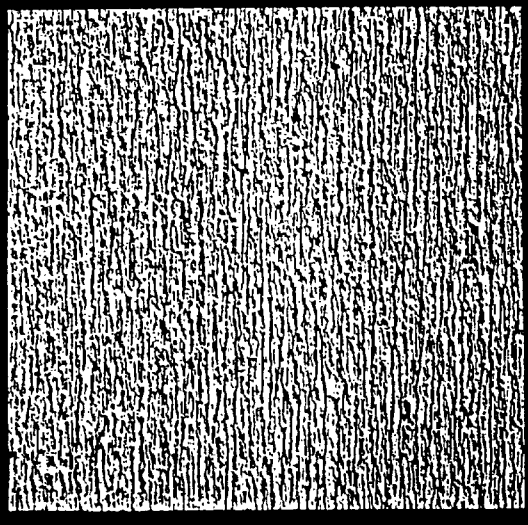
PLAINTIFF'S EXHIBIT
USC-693

Modular Space Units



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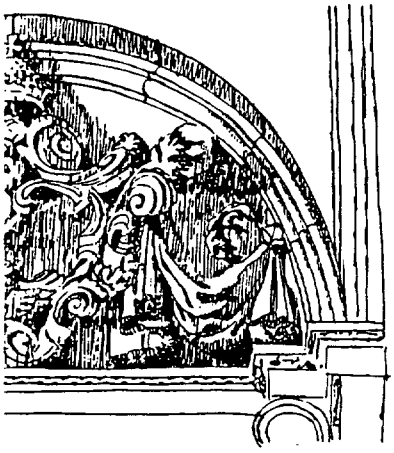
the third dimension in sound control

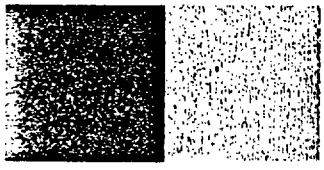


Sound control is a complex subject that permeates almost every phase of the architect's work. In some respects, sound control means privacy—stopping sound from passing through walls, over partitions, through floors and ceilings. In another respect, within a room or area, sound control means enhancing *wanted* sound by decreasing *unwanted* sound. It is within a room that ACOUSTONE Space Units add a third dimension to sound control. These units are square-shaped, three-dimensional design plaques. They are mounted away from wall or ceiling surfaces, permitting all six plaque surfaces to absorb noise or unwanted sound.

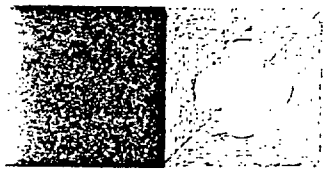
ACOUSTONE Space Units complement speech communication—the most important criterion for sound control within a room. With no sound conditioning, an excessive reverberant condition tends to sustain itself and create a high, continuous level of reflective sound energy.

Reverberations may last only two seconds, but that's long enough to force the speaker to raise his voice or move closer to the listener to be understood. Reverberations can actually transform wanted sound, or communication, into unwanted noise.

Acoustical treatment of the ceiling alone is often not enough. The versatility of ACOUSTONE Space Units, however, permits them to be used not only as primary acoustical material on the ceiling, but also as economical supplements placed strategically on ceiling or wall in areas where needed or where it is impractical to install acoustical material throughout. Thus, by adding a third dimension in sound control, ACOUSTONE Space Units add a new dimension to the architect's ability to solve acoustical problems.



Acoustone® Space Units



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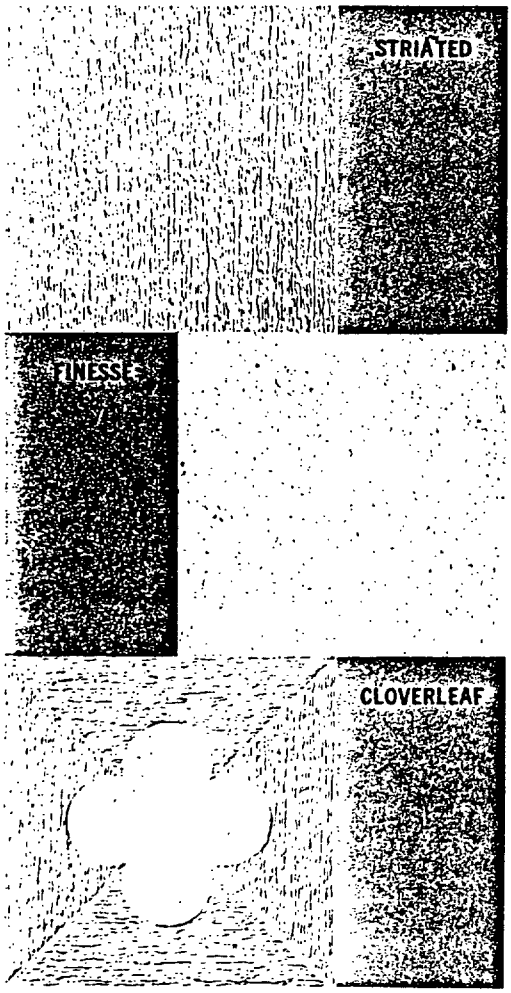
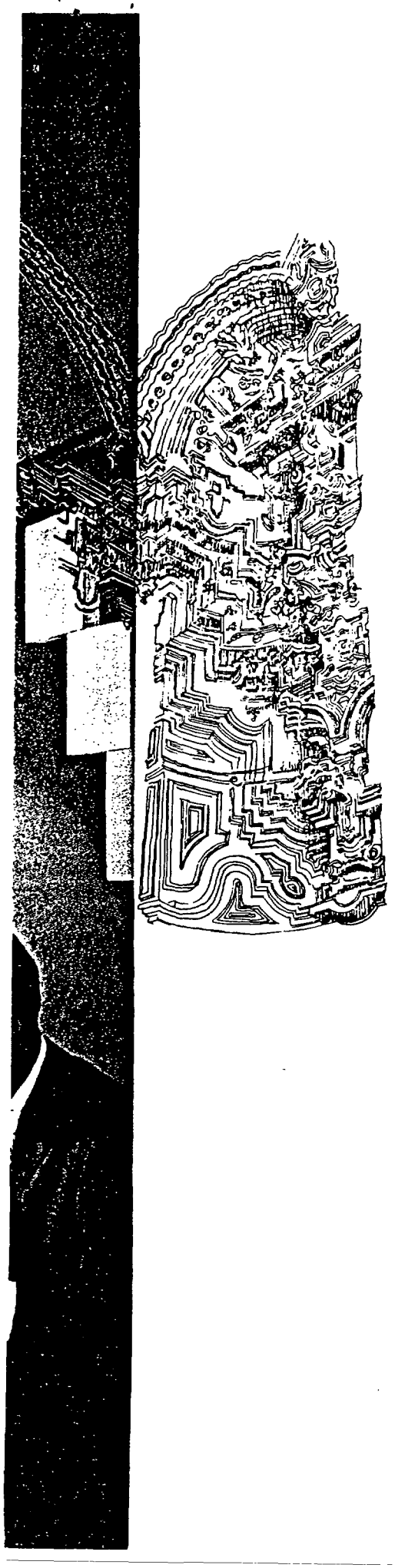
Accent on acoustics provides decorative accents, too

Now you can plan wall and ceiling plaque arrangements that combine functional efficiency with rare beauty. Not only do ACOUSTONE Space Units absorb unwanted sound precisely where needed within a room, but they also add striking accent to a wide variety of interior surfaces.

These units allow almost unlimited design flexibility. They are available in three distinctive patterns: Striated, Finesse, and Cloverleaf. Each pattern is, in effect, a 12-in. module that invites your custom placement to add texture to a wall or augment any room decor. ACOUSTONE Space Units provide custom richness at low cost. They are easy to install, require little or no maintenance, and contribute individuality and prestige to your design.







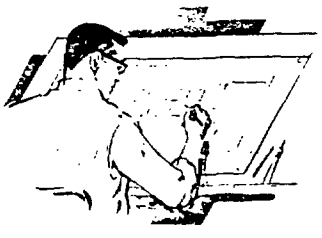
Simple step-by-step installation

ACOUSTONE Space Units are made of mineral wool fibers, molded into units 2 in. x 12 in. x 12 in. There are no limitations of use for any conditions normal for acoustical materials. Tests have shown that these units are not affected by moisture or temperature change.

Placement is dictated principally by the amount of sound absorption required. In most cases, acoustical requirements will be of sufficient latitude to accommodate broad variations in decorative treatment. One important feature: ACOUSTONE Space Units also leave wall and ceiling areas open—non-absorbing—to allow for any reflective surfaces required to radiate *wanted* sound throughout the room.

ACOUSTONE Space Units can be installed on any rigid surface to which the mounting device can be mechanically attached. The mounting device consists of two units: a furring part which attaches to the mounting surface (wall or ceiling), and a locking part which attaches to the back of the Unit.

This incombustible mounting device, properly attached to mounting surface and Space Unit, provides a positive, resilient mechanical attachment that facilitates easy attachment and quick removal for decorating. Space Units can be painted with brush or spray gun without appreciable loss of sound absorption properties.

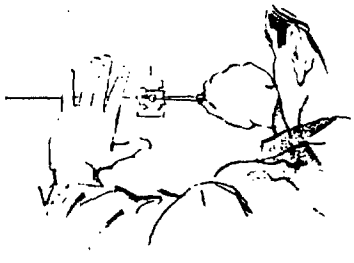


1. Make an accurate layout on paper. From this, locate tile centers on wall or ceiling.



3. Attach locking part of mounting device to back of ACOUSTONE Space Unit.

2. Anchor the furring part of mounting device to mounting surface (wall or ceiling).



4. Attach Space Unit to the wall or ceiling surface and adjust for proper alignment.



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Sound Control Data

REVERBERATION TIME

The reverberation time of any room depends on two factors: its dimensions and its sound absorbing properties (wall and ceiling surfaces, furnishings, and occupancy). The reverberation time for any space can be found by using the following formula.

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

where:

T = Reverberation time, sec.
V = Volume of room, cu. ft.
a = Room absorption, Sabins.

One Sabin is the equivalent of one square foot of material having an absorption coefficient to 1.00. Thus, a 100- sq. ft. surface of ACOUSTONE*F Mineral Acoustical Tile with a sound absorption coefficient of 0.83 at 500 cycles per second would furnish an absorption of 83 Sabins of the sound at that frequency.

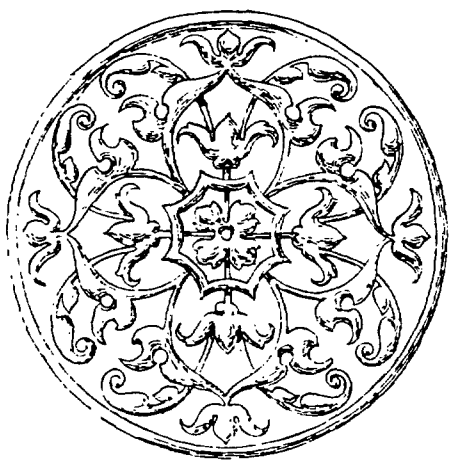
RECOMMENDED REVERBERATION TIMES

for music

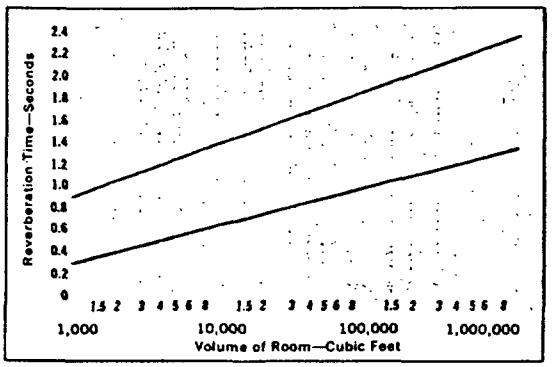
Chamber music—1 to 1.5 seconds
Orchestral, choral average church music—1.5 to 2 seconds
Large organ, liturgical choir—2 seconds and higher
Rehearsal rooms—0.8 to 1.0 second

for speech

Small offices—0.5 to 0.75 second
Class rooms—0.75 to 1.0 second
Work rooms—1.0 to 2.0 seconds
Lecture rooms—0.75 to 1.0 second



RANGE OF ACCEPTABLE REVERBERATION TIMES (500 cycles per second)



SOUND ABSORPTION COEFFICIENTS OF ACOUSTONE SPACE UNITS (Sabins per unit)

FREQUENCY (cycles per second)	125	250	500	1000	2000	4000	AVG.
16" Patch	0.45	0.97	1.57	1.79	1.70	1.68	1.51
24" Patch	0.53	0.93	1.59	1.94	1.93	1.87	1.60
32" Patch	0.42	0.91	1.69	2.12	2.08	2.01	1.70
16" Strip	0.60	1.02	1.56	1.71	1.68	1.68	1.49

SOUND ABSORPTION COEFFICIENTS OF GENERAL BUILDING MATERIALS AND FURNISHINGS†

	Coefficient at 500 cps
Brick, unglazed	0.03
Brick, unglazed, painted	0.02
Carpet, Heavy on concrete	0.14
Same as above, on 40 oz. hairfelt or foam rubber	0.57
Same as above with impermeable latex backing on 40 oz. hairfelt or foam rubber	0.39
Concrete block, coarse	0.31
Concrete block, painted	0.06
Fabrics	
Light velour, 10 oz. per sq. yd., hung straight in contact with wall	0.11
Medium velour, 10 oz. per sq. yd., draped to half area	0.49
Heavy velour, 18 oz. per sq. yd., draped to half area	0.55
Floors	
Concrete or Terrazzo	0.015
Linoleum, asphalt, rubber or cork tile on concrete	0.03
Wood	0.10
Wood parquet in asphalt on concrete	0.07
Glass	
Large panes of heavy plate glass	0.04
Ordinary window glass	0.18
Gypsum Board	
½" nailed to 2 x 4' @ 16" O.C.	0.05
Marble or glazed tile	0.01
Openings	
Stage depending on furnishings	0.25—0.75
Deep balcony, upholstered seats	0.50—1.00
Grilles, ventilating	0.15—0.50
Plaster, gypsum or lime, smooth finish on tile or brick	0.02
†Acoustical Materials Assn. Data	
Plaster, gypsum or lime, rough finish on lath	0.04
Same, with smooth finish	0.03
Plywood paneling, ⅛" thick	0.17
Water surface, as in a swimming pool	0.013
Acoustical Tile	Refer to manufacturer's absorption coefficient
†Audience, seated depending on spacing and upholstery of seats	4.0—5.5
†Seats, heavily upholstered with fabric	4.0—5.0
†Seats, heavily upholstered with leather, plastic, etc.	3.0—4.0
†Seats, lightly upholstered with leather, plastic, etc.	1.5—2.0
†Seats, wood veneer, no upholstery	0.25
†Wood pews, *no cushions*, per 18" length	0.40
†Wood pews, cushions, per 18" length	1.8-2.3
†Person	
Adult	4.2
Adult Seated	4.5
High School Child	3.8
Grammar School Child	2.8

†Coefficients in Sabins per unit

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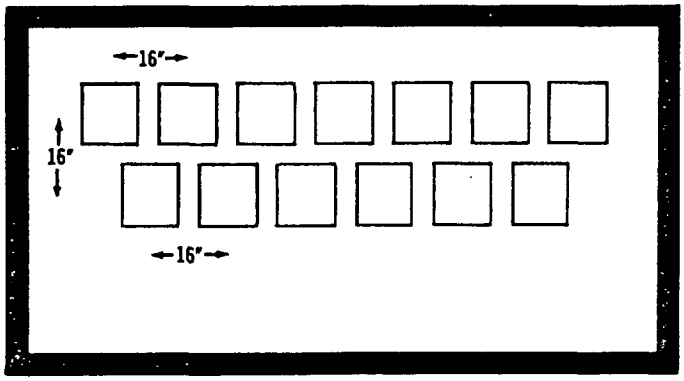
RECOMMENDED LAYOUTS

STRIP



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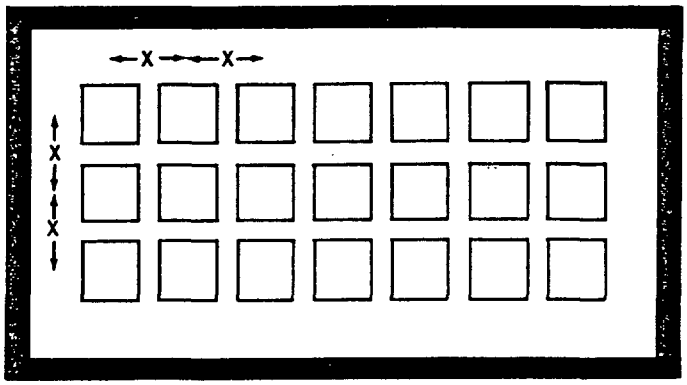

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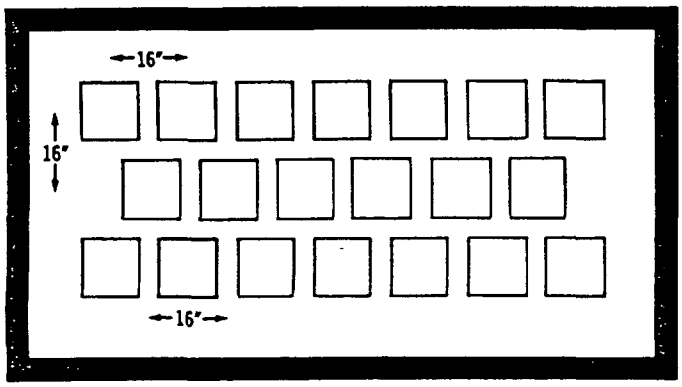

Architectural Specifications

Scope

List all areas to receive acoustical treatment.

General Provisions

Acoustical units shall not be installed until satisfactory enclosures for windows and other openings are in place, in accordance with good practice for installing acoustical materials.

Materials

Acoustical unit by United States Gypsum shall be ACOUSTONE Space Unit—either Striated, Finesse, or Cloverleaf pattern—measuring 2 in. x 12 in. x 12 in., with the 2-in. dimension striated parallel with its 12-in. length.

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Acoustone Space Units

BB028 1952

UNITED STATES GYPSUM