Theater Engineering Committee Report

By BENJAMIN SCHLANGER, Chairman

THE SMPTE SENT theater owners a screen questionnaire dated May 25, 1953, that was designed to help the industry determine how much larger most theater screens could be made and also what limits on picture aspect-ratio accommodation are fixed by physical conditions in the theaters. Out of 370 questionnaires returned, 330 had sufficient data to be useful in the study that is reported here.

Because the number of theaters represented is so small, the results actually show a number of typical situations that do not necessarily align with any national averages that might have been drawn, had most theaters in the country been included. But the value of the information derived should not be minimized on this score.

It is desirable to compare the number of surveyed theaters in certain categories with the number of theaters in those same categories throughout the United States. To make this possible, theaters were considered as falling into three groups; those with up to 500 seats being the first group, the second group to include those with 500 to 1500 seats and the third group those with 1500 seats or more. The percentage of surveyed theaters in these groups and the actual percentage of U.S. theaters falling in the same grouping are as follows:

Group	% *Theaters Surveyed*	% *Theaters in U.S.*	
Up to 500	18	51.9	According to statistics obtained from MPAA
500–1500	46	42.5	
Over 1500	36	5.6	

Although the sample includes information on a disproportionate number of large-circuit theaters and large-seating capacity theaters and in consequence, theaters in densely populated areas, it was felt that much worth-while information was still to be derived because the percentage of surveyed theaters that fall in the middle group of from 500 to 1500 seats differed from the percentage of this group in the whole United States by only a few percent.

Referring to the accompanying tabulation, column 1 shows the average maximum viewing distances that were found in this survey. In the first group the average maximum viewing distance is about 80 ft; in the second group, about 103 ft; and in the third group this distance is about 120 ft. The range in the latter group is quite wide, however, the lowest distance being about 100 ft and the highest being about 180 ft. This factor of viewing distance is very important because it helps to determine picture size or, stated in other terms, minimum angle subtended in viewing motion pictures from the back row. This information will also be helpful in reaching conclusions in relation to picture aspect ratio.

The survey also supplied valuable information on average picture height available. This is a key figure, which will have influence on the determination of an optimum picture aspect ratio. In column 2, in the smaller theater group, the average picture height available is a little under 15 ft. In the second grouping (of 500 to 1500 seats) the average picture height is about 19 ft, ranging from a low of 16 ft to a high of 23 ft. In the third group, the height does not increase as much as one might expect, the average height being only 21½ ft, or only about two feet more than in the group of theaters between 500 and 1500 seats. This limitation is due, in the latter group of large theaters, mostly because of the overhang of balconies. Most of these theaters have balconies, causing this restriction of view of increased screen height. These large theaters were patterned after the old stage theaters where the trapeze act set the

Presented on October 9, 1953, at the Society's Convention at New York by Benjamin Schlanger, Theater Consultant, 35 W. 53 St., New York 19, N.Y.

SMPTE Indoor Theater Survey Data.

Seating Capacity	1 ft	1 in.	2 ft	2 in.	3	4	5 ft	5 in.	6 ft	6 in.	7 ft	7 in.	8 ft	8 in.	9 ft	9 in.	10	11	12
Up to 300	77	5	13	7	1.5	Less	25	10									9		
301 to 400	79	3	14	6	1.77	than	26	5	80	4	26	9	14	8	26	5	22	60	51.9%
401 to 500	82	6	15	2	1.87	38 ft avail-	27	6									29	18%	
501 to 600	83	5	16	0	1.91	able	27	10									21		
601 to 700	84	7	18	8	1.81		28	2									17		
701 to 800	91	4	18	8	1.87		30	5									20		
801 to 900	84	2	18	0	1.88		28	0									15	154	42.5%
901 to 1000	95	0	19	0	1.94	1.85	31	8	102	7	34	10	19	2	34	6	26		
1001 to 1100	106	11	20	0	2.00	1.80	35	5									11		
1101 to 1200	107	4	19	10	2.27	1.97	35	9									11	46%	
1201 to 1300	106	9	21	4	2.25	1.84	35	4									10		
1301 to 1400	112	6	21	8	2.10	1.79	37	6									11		
1401 to 1500	107	0	22	9	2.16	1.78	35	7									12		
1501 to 1600	104	0	20	10	2.14	1.80	34	8									13		
1601 to 1700	106	0	22	0	2.30	1.79	35	4									14		
1701 to 1800	120	2	22	2	2.23	1.78	40	0									16		
1801 to 1900	105	11	20	6	2.16	1.86	35	4	120	4	40	6	21	6	38	8	9	120	5.6%
1901 to 2000	113	2	20	5	2.06	1.88	37	9									8		
Over 2000	129	9	21	8	2.19	1.77	43	4									60	36%	

(1) Average maximum viewing distance
(2) Average picture height available
(3) Aspect ratio for maximum picture height & width available
(4) Aspect ratio for maximum picture height available and proposed maximum of 38-ft picture width
(5) Picture width on 3W basis
(6) Average maximum viewing distance by groups
(7) Average picture width on 3W basis by groups
(8) Average picture height available by groups
(9) Average picture height available by groups used to give picture width for 1.8 to 1 aspect
(10) Number of theaters
(11) Number of theaters by groups and percentage of total survey
(12) Percentage of total number of theaters in U.S. for same grouping

height limitation to about 20 ft above the stage floor.

The next compilation of figures that might be of interest is available aspect ratio. The maximum height and maximum width available indicate the following aspect ratios. In the first group the aspect ratio ranged from 1.5 to 1.87:1.00. In the second group the aspect ratio ranged from a low of 1.81 to a high of 2.27:1.00, the average being about 1.9:1.00 in this latter group. In the group of 1500 seats and over, the low aspect ratio was 2.06:1.00 and the high 2.30:1.00. If an aspect ratio greater than the average (and the average in these very large theaters is about 2.2) were desired, a sacrifice in the height of the picture would have to be accepted.

In column 4 is an interpolation of what would happen to aspect ratio, if all the available height and an arbitrary maximum width of 38 ft were to be used. The 38-ft maximum was chosen because greater magnification of picture image from 35mm film will show disturbing film grain. The average maximum aspect ratio under these conditions comes close to 1.8:1.00.

Discussion

Morton D. O'Brien (*Assistant Director, Projection and Sound, Loew's Theaters*): In making your computations did you base them on the fact that every seat in the theater was available at these ratios and these sizes of screens or did you incorporate a loss of a certain amount of seats in these theaters?

Mr. Schlanger: The interpolations made in this analysis were based on the assumption that all existing seating would remain in use, but knowing that there would necessarily be some existing seats nearer the screen that would be less desirable with bigger screens.

William A. Shurcliff (*Polaroid Corp.*): Do I understand that over half the theaters in the country then cannot accommodate an aspect ratio more than about 1.9 unless they cut down the height?

Mr. Schlanger: The survey indicates that this may be so.

Standards PH22.5, —.12 and —.93 Related to 16mm and 35mm Low-Shrink Film

Three American Standards, approved by the American Standards Association on December 17, 1953, are published on the following pages. Two (PH22.5-1953 and PH22.12-1953) are revisions of previous standards; PH22.93-1953 is a new standard. These three standards were published previously for trial and comment, and the background information on their development and processing will be found in the December 1952 *Journal*.—*Henry Kogel*, Staff Engineer