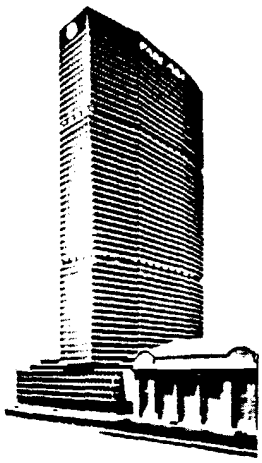
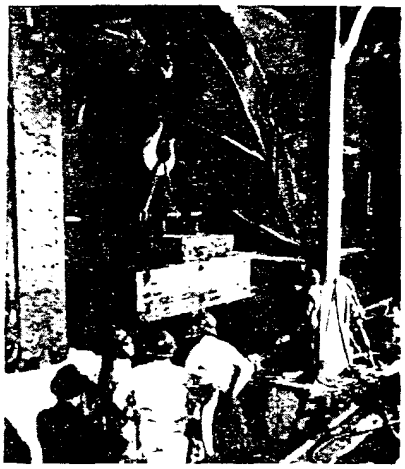


Emery Roth & Sons, Architects; Walter Gropius & Pietro Belluschi, Design Consultants.

Confronted with heavy street, rail and subway traffic,

engineers counter vibration with . . .

Lead Pads for the Pan Am Building



Steel grillage (above) supports tower columns. From street level (below), tower columns at rear, burned-off columns in foreground.

Half of pad is positioned.

Several hundred thousand commuters in New York City have been watching with interest daily progress on one of the most fascinating construction jobs ever seen in Manhattan. The address is 200 Park Avenue. Just north of and adjacent to Grand Central Terminal, 45 thousand tons of structural steel will be erected — without disrupting rail traffic beneath, or street traffic flanking the project.

Known as the Pan Am Building, the 59-story skyscraper is named after its principal tenant, Pan American World Airways. Expected date of completion: the end of 1962. Containing 2.4 million sq. ft. of rentable space, it will be the world's largest commercial office building. General contractor is Diesel Construction Co.

The 808 ft. giant will rise not only over the operating tracks of the New York Central and New Haven Railroads, but also over station platforms of the terminal itself. Costing nearly $100 million, the project will stand entirely on caissons jutting up from between two levels of tracks.

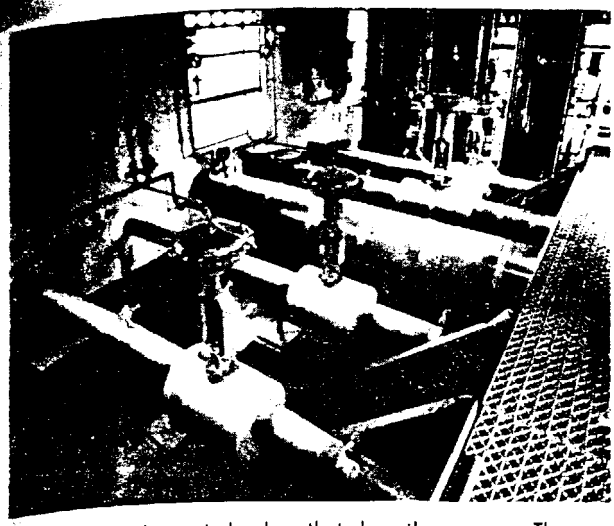
One of the major engineering problems, solved by Structural Engineer James Ruderman, was to prevent railroad rumble from being transmitted to the new building's frame. The answer? Lead-asbestos anti-vibration pads under every supporting column.

Vibration isolation was accomplished in two separate phases. First, huge pads — so big they were fabricated in two pieces — were placed in bedrock excavations more than 50 ft. below street level. Giant grillages to support the steel columns of the tower came next. Then massive 60-ft. columns were threaded down holes through two levels of tracks and connected to the grillages.

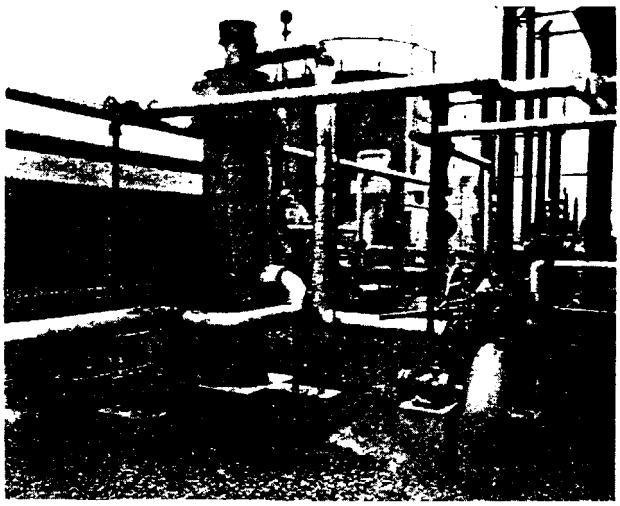
These pads, as well as pads for the final phase of vibration isolation, were manufactured by John F. Abernethy & Company, Inc., of Brooklyn. In all, 99 new columns were installed. Final load on the pads under these columns is expected to be 800 psi.

Second phase was to isolate existing steel columns retained from the razed building that formerly occupied the 3½ acre site. Of these, one hundred and twenty-eight were cut off and capped where they emerge from the concrete deck covering the upper train room. They will be used to support the rectangular 10-story base of the Pan Am Building. Lead-asbestos pads were placed between the steel caps on the old columns and base plates for the new columns. The pads extend several inches on all sides beyond the edges of the steel plates (see photo). Bolts used to secure the plates were isolated by lead sleeves and gaskets, so vibration would not be imparted from the old column to the new. Estimated load on these pads will be 1200 psi.

From the bottom of its footings to the top of its 49-story concrete and steel tower, the Pan Am Building is a modern engineering marvel that incorporates the latest advances into its design. Advances to insure maximum efficiency and comfort among its 25,000 inhabitants, such as sixty-five elevators — six of them the fastest in the world — to handle traffic automatically, a 400 car parking garage, four restaurants, 300 tons of refrigeration compressors to cool the offices, and millions of dollars worth of the latest telephone equipment to eliminate switchboards and provide direct inward dialing.



View of the control valves that drop the pressure. The smooth lead-loaded vinyl material encloses glass fiber lagging and the pipes themselves. At right, just outside



the pressure reduction station. These pipes handle the gas on its way from high pressure lines or storage to the customer. Note the Public Service gas-holders in background.

From a **ROAR** to a RUSTLE

After a thousand mile trip from the gas fields of the southern U. S., natural gas has to be stored against pipeline shutdown and injected into local mains at the customer's specified pressure. One of the many local stations where this takes place is in Trenton, N. J. Here, a plant of the Public Service Electric & Gas Company receives and redistributes thousands of cubic feet of gas a day.

Taking advantage of the compressibility of gas, the big cross-country pipelines hold it at about 600 psi. Before it reaches local stations like Trenton, though, it has been dropped in pressure to 150 psi. One of the main functions of the local station is to reduce the pressure still further — to 50, 30, or even lower pressures like 5 psi to meet gas customer requirements.

Picture a network of mains and pipes, some ending at kitchen stoves and some at huge industrial furnaces, all drawing their supply through six pipes ranging in size from 2 to 6 in. at the pressure reduction stage of the local station. The reduction is made by control valves. Automatically operated to maintain the set downstream pressure, these raise or lower plugs with V-notches cut in them. The size of the exposed notch within the valve body controls how much gas can pass.

It is a routine operation for Public Service engineers to maintain close control of pressure in this way. But until now they have always gotten an unwanted by-product — noise. While V-port valves don't actually act like whistles, the vast volumes of gas rushing through the constrictions produce a hissing roar much like that of a waterfall.

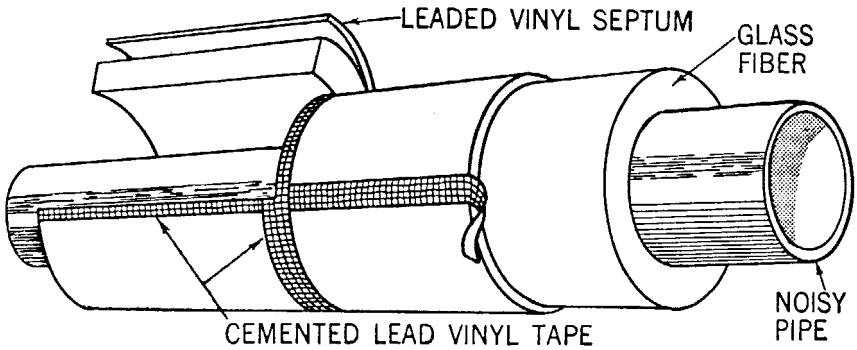
Measurements of sound level in the pressure reduction building showed 110 to 130 decibels. This is less noise than a four engine jet (140-160 db) but a good deal more than a subway train makes (90-100 db). Needless to say, Public Service was interested in any scheme to quell such a nuisance.

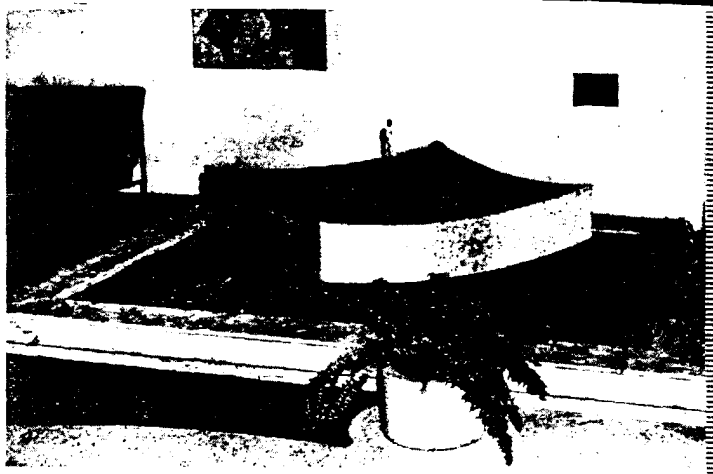
Making use of a limp lead-loaded vinyl plastic material backed with cloth, they have cut the noise level approximately 30 db so that it is now possible to talk without even shouting in the pressure reduction house. First the pipes were covered with a fitted lagging of very fine yarn glass wool about 2 in. thick. Over this "Enfab" glass, a layer of "Coustifab" leaded vinyl 0.055 in. thick and weighing 0.87 lb./sq. ft. has been wrapped. Seams in the single layer of leaded plastic were closed with self-adhesive fabric tape. Covering the six 14-ft. lengths of pipe and their valves plus a larger by-pass pipe without a valve took one man six days.

The result has been well worth it, Public Service engineers feel. They plan to use the same technique at several other stations where noise has been a nuisance. The higher pressure cross-country pipelines have become interested in the technique, too, and are planning variations of the scheme for their reduction stations.

Coustifab is made by Cordo Chemical Co. of Norwalk, Conn.

Sketch illustrates how leaded vinyl and glass fiber are applied.





A touch of restful elegance. This lead-lined pool and fountain sets the mood of American Airlines 'Sky Chef' cocktail lounge.

A Fountain for Elegance

Repeatedly cited as an architectural showpiece, the American Airlines Terminal at New York's Idlewild Airport has made bold use of many traditional decorative media. Its stained glass window is the world's largest. Glazed ceramic interior walls make use of abstract designs in color. Still another note taken from traditional decor is the pool and fountain of the cocktail lounge of the Sky Chef restaurant in the building.

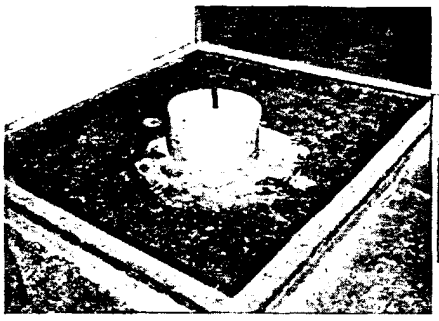
Stained glass, ceramics, and indoor pools all have histories extending back over the centuries. The interesting facet of their use in the new terminal is the clean and sparkling contemporary effect that has been produced.

In setting the decor for the Sky Chef facility, Project Manager Roberts Bujac of J. Gordon Carr & Associates, Architects, designed a modern basin overflowing into a pool to establish a restful atmosphere. The fountain is located in the lounge adjoining a coffee shop and dining room.

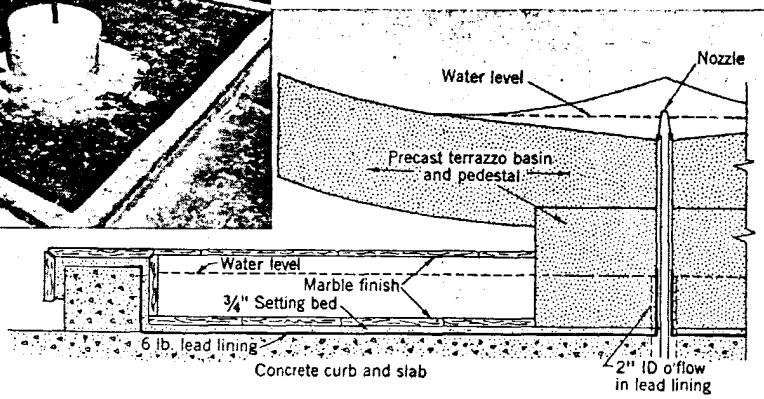
An irregular trapezium, the pool measures 7'9" x 6' and has an elevated square basin 3'8" on a side. As shown by the photograph, the basin has warped corners so that water cascades over all four sides into the pool below. A small 6 gpm pump powers the closed water system.

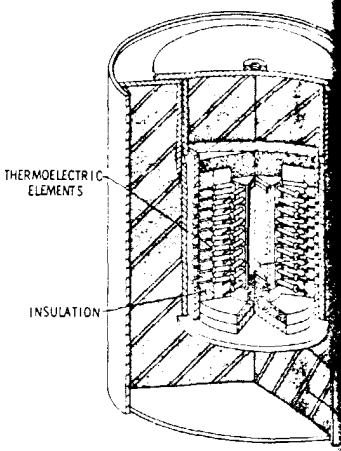
Under the prime contractor, Turner Construction Company, the lead work was done by John F. Abernethy Company of Brooklyn. Six-pound sheet lead was formed into a pool with a single drain and overflow located in the floor behind the basin. The pool lining was routine, following recommended practices of coating all lead and concrete interfaces with asphaltum and burning all seams for water tightness. (The asphaltum coating is used to protect the lead from alkali attack until the "green" concrete has carbonated.)

Completed in May 1960, the fountain has been in use continually since. No maintenance or service has been required. The pool is finished in marble with a terrazzo basin. Freedom from leaks is especially important in this pool because a service floor is located directly under it.



Construction details are shown in the designer's drawing. Note overflow drain in completed lining at left.





1. Power

The frozen arctic isn't even ... place to visit, much less to stay ... year 'round. Yet there are man... ous gaps in our worldwide weath... tion network in these polar regi... establish a permanent weather ... in these locations would requi... ceptionally hardy people and hu... of tons of supplies annually. ... least it would have, prior to t... velopment of a fully automatic ... powered station.

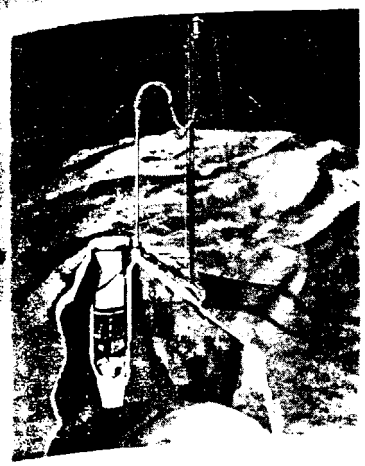
In June, The Martin Compa... nounced completion of just s... station. It is slated for installati... one of the islands north of the ... dian mainland. Every three h... radios will beam out temper... barometric pressure, wind spe... direction. The 5 watts of cont... electric power will be stored to ... radio reception possible up to ... miles away.

In place of hundreds of tons ... for power, the station has a b... slug of ceramic containing stro... 90. This weighs about one poun... designed to power the station ... least two years — it may well l... long as ten years. As in the ... devices, heat produced by the i... is directly converted to electric ... by thermoelectric elements.

Working like a thermocoup...

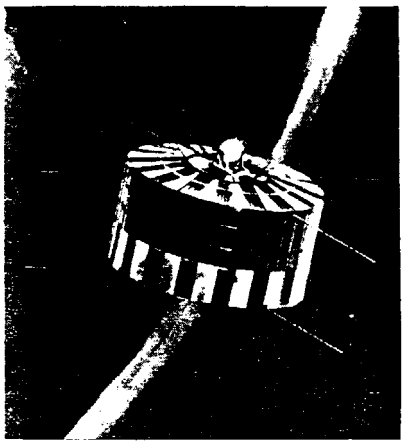
LIA26247

Le[illegible]ermoelectrics at work!



Somewhere in space the TRANSIT IV-A is drawing power from a thermoelectric SNAP unit. The artist shows it here as the white globe on the face of the satellite.

Weather reports from the arctic have begun — this unmanned station is powered by a lead-shielded atomic thermoelectric capsule (shown at the bottom of the well in the cutaway). Lead shielding (shaded in color at left) and lead telluride thermoelectric units are shown in this section through the power capsule.



[illegible]r Arctic Ice

[illegible]hermoelectric elements consist of two [illegible]similar metals joined and heated. If [illegible]e other (outer) ends are cooled and [illegible]ectrically connected, current flows [illegible]rough the circuit. In this unit the dis-[illegible]ilar "metals" — actually they are [illegible]th intermetallic compounds — are [illegible]d telluride doped with one per cent [illegible]dium as the positive leg and lead [illegible]lluride doped with 0.03 per cent lead [illegible]dide as the negative leg.

Operating at design temperatures of [illegible]0° F hot junction and a 140° F [illegible]k, sixty pairs of these elements will [illegible]oduce 5 watts at 4.0 volts. This con-[illegible]nuous power is converted to 28 volt [illegible]C and used to charge batteries. Thus [illegible]here is ample power for a 250 watt [illegible]transmission of 9 seconds on each of [illegible]o frequencies once every three hours.

In addition to the 55 pounds of ac-[illegible]ive power generating material (iso-[illegible]pe and electrical), the capsule is self-[illegible]shielded by a lead case 4.4 inches [illegible]k. This accounts for 1625 pounds. [illegible]ogether with mechanical casing and [illegible]tructure. The whole package is only [illegible]0 in. high, 18 in. diameter. Lead [illegible]rovides completely effective shield-[illegible]g at the lowest cost. Weight and [illegible]pace requirements are relatively low. This is important since air transpor-[illegible]tation is the only practical way to [illegible]each many of these remote areas.

LIA26248

2. Transit IV in Orbit

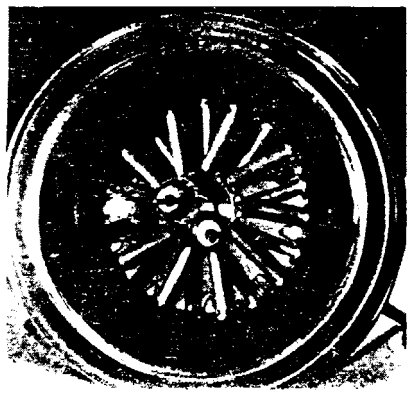
Early in July the United States orbited its Transit IV-A satellite, a navigational aid intended to function for many years to come. Appended to one face of the bass-drum-shaped instrument is a grapefruit-sized power pack designed to supply the satellite for years to come.

Inside the power pack, a radioactive isotope, slowly going through the process of nuclear decay, furnishes heat which is converted to electric power by thermoelectric elements. It is a SNAP unit — System for Nuclear Auxiliary Power. Most of the technical construction details of the Transit's SNAP unit are classified. Its predecessor, however, used lead telluride as the thermoelectric material. Many informed thermoelectric experts feel that the unit now in orbit employs lead telluride too.

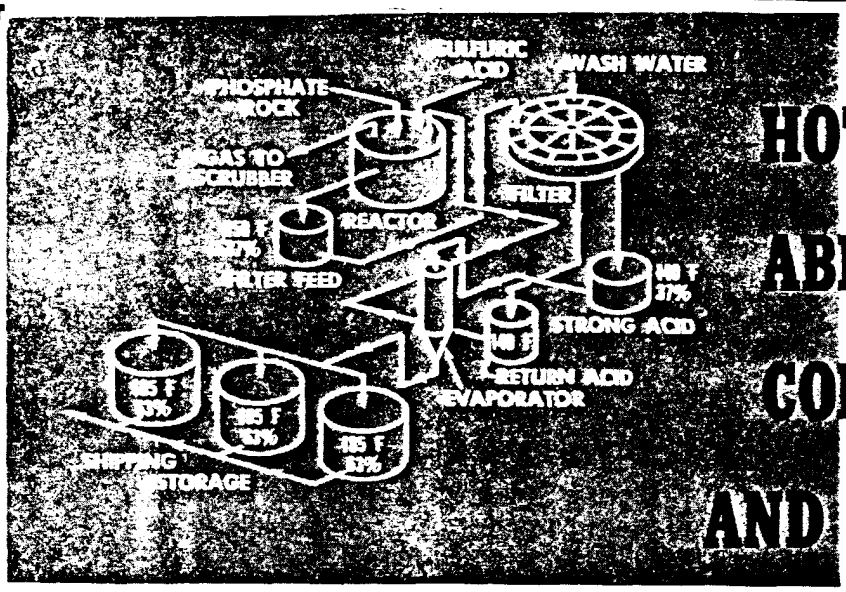
One detail revealed about the new unit is its use of plutonium-238 as a heat source. Polonium-210, used in the SNAP III, has a half-life of less than five months. The useful life of the SNAP III is correspondingly short. With a half-life of nearly 90 years, plutonium-238 should provide decades of power, barring any mishaps, of course.

To be sure that the unit will survive space hazards, its builder, The Martin Company, put it through many pre-flight torture tests. The fact that the unit is operating successfully after the vibration and acceleration of its rocket ride into space is proof of the ruggedness of thermoelectric systems. They have no moving parts. Heat is converted directly into electric power as in a thermocouple.

Looking into a SNAP III — the "spokes" are lead telluride rods.



A final check on the SNAP unit prior to launching the TRANSIT.



HOT, ABRASIVE, CORROSIVE SLURRIES AND LEAD TANK LININGS

Simplified schematic view of the process showing six lead-lined tanks.

Picture a hot (158°F), abrasive slurry containing 37 per cent phosphoric acid (32 per cent P_2O_5) being agitated in a 12-ft. diameter tank by inflow of 90 gallons per minute. These are tough service conditions. Not many construction materials can be recommended for them. In the new phosphoric acid plant of The Bunker Hill Company the tank described here is lined with 10 lb. antimonial lead and has a lead-and-acid-brick covered bottom.

The $2 million plant (130 tons per day) is located at Kellogg, Idaho. Dorr-Oliver, Inc., did the design; the contractor was Bumstead-Woolford of Seattle.

In addition to the filter feed tank described above, the plant uses lead or lead-and-acid-brick linings in the strong acid storage tank, the return acid storage tank, and three shipping acid storage tanks.

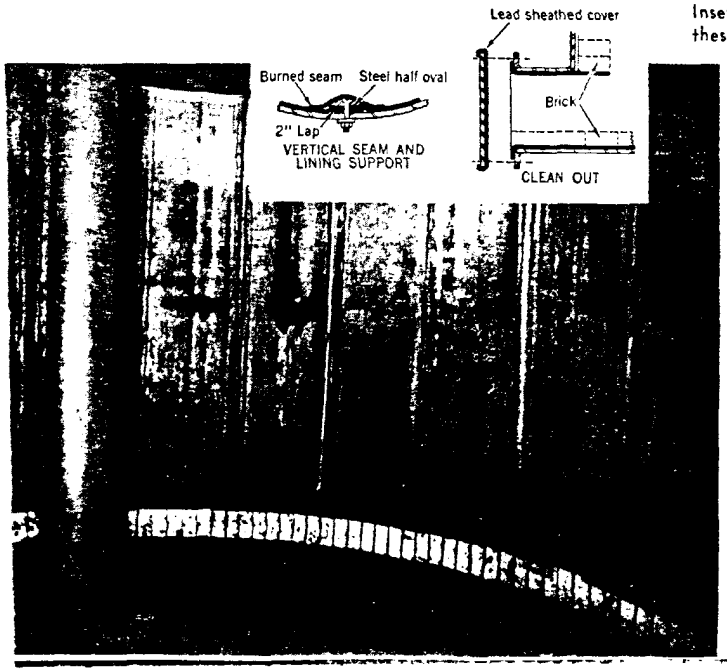
In the strong acid storage tank filtered acid is clarified and fed on to the evaporator. This tank, 20 ft. in diameter and 12 ft. high, has a floor of acid brick over lead. Acid in it averages 140°F.

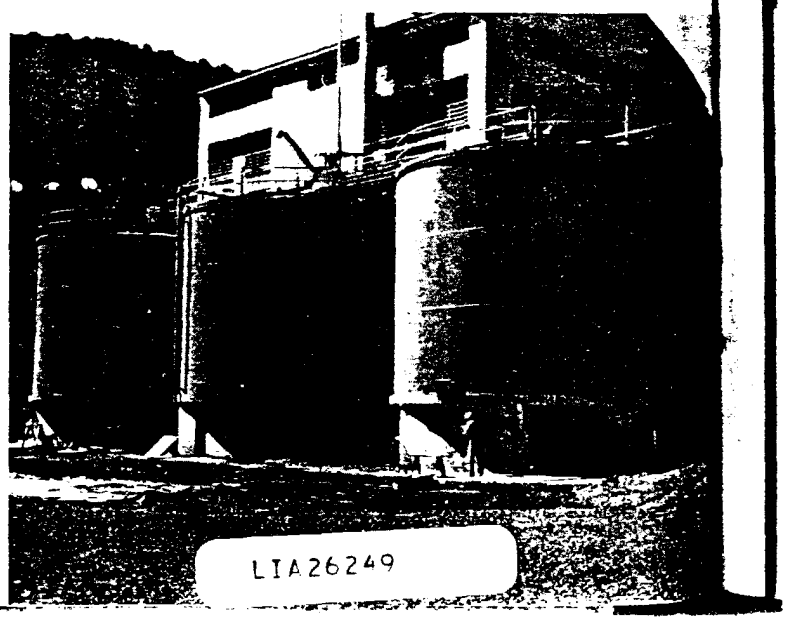
A smaller return acid tank holds the filter washings which are somewhat more dilute — 18 per cent P_2O_5 — but still hot. In addition to an acid brick floor, this tank has brick about halfway up its walls.

Still hotter and more concentrated, the acid coming from the evaporator feeds directly to the three shipping storage tanks. Here temperatures reach 185°F and concentration is held to 63 per cent (54 per cent as P_2O_5). These are completely lined with lead and acid brick.

About 90 tons of lead went into the lining of this equipment. It is 10 lb. (approximately 5/32 in. thick) 6 per cent antimonial lead throughout. The mild steel structural shells of the tanks are all drilled with weep holes, but since start-up in January, 1961 the only leakage has been traced to a weak tank base. This has since been corrected.

As proof of how well the construction has worked out, a 2000-ton lead-lined storage tank is being added.





Lead lined tank (left) with brick floor in place and the first course of the brick lining laid. Inset shows construction detail of vertical seams and a clean out (not to scale). Inside these shipping storage tanks: hot 63 per cent phosphoric acid at 185°F.

Battery powered 16-ft. boot ghosting along in St. Louis' Forest Park Lagoons. The boats can make a top speed of five knots.

A look in the engine compartment shaws the 180-lb. lead-acid battery. The shaft in the boat's starboard quarter leads to the 1/3-hp motor and steering combination underwater.

The Electric Fleet

For most of the years since the World's Fair of 1904, St. Louis' Forest Park lagoon has had a fleet of battery powered boats in operation. This summer the fleet was replaced. Twenty-four new 16-ft. aluminum boats, still battery powered, are carrying the third generation of St. Louis' fair-weather sailors.

Though the lagoon is shallow (only 18 in. in most spots) stability and "seaworthiness" had to be considered. But more trying was the problem of providing the positive steering that automobile drivers demand as helmsmen. Small boats normally tend to slue and yaw a bit. To overcome this, Meteor Production Engineering, Inc., power specialists, and Wendell Emmerich, a marine expert, worked out a "power steering" system making use of submerged waterproof electric propulsion motor.

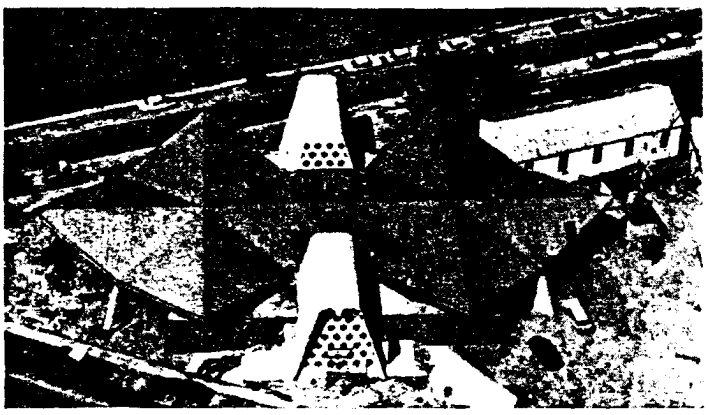
The one-third horsepower motor with propeller attached is mounted underwater on a vertical shaft passing through the hull. By turning the wheel, the steersman rotates this mounting shaft. Thus there is no rudder. Thrust from the waterproof motor itself provides the steering.

Nor was steering the only problem they solved. Moonlight cruises are as popular as daylight jaunts at the park. The batteries have to provide ten hours of service a day without unreasonable weight. And since both daylight speed demons and moonlight dawdlers use the boats, a wide range of speed control and power is necessary to please their varied tastes.

This problem was easily solved by using 12-volt bus batteries as the power source. Each boat has a single 180-lb. lead-acid bus battery. Two dry chargers (silicon diode units) can each handle from one to 16 batteries at once. The whole fleet is conveniently and automatically charged after the last starry-eyed couple has left and is ready for the morning group.

TEMPLE IN TERNE

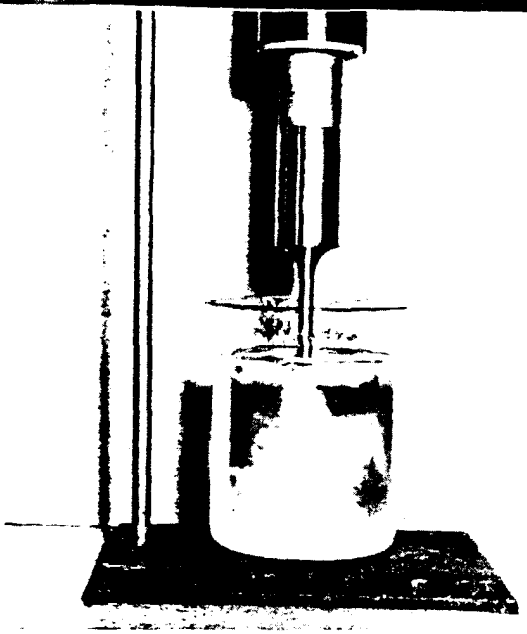
A terne roof 224 ft. along the main ridge is the dominant feature of the new Beth Torah Temple shown here as it neared completion in North Miami Beach. The unique appearance is echoed in the novel construction methods — the roof is made up of 2 in. thick wire-reinforced gypsum slab over 1 in. thick form board. Outer sheathing is a standing seam terne roof. Terne is thin sheet steel coated with a lead-tin alloy. Light in weight, it is durable and inexpensive.



Architect — Phillip Pearlman, North Miami Beach

Oil and Water Don't Mix? Who Sez?

The milky cloud in the center of the beaker is an oil-in-water emulsion forming in seconds after power is applied to the ultrasonic tranducer above. Known as a "Sonifier," the device manufactured by Branson Instruments employs lead zirconate-titanate to convert electrical impulses to sound waves at 20,000 cycles per second. Describing the lead ceramic transducer material, Branson says, "This highly efficient ceramic permits Branson's transducers to handle up to three times the power permissible with conventional transducer materials."



lead

LIBRARY OF TECHNICAL INFORMATION

The following publications are available free of charge unless otherwise noted. Send request to the

LEAD INDUSTRIES ASSOCIATION, 292 MADISON AVENUE, NEW YORK 17, N. Y.

The materials you buy — lead

Descriptive information about lead from mine to finished products. Reprinted from "New York Purchasing Review," January, 1959.

Corrosion Data — lead & alloys

Chart form presentation of the corrosion resistance of lead and its alloys to 188 common chemical materials over the normal temperature range. Reprinted from "Chemical Engineering." February, 1953.

Methods of lead lining tanks

Four page review of corrosion performance and fabrication methods for lead in process vessels and piping. Considers five ways of using lead. Reprinted from "Chemical Engineering," January 9, 1961.

Materials of construction reviews

Lead and lead alloys in design and construction for research and engineering use. Bibliographies for 1961, 1959, 1958 and 1957 are available (editions are not cumulative). Reprinted from "Industrial and Engineering Chemistry."

Lead-asbestos anti-vibration pads

Gives specification, drawings, and reviews recent applications of lead-asbestos anti-vibration pads for buildings.

Lead work for modern plumbing

$2.00 Postpaid, $1.50 per copy in quantities of 10 or more.

Profusely illustrated with over 140 photographs and drawings, the textbook presents clearly to the plumbing student the necessary tools, procedures and the methods required for lead work.

Red lead technical letters

No. 12 Seven formulations and schedules for painting highway structural steel.

No. 13 L.I.A. Formula 9-2. A single Red Lead Primer for Rusted, Weathered or New Galvanized Steel.

No. 14 Describes the formulation of red lead-coumarone primer for seawater immersion — ship hulls, fixed marine installations.

Lead in modern industry

(Request on company letterhead, please)

A fully illustrated 230 page, cloth bound book describing all phases of the production and use of lead, lead alloys and lead compounds.

Truck costs in a jiffy

Three nomographs permit estimation of costs for gas or battery powered industrial trucks in two or three minutes. Depreciation, operating costs, and maintenance are appraised separately for all unusual types of operation.

Building construction bulletins

No. 1 Specifications for Lead Waste Connections for Plumbing Fixtures with Integral Traps (Water Closets — Pedestal Urinals — Service Sinks.)

No. 2 Specification for Lead Shower and Safe Pans.

No. 3 Specification for Lead Chemical Laboratory Drainage Systems.

Seamless terne for roofing

Illustrated four-page architectural specification also provides data on strength and weight characteristics and color advantages of terneplate as roofing.

Design engineering data

Twelve-page publication summarizes all main lead uses, tabulates data.

Oilless bearings — helicopters

Reprint from "Design News" shows use of lead-teflon bearings in helicopter. Photos and drawings included.

Nuclear materials

Eight-page reprint from "Materials in Design Engineering" inspects current fuels, controls, moderators, reflectors and shielding.

1000° F bearings

Data on dry high-temperature lead oxide bearings developed by N.A.S.A. Reprinted from "Materials in Design Engineering."

Flashing with hard lead

A complete "How-to-do-it" article on the use of hard lead in roofing and flashing. Reprinted from "American Roofer & Siding Contractor," December, 1958.

Decorative finishes for lead

Informative four-page reprint from "Metal Finishing" (1949) describes methods for all finishes and plating methods for lead.

Cutting press vibration

Describes use of lead-asbestos anti-vibration pads to reduce newspaper press vibrations. One-page reprint from "Publication Management" for April, 1961.

A new look at lead

Roundup story from "Ethyl News" presents the newer roles of lead on today's technical front.

Quiet please!

Two-page reprint explaining lead's function as soundproofing material. From "Modern Sanitation and Building Maintenance" April, 1961.

Electric delivery trucks

The facts and figures about battery powered street delivery trucks for milk, bakery and other routes. Reprinted from "Food Processing" March, 1961.

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