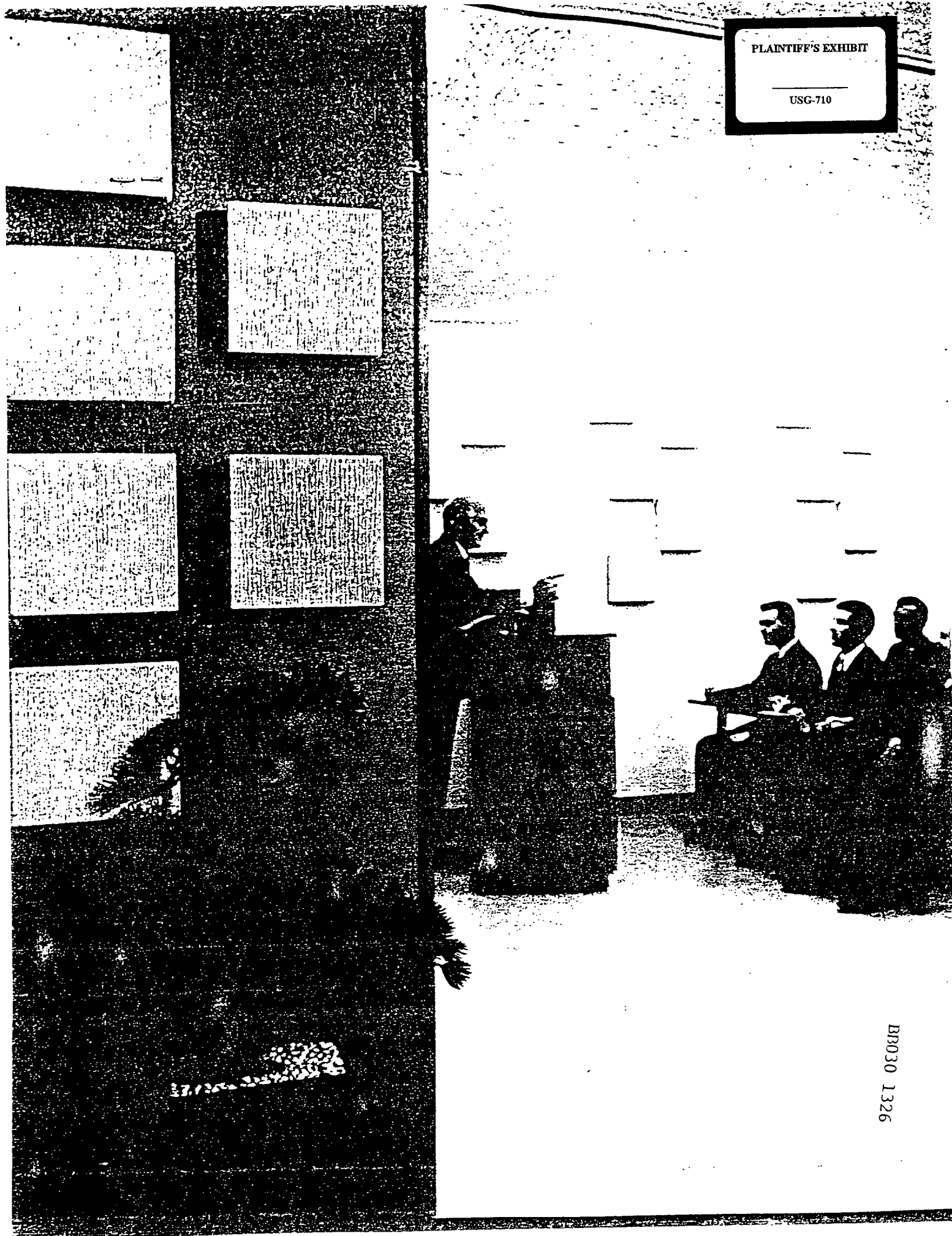


PLAINTIFF'S EXHIBIT

USG-710



BP030 1326

Acoustone Space Units...

free-standing

sound absorbers

One foot square and two inches thick, ACOUSTONE Space Units absorb up to three times as much reflected sound energy as one square foot of high-efficiency acoustical tile conventionally applied with adhesive.

Beautifully effective, unusually flexible in use . . . this third dimension in sound control works when no other method will. When mounted on ceiling or wall, all six Space Unit surfaces absorb unwanted noise. Space Units can serve as primary acoustical treatment, or as economical supplements in areas where it is impractical or unnecessary to install acoustical material throughout the room. Thus, the addition of this third dimension in sound control adds a new dimension to the architect's ability to solve complex acoustical—and incidentally decorating—problems.

For the comfort of quiet . . .

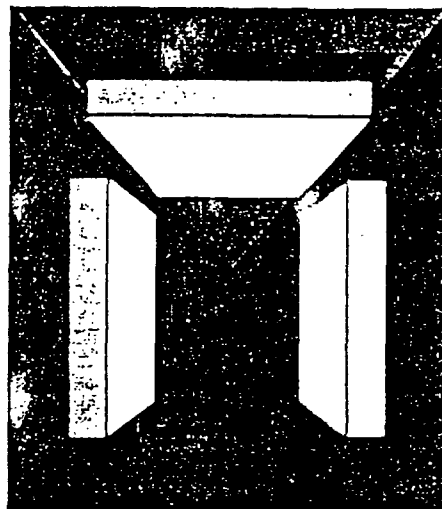
consider an example of the exceptional efficiency of ACOUSTONE Space Units:

Smooth plaster walls have a sound absorption coefficient of only .04. ACOUSTONE tile, adhesively applied, rates .83 at 500 cps. ACOUSTONE Finesse Space Units, in 32-inch patch arrangements, have a coefficient of 1.85—over twice the efficiency. And at 250 cps, that figure is .93 vs. .27 for conventional tile application—over three times the efficiency.

Where intelligibility is critical . . .

ACOUSTONE Space Units permit precisely metered control of reverberation, better understanding of speech for optimum communication. Units can be used alone or in combination with other acoustical treatments.

As an example . . . if continuous room noise is reduced by one-third, the speaker need expend only one-fourth the vocal effort (energy) to be heard at the same loudness by his audience. Or, he can move back twice the distance. Similar statistics apply to intercom, public address, or other telephonic systems in use. Additionally, precise control of reverbera-



tion to build in optimum room characteristics will provide most efficient audio-utilization of that room.

When developing a new design . . .

ACOUSTONE Space Units permit almost unlimited design flexibility. Units are available in three distinctive patterns, each in effect a 12-inch module that invites your ingenuity to add texture and pattern to a wall. They show decorator distinctiveness, without demanding a premium price.

When remodeling . . .

ACOUSTONE Space Units give both freedom and function. They work efficiently where most ordinary acoustical treatments won't. They offer stunningly attractive interiors that few viewers would realize are working walls of acoustical treatment.

When correcting troublesome areas . . .

ACOUSTONE Space Units let you add precisely measured sound control, exactly where required. You can provide efficient, effective supplementary sound control easily, economically, attractively.

Uncontrolled reverberations transform sound into noise, disrupting effective communication. ACOUSTONE Space Units permit precision sound control, while adding decorative accents to room interiors.

*Reg. U.S. Pat. Off.

BD030 1327

Sound Control, Beautifully Done and Practical

Beauty that blends with any decor

Attractive, richly textured surfaces complement any interior. The three standard surfaces offered are carefully selected to be most compatible with a broad range of interior designs. Custom designs, available on special order, can feature a company trademark or other symbol. The highly light-reflectant, neutral white finish may be redecorated to suit individual needs.

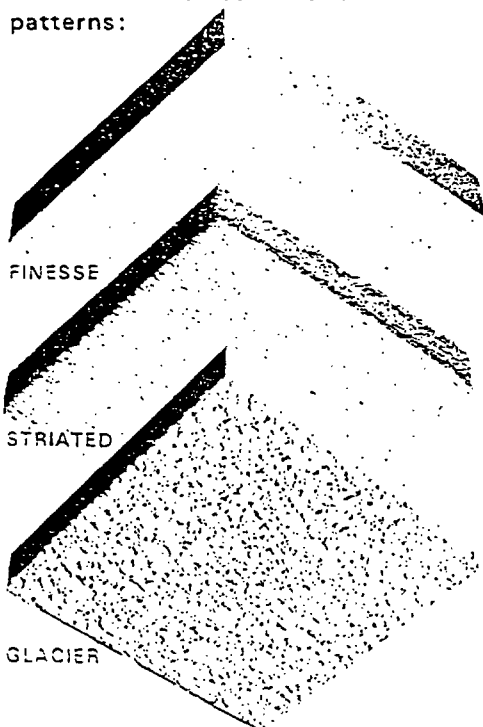
Dirt resistant . . . easy to maintain

While highly resistant to soiling, ACOUSTONE Space Units may be easily cleaned with conventional methods. Quick removability of Units simplifies cleaning of rear surfaces. Optional "PC" plastic coating greatly improves washability—an ideal choice for high-soiling interiors.

Fire resistant Class A

Incombustible ACOUSTONE Space Units are of mineral fiber composition, and employ metal mounting hardware. For fire and sound ratings of ACOUSTONE Tile, see U.S.G. Technical Folders b-1559 and f-1929.

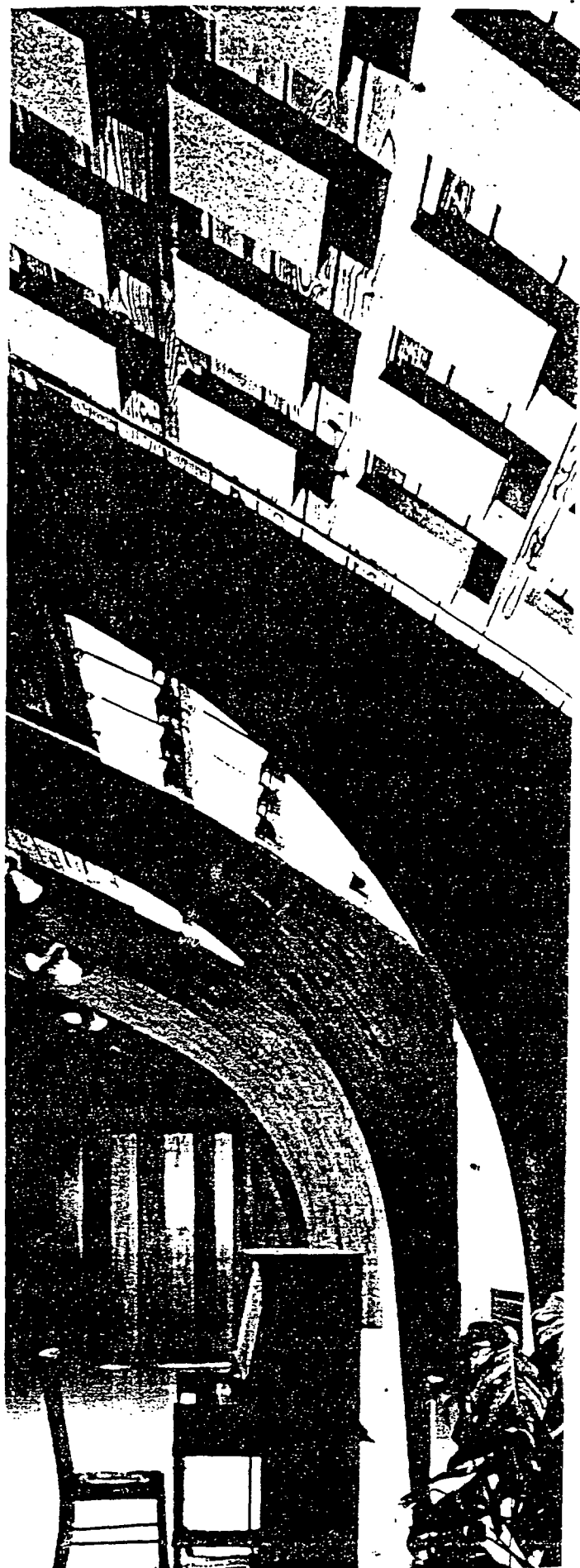
Choose from three surface patterns:

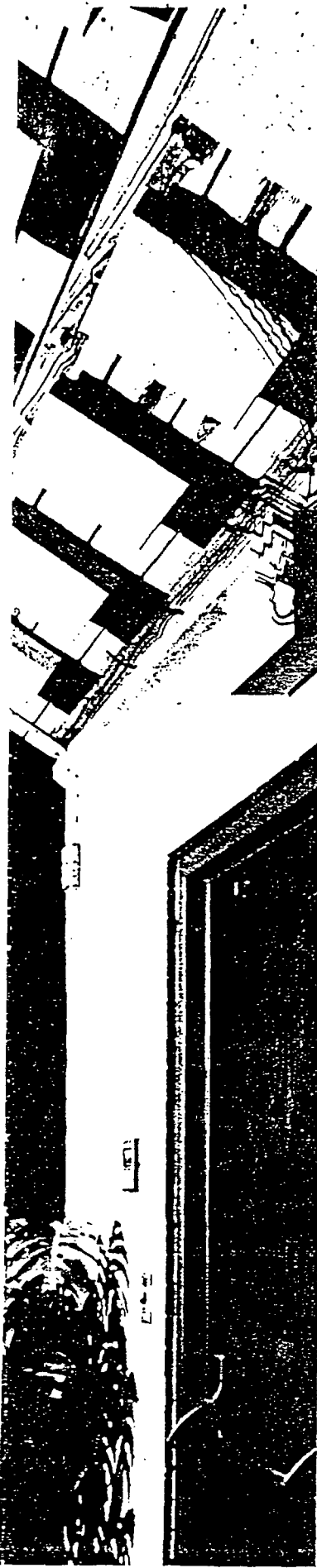


FINESSE... Classically beautiful and subdued . . . created by subtle fissures within the finely textured natural surface

STRIATED... A handsome bas relief pattern, permanently etched into the surface by an exclusive U.S.G. process

GLACIER... Bold, rich texturing created by deep, heavy fissures on the natural, unplanned surface

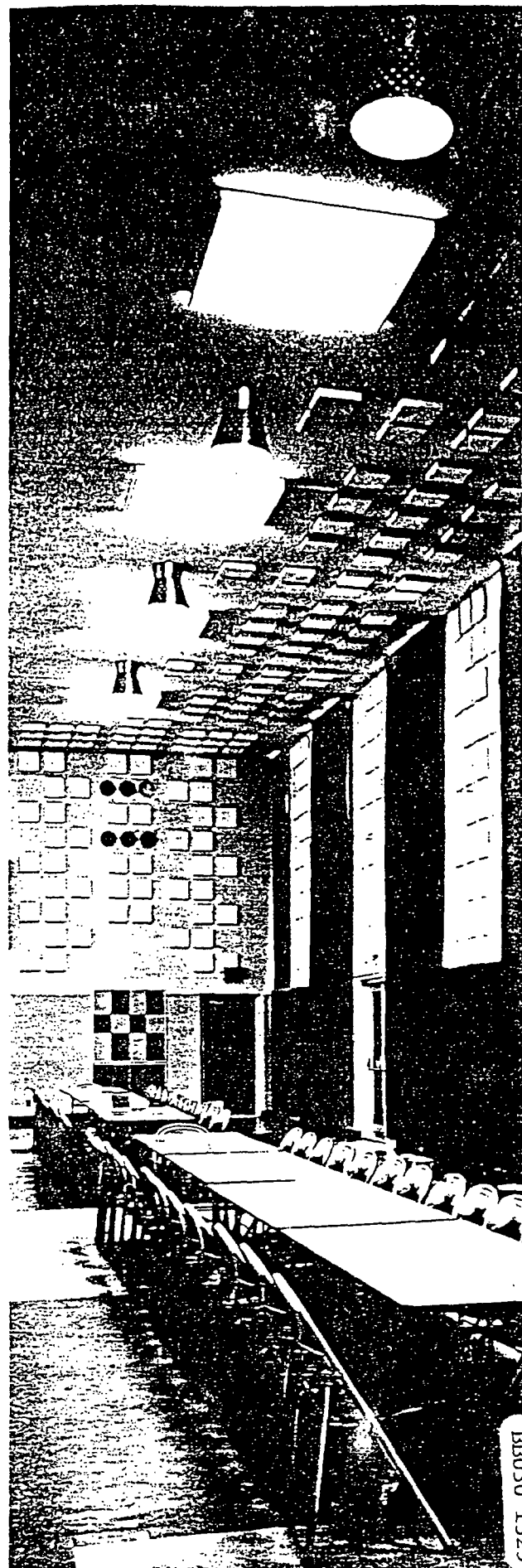




Highly reflective wood ceiling surface is treated ingeniously with ACOUSTONE Space Units.



ACOUSTONE Space Units permit precision treatment of interiors, such as multi-purpose rooms with difficult-to-resolve design considerations.



Exceptional Versatility of Installation

FROM WALL

Spin-on Clip

Most installations will use the standard wall clip. It should be located not closer than 16 in. o.c., or 9 in. from any obstruction, to allow free rotation of the unit during installation.

Secure clip to wall using two suitable fasteners. To attach Space Unit, position the pre-cut hole on the unit's back to engage the machine screw factory-attached to the clip. Turn the unit clockwise until secure. Do not over-tighten, as this could strip the nut within the Space Unit.

Snap-on Clip

Specify use of this supplementary fastener where Space Units must be spaced closer than 16 in. o.c., or less than 9 in. from obstructions (noting that a 12x12-in. Unit cannot be mounted closer than about 13" o.c.). Typical installations are concrete waffle slab, intersecting walls or ceilings, columns, or pilasters.

Secure the standard wall clip to the wall with two fasteners. Attach supplementary Snap-on Clip to Space Unit with a 1½-in. USG Brand Type G Bugle Head Screw; or 10-24 machine screw.

Finally, press the two clips together, by first engaging the Snap-on Clip's upper lip and then the lower.

Although Space Units are not recommended for use where they are subjected to bumping or impact, they can be made more rigid by shimming.

FROM CEILING

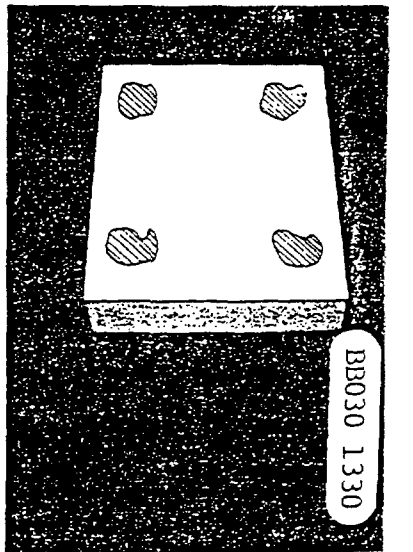
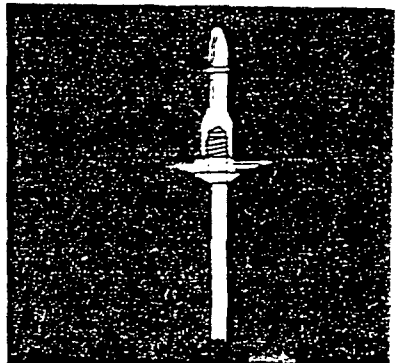
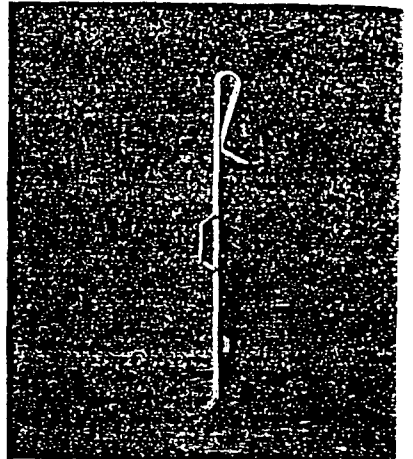
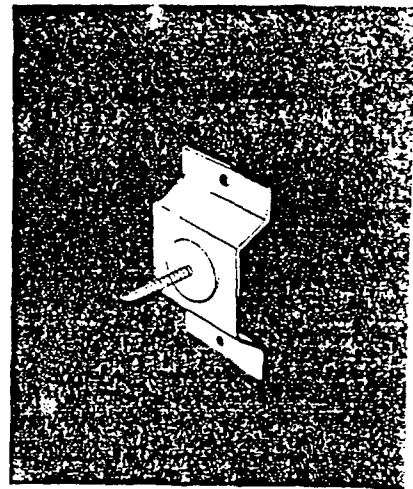
Pendent-style mounting

ACOUSTONE Space Units may be suspended from all conventional ceilings using a ¾-in. rod threaded at both ends (with 10-24 thread at Unit). Plaster, wallboard or other ceiling panels should be drilled to accept the rod and a standard toggle. Add "FASTEX" nylon snap-on caps as shown. The Space Unit is added by spinning it onto the hanging rod. In masonry, a RAMSET drive-in stud (10-24 internally threaded, No. 2526 and 2527) must be installed to accept the threaded rod.

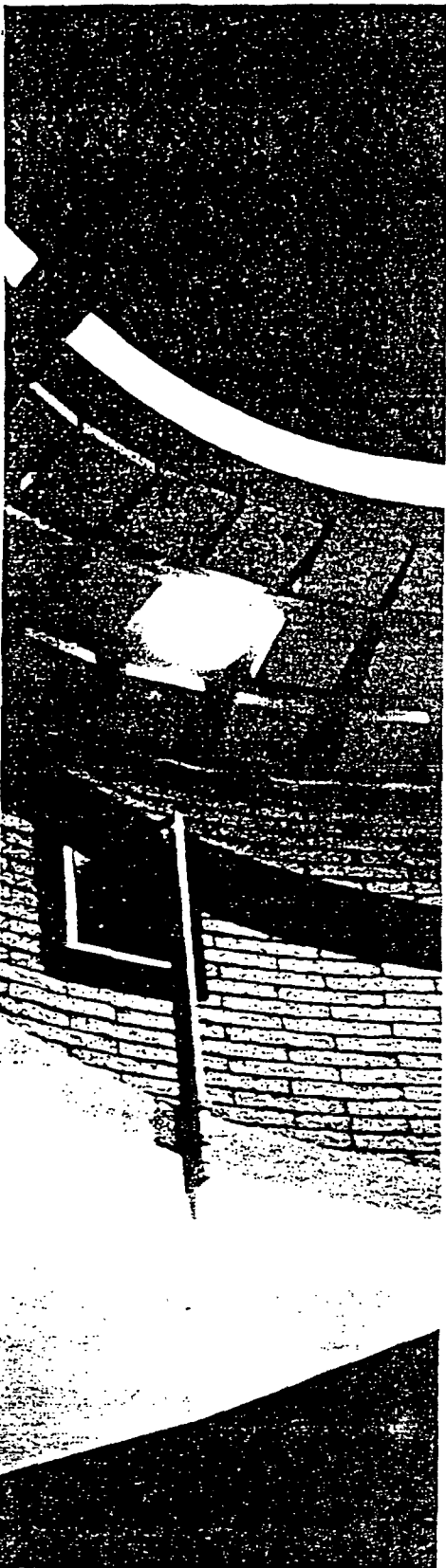
Adhesive mounting

ACOUSTONE Space Units may be conventionally applied using regular acoustical tile adhesives, although some reduction in the Unit's sound-absorbing efficiency may result. To each unit, apply four 1-in. daubs of:

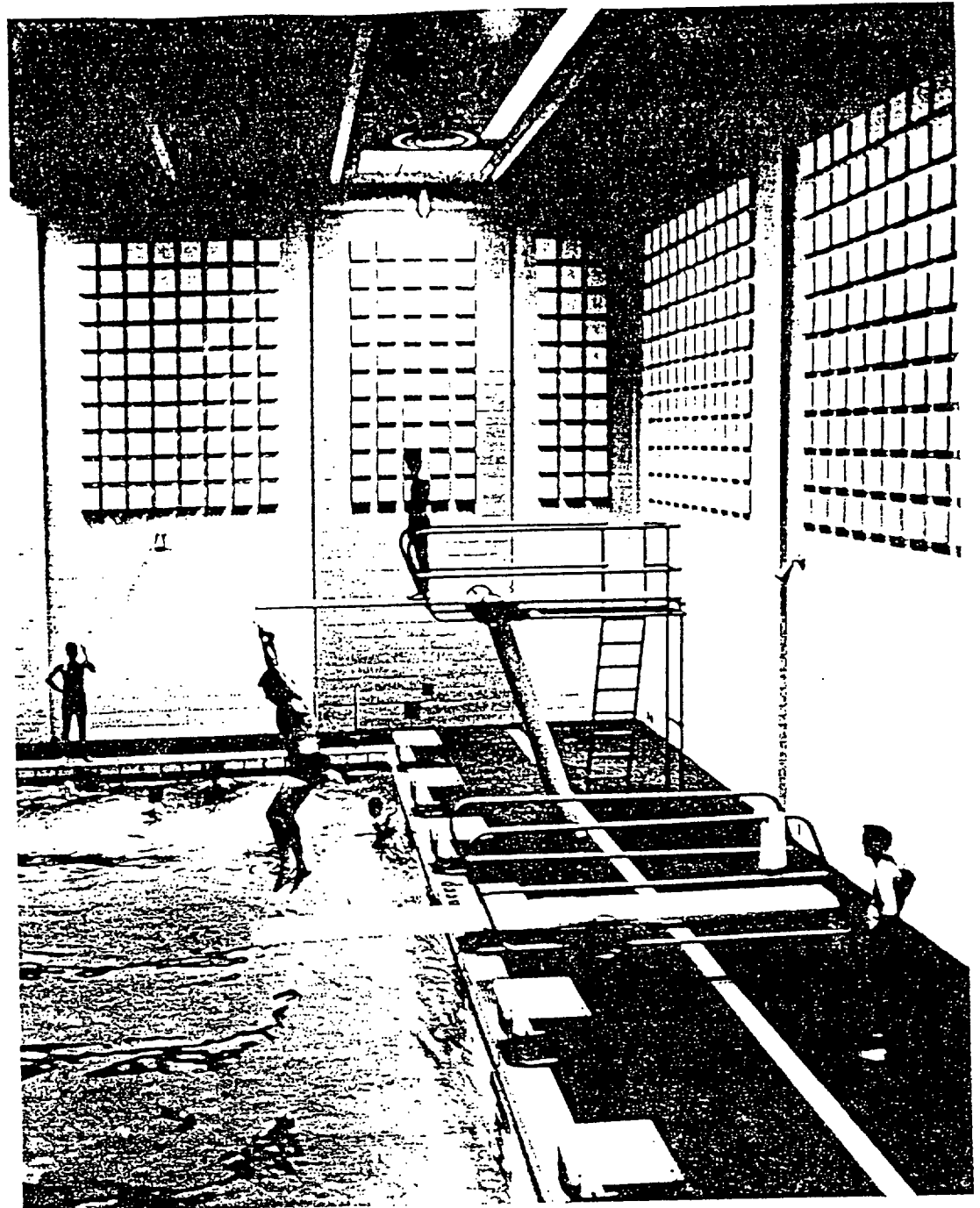
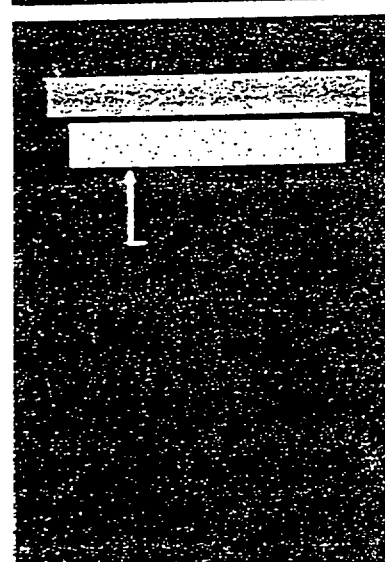
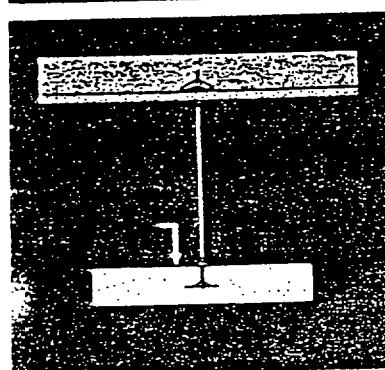
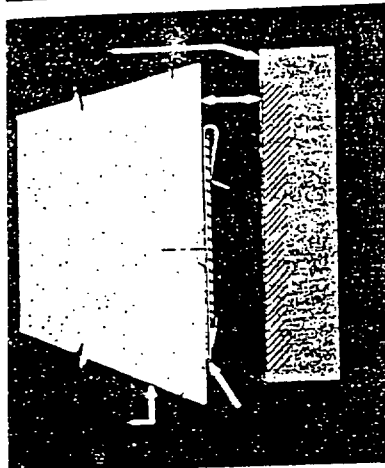
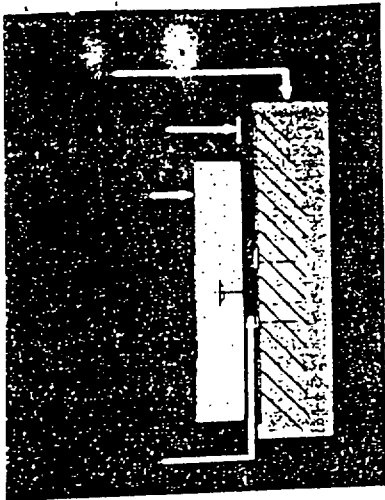
- (1) Acousti-Gum (Templar, Inc., South River, N.J.), or
 - (2) Acousti-Bond (A. F. Bogart Co., Philadelphia, Pa.), or
 - (3) Penco Super Shur Stick (McGuffie Co., Cleveland, O.).
- All recommendations and product limitations set forth by the specific adhesive's manufacturer must be observed.



BD030 1330



ACOUSTONE Space Units are not abutted, hence simplify application to surface shapes that would make conventional treatment difficult.



ACOUSTONE Space Units may be installed on ceiling or wall. Their inherent water resistance permits installation in many areas, including swimming pools, where great variations in humidity and temperature might otherwise cause problems.

Design Data

Reverberation is one of the most important aspects of acoustics that may be applied to architecture. Reverberation is the perpetuation of sound within a space after the source has ceased, such as an echo. Reverberation time is the time required for sound to die down to one millionth of its original value after the source has ceased.

Reverberation time relates directly to room noise and its effect on communications. If sound persists over a long period, speech becomes impossible; music blurs and lacks clear definition; distracting noises are prolonged. Rooms with reverberation times of more than 2 seconds are considered "live" or excessively reverberant and communication is difficult because reflected syllables overlap those travelling directly to the listener. When sound decays too rapidly—below .6 seconds—the room is considered "dead".

Studies on speech intelligibility and acceptability of performed music reveal that average reverberation times generally fall within the following ranges:

SPEECH

Small offices—	.50 to .75 seconds
Classrooms—	.75 to 1.0 seconds
Work rooms—	1.0 to 2.0 seconds
Lecture rooms—	.75 to 1.0 seconds

MUSIC

Chamber music—	1.0 to 1.5 seconds
Orchestral, choral, average church music—	1.5 to 2.0 seconds
Large organ, liturgical choir—	2 seconds and higher
Rehearsal rooms—	.80 to 1.0 seconds

The reverberation time depends on the room volume and the total absorption of wall, floor and ceiling surfaces, furnishings, and occupancy. The reverberation time for any room can be found by using the following formula:

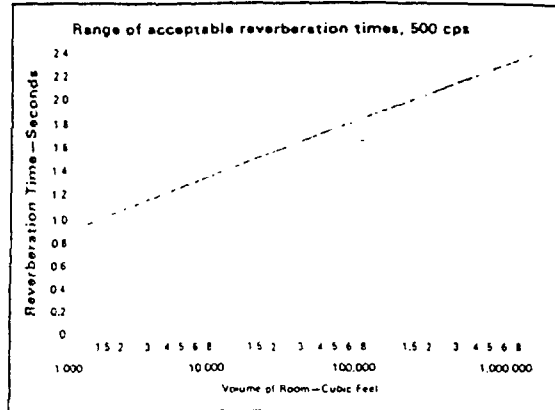
$$T = \frac{0.05V}{a}$$

where T = reverberation time in seconds

V = volume of room in cubic feet

a = room absorption in sabins

(One sabin is the equivalent of one square foot of material having an absorption coefficient of 1.00.)

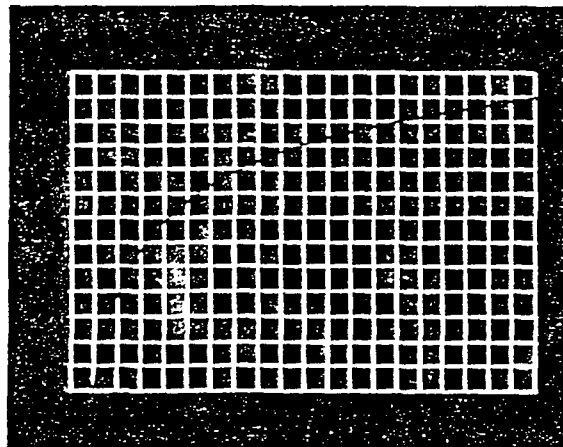


The lower part of the band should be used for rooms intended primarily for speech, the upper part for churches and concert halls where music is emphasized, and the middle portion for general purpose rooms where both speech and music may be presented.

Loudness Reduction

The amount of reflected sound energy reduction provided with Acoustone Space Units is inversely proportional to the ratio of absorption, $a_2:a_1$, between the treated and untreated room. If, as shown in the example below, 800 sabins of absorption were added to an untreated room having 400 sabins of absorption, the reflected sound energy would be in the ratio of 400:1200; reduced to one-third the untreated level.

The human ear does not judge reduction in loudness as a direct proportion to the reduction in sound energy level. The graph below shows the relationship of the absorption ratio to the percent loudness reduction apparent to the ear.

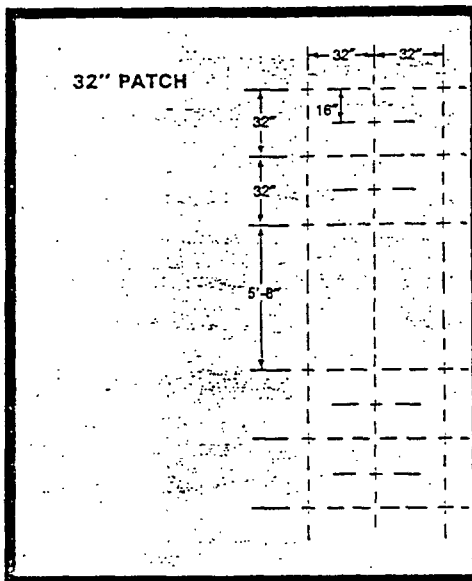
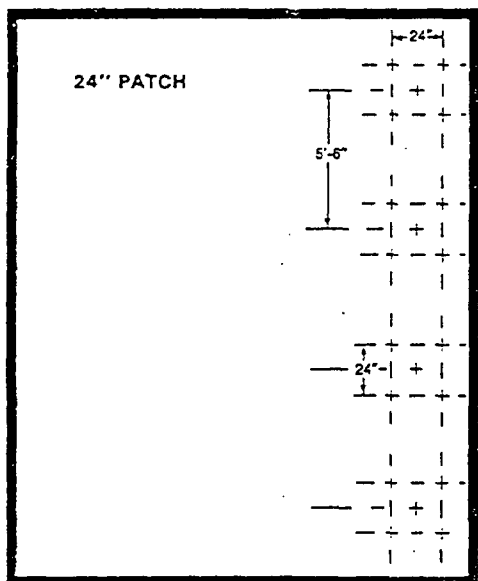
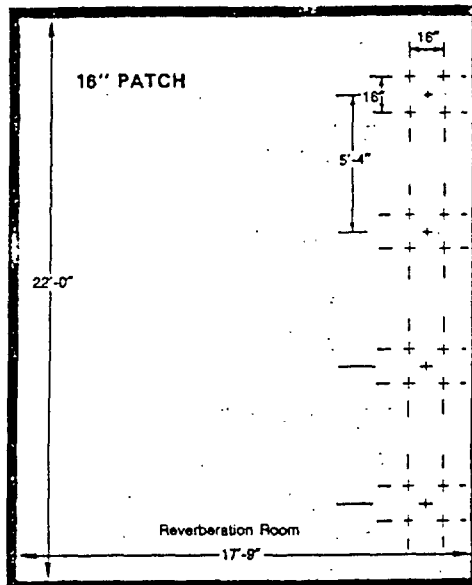
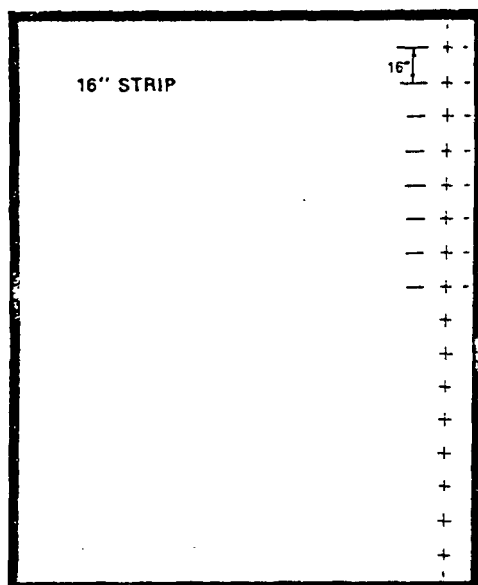


Note that a 2:1 absorption ratio effects a 20% reduction in loudness; and a 3:1 ratio gives a 25% reduction.

Sound Absorption Coefficients

General Building Materials and Furnishings	Coefficients (sabins per sq. ft. except as noted)					
	125 cps	250 cps	500 cps	1000 cps	2000 cps	4000 cps
Brick, unglazed	.03	.03	.03	.04	.05	.07
Brick, unglazed, painted	.01	.01	.02	.02	.02	.03
Carpet, heavy, on concrete	.02	.06	.14	.37	.60	.65
Same, on 40 oz. hairfelt or foam rubber	.08	.24	.57	.69	.71	.73
Same, with impermeable latex backing on 40 oz. hairfelt or foam rubber	.08	.27	.39	.34	.48	.63
Concrete Block, coarse	.36	.44	.31	.29	.39	.25
Concrete Block, painted	.10	.05	.06	.07	.09	.08
Fabrics						
Light velour, 10 oz. per sq. yd., hung straight, in contact with wall	.03	.04	.11	.17	.24	.35
Medium velour, 14 oz. per sq. yd., draped to half area	.07	.31	.49	.75	.70	.60
Heavy velour, 18 oz. per sq. yd., draped to half area	.14	.35	.55	.72	.70	.65
Floors						
Concrete or terrazzo	.01	.01	.015	.02	.02	.02
Linoleum, asphalt, rubber or cork tile on concrete	.02	.03	.03	.03	.03	.02
Wood	.15	.11	.10	.07	.06	.07
Wood parquet in asphalt on concrete	.04	.04	.07	.06	.06	.07
Glass						
Large panes of heavy plate glass	.18	.06	.04	.03	.02	.02
Ordinary window glass	.35	.25	.18	.12	.07	.04
Gypsum Board						
½" nailed to 2 x 4's 16" o.c.	.29	.10	.05	.04	.07	.09
Marble or Glazed Tile	.01	.01	.01	.01	.02	.02
Openings						
Stage, depending on furnishings			.25—	.75		
Deep balcony, upholstered seats			.50—	1.00		
Grills, ventilating			.15—	.50		
Plaster, gypsum or lime, smooth finish on tile or brick						
	.013	.015	.02	.03	.04	.05
Plaster, gypsum or lime, rough finish on lath						
	.02	.03	.04	.05	.04	.03
Same, with smooth finish						
	.02	.02	.03	.04	.04	.03
Plywood Paneling, ¾" thick	.28	.22	.17	.09	.10	.11
Water Surface, as in a swimming pool	.008	.008	.013	.015	.020	.025
Air, sabins per 1000 cubic feet @ 50% RH				.9	2.3	7.2
Audience, seated in upholstered seats						
	.60	.74	.88	.96	.93	.85
Unoccupied cloth-covered upholstered seats						
	.49	.66	.80	.88	.82	.70
Unoccupied leather-covered upholstered seats						
	.44	.54	.60	.62	.58	.50
Wooden Pews, occupied	.57	.61	.75	.86	.91	.85
Chairs, metal or wood seats, each, occupied	.15	.19	.22	.39	.38	.30
Person, Adult, each						
			4.2			
Adult seated, each						
			4.5			
High school child, each						
			3.8			
Grammar school child, each						
			2.8			

Test Layouts and Results



Absorption of Acoustone Space Units
(sabins per unit)

mounting	pattern	frequency (cps)						NRC
		125	250	500	1000	2000	4000	
16" strip	Glacier	.29	.67	1.66	1.89	1.77	1.56	1.55
	Striated	.41	1.02	1.67	1.77	1.73	1.60	1.55
	Finesse	.42	1.02	1.66	1.78	1.60	1.33	1.52
16" patch	Glacier	.25	.74	1.71	1.92	1.79	1.59	1.54
	Striated	.33	.99	1.66	1.79	1.73	1.58	1.54
	Finesse	.36	1.06	1.71	1.79	1.64	1.38	1.55
24" patch	Glacier	.24	.74	1.76	2.13	2.01	1.71	1.66
	Striated	.35	1.01	1.79	1.97	1.94	1.69	1.68
	Finesse	.37	1.06	1.80	1.96	1.65	1.48	1.67
32" patch	Glacier	.22	.81	1.88	2.26	2.16	1.63	1.78
	Striated	.31	.92	1.82	2.09	2.06	1.65	1.72
	Finesse	.32	.93	1.85	2.13	1.95	1.54	1.72

Note: One sabin is the equivalent of one square foot of material having an absorption coefficient of 1.00.
Tests were conducted in accordance with ASTM C423. Threaded mounting clips were used.

BB030 1334