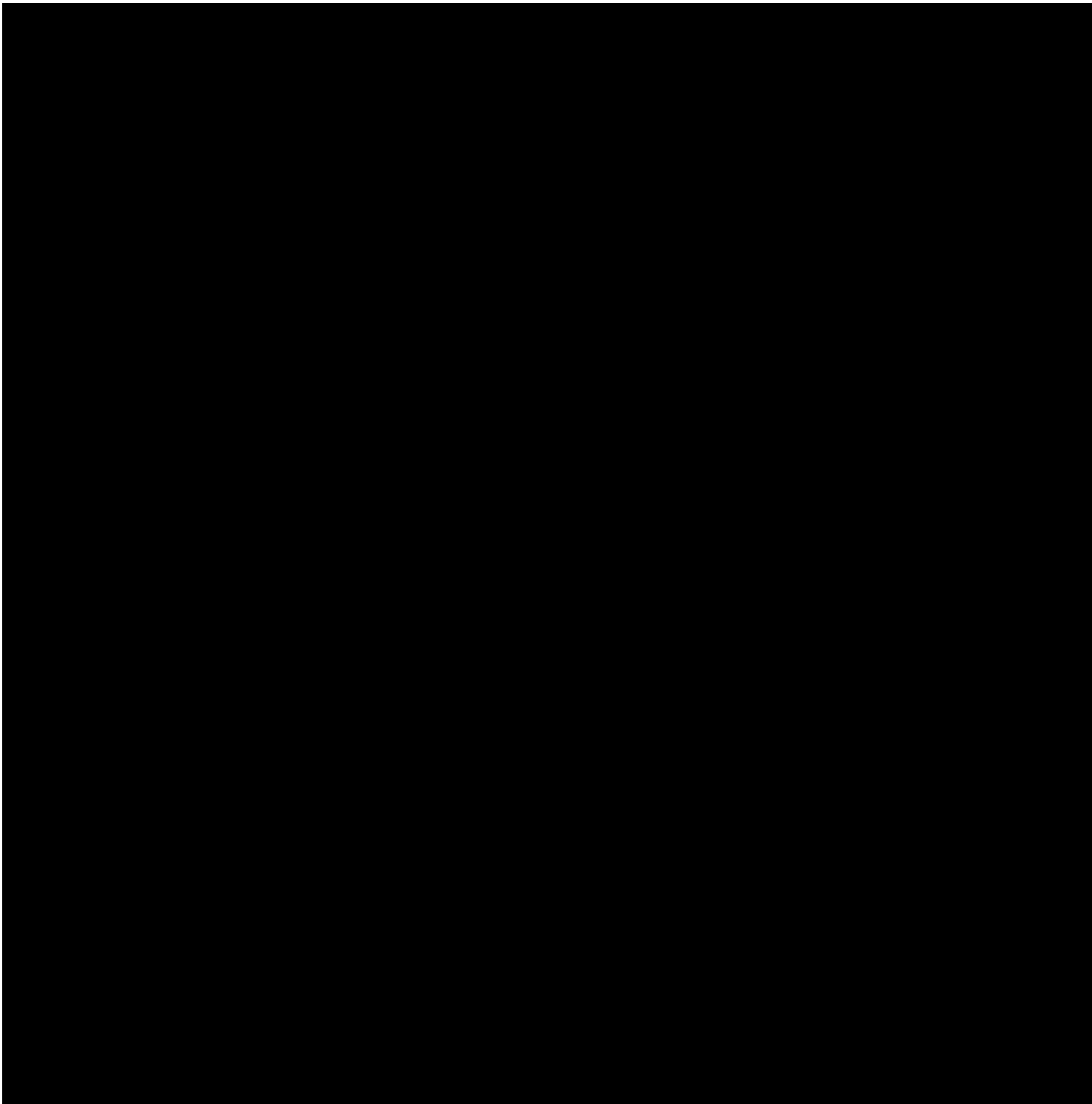
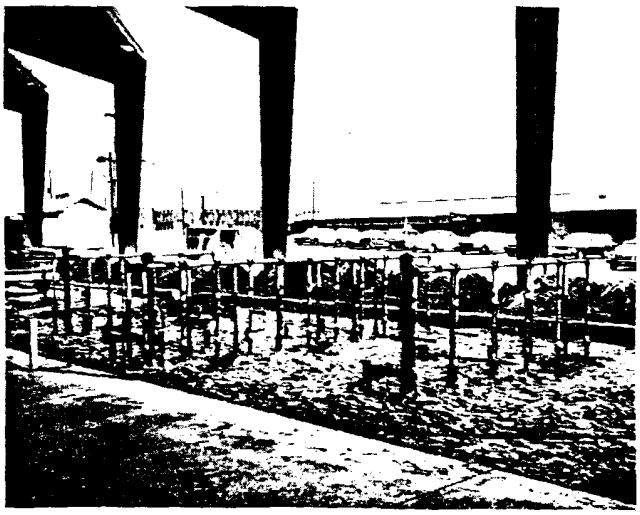




One pair of toilet rooms showing roughed in urinals, water closets and floor drains.

Tulsa builds a new exhibition hall

FLEXIBLE LEAD PLUMBING MEETS RIGID REQUIREMENTS

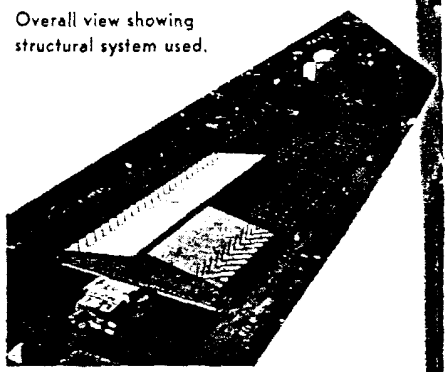
The biggest building of its kind in the country is the new Tulsa Exposition Center in Tulsa, Oklahoma. Its huge spans leap across 400 feet of unobstructed space and its 1,200 foot length results in a total floor area of more than ten acres. It was completed in time for the International Petroleum Exposition in May. In Tulsa this is known, more simply, as "The Oil Show".

The real "Oil Show" started back in 1859 in Titusville, Pennsylvania when Colonel Drake brought in the first oil well drilled. This was the daddy of them all. Colonel Drake needed 69 feet of pipe to reach the rich oil deposit he was seeking. Today twenty times that amount of pipe is used just for soil and waste drainage in the present showcase for the oil industry.

In the seven, almost typical, toilet rooms (two of which are illustrated in the accompanying photograph) there are 276 plumbing fixtures all with flexible lead waste connections. There are fifteen 6 inch vent stacks through the roof, each with 4 pound sheet lead flashings having 12 inch high boots dressed down into the top of the vent one inch and lead base sheets. All 114 water closets are connected to the drainage system with 4 inch x.h. lead bends. The remainder of the lead piping used is in connection with lavatory and urinal waste connections and pipe branches, not to mention 4,500 pounds of lead for calked joints.

Although the Tulsa plumbing code permits rigid drainage systems in fireproof buildings, flexible lead and soil construction is favored by most architects and engineers in the Tulsa area as well as by the Plumbing and Mechanical Contractors Association and the local Journeyman's organization. David Graham and Associates were the architects and mechanical engineers and the plumbing was done by the Easley Plumbing and Heating Company, both of Tulsa. The building will become a part of the Tulsa State Fair Properties.

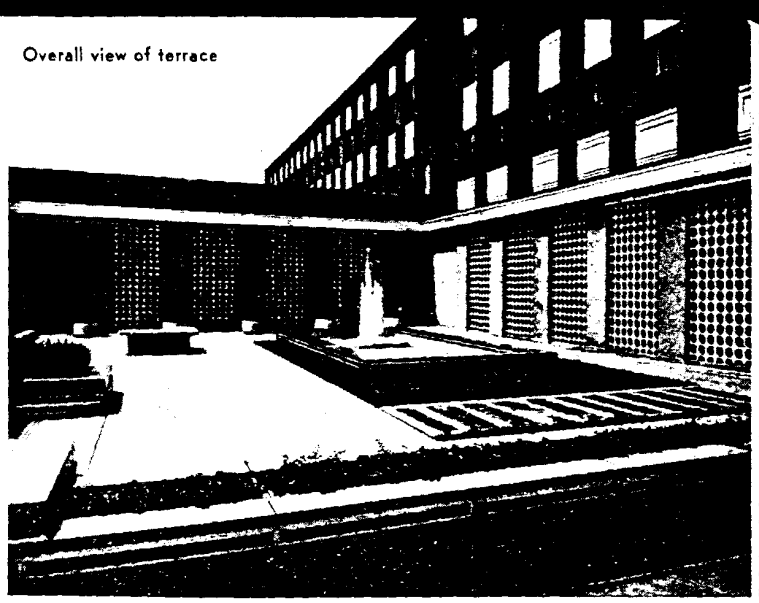
Overall view showing structural system used.



LIA26461

Architect: American Electric Power Staff Architect
General Contractor: Theodore Bogner
Lead Work: Knapp Mills, New York City

Overall view of terrace



KEEP YOUR POWER DRY

When the American Electric Power System recently centralized under one roof a power control network for seven states, that roof had to be a good one. The roof is actually a sheet lead membrane waterproofing under a terrace a foot or two above grade on AEP's new building downtown in Canton, Ohio.

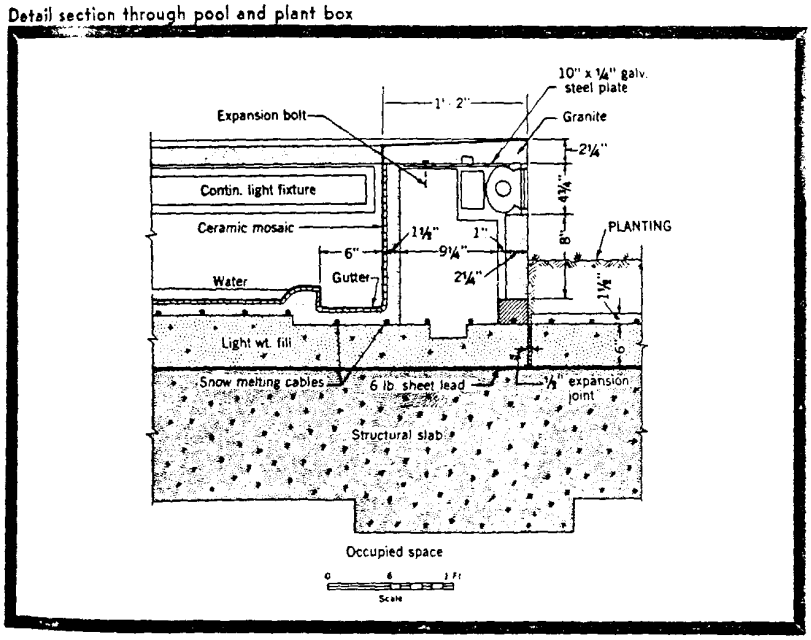
The control system, housed in a partly-below-grade structure, is a computer which conducts a minute-by-minute check on the vast network of power stations operated by the AEP System. It is linked by the system's own 1,700-mile microwave communication network with automatic electronic equipment installed in the power plants, thus providing a constant "reading" of power flow over the entire System.

The waterproofing was accomplished with approximately 4,000 square feet of 3/32 inch thick (6 lb.) antimonial lead used as an underlayment for the entire plaza area. All sheet lead was lapped a minimum of one inch and joints were burned.

The lead, placed directly on the structural slab, was protected underneath by a layer of 30-lb. asphalt impregnated felt. The top surface, over which concrete fill and various finishes were placed, received a heavy brush coat of a bituminous coating compound. In both cases this was protection against the hazard of freshly placed concrete. Concrete, cement, grout and similar materials contain free lime. Until the lime carbonates (in other words, until the concrete "cures") it can corrode the lead as it will other metals as well.

The plaza thus formed serves as a landscaped terrace offering a pleasant stopping place in the midst of the city. Set some thirty inches above the level of the surrounding streets, it offers a varied cityscape of plant boxes and grass plots with a tiled fountain surrounded by terrazzo walkways. Sculptural pierced walls on two sides and imaginative lighting create a constantly changing visual effect which is an ornament of the city and a credit to the company which gave it form.

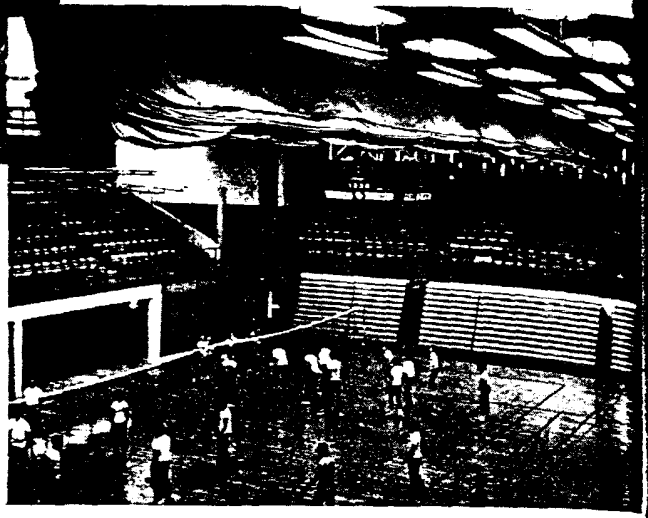
Detail section through pool and plant box



LIA26462

Beyond the leaded vinyl curtain lies . . .

. . . the other half of the gymnasium. Curtain can be raised (as here) when the full floor expanse is needed.



LEADED VINYL CURTAINS FOR NOISE

High schools, like the boys and girls they serve, have a habit of growing. Sooner or later, enrollment reaches or even passes the number of students the building was designed to accommodate. Then a number of things may happen—most of them less than an educator might desire.

One case in point has been overcrowding of gymnasium space. A normal size class of youngsters letting off steam in a gym sets up a sizable amount of noise. But when more than a normal number—perhaps classes of two age groups, or boys and girls—must share a gym, the noise becomes a real problem. In some schools, an attempt has been made to partition the gymnasium space by hanging canvas curtains. These afford some visual screening but do not block noise.

The new Harvey S. Firestone High School in Akron, Ohio, is a long way from being overcrowded. Its student body of 1,230 is well within the number it was designed to serve. If it does become crowded at some future date, though, the problem in the gymnasium will not arise. A leaded vinyl curtain may be raised or lowered in the gym to provide real acoustic privacy for separate classes.

The gym measures 104 x 107 feet with bleachers 40 feet deep surrounding it on three sides. This is large enough to accommodate two basketball courts, side by side.

The main curtain crosses the narrow dimension of the gym at the center, splitting it into two areas each 52 x 107 feet.

Secondary curtains, riding on overhead tracks like draperies, can be used to close off all or any of the four sections of bleachers along long walls of the gym.

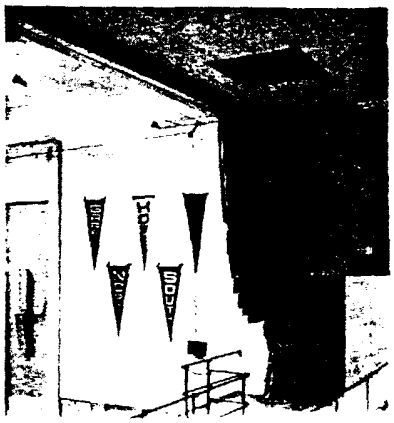
The main curtain consists of two independently controlled leaves separated by a 12 inch air space. Either or both of these can be raised or lowered electrically.

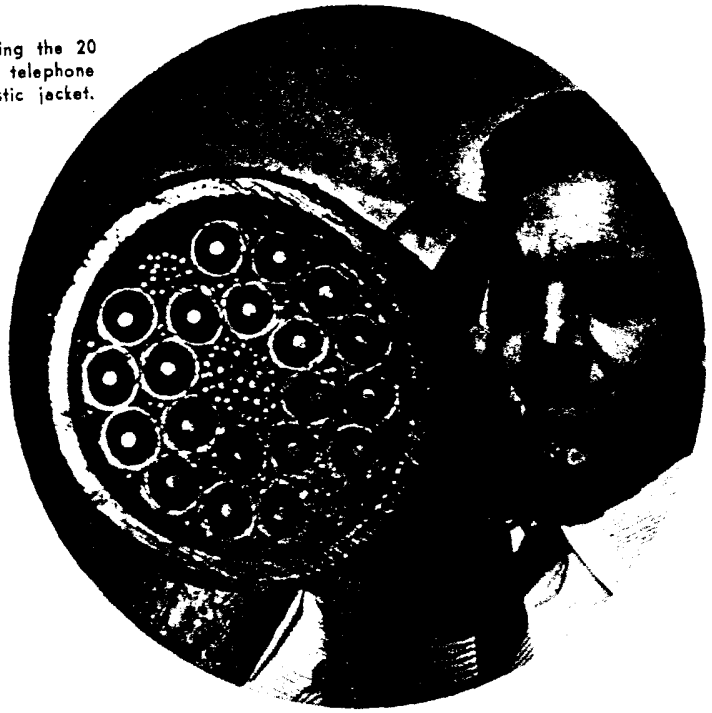
All of the curtain material is leaded vinyl coated on durable fabric backing. Thus it is impervious to air flow and, with a weight of about 0.4 pounds per square foot, has sufficient mass to block sound. The finished side of the curtain is turquoise with an embossed pattern.

Currently the curtain comes into use two evenings a week when the gym is split for separate activities in the adult education program. When the school reaches capacity enrollment it will be used every day. At that time it will enable physical education teachers to follow a normal course program. In cases where the canvas curtain was employed, they had to schedule both sections of the gym for the same activity. As one teacher put it, "It's just impossible to try to teach skills—a wrestling class, for example—when another group is playing volleyball on the other side of a canvas curtain."

The curtain arrangement was installed by Jansen Industries, Canton, Ohio according to the plans of architect, Joseph Tuchman, Tuchman & Canute, 88 S. Portage Path, Akron, Ohio. The material itself is made by The Duracote Corp. of Ravenna, Ohio. While the installation of this 4600 square feet of double curtain cost $18,000, it provides, in effect, a second gymnasium—a terrific bargain for the community at this figure.

Curtains of the same material hanging like draperies at the ends of the bleacher can be used to close off that sound path.





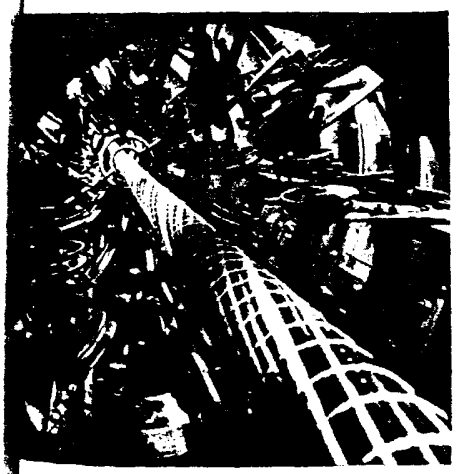
Section of Coax 20 cable showing the 20 coaxial units that carry 18,740 telephone calls, the lead sheath and plastic jacket.

COAX 20 Spans The Continent

A unique type of lead sheathed communication cable as thick as a man's arm has made its debut as a superhighway for transmitting telephone calls, TV and other communications within the country.

The modern new cable, designed by Bell Telephone Laboratories and produced by Western Electric Company's Baltimore and Hawthorne Works for use by Bell Operating Companies is known officially as Coax 20. It can carry as many as 18,740 telephone calls using existing carrier equipment or about 32,400 with a new carrier system now under development. A predecessor of Coax 20 was previously described in LEAD.*

The neatly bundled core of coaxial cable moving toward the paper wrapping section of the cable stranding machine. Lead sheathing is extruded onto this core after wrapping.



As its name suggests, Coax 20 is mainly composed of 20 coaxial lines plus a number of regular wires for monitoring alarm, telemetry and test circuits. A coaxial line, which can carry more signals than a wire conductor, is a continuous copper tube $\frac{3}{8}$ in. in diameter—surrounding a central wire which is held in place by circular plastic spacers. Looking at the ends of these units when grouped inside an overall lead sheath and plastic jacket is like looking down the muzzle of some futuristic, multi-barreled weapon.

A coaxial cable system, like a microwave radio system transmits a band of frequencies spanning millions of cycles per second. This broad band is then subdivided into hundreds of narrow bands, each used to transmit one high-quality voice signal over long distances. The bands required for transmitting television programs or high-speed data are much wider than those used for voice signals. A separate coaxial tube is required for each direction.

The overall diameter of the cable is 3 in. and the lead sheath is 0.112 in. thick.

Bell Systems engineers specified the lead-polyethylene combination as the best protection against the wide variety of environmental conditions the cables will encounter in their transcontinental crossings.

Approximately 1000 miles of Coax 20 cable will be installed in 1966 in addition to the some 13,000 miles of other coaxial cables the Bell System has criss-crossing the country.

Development of the new cable was prompted by a program aimed at supplementing the rapidly growing microwave radio relay system that forms the backbone of the system's long distance network. It is presently estimated that growth in long distance calling require a doubling of network facilities every eight to ten years.

At the same time, room for more microwave channels on the radio spectrum is being used up, especially in and around cities but there is plenty of space left for more cables. And because coaxial cable is less subject to propagation changes and interference it affords a very high degree of reliability.

Security is an equally important consideration favoring coaxial cable. When buried in the earth it is far less vulnerable to damage by storm or enemy attack than microwave towers; and common sense practically dictates a mix or diversification of communication facilities.

* "Lead Sheaths Newest Telephone Cable," LEAD, Vol. 27/No. 4, 1963

LIA264E4

"Electrics" move ou

Historically, battery powered industrial trucks have led a sheltered life, rarely poking their forks out-of-doors except in emergencies. The familiar design has been that of small diameter wheels with solid tires. The idea originally was intended to reduce traction friction losses to the minimum, a concession to the industrial battery capacity of a decade or so ago. And so the electric has been a hard surface vehicle, not daring to get it's "feet" wet in snow, ice, gravel, or soft earth.

But today's lead-acid battery delivers up to 70% more ampere-hours than those of ten years ago; today's solid state control systems contribute another 28-40% in battery life; and today's radically improved charger and charger techniques add still more life to the power source. So, even the small wheel, solid tire battery truck is venturing out into the open more often.

More to the point, some electric trucks now sport large diameter, pneumatic-tired wheels, and they easily hold their own with competitive trucks, working full shifts on surfaces formerly out of bounds to them.

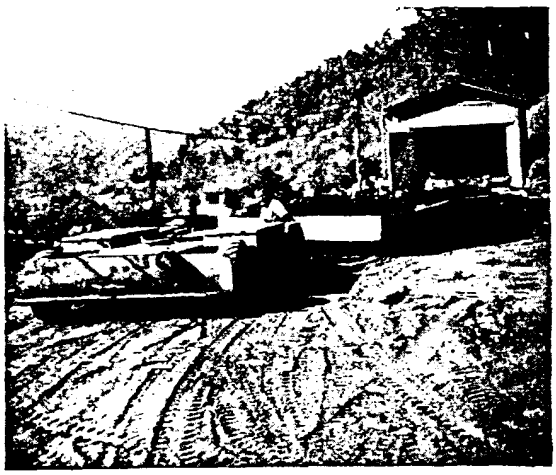
We found some good examples:

• A more rugged assignment would be hard to find than that performed daily in a West Virginia coal mine. Here, battery powered tractors haul out 600 tons of coal per shift, backtracking each outbound load trip with supplies to the working face.

The running surface presents every challenge you would expect, but the heavy duty, mud-cleated pneumatic tires crunch in and out over the three mile round trip without difficulty. All the usual benefits of electrics—low maintenance, low operating cost, flexibility—are still there.

• Then there is an eastern electric utility, anxious to use electrics—to use what they sell: electricity. But much of their power line maintenance material is weatherproof and can be stored out-of-doors—one of the economies that helps keep power rates down. Surfaces need not be paved, either, and this presented

A Maryland based electric utility uses pneumatic-tired forklift in loose gravel yard in every day operations. Works equally well in snow and ice.

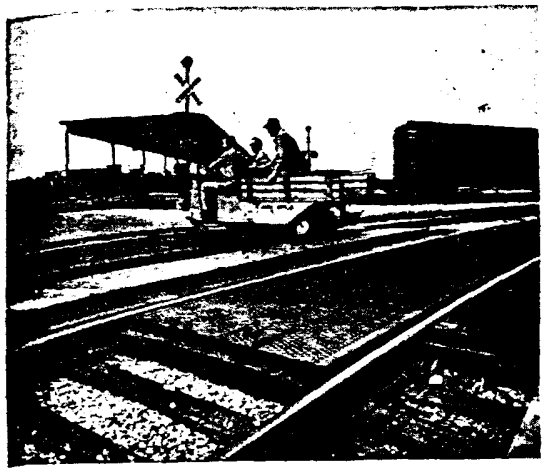


Battery powered mine tractor leaving Amigo Smokeless Coal's Jackpot Mine with 25 ton load for tipple. Note rugged tires and soft surfaces.

LIA26465

ors!

Battery tow truck moves heavy containerized shipment from freight shed to ship's hold at Port aux Basques, Newfoundland. Outdoor conditions are formidable in winter, but operations are not delayed.



At the auto assembly plant this close-up view shows special rubberized material designed to cushion shock of loaded fork trucks and maintenance vehicles when crossing with heavy loads. Cracked and broken axles were eliminated.

a traction problem with the old-style, small wheel electric fork trucks.

It took some doing but the Stores Department finally located a vehicle ideally suited to the job. Pneumatic tires are standard equipment on these fork lifts and the company is in process of converting their entire fleet to the new line. Gravel surfaces make up about a third of their yard, and snow and ice are factors in winter; but these are no longer obstacles.

(Incidentally, the sales-minded Manager of Stores of this company has some excellent cost records on the fleet showing the many advantages of "going electric.")

• But, as if to prove that there was no problem after all, a major auto manufacturer has found a way to accommodate, outdoors, the small wheel and solid tire of his older, but still dependable electrics.

As the plant engineer said, it just didn't make sense to pick up a load outside with one type of truck, and then unload and reload on another type inside the door. So they tried using electrics all the way out and in. The only hitch was that the small-wheel vehicles kept cracking their axles when going over the railroad crossings with heavy loads.

That turned out to be an easy one . . . the crossing places needed replacing, anyway. So a consultant from one of the rubber companies was called in and a new material was developed for crossing plates that cushioned the shock, when the loaded trucks rolled over them. No more cracked axles!

• Finally, we searched for the most "outdoors" location that we could imagine and found a good one . . . at Port aux Basques, Newfoundland! Temperatures here reach some low lows and stay that way for weeks. Yet the rail and steamship line that serves this bustling, frontier-like port uses battery powered tow trucks year 'round to load and unload cargo containers in freight sheds and transfer them from ship to rail and rail to ship.

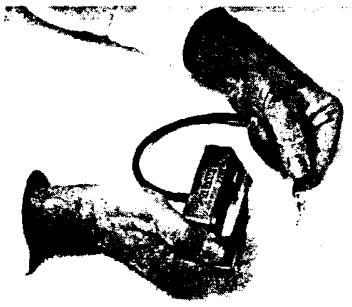
Although cold weather does have some weakening effect on batteries, it is no contest with the havoc created when trying to start internal combustion engines in that same weather. The port, by the way, is enjoying a tremendous influx of commerce, and is expanding at a rapid rate due to a government sponsored campaign to attract tourists to the many woods, wildlife and water facilities.

It would seem safe to predict that the battery powered truck has at last come out in the open to stay. Most of the recent improvements in fork lifts have been in the electrics, so it follows that the next important change will be in the wheel assembly style, increasing their well-known versatility even more.

LEAD CERAMICS SPARK NEW DESIGN APPLICATION

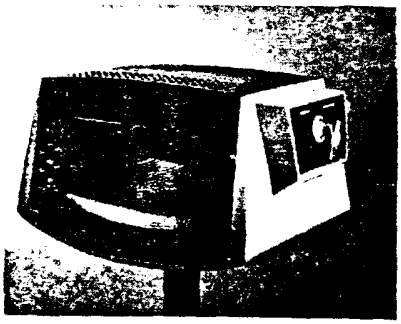
. . . A Matchless Igniter

In the past few years, solid state ceramics have truly made an impression on modern living. From the ubiquitous transistor radio to T.V.'s the size of a cigarette pack, these materials have helped to brighten our leisure hours and lighten our work load.



Press the lever and ZAP, 20,000 volts are released at the ignition area. No batteries, electrical circuits, transistors or tubes to wear out, replace or recharge in this reliable spark device.

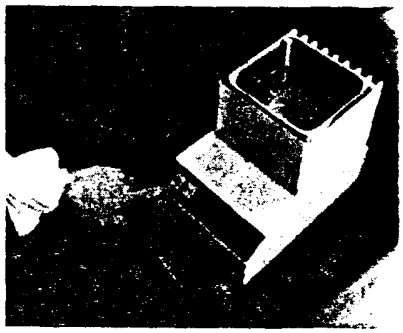
One of the most curious—and useful—of these solid state devices is the Spark Pump® Igniter. Developed at Clevite Corporation, this "solid state match" utilizes lead zirconate-lead titanate, a piezoelectric ceramic. Squeeze the lever and it produces a series of powerful sparks—three times more than is needed to ignite any of the common fuels listed in the table below.



The Corning™ Patio Boiler. All you do is turn on the gas, press a lever, and sparks instantly ignite the broiler.

Potential uses reach from the gas range in your kitchen to a self-contained spark source for your automobile of the future. Numerous units are already in use as the faithful "lighter" for Corning's Patio Broiler.

Other commercial applications for the Spark Pump Igniter either currently in use or in the prototype stage: camp stoves, infrared heaters, hot water heaters and outdoor lights. Because the lead zirconate titanate is piezoelectric, it not only produces electricity when squeezed, but also changes shape when voltage is applied. This has resulted in numerous applications in the field of ultrasonics and sonar. Another more familiar application is in phonograph pickup cartridges.



The best Ultrasonic Cleaners are powered by lead zirconate-titanate transducers.

MINIMUM ENERGY IGNITION REQUIREMENTS

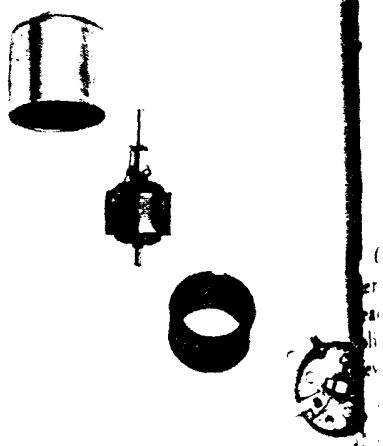
(Based on optimum fuel/air mix)

Fuel	Joules
Acetylene	.00003
Benzene	.00055
Butane	.00076
Gasoline	.00030
Natural Gas	.00200
Hydrogen	.00002
Methane	.00033
Propane	.00031

. . . A Magn

There's a revolution taking in small appliances. Portable el devices of all types have re come along to mechanize every from toothbrushes to swizzle st And ceramic permanent magnet the millions play a vital part.

Electric carving knives, scratchers, shoe shiners, pencil sh eners, razors, motorized toys and table power tools all depend u efficient ceramic magnet motor reduce their size and weight.



Ceramic permanent magnets wi lead oxide additions have been fou to be just the ticket for cutting e ergy requirements for the motors th run these devices too. In fact, most them were just not practical until th more efficient ceramic magnets ca along to conserve battery power increase motor energy, or both.

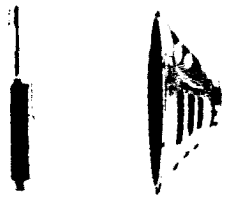
The main reason the magnets r duce energy drain on the battery that no current is required to ene gize the motor field. In addition, th magnetic field is more uniform tha the typical wire-wound field, thus th overall output of the motor is bett for equivalent horsepower ratings.

Current applications of these c ramic permanent magnets are not con fined just to home appliances eithe — the automobile, with its man accessory requirements can use any where from 6 to 20 ceramic magne

LIA26467

chnology Boom

tors. Examples are windshield er, heater fan, sequential signal actuators, power seats, power dows (4 or 5 motors), power an- na, power door locks, air condi- er fans, windshield washer, tape er motors, and even the loud- aker (two for stereo) utilizes ce- mic magnets.



Of course, outside of the motor use, eramic permanent magnets utilizing ad are finding numerous design ap- lications; the following are just a w of the more interesting ones:

- Magnetic Separators for removing ferromagnetic contaminants from wool, tobacco, china clay, grain, feed, liquid coolants, tea, coal, and quarried stone.
- Pulley Separators—For conveyors.
- Automatic Drum Separators—In chute type operations.
- Floor Sweepers—Pick-up ferrous metals from tables, floors, parking lots, etc.
- Magnetic Chucks—Surface grinders, drill presses.
- Sheet Fanners—For feeding and handling sheet steel from cutting room to punch press, stamping press, etc.
- Fishing Magnets—recovering objects from tanks.
- Holding sheet plate to overhead conveyors.

Blue Ribbon Bridges

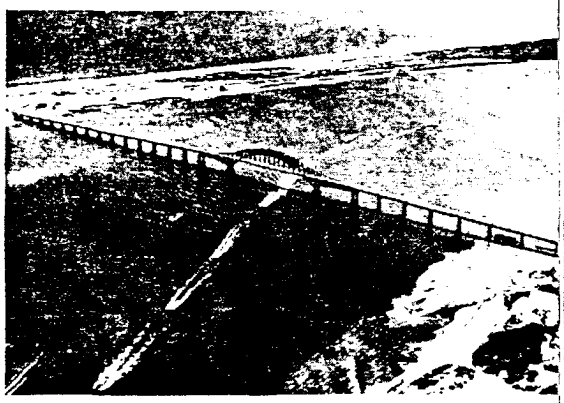
in decorator colors

Noting that "Too much emphasis is currently being placed on economy in bridge design," members of the American Institute of Steel Construction Prize Bridge Jury recently named several bridges opened in 1964 that defied this trend. And four of these outstanding bridges were painted with basic lead silico-chromate paints. Wearing a three-coat system as specified by the State of New York Department of Public Works, these Prize Bridges will still look beautiful many years later—thanks to the built-up corrosion resistance supplied by every coat of this lead-pigmented protective paint system.

Normally, if you want corrosion protection on structural steel, the color palette is limited, but with basic lead silico-chromate pigments the color may be suited to the structural design and setting. Commenting on the esthetic considerations, the jurors pointed out, "Attention to appearance should be given increased emphasis" in bridge design.

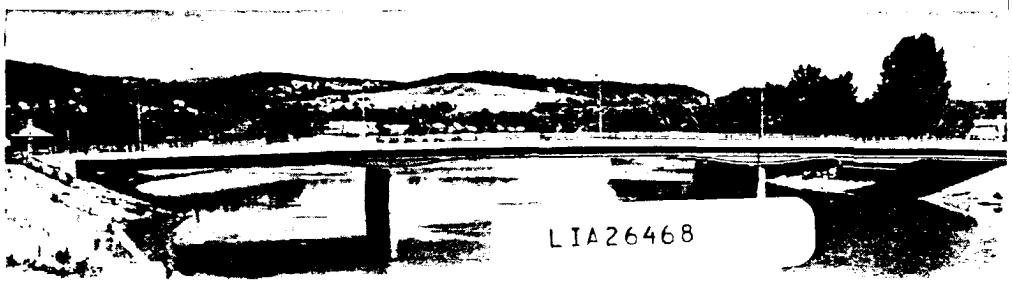
Special Award of Recognition: The Verrazano-Narrows Bridge — representing "outstanding achievement in technology and aesthetics." Owner: Triborough Bridge and Tunnel Authority, New York, N.Y.

First Prize, Short Span: Bridge over Cayuga-Seneca Canal, Seneca Falls, N.Y. Owner: State of New York.



First Prize, Long Span: Robert Moses Bridge, Long Island, N.Y. Owner: Jones Beach State Parkway Authority, Babylon, N.Y.

First Prize, Medium Span (Low Clearance): Tompkins Street Bridge, Binghamton, N.Y. —Owner: State of New York.



LIA26468

Weighed in the balance, lead-asbestos pads are not found wanting

STEADIER THAN A ROCK

The period at the end of this sentence weighs about 5 micrograms. The balances used in pharmaceuticals research at the Lederle Laboratories in Pearl River, N.Y. routinely make weighings accurate to one microgram —one fifth of the amount of ink that constitutes this little dot (.)!

Fine balances they are, and rightfully acclaimed masterpieces of the instrument makers' skill. But without taking an iota from their perfection, no instrument can do such delicate work without extraordinary precautions. Each balance is in its own cubicle and, thanks to painstaking facilities planning, even the type of door for these rooms has been carefully selected. (Sliding doors are used rather than swinging — they don't cause drafts!) Humidity is controlled. Temperature is held within a range of just one degree. The lighting is even and cheerful but so arranged that direct sunlight never gets within a barn door of the balances.

Formerly these balances were installed on the sixth floor of a research center and using them was a lot like taking the pulse of the surrounding activity. A door slammed three labs down the hall, somebody setting down a heavy gas cylinder, most anything that happened—it all registered on the balance's scale along with the weight. People with lab experience are familiar with the problem—accurate microgram weighings are as much the result of the worker's estimate as the balance's exquisite sensitivity.

In the new facilities it actually happened that a pneumatic hammer breaking up a concrete floor 50 feet away did not even register on the balance! And a rail siding 400 feet away, though used infrequently, has yet to cause trouble.

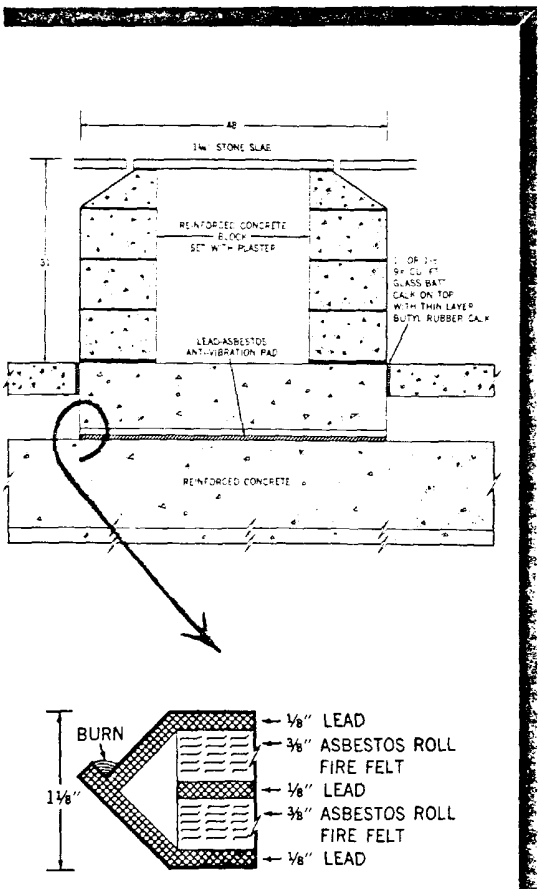
Here's why: In the new laboratory facility concrete piers entirely separate from the building were run down to foundation level at the balance locations. Just below floor level (at grade) lead-asbestos pads 18 x 46" were installed on these piers. A concrete inertia block of the same dimension and 18" thick brought the surface up to floor level. And the table, of concrete blocks, was set up with rigid plaster and topped with a 4" marble slab on shock absorbing pads. These latter pads were suggested by the balance maker's technical expert to prevent damage in event of earthquake—for, as he observed of the balance table, "I've never seen one as steady as this before!"

A vibration break of fiberglass batting topped with a thin layer of flexible waterproof calking is used at floor level. Another, a 1" air space, occurs between the surrounding table top and the marble slab. Without these, of course, vibration could get into the critical area—but that hasn't happened in the 24 months the facility has been in use, nor is it expected to.

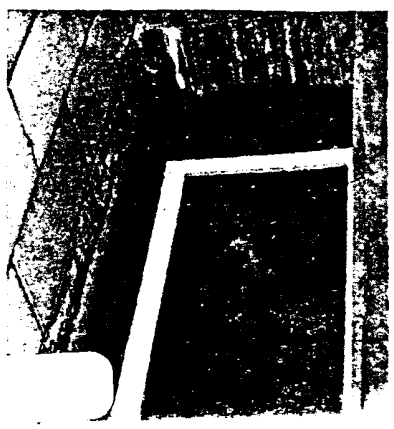
In this installation the lead-asbestos pad is subjected to a total static load of less than 1 psi—a far cry from the 1000 psi required of some such pads used in modern building foundations. One change occasioned by the lighter loading is the detail used to seal the edges. This "beveled edge" eliminates any possibility of structural load bearing by the lead itself.

This pier carries the balances and is separate from the building structure.

Sectional drawing shows pier, pad, inertia block and slab of the balance table. Note beveled edge detail of pad to prevent load bearing by these edges.



Pads were shop coated with asphaltum to protect them from free lime in the green concrete.



LIA26469

Interesting Odds 'N' Ends about Lead

Lead lined laundry truck gets "HOT" wash at Los Alamos Lab—Careful procedure is used to launder and decontaminate clothing worn by workers who handle radioactive material at the Los Alamos Scientific Laboratory. The laundry is picked up by lead lined trucks of the Interstate Laundry in Santa Fe, New Mexico, carried over what is said to be one of the longest laundry routes in the nation and decontaminated in a special laundry area. Stringent safety precautions protect washing crews against radiation. When the laundry is returned, again in leaded trucks, it has not been ironed. Apparently the laundry people feel that they have done enough.

"Waterproofing" your soldering iron. If you're a tinkerer (or a tinker) who works with soldering irons you know all about filing down the tip and retinning now and then to keep it free of pits. You may not have thought of it exactly this way, but those pits are caused by the copper dissolving in the molten lead-tin solder. One manufacturer has now "waterproofed" (would you believe "lead-proofed"?) soldering irons by a clever but simple trick—his solder has enough copper pre-dissolved in it that it won't wash away your iron's tip!

Wooden water mains had a lot of virtues... like long life. These turned up in the course of some street repairs in Copenhagen, Denmark. Nobody remembers when they were laid or went out of service. Making joints for branches like this one called for

an equally durable and easily worked material. The moral of the story is if you are looking for service life to outlast the longest memory, try lead.

A national magazine recently reported an industrial pilferage ring making off with $100,000 worth of lead by melting it down, casting it into shapes to fit around their bodies, and lugging it out of the shop under their clothing. We will not presume to argue the facts, but lest any reader think this gang of crooks had more brain that muscle we would point out that $100,000 represents about 200 tons—or, let's (groan) say 8000 (ugh!) back-breaking trips (oof) of 50 pounds each!

NBS Foxes the President or something. The following is quoted from Measure for Progress, a History of the National Bureau of Standards, by R. C. Cochrane: "An avid reader of detective and mystery novels, the President [Woodrow Wilson] one morning sent a messenger to the Bureau with an envelope bearing his seal. He had read the night before that such a letter could be opened and resealed without any sign of tampering. Could the Bureau do it too? A day later the President had his sealed letter back, apparently intact. Inside was a note and the lead discs from which the fraudulent seal replacing his seal had been made overnight."

Saturn Rocket rolls along on lead—The giant transporter designed to move the Saturn out of the shed and to the gantry at Cape Kennedy is now an operating vehicle. It had been held up until now by failure of the wheel bearings when loaded up to its rated 12 million lb. Tapered roller bearing shattered when it was tried with the load aboard. Now the steel rollers have all been replaced and a bronze-tin-lead sleeve bearing has been substituted—about a fifth of the metal in the new bearings is lead. The unit tested out perfectly up to its maximum speed of 1 mph under load.

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