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Marconi

TELEVISION STUDIO PLANNING

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TECHNICAL FOLDER

FOR

TELEVISION STUDIO PLANNING

DATA.

CONTENTS.

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FLOW DIAGRAM

TELEVISION STUDIOS

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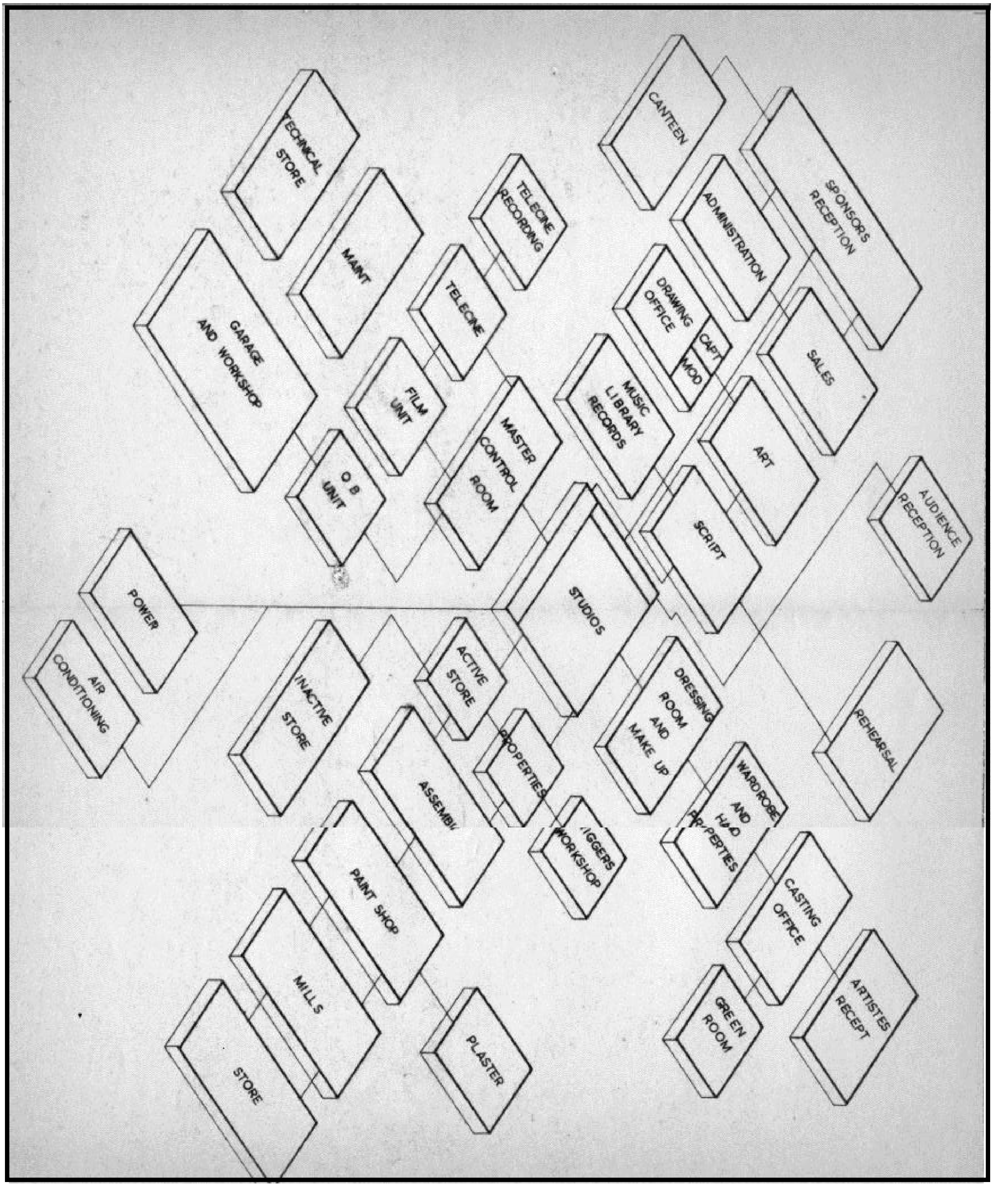
CANTEEN
SPONSORS RECEPTION
ADMINISTRATION
TECHNICAL STORE
TELECINE RECORDING
MAINT
TELECINE
DRAWING OFFICE
CAPT
MOD
SALES
GARAGE AND WORKSHOP
FILM UNIT
MUSIC LIBRARY RECORDS
MASTER CONTROL ROOM
ART
O B UNIT
SCRIPT
AUDIENCE RECEPTION
POWER
STUDIOS
AIR CONDITIONING
INACTIVE STORE
ACTIVE STORE
DRESSING ROOM AND MAKE UP
REHEARSAL
PROPERTIES
ASSEMBL
WARDROBE AND H-D PROPERTIES
RIGGERS WORKSHOP
PAINT SHOP
CASTING OFFICE
MILLS
PLASTER
GREEN ROOM
ARTISTES RECEPT
STORE

TELEVISION STUDIO PLANNING DATA

1. Overall Plan of Studio Centre

The site must be considered in relation to:-

a) Transmitter or Link to Transmitter
b) Cast and Staff Access
c) Public Access
d) Scenery and Property Access
e) Power Supplies
f) Local Noise Level
g) Local Electrical/Radio Interference
h) Availability of expansion space, car-parking etc.

2. Studio Dimensions.

The minimum useful size of studio is about 30 ft x 20 ft. - below this the cameras, mics, lighting equipment etc. leave little room for movement of cast. A rough general guide to studio areas is:-

Small "Presentation Studios"	- 600-1000 sq.ft.
Small Feature Productions	-1000-2000 sq.ft.
Audience Participation Games	-1500-2500 sq.ft.
Small Drama	- 2500 sq.ft.
Large Drama	- 6000 sq.ft.
Small Variety	- 3000 sq.ft.
Large Variety	- 6000 sq.ft.
Variety Theatre	- 12000 sq.ft.

3. Studio Proportions.

A minimum height of 15ft. for small studios is desirable with 20ft. for larger studios. The large studios should approximate to a volume of proportions 2 x 3 x 5 - or better the "Golden Mean" rule of 5 x 7 x 11. This will help the acoustic problems and provide a studio with adequate headroom. Where structural economy is important, a maximum floor-to grid height of 20ft. can be considered adequate.

The height is determined by the scenery used, and this in turn will frequently depend on the local standard sheet size of hardboard ("Masonite" etc.) which is frequently 8ft. x 4ft. or 10ft. x 4ft. At least 2ft. should be allowed between top of scenery and the lighting grid.

4. Studio Acoustics.

This problem for concert and film studios is adequately dealt with in standard works. The Reverberation Time of a TV Studio should fall somewhere between these two, the aim being to keep R.T. constant over the range 50 cps to 8 Kc/s. The studios must also be isolated from external noise and will need double-doors, and special attention to duct work. There is now a tendency to make T.V. studios more "live" than would have been thought wise a few years ago, as this also tends to reduce the cost of acoustic treatment.

5. Air-conditioning.

It is rarely economically possible to fully air-condition the studio, in which case the available funds should be concentrated on providing cool air to equipment and control rooms, dressing rooms and viewing rooms. Fans to cool the studio outside actual transmission times are useful. If the studio is to be fed with fresh air during transmission, care must be exercised to keep noise-levels low. Rarely will heating be required for the studio proper. Control rooms need 15-20 air changes per hour. Dressing and Audience Rooms 10-15 (Where smoking is not allowed). Local bye-laws will generally determine ratings required. Considerable economy in plant can be effected by "zoning" the air-conditioning so that different areas have air-flows graded to their duty period.

6. Studio Auxiliaries.

The "Flow Diagram" LT.4670 shows the main departments feeding the studio. All these services will exist in some degree in a complete system, but their juxta-position and importance will, of course, vary with each installation.

7. Equipment Rooms.

Floor-loadings of 100 lb/sq.ft are commonly met with, and adequate air circulation is essential. Easy entry for equipment, good duct connections with studios etc. are critical design points, details will vary with different manufacturers. It is quite possible, and obviously convenient to do without any floor ducting, by careful disposition of equipment.

8. The use of O.B. (Remote) Equipment

A great deal of programme material can be made available through the use of an O.B. unit, where all the equipment is compactly stowed into a vehicle weighing perhaps 7 tons total. The obvious thought is to use such portable equipment in the studio to ensure interchangeability, and economy of operation.

In general, however, the portable forms do not lend themselves to convenient studio operation, because of relatively poor accessibility and possible over-heating problems. Marconi equipment uses similar chassis in alternative mountings to meet both cases to the best advantage.

A very simple studio can be operated from an O.B. Unit, which drives in alongside when not required on remote shows. Generally a second set of camera and microphone cables will be required to save riggingtime, and the use of a permanent sound control booth will improve efficiency.

An O.B. Unit can be expected to handle each week 3 or 4 shows which require rigging work - or more if a separate rigging gang can lay additional cables in advance.

9. Quantities of Camera Channels.

With only one camera and normal lenses it is not possible to shift viewpoint - except by a break to film or slide - therefore two is a minimum. Three cameras will tackle anything, given reasonable studio space and adequate camera mountings. The fourth camera only becomes useful where trick shots are employed (involving superimpositions etc.) or where complex sets are used. A spare camera is useful for important "unrepeatable" shows - but regular preventative maintenance is probably more valuable! Where "live commercials" are used during the production, extra cameras may well be necessary. The zoom lens gives the valuable facility to concentrate attention quickly from a wide area to a small detail, but the effect must be used with discretion in studio productions.

10. Camera Mountings.

For the O.B. Camera a solid tripod (preferably of metal) is usually adequate, with a "castor base" or "skid" to improve mobility. Special "dollies" with motor-cycle wheels are available for working over rough ground. In the studio some rapid means of height adjustment is desirable, and camera mountings fall into these categories:-

a) Studio Pedestals with manual lift.
b) Studio Pedestals with counterbalance.
c) Studio Pedestals with motorised lift.
d) Studio Cranes with manual drive & lift.
e) Studio Cranes with motorised drive and lift.
f) Studio Cranes with counter balance.
g) Large Cranes for special effects.

In general a studio with 3 cameras will be equipped with 2 pedestals and 1 crane - any other requirements being met by interchange with other studios or hire from film companies. Dollies and Cranes are largely a matter of local preference - and finance available!

11. Lighting for the Studio.

The Image Orthicon camera scores in being the most sensitive, and lighting loads of about 30 to 40 watts per square foot of studio area are all that are necessary. Pictures can be obtained with lighting levels of only a few foot/lamberts - but for "sparkle" the highlight brightness must be kept up to 25-50ft/lamberts or so depending on depth of focus required and tubes in use. For the artist this sort of lighting level causes no discomfort, and indeed produces the right "theatrical" atmosphere.

The Studio Vidicon, in the present state of development, suffers to some degree from smearing of movement unless high lighting levels are maintained. For "Presentation" Newsreader or Announce work, they are entirely adequate and are relatively simple to operate. Roughly 50% more light than for the Image Orthicon (ie. 40-75ft/lambert highlight) will produce good quality pictures with the Marconi cameras.

12. Sound Equipment

The TV Studio demands greater flexibility from the sound equipment than the normal "sound" broadcasting studio, and the High Frequency (often F.M.) transmissions demand more critical standards of performance; therefore, adequate sound facilities must be provided.

The main sound pickup will be from directional microphones mounted on movable booms, and manoeuvred by an operator to be as near the source as possible without coming into picture or casting shadows in the picture area. In addition however, a large number of channels are required to deal with fixed microphones fitted at strategic points in the studio (in or out of picture) and for the high-level inputs from film machines tape replay and turntables. In all therefore, more channels are required than for 'sound only' broadcasting. The relatively high noise level in the TV Studio means that directional microphones must have more prominence, and each microphone will serve a small studio area.

An additional consideration is that the vocal artist who has made a reputation in film and gramophone recordings will almost invariably have had the benefit of various devices in the recording studios to increase the effect of their act, and thus filter, echo (variable in amplitude and harmonic content) and similar "effects" are called for in the TV Studio sound installation. The net result is that sound apparatus costs must be allowed about 1/3rd of the vision apparatus.

13. Telecine Equipment.

Standard motion pictures of 16 and 35 mm. width are taken at 24 frames per second and have soundtrack at one side of the picture. When transmitted on a television system which has 25 interlaced pictures per second the film-speed (and hence pitch of sound) is normally raised to 25 frames per second for easy synchronisation. The increase in speed has in practice little effect except a reduction in running time. On 30 cycle systems the film projector has to be run in an 2-3-2-3 sequence of television fields relative to picture frames - and the projector mechanism is accordingly more complicated.

Three major systems are in use:-

a) Vidicon pick-up tube
b) Flying-spot system with film "immobilised" by rotating prism or split optical system
c) Iconoscope pick-up.

The first of these is rapidly superceding the other methods on account of the relative simplicity and excellence of results. It is fortunately not greatly affected by the non-synchronism of the film frame rate referred to above. Generally an optical multiplexing system is adopted to allow several projectors to show into a single camera, and a typical assembly would be two 16 mm. projectors, two slide projectors (showing 2" x 2" miniatures slides) and an opaque viewer. The use of 35 mm. projectors is largely confined to large broadcasting authorities, in general the 16 mm. film gives adequate performance when properly operated.

Sound on 16 mm. film is not always of sufficiently good quality, but the use of magnetic stripe or separate magenetic sound film is gaining ground and producing vastly improved sound quality.

14. Film Cameras

An important consideration in TV operations is the production of short film sequences to provide "Outdoor" shots in studio productions, background scenes for mixing or back-projection, and newsreel material. The 16 mm. film with magnetic sound has many advantages in cost and portability and combined sound/picture cameras are available which give exact synchronism. Means must be provided for handling the processing of such films where large-scale commercial processing laboratorks do not exist and the telecine equipment must be capable of reproducting them, if possible in negative as well as positive form.

15. Telerecording

It is frequently desirable to record programme from the television system (for re-use later, or for distribution to other stations) and considerable economies in operation are possible by programme exchange between stations. While magnetic tape has the advantage where local variations of time zone make short-term storage of programmes desirable, for general use recording on film is more convenient and in particular 16 mm. films recorded by the "fast pull-down" or "afterglow" systems give full information on the recording. So-called, "suppressed frame" or "alternate field" systems only record half the picture information and thus cannot compare favourably.

Sound is best dealt with magnetically, where local processing must be undertaken, as extreme accuracy is essential if optical tracks are to be recorded on the same film without loss of response.

16. Test Signals.

Standard forms of vision and sound signal must be available for testing prior to transmission, and to help the public and dealers to setup receivers. A monoscope pattern is frequently radiated for this purpose, accompanied by suitable sound recordings. Such test patterns should be equivalent to an average picture (i.e. containing a large proportion of 50% grey or equivalent) and bear resolution test lines or wedges which are capable of reception by properly adjusted equipment. A stepped grey-scale and geometry test lines are valuable, but in general the receiver manufacturers do not look favourably on too critical a test of receive linearity. Thus for internal use, more rigorous tests are essential and these usually are generated by special electronic circuits. Useful test signals are:-

a) Grating or grille (geometry check)
b) Spike (amplifier overshoot and response)
c) Sawtooth (amplifier linearity)
d) Cross (low frequency response & streaking)
e) Step-wedge or "stair-case" (greyscale)
f) Black/White (amplitude check)

The sound equivalents are stable oscillators of standard level and frequency which can be used to check audio systems. Generally a tone of about 800/900 cps is used for "line-up" and provided with keying means from the master clock for time signals, 1000 cps being reserved for standard frequency transmissions.

17. Maintenance

The complexity of television equipment means that a high degree of reliability can only be achieved by careful "preventitive maintenance" and full facilities must be provided to enable the staff to keep equipment in efficient condition. The technique of feeding amplifiers etc. with signals sweeping through the spectrum and displaying the input/output characteristic shows a considerable saving of time and gives easily visible results. Any falling-off in performance can be quickly detected and transmission breakdown prevented.

The bulk of failures occur as a result of valve faults, and with complex equipment the breakdown rate follows closely the laws predictable by a knowledge of statistics. The Marconi Company have therefore, on new designs, reduced the number of valves and increased the predictable life of those valves, by the use of long-life types of closely-maintained characteristics.

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