2 Announcers
1 Artist (Lettering, Slides, etc.)
6 ..... $ 45,000

Technical Operations

1 Chief Engineer
4 Engineers (For Studio, and Transmitter, including Camera Operation)
1 Projectionist
6 ..... $ 40,000

Grand Total $110,000

*For Programming which will include Network, Film, Slides and Simple Live Talent Studio Production.

EQUIPMENT

Transmitter and accessories	$ 80,000
Antenna and accessories	13,000
Transmission line and accessories	6,000
Tower lighting equipment	1,500
Transmitter monitor and control equipment	4,500
Complementary transmitter equipment	4,000
Signal generating equipment	9,000
Film camera channel and accessories	13,000
Film and slide projection equipment	12,000
Video switching equipment	10,000
Master control equipment	2,500
Audio equipment	5,000
Audio recording equipment	1,500
Studio lighting equipment	4,000
1 TV camera chain (2 cameras)	44,000
Remote TV camera control pedestal	6,000
Film processing equipment	10,000
Test equipment	3,000
	$229,000
Installation expenses, approximately 10%	22,900
	$251,900

Capital Expenditures in First Development Stage

Equipment (see breakdown above)	$251,900
New TV building, including transmitter facilities, mechanical equipment, air-conditioning, heating, etc.—approximately	150,000
	$401,900
Engineering fees—10%	40,190
	$442,090
Contingencies—10%	$ 44,209
	$486,299

Approximate Expenditures for the First-Year Operation

Transmitter (Power, Tubes, Repairs, etc.)	$ 10,000
Salaries	110,000
Talent (Writers, Artists, Performers)	10,000
Film and Sustaining Programs	30,000
Royalties	5,000
News Service	5,000
Professional Expenses (Attorneys, Engineers)	5,000
Insurance	2,000
Depreciation—10 years (technical equipment only, worth $250,000)	25,000
Depreciation of Building—20 years (worth $150,000)	7,500
Miscellaneous (Telephone, Telegraph, Office Supplies)	6,000
Total	$215,500
Contingencies—10%	21,550
Grand Total	$237,050

2 Station Film Editing Equipment

The National Association of Radio & Television Broadcasters, Washington, D. C., through its Television Department, under the supervision of Thad H. Brown, has produced an excellent study and analysis of film operation in its "Film Manual," 1954.

Excerpts have been reprinted in condensed tables and have been reproduced by special permission of the Association.

Film Production Can Be Generalized:

Valuable Conclusions in Connection with

1. In smaller television stations, film programming is roughly twice as much as live programming.
2. In any television station presently in operation, more film hours are telecast than live hours.
3. In larger television stations, feature films are a great percentage of film programming; and only in Group 3 are syndicated films a large proportion of film programming.
4. Cost of film programming versus live programming at the local level is 1½ to 1 film over live.

Needed Items of Film Equipment

1. 2 editing tables, 2 film rewinds, 2 splicers, 2 footage meters, 2 viewers, 2 16mm cuers, 2 preview projectors, 2 preview screens, 1 editing barrel, reserve reels 200 ft., 1600 ft., 1200 ft., 800 ft., 400 ft., 100 ft.; 4 of each size.
   (Duplicate facilities for editing)
   Reserve reels 2000 ft., 1600 ft., 1200 ft., 800 ft., 400 ft., 100 ft.,; 4 of each size.
2. 300 cans for storage space with 2 film flanges and 50 spare film hubs.
3. 1,000 ft. blank footage leader.
4. Shipping bench, accessories, such as masking tape, film cement, china marking crayons, etc.
5. 1 pair of scales.
6. Film racks for various size reels, portable film rack for moving film from editing room to projection room.
7. Editing table for the projection room.
8. File cabinets. Film storage for 35mm type.

ANALYSIS OF PROGRAM HOURS

Average Hours Per Week

Group TV Families Stations Reporting	#1 Up to 50,000 8		#2 50,000-150,000 9		#3 150,000-500,000 28		#4 500,000-1,000,000 6		#5 1,000,000 & Over 9	
Live (Local)	10:37	18.1*	21:43	22.4*	23:20	21.0*	24:01	22.6*	32:50	31.4*
Studio	9:57	93.7%	20:03	92.1%	20:50	89.3%	22:16	92.8%	28:55	88.1%
Remote	:40	6.3%	1:40	7.9%	2:30	10.7%	1:45	7.2%	3:55	11.9%
Film (Local)	26:54	45.9*	22:39	23.4*	28:03	25.3*	34:02	32.1*	42:20	40.4*
Features	12:04	44.8%	9:26	41.7%	12:57	46.3%	21:27	63.1%	29:03	68:5%
Syndicated	9:41	36.0%	8:33	37.7%	10:53	38.8%	6:40	19.6%	7:30	17.7%
Short Subjects	1:55	7.0%	1:33	6.8%	1:50	6.5%	3:10	9.3%	3:58	9.4%
Produced by Station	:08	0.7%	:35	2.6%	:11	0.6%	:29	1.4%	:26	1.1%
Free Film	3:07	11.5%	2:32	11.2%	2:12	7.8%	2:16	6.6%	1:23	3.3%
Network	21:05	36.0*	52:30	54.2*	59.39	53.7*	47.58	45.3*	29:35	28.2*
Kine	13:04		16:58		9:15		12:42		4:55	
Line	8:01		35:41		50:24		35:16		24:40	
TOTAL	58:36		97:01		111:02		106:01		104:45	
Percentage of:										
Total Programming, Local Hours (L plus F)		64 %		45.8%		46.3%		64.7%		71.8%
Total Programming, Network Hours		36 %		54.2%		53.7%		45.3%		28.2%
Film to All Local Programming		72 %		51.0%		54.0%		59.0%		56.0%

**Percent of local film programming to total cost.

Film Programming Cost Range—Based Upon Reported Annual Estimates

In Dollars (42 stations or 35% of stations in operation May, 1953)

Group	#1	#2	#3	#4	#5
Yearly costs of programming, film and operating film facilities (film costs, personnel, equipment)	$ 35,900 to $150,000	$ 24,300 to $118,000	$ 30,000 to $160,000	$153,300 to $534,000	$ 45,000 to $716,000

Local Film and Live Program Costs—Reported on Hourly Basis

Indicative Only

Average Local Cost per hour in Dollars

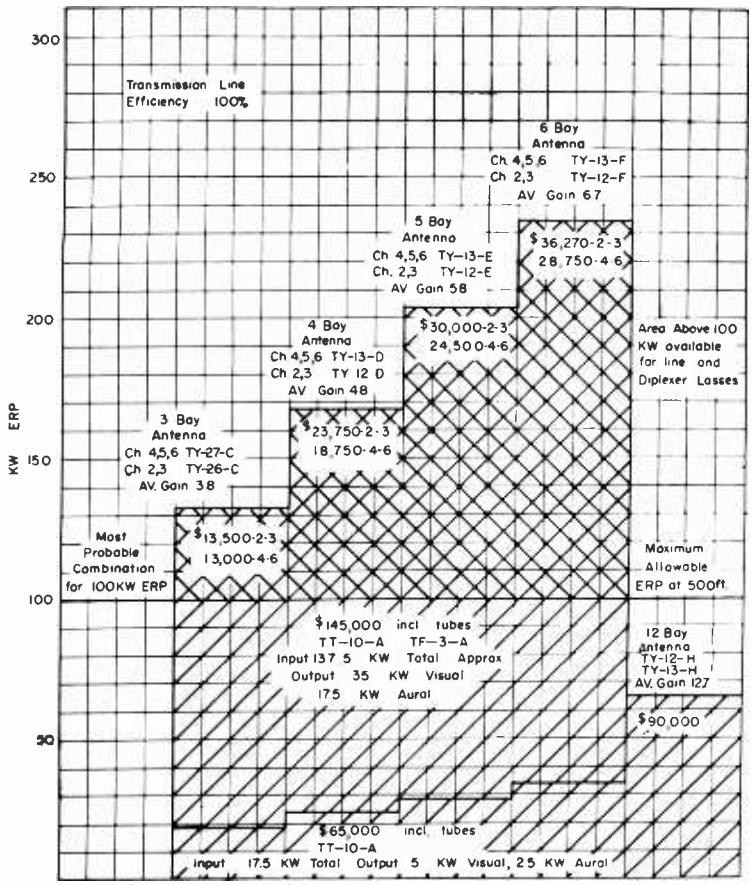
Group	#1 and #2	#3	#4 and #5
Live			
Studio	36	75	128
Remote	50	88	291
Film			
Features	45	92	169
Syndicated	97	160	321
Short Subjects	81	4	102
Prod. by Station	..	942	500

Live Programming	42	25%*	76	38%*	138	40% *
Film Programming	68	75%**	125	62%**	191	60%**
All Programming	57		96		154	

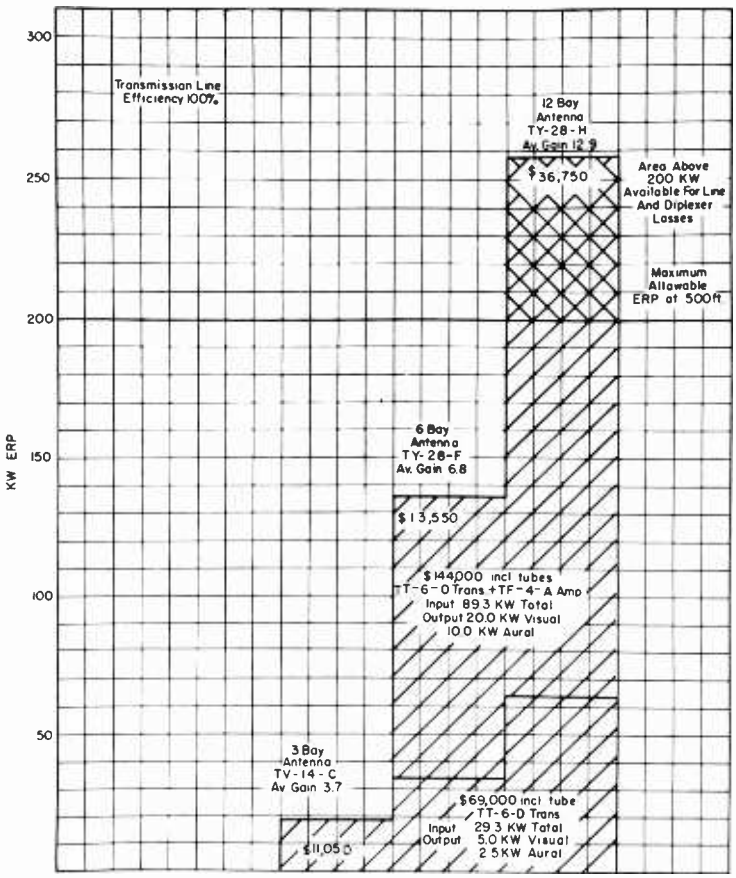
*Percent of local live programming to total cost.

**Precent of local film programming to total cost.

Credit: Television Station Film Manual
National Association of Radio and Television Broadcasters
Television Department, Washington, D. C.

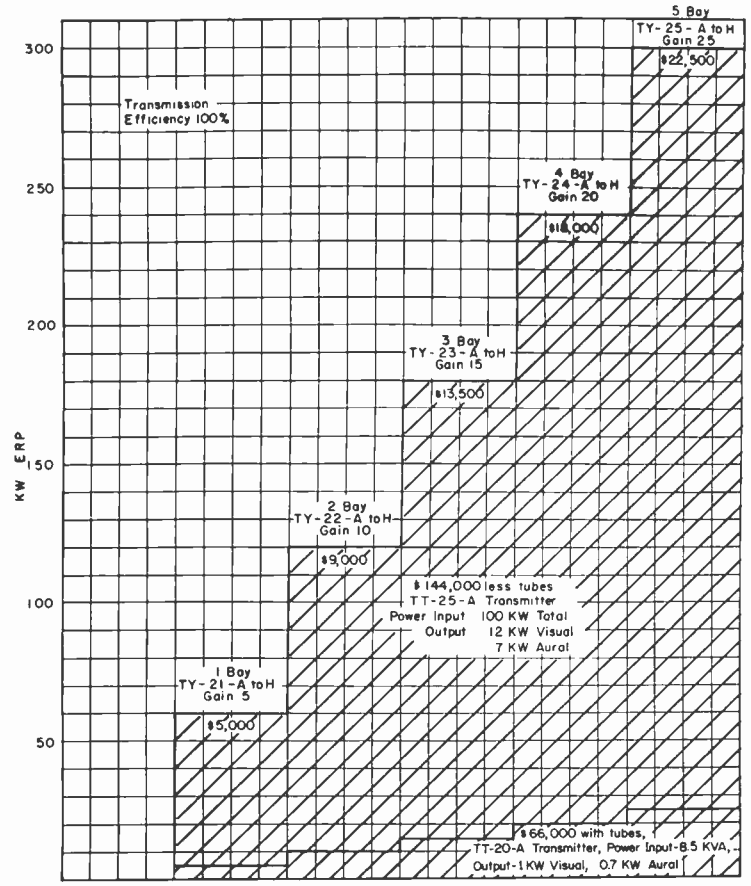


E.R.P. vs. transmitter-antenna combinations for VHF channels 2-6

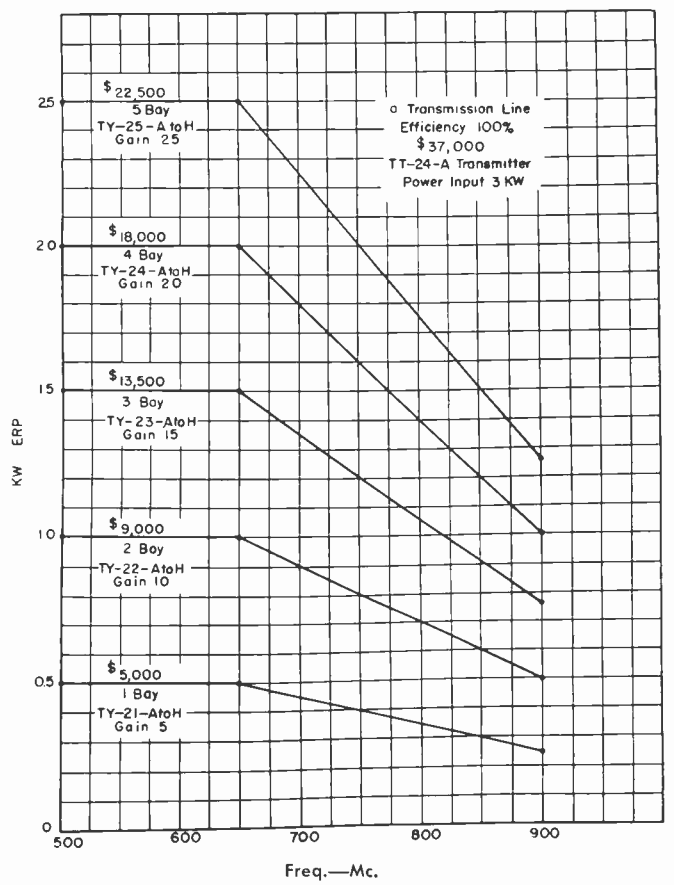


E.R.P. vs. transmitter-antenna combinations for VHF channels 7-vc.

E.R.P. vs. 1 kilowatt and 12 kilowatt transmitter-antenna combinations for UHF channels 14-83.



E.R.P. vs. 100 watt transmitter-antenna combinations for UHF channels 14-83.



3

Antenna-Transmitter Combinations

Four charts are given to assist in selecting the proper transmitter-antenna combination to obtain a specified effective-radiated-power. A convenient bar chart covers virtually all the possible combinations of the transmitting systems in each of the three general channel groups. Thus three bar charts in addition to a separate chart for the 100 watt UHF transmitter cover all the combinations now available.

On the facing page you will see bar charts indicating the maximum effective-radiated-power obtainable from various combinations of transmitters, amplifiers and antennas. The height of the crossed bars gives the ERP obtainable with the indicated transmitter and various antennas which are given at the top of the column. The height of the diagonals gives the ERP's obtainable with the indicated transmitter-amplifier-antenna combinations. A horizontal line across each VHF chart represents the maximum ERP allowable by the F.C.C. and the cross-hatched red above this line indicates the power available to absorb transmission line and diplexer power loss, since all bars are calculated on the basis of zero transmission line and diplexer loss. The antenna gains used on the VHF charts are not exact, but are average gains over the low or high channels.

(From the General Electric Broadcast Equipment Data Book, Nov. 1, 1951.)

4

Color Television

The availability of color TV equipment in the near future is indicated by published articles in the various TV periodicals. This demands careful consideration in connection with the planning of future TV plant facilities.

In general, equipment producers forecast their release of equipment in the following groups:

(a) Color TV equipment for network originating stations and network connected stations, including transmitters, test and measuring, as well as synchronizing.

(b) Color pick-up equipment for live talent shows, that is, TV color cameras.

(c) Color slide and film production equipment.

Many equipment manufacturers stress the point that present TV stations will be able to transmit compatible color network programs at relatively low cost with a minimum of additional equipment, and can make full use of their present black and white transmitter facilities. Total expenses for additional color TV operation—network, live, film and slide—are presently estimated to be in the region of $130,000 to $150,000. These figures are obviously tentative as many items are still in the development stage.

What color does mean to a TV station planner is the question concerning us here. For color TV origination in the studio it will replace at least in the first stages the demand for TV lighting, which in turn will increase general power requirements. This increased demand for station lighting will reflect in more stringent air conditioning. Also it will demand special attention in connection with lighting switchboards selected for use of present black and white operations in the studio.

In larger originating stations, studio color origination will demand attention in connection with the costume wardrobe storage, background scenic production, paint storage and spraying and other auxiliary production items. Art designers, color artists and other art production personnel will have to enlarge their equipment to cater to color and texture.

The studio control room will not be encumbered with too many new racks. Certain camera monitors will have to be exchanged to receive color. The master control room must be planned to receive additional rack equipment for color reception (3 to 6). This is also true for the film projection area where a certain amount of rack equipment may be added. The transmitter room area is in many instances large enough to handle additional equipment and will not have to be changed. Color monitors will replace to a large degree the present black and white monitors in many locations in the TV station.

5

Union Directory

Actors Equity Association
American Federation of Musicians
American Federation of Radio Artists
American Guild of Musical Artists
American Guild of Variety Artists
Associated Actors & Artists of America
Authors' League of America
International Alliance of Theatrical Stage Employees and Moving Picture Operators
International Brotherhood of Electrical Workers
International Union of Electrical, Radio and Machine Workers
National Association of Broadcast Engineers and Technicians
National Association of Broadcast Union and Guilds
Radio and Television Directors Guild
Radio Writers Guild
Screen Actors Guild
Screen Extras Guild, Inc.
Screen Writers Guild
Television Authority
United Electrical, Radio and Machine Workers of America
United Scenic Artists

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Glossary

Acting Area: Often called staging area—the part of the studio occupied by sets, props and talent, where the actual performance is initiated.

Acoustics: The science of sound. Architectural design as related to planning for good sound transmission or reproduction in buildings and facilities.

AM: Amplitude modulation broadcasting is a transmission in which the carrier wave frequency remains constant while the power is constantly varied at the rate of the audio frequency. ICC has allocated for AM band from 550 to 1,600 kilocycles.

Amplifier: Electrical equipment by which sound or picture signal is strengthened.

Angle of Vision: Angle defined by the outmost tangents on obstructions. Important in establishing studio vision for control room operator. Both horizontal and vertical angle must be considered.

Angle Shot: A TV camera technique which permits pickup of a subject from an unusual or extreme angle. It is used for dramatic effect.

Antenna: A structure for radiating or receiving radio waves that carry television and sound broadcasts. Compact antennas are used; normally positioned at the top of an antenna tower at the highest possible elevation.

Audio: Used for the word "sound"—the electrical impulses which carry aural intelligence.

Backdrop: A curtain used for setting the stage for a TV production. A simple means to achieve a quiet background.

Background Projection: The projection of slide or moving film on a translucent screen which acts as scenery background. Falls into the category of special effects.

Bandwidth: The number of continuous frequencies required to convey the information being transmitted either visually or aurally. Present U.S. television channel bandwidth is 6 megacycles wide.

Boom Microphone: A microphone suspended from a tubular boom. Boom can be extended, retracted, lowered or raised by an operator to follow the actor about the stage for perfect sound pickup.

Broadcasting: A general term used to illustrate the distribution of radio and TV programs over the air.

Camera: The TV camera unit with its electronic pickup tube converting the image into electrical impulses.

Camera Monitor: The control equipment associated with the TV camera used to control the final picture for shading and other factors. The monitor is usually placed in the control booth in studio productions.

Camera Switching and Mixing: Control and adjustment operations executed in the interest of a versatile TV production. This equipment is usually installed in the studio control room or master control room.

Catwalk: Elevated walks either attached to walls or hung from ceiling used for maintenance or installment of lights or other equipment.

Channel: The band in the radio spectrum assigned to television or the special television station or other form of communication. TV channel allocations for VHF and UHF are obtainable from the FCC.

Closeup: TV camera view close to the subject—the camera registering the area of the production—used for dramatic effect.

Coaxial Cable: A special type of conductor constructed from a hollow metallic conductor, with a single wire accurately centered along the axis and held in position by a suitable insulating material.

Commercial: A selling part of the program of restricted length. Only a limited amount of commercial inside a given time is permitted. This self-imposed rule of telecasters is attrating more and more attention.

Console: Also called control desk, both for video and audio equipment.

Control Room: An elevated area adjacent to the studio, housing equipment and personnel controlling the video and audio pickup used in studio production. The same equipment and personnel switches and mixes other program sources into a finely-composed production. Large windows from this area

are provided to permit unobstructed vision into studio, announcer's booth, and film production room.

Coverage: Indicates the area into which the television signal penetrates, and can be received by the TV home receiver set. Coverage, as defined by the FCC, varies with channel power, antenna height and terrain character. Coverage should be consistent with the market area of the television station.

Cyclorama: A unified background to be used for many types of production, incorporating backdrop and side wings. A rear projection screen can be part of the cyclorama.

Common Carrier: A communications firm which has Governmental approval to construct and operate communications services, including TV network transmission, either by coaxial cable or microwave relay methods.

Directional Antenna: An antenna designed to direct radio signals better in certain directions than in others.

Director: Also called Program Director; in charge of production during a television program.

Dissolve: The technical process in which the picture produced by a TV camera may be gradually faded out while another one is gradually brought into full view.

Dolly: The mobile stand or base on which equipment is mounted. Dollies are used for cameras and camera cranes.

Dolly Man: Presently most cameras on dollies are manually moved. The operator moving the dolly is called a dolly man. Crane dollies are sometimes motorized.

Editing: Used in connection with the preparation of a TV film and kinescope before it is presented to the viewer.

Elevation Plan: A sketch made of the set and props used in the TV production to facilitate the construction, painting of scenery and the establishing of camera movements.

Element: A planning expression indicating a basic factor in the planning and arranging of facilities.

Fading: The words "fade-in" or "fade-out" are used to describe a camera control technique by which a scene is gradually brought into the view from the black level or is dimmed down from the view.

FCC: Abbreviation for Federal Communications Commission, the U.S. Governmental agency regulating communications.

Field Pickup: A TV remote event picked up by the TV camera and mobile sound equipment and transmitted to the viewer by the station.

Film Pickup: The telecasting of motion picture film by a TV station. Regular 16 or 35mm film is projected into a TV camera.

Flat: A canvas or other light material covered section used to construct a stage setting. It's used extensively for wall backgrounds. It can be designed to be self-supporting by using braces and weights to keep it on the studio floor. It also can be "flown," which indicates that the flat is hung from the ceiling of the studio and stored there when not in use.

Floor Area: A planning term indicating the unobstructed area in the studio.

Fly: The lifting of a scenery set above the stage.

Flying Spot Camera: A device used to produce a steady station identification sign for transmission by the TV station. Station identification is demanded by the FCC.

FM: Frequency modulation broadcasting is a transmission in which the carrier wave varies in frequency while its power remains constant.

Foot Candle: A unit of illumination used in TV lighting practice (also elsewhere). Average lighting used for studio pickup is 150-foot candles. TV camera can pick up average at much lower level.

Frequency: Vibration or cycles per unit of time. Generally, radio waves fall into low frequency, high frequency, ultra high frequency and microwaves.

Free Height: A planning term indicating height between floor and lower part of ceiling truss or ceiling itself.

Free Standing Tower: Also called self-supporting tower—used in location where site area is restricted and a guyed tower would not be permissible.

Ghost: A secondary or multiple image formed on the picture tube of the TV receiver set caused usually by a reflected signal. Reflections are caused by buildings, mountains or other obstructions.

Gimmick: A TV term used for special-effect devices of an optical, electromechanical and/or electronic nature.

Greenroom: Assembly and waiting area used by talent, usually equipped with telephones, call system and clock system

Guyed Tower: A tower structure supported by guy lines (steel cable). Guyed towers are used extensively because they are, height-for-height, far cheaper than self-supporting towers.

Half Lap: A control technique called dissolve or overlap, by which two pictures are held at simultaneous definition so that both are visible to the viewers.

Hot Camera or Mike: A TV term indicating that the camera or mike is in use and is energized.

Hot Kine: A short, delayed telecast of a live talent program. The film taken from the cathode ray tube is rapidly processed and can be used shortly after the original Live Talent presentation. the original live talent presentation. differences.

I.D.: Station identification, mostly produced by film or slide. it is demanded by the FCC.

Image: The picture focused on the mosaic of the camera; also the picture reproduced on the face of the receiver picture tube.

Image Orthicon: A highly sensitive camera tube used in the modern TV pickup camera.

Interference: Spurious radiations that interfere with quality of the TV picture.

KC: Kilocycles or one thousand cycles per second.

Kinescope or Kine: Motion picture film taken directly from the TV receiver set tube by a special device. Kinescope quality presently does not approach film yet. For TV production, film and kine are handled through the TV film projection room without any difference in procedure.

Lap Dissolve: A television camera control technique by which a picture shown by a TV camera is merged with another one. One or the other picture can be taken gradually out of view.

Light Bridge: An elevated structure in the TV studio from which ceiling and floor lights can be remotely controlled and operated. Now often superseded by lighting control boards and consoles located on the studio floor or the studio control room operating studio lights by remote control.

Light Chart: A chart indicating the exact position of studio lights and the level of illumination to be used in the TV production which is in preparation.

Light Level: The intensity of illumination at the set measured in foot candles.

Line of Sight: Used in TV transmission where TV signals received are in line of sight from the transmitter antenna.

Live Talent Production: All TV productions originated from a studio taken by the studio TV pickup equipment and distributed to the viewers. While outside studio production also is essentially a live talent production, it is called either "remote" or "TV reportage."

Live-Talent Studio: Space in which live talent programs are produced.

Long Shot: The TV camera is moved away from the set and the performers. Long shots, because of the restricted size of the TV receiver set, are not frequently used. Figures and objects in the distance become insignificant.

Lumen: One lumen per square foot of surface is equal to one-foot candle.

Magnetic Tape Recorder: Used to record the sound program part. Can be used instead of or with the conventional disk recorder.

Master Control Room: A central control area which receives and distributes incoming and outgoing programs and is responsible for their final quality. In small TV stations, the master control

room and the transmitter control room are combined conveniently into one space.

Master TV Station: Also called TV originating center—a TV station capable of originating all types of TV production.

MCS: Megacycles—one million cycles per second—a measure of frequency.

Medium Shot: A TV camera pickup technique putting on the TV receiver tube an image representing an approximate medium-size format scene. It is used for group shots.

Microphone Boom: A microphone suspended by an arm above the set and actors televised. The boom is retractable.

Microwaves: Generally refers to radio waves having less than one meter wave length. Used for network transmission on a national scale. The coming medium of distribution of TV and radio on a global scale.

Mixing: A camera control technique used by the video switcher or the technical director.

Mobile Unit: Truck or station wagon specially designed to house TV pickup, control and transmission relay equipment and used for the telecasting of remote productions, outdoors and indoors. The relay of picture and sound to the TV station transmitter is by radio relay and less often by cable or wire.

Monitor: The operator controlling the image at the cathode ray tube to check the transmitted picture. Also the control screen device used in the control of the associated TV camera pickup equipment.

Multipath Transmission: The route of the TV signal from the antenna of the transmitter to the receiver antenna often is not a direct path but, because of reflections from obstacles, a multipath effect. This usually results in ghost pictures.

Network (NTW): An affiliation of TV or radio stations able to broadcast simultaneously the same program received from a network originating center. At present there are in existence four TV networks—ABC, CBS, DuMont and NBC.

Noise (Electric): Impulses which absorb the picture and sound during TV reception.

Observation Booth or Gallery: An area reserved for the public or sponsor to observe TV production in the TV live talent studio.

Pan: Also called panning. The movement of the TV camera in a horizontal plane so as to view additional persons, and objects on the set: also switching to other performers.

Pedestal: The base on which the TV camera may be mounted instead of a tripod. Pedestals are also equipped with casters for mobility, and some with remote control equipment for camera use.

Pickup: Transformation of the light image into an equivalent electrical signal.

Picture Tube: The receiving cathode ray tube.

Preview: Viewing of film or kinescopes in the screening room before actual telecast over the station TV transmitter. This will safeguard against faulty production, both technically and editorially.

Producer: Also called Program Director; in charge of the TV production during preparation and telecasting.

Production: Includes the preparation of A TV program and also talent, scenery, sets, properties, writers and designers.

Projection TV: A combination of lenses and mirrors which project an enlarged TV picture onto a screen. Used for movie theatres mostly.

Props: An abbreviation for properties—all physical items used in a production, except for the costumes, sets and technical equipment.

Rating: An arbitrary system adapted by the TV stations to estimate viewers' reactions to different TV programs.

Rehearsal Room: An area for rehearsals of TV live talent programs. It is used in connection with complex studio productions.

Relay: A term used for the system and equipment which transmits the picture and sound by radio relay between TV stations, remote unit and station transmitter, or station and TV transmitter.

Remote Pickup: Special events picked up away from the station studio by the mobile unit and transmitted to the station for further distribution other than the station TV transmitter or the network.

Scene: Used in TV production in the theatrical sense.

Script: A written form or manuscript in which the TV program is drafted and finalized.

Set: Refers to stage sets and scenery.

Shading: Correcting the light distribution in the image produced by the TV camera. This is a control operation technique executed in the studio control room.

Shops: Refers to the work areas needed for the finishing and construction of scenery. Often includes the carpenter, painting, spraying, model and plastic shop.

Sight Line: An imaginary line drawn from the observer to the object. Used in facility planning to determine unobstructed viewing positions for the different types of control operators.

Sign-on, Sign-off: The required signals as specified by the FCC when starting and terminating the daily program.

Signal: An electrical impulse (video and sound respectively) carrying information.

Slide: A glass slide or mounted film of specific size which is televised through the slide projector for TV station transmission.

Sound Equipment: Includes all sound pickup and control equipment; also turntables, and magnetic tape recorders.

Sound Absorption: Sound is absorbed by a mechanism converting sound into other forms of energy. Materials for sound absorption depend largely on their porosity for their effectiveness.

Special Effects: Also called gimmicks, which include optical, electro-mechanical and electronic devices to obtain unusual pictures and illustrations.

Spot Announcement: A short sequence of commercial or public interest spotted in the intermission between two productions.

Spot Light: A light source designed to direct its main effort on a relatively small area.

Studio: Called live talent studio—the space in which production of TV programs for origination is executed.

Studio Control Room: An area adjacent to the studio in an elevated position to permit the control of the TV live talent production. The studio control room houses TV camera control equipment, sound control equipment and other auxiliary control facilities.

Super Turnstile Antenna: Is designed for TV use to radiate the signal well in all directions, and also to provide a substantial power gain.

Sustaining Program: A TV program in which the main or total expense is carried by the TV station or network without or with only slight commercial reimbursement.

Switch: A control technique in which instantaneous switching from one camera to another is accomplished.

Simulcast: Simultaneous broadcasting of a live talent program on television and radio.

Take: A picture held by a TV camera ready for transmission.

Technical Director: He is responsible for the technical operation of the camera crews and handles the final technical picture control.

Telecast: The broadcasting of a TV program.

Tempo of Adaptation: A planning term indicating the rate of growth in a TV station facility and equipment program.

Test Pattern: A transmitted pattern of lines and circles to permit the TV home viewer to adjust his set. Also used for transmitter test purposes.

Tower: The structure which carries the TV antenna.

Transmission Line: An electrical conductor which conveys radio frequency energy from one point to another. Because of resistance, inductance and capacitance, the transmission line presents

impedence to the flow of radio frequency energy.

Truss Floor: The floor which is utilized inside a building truss.

Turntable: A device to replay records.

UHF: Ultra High Frequency—normally about 300 megocycles.

VHF: Very High Frequency—normally between 30 and 300 megocycles.

Video: The portion of the TV signal which contains the picture information.

Viewfinder: Used in connection with the TV camera and is usually an electronic device.

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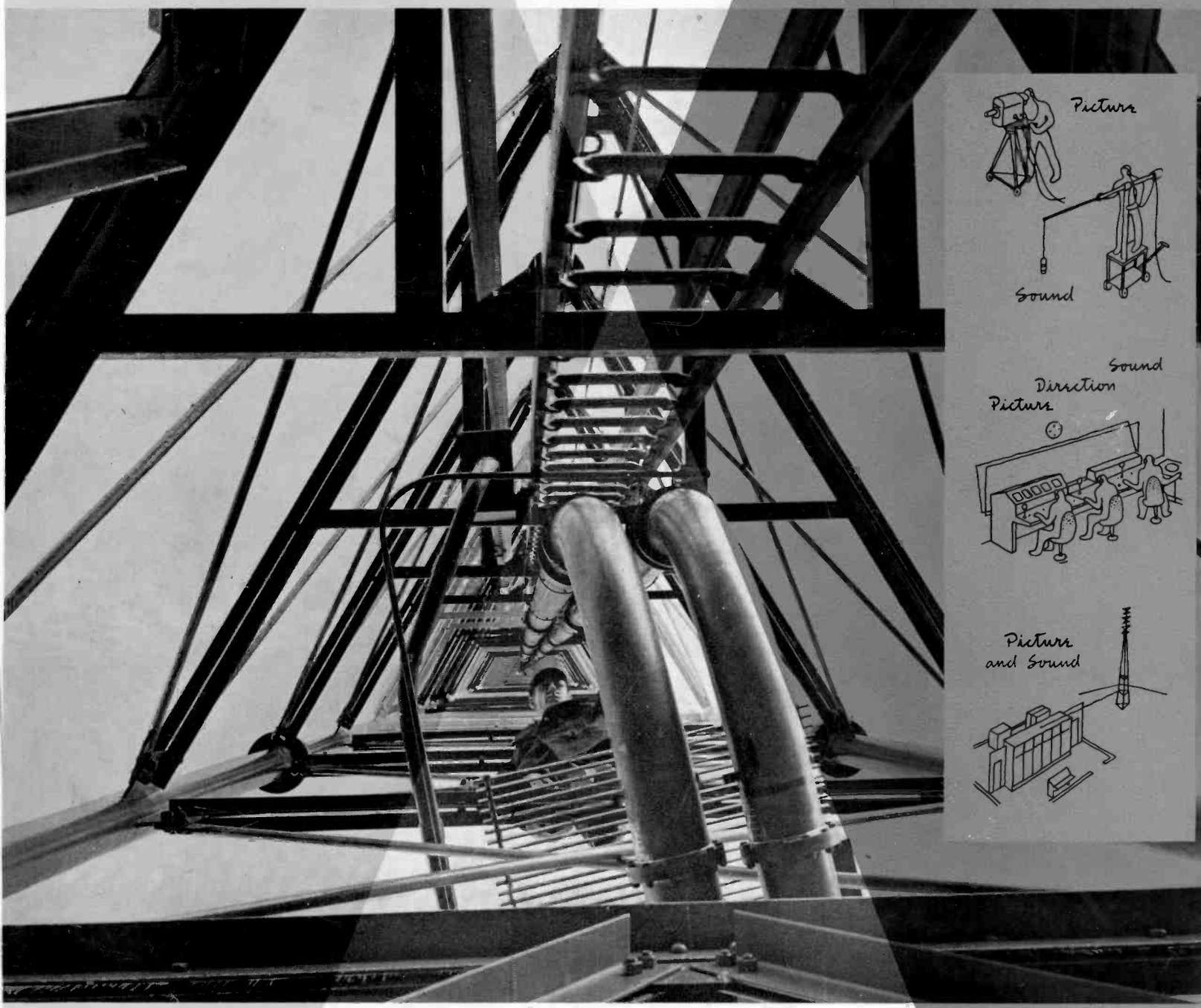

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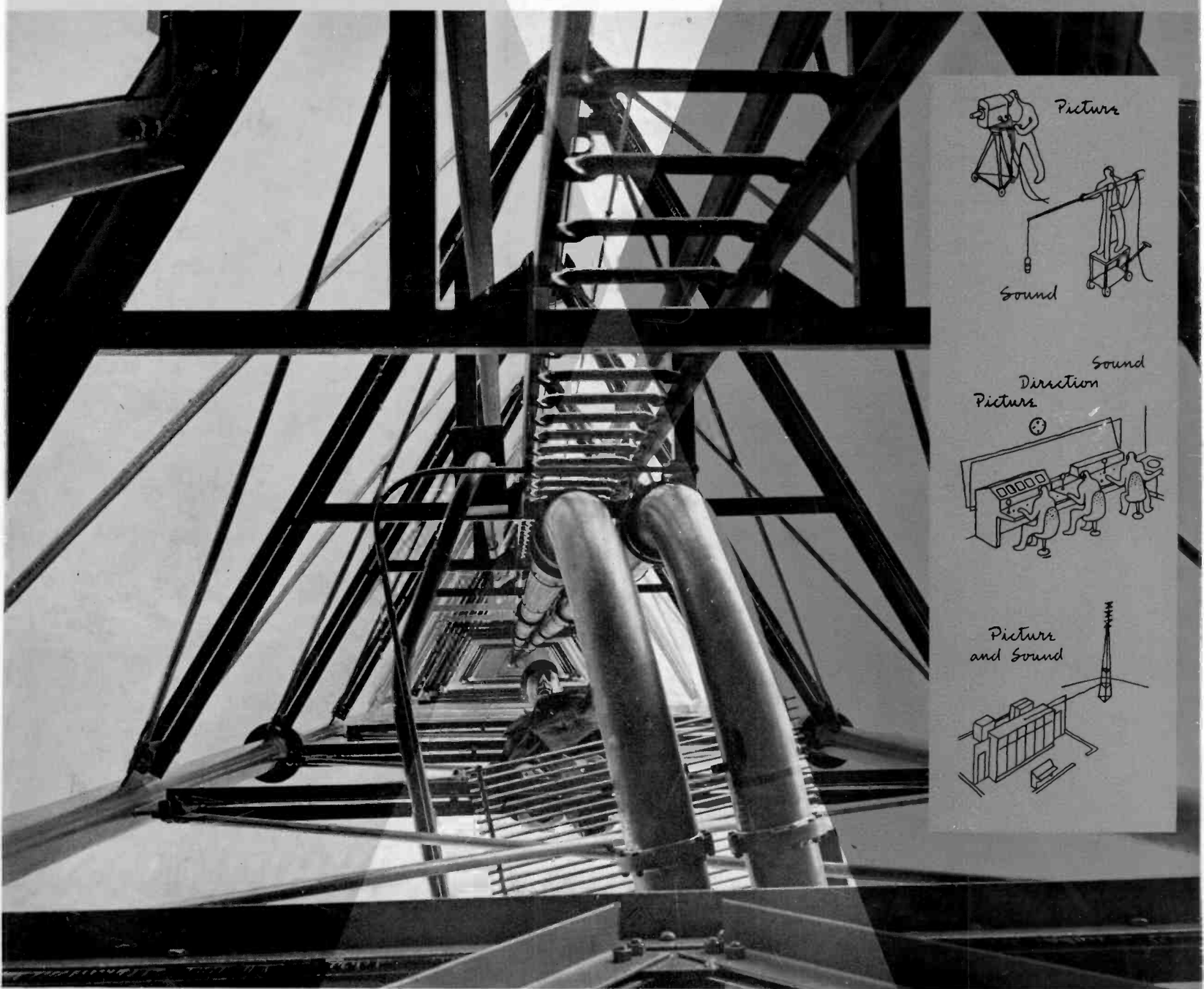

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