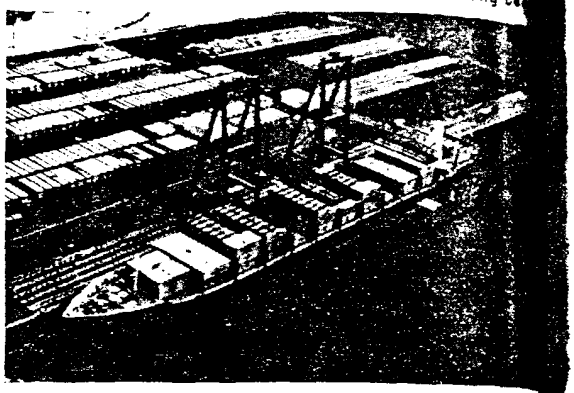
lead

LEAD INDUSTRIES ASSOCIATION, INC.

Chrome Yellow Control Stripes



speed ship loading and unloading

Chrome yellow stripes are an important factor in the fast-paced loading and unloading of cargo at Sea-Land operations in Long Beach, California. These stripes and safety bands offer maximum visibility and assist in the accurate placement of trailers awaiting loading or unloading of their contents.

Taking advantage of a system developed and built by Litton Industries, the SS Long Beach (pictured here), can load or unload the containerized vans at the rate of more than one a minute.

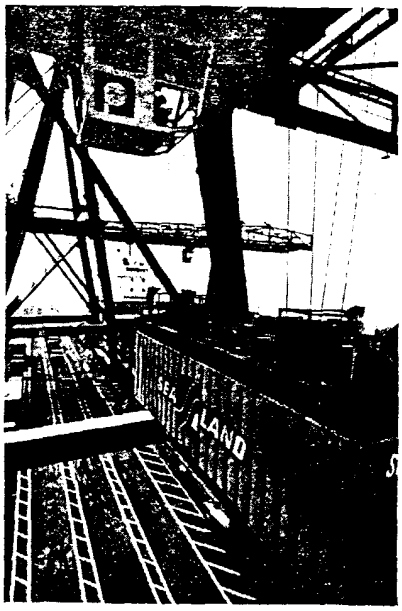
Speedier loading and unloading means faster turn-around time for ships which in turn means greater profits for the carrier.

The premise of containerization is that it pays to put all your eggs in one basket. A single big load is made by packing many small ones in a reuseable metal container designed to be shifted quickly by mechanized cranes and forklifts from plant to truck, truck to train, train to ship, and ship to warehouse.

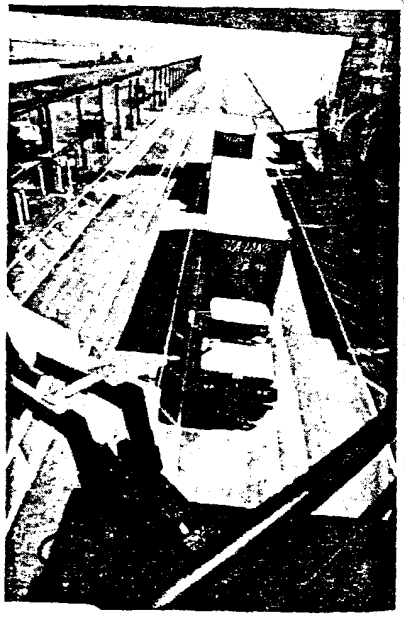
In addition to marking applications around docks, chrome yellow stripes are also used in parking lots to help assure maximum use of the parking apron. It is a well-known fact that drivers are hesitant about crossing or straddling yellow lines. Visibility is another important factor in the selection of chrome yellow for this application.

Wherever safety is the *watchword*, chrome yellow guide lines are used. On the highways, at the airports, in the parking lots, and in modern plants where its use clearly identifies hazardous areas.

One man in a comfortable cab controls the Sea-Land crane.

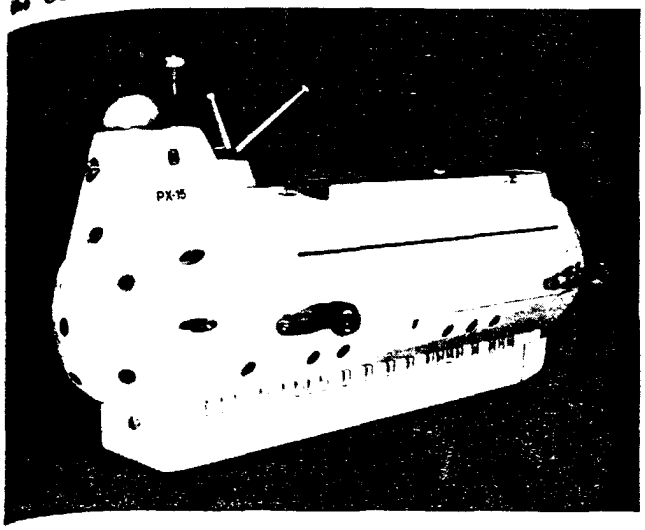


Two trucks waiting to be unloaded. Chrome yellow stripes are clearly visible from above.



LIA26509

Dr. Piccard and a crew of five will study the Gulf Stream from this research sub.



lead-acid batteries furnish the power

SIX WEEKS UNDER WATER

Few space age undertakings have the sheer adventure and pioneering spirit embodied in the project being planned by Grumman Aircraft Engineering Corporation and Swiss scientist. Dr. Jacques Piccard.

At this moment, Grumman is building a new research submarine, the PX-15, based on a design by Dr. Piccard. This 130-ton vehicle, intended to operate as deep as 2,000 ft. down, will have a steel hull which is less compressible than the water itself at those depths. By proper ballasting, a perfect equilibrium can be maintained at any depth, permitting the PX-15 to hover in mid-water.

This unique capability—maintaining constant depth without taking on or blowing ballast water—makes the submarine admirably suited for acoustic studies. In fact, that is one of the principal objectives of the "Jules Verne" scientific mission proposed for the PX-15.

Next spring, Dr. Piccard and five colleagues will submerge in the Gulf Stream off the coast of Florida and drift along with the northerly current for six weeks at depths from 300 to 1000 ft.

The four AC electric motors will only be used periodically to realign the vessel's position parallel to the west wall of the underwater river.

15 Tons of Batteries

PX-15 will offer scientists what is probably the most sophisticated electrical capabilities of any existing non-military submarine — all drawn from more than 15 tons of lead-acid batteries.

Combined with solid state variable and fixed frequency inverters, 168 cells will provide 168/336 v. power for the propulsion motor units. One hundred and twelve cells will be arranged to supply the input power to some of the 70 incandescent exterior lights, while some 98 additional cells will supply the power to auxiliary and instrumentation loads requiring low voltage (28 v.) D.C. Making a combined total of 378 cells.

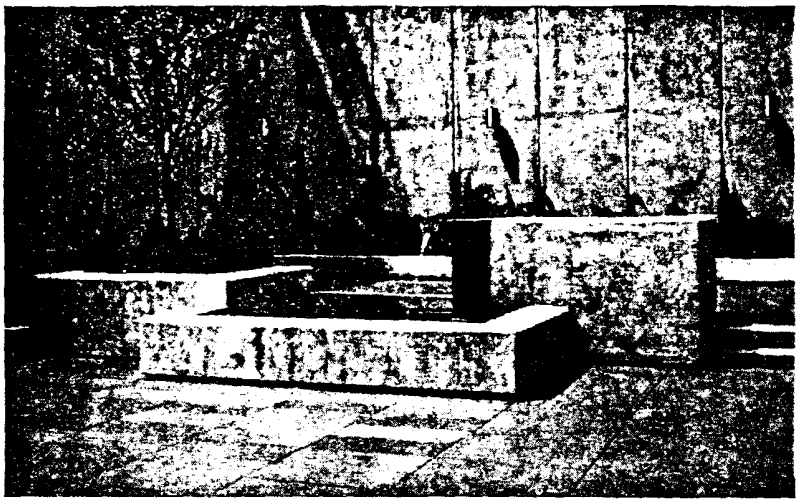
The cells will operate in seawater at ambient temperature and pressure. A special pressure compensation reservoir and diaphragm, and gas vent valve will be an integral part of each cell.

Endurance and reliability are the watchwords for the Grumman engineering team and the men constructing the vehicle in Switzerland under Dr. Piccard's supervision.

Although electricity will only be used in minimum quantities to propel the 50-ft. submarine during the Gulf Stream Drift Mission, there is no illusion about the need to conserve available power. A passive "natural convection" system of carbon dioxide contaminant and humidity control is being used to eliminate the need for fans or blowers, and heat in the vehicle will come from the 55-65 deg. temperature of the Gulf Stream itself, with another ten degrees generated by the equipment and "warm bodies" manning the vehicle.

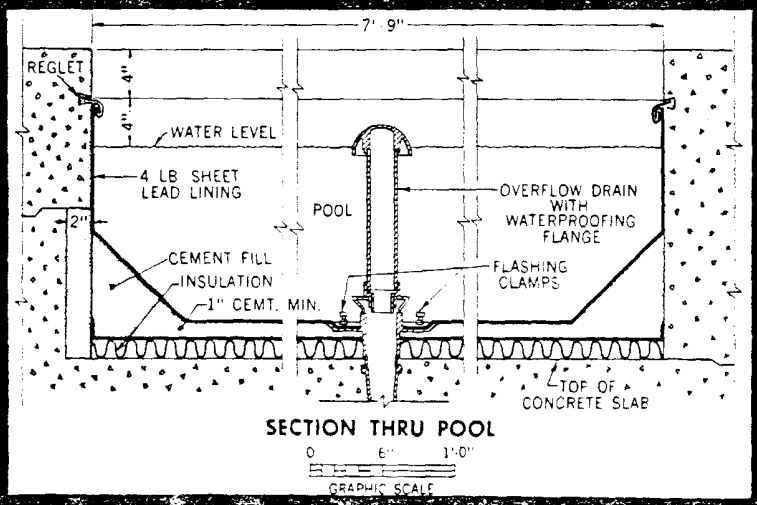
Even food preparation will be carried out without need for electrical power. Freeze-dried, frozen meals will be reconstituted using 210-deg. water kept hot in superinsulated tanks for the duration of the voyage.

Although the exact scientific goals of the Gulf Stream Drift Mission are still being formulated, the use of electricity plays one vitally important role in the safety precautions aboard the PX-15. Just as in the bathyscaph "Trieste", designed by Professor Auguste Piccard and his son, Dr. Jacques Piccard, and in the tourist submarine "Auguste Piccard", an emergency ballast system will rely on electromagnetic valves holding several tons of iron shot. Any electrical failure causes the valves to open, dropping the shot and adding many tons of buoyancy to the "floating" power of the vehicle.

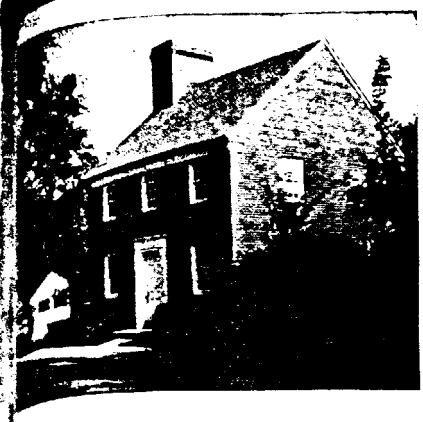


General view of courtyard and lead-lined fountain.

Split-Level Lead Lined Pool



The Laurence G. Payson House at 435 East 70th Street in New York City is "home" to some 425 families. What makes this home unique is the fact it is part of the huge complex called the New York Hospital, one of the world's great hospitals. It houses a large part of the staff: doctors, nurses, interns and technicians in a variety of apartments ranging from "efficiency" types to duplex apartments. The advantages to the staff in living here, in addition to the convenience of living near one's job, include central air conditioning, recreation terraces, group meeting rooms and a two-level garage. The architects, Frost Associates of New York City, have left no stone unturned to provide amenities one would expect in a well designed home. First impressions often being the most lasting, the designer has taken care that spacious plazas with landscaped gardens meet the eye as one approaches. It is in one of these that the charming fountain, pool and planter, illustrated in the photograph, is placed. Constructed of concrete, the pool is built in two levels. It takes advantage of the sound and movement of water along with the counterpoint provided by greenery in the integrally designed plant box. Lead, of course, is the waterproofing membrane used in order to protect the occupied space below—in this case the garage. The innovation in this particular installation is the use of sheet lead as an exposed membrane instead of the usual system involving layers of protective fill and finish. Exposed lead was used in this case because of its unique and lasting beauty, according to Nembhard N. Culin, Associate in charge. Four lb. lead (1/16 in. thick) was used and installed by A. Munder & Son of Long Island City. Joints were burned, and, since they were designed to be exposed, extreme care was exercised in their formation. A butt joint between sheets was specified. In order to guarantee the integrity of the lining along this joint, a 3 in. wide strip of 2-lb. (1/32 in. thick) sheet lead was laid continuously under the joint. The two abutting layers, and the strip underlayment were then burned together. All other edges were secured by calking into reglets. As is standard practice in all such installations, surfaces of lead to be in contact with fresh concrete were protected with a brush coat of a bituminous coating compound against corrosive action of free lime found in all cementitious materials until cured. Construction work was carried out under a general contract held by Turner Construction Co. with Meyer, Strong and Jones as mechanical engineers, all of N.Y.C.



The House on Oliver Street

LEAD HELPS KEEP ITS SECRET

Nobody lives at the attractive colonial house on Oliver Street—nobody, that is, but a 4 KV distribution transformer you'll never see or hear.

In a way, the house on Oliver Street is like the living room hi-fi set. The typical husband buying such a set is concerned with performance and specifications and has little time for appearance. The average wife is concerned with its appearance as a piece of furniture.

The analogy between the hi-fi set and the house on Oliver Street is not far-fetched because it, too, represents the best of both performance and appearance. It is a substation of the Potomac Electric Power Company.

Like other utilities, PEPCO is proud of its reputation for reliability. To deliver power without interruption, it has earned that reputation by investing in rugged, quality equipment with adequate factors of safety. But appearance counts too for the company realizes that the nation's capital is also the nation's show place and functional equipment like the transformer and switchgear of a substation need tasteful housing in keeping with the surrounding decor.

Thus it is that the inside of the decorative two-story, brick colonial house in a Washington suburb is an efficient substation dominated by a 4 KV transformer and its associated switchgear. No one could guess from the outside. The house is perfect right down to its multi-pane windows and slate roof. Some of the windows even light up at night.

So perfect is its resemblance to the surrounding residences that nobody could have guessed that this was a substation . . . except for one thing. In the early morning hours or at other times when the normal street noises fell to low levels, the hum of the transformer could be heard outside the house. This happened despite precautions taken to block all unnecessary openings and sound paths.

The sound paths judged to be at fault in leaking the hum were the air intake opening and duct, the white wooden front door and the two front windows which lit up at night. The other windows, incidentally, are complete in every detail (even to stage flat painted venetian blinds) except that they are backed up by a single course brick wall.

Block that sound path

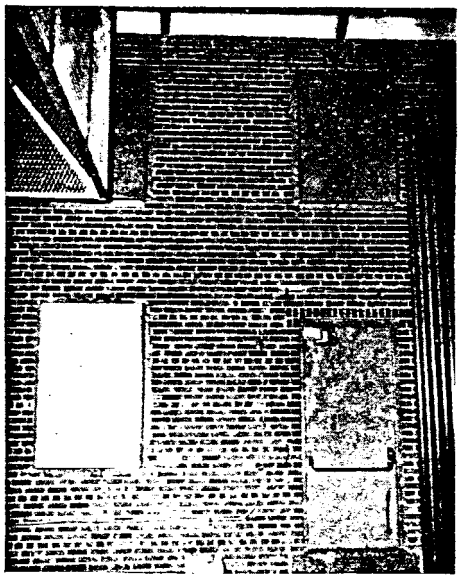
The intake duct measures 4'-2" x 3'-2" and is 17 ft. long with two right-angle bends in it. It was lined with fiberglass and two baffle plates were inserted. The exhaust goes up the chimney and the treatment of the duct reduced its level to well below that of the other sound leakage paths.

Next in line for treatment were the windows and door. The door was covered with 8 lb. lead over a layer of sheet metal on the inside. A good fit and heavy frame allowed PEPCO to dispense with gasketing which is usually also necessary in treating doors.

The front windows—the ones that light up at night—were surrounded by a box structure a little larger than the window frame and 4 in. deep. This has an access door so that the lights can be changed or cleaned. The box was made completely of 12 lb. lead and framed with wood. The false side windows were backed with a single course of brick and this was also considered a weak point for sound leakage. Treatment here was quite simple: a sheet of 12 lb. lead somewhat larger than the window area was nailed to the inside of the brick wall so that it was at least equivalent to the remaining thicker portion of the wall.

When the substation was tested it was found that sound leakage had been reduced a substantial amount.

Interior view of lead covered door and windows. Treatment reduced sound leakage substantially.

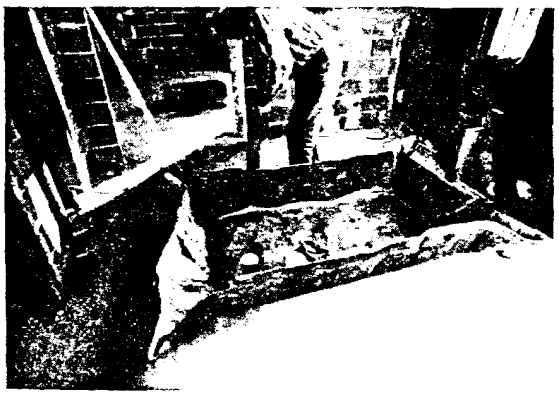


Sheet lead covered windows keep transformer noise inside house.

Lead makes a better shower pan!

Illustrations on this page show a step-by-step construction of a typical sheet lead shower pan. The pictures were taken during construction of the new Cathedral College of the Immaculate Conception in Douglaston, Queens, N.Y. Graziano Brothers of Brooklyn used nearly 4 tons of 6-lb. sheet lead in the shower pans, and a considerable quantity in the swimming pool and roof area flashings. The large three story and basement structure was designed by John O'Malley and Associates, Architects of Brooklyn.

2. Crimping pigeared corner. Hole for drain already cut out.



3. Four corners roughed out.

5. Completed pan before installation in shower room.

6. Completed pan, folded slightly to facilitate placement, being fitted into place. Note formation of pigeared corners.

7. Shower [illegible] asphalt [illegible] contact [illegible]

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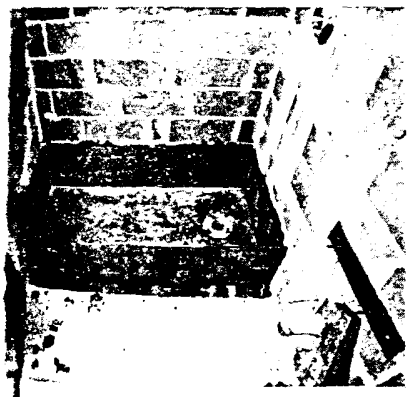
Dressing down 6-lb. sheet lead shower pan.

Pigeared corner folded into place and receiving final shaping.



alled. Note bituminous coating compound or d felt on all concrete or mortar surfaces in d.

Shielding the URIPS . . .

An Atomic Age Battery

The compact URIPS generator. This small lead shielded nuclear powered unit features high reliability and long operational life.

Imagine being lost in the desert with no idea of where you are or which way to go. Well, a ship's navigator faces a similar situation every time it's cloudy and he loses sight of land. There are no landmarks to accurately establish his whereabouts.

Now, nuclear technology may change all that. A low-cost, reliable atomic generator for beacons and buoys has been developed which will permit the marking of sea lanes throughout the world.

Called URIPS, for Undersea Radioisotope Power Supply, it stands only 20 in. high and can operate at depths of up to 20,000 ft. Aerojet-General Corporation of San Ramon, California, who manufacture the URIPS emphasize its high reliability and capabilities for unattended operation —two absolute prerequisites for successful operation from a fixed, deep sea location.

Revolutionary in design of the URIPS (and what makes Aerojet-General capable of specifying 5 and 10 yr. reliability) is its lack of any moving parts—it's all solid state.

Of course, another important feature, and one that makes possible the safe handling and easy transport of this compact, 800 lb. generator is its lead shielding. Lead shielding is used in the URIPS to effectively block radiation from the radioactive (Strontium 90) fuel capsule during installation or eventual replacement of the generator.

The heart of URIPS is its radioactive heat source. Next to it—and pulling heat from it—is a thermoelectric converter. This is a semiconductor material that turns heat into DC electricity. Completely surrounding this "generator core" is a lead shield which reduces the radiation dose rate at the surface of the URIPS to a tolerable limit less than 100 milliroentgen per hr.

There are many applications for the URIPS besides navigational aids such as beacons and site markers. For example, it may be used to power scientific devices such as data recorders and transmitters for oceanographic and metereological equipment; for fixed underwater networks handling acoustic surveillance and detection systems; and simply for maintaining battery trickle charge.

Aerojet-General says satisfactory power systems such as this for a fully-submerged marine environment have been sought for many years. In deep hydrospace, nuclear power stands out because of long service life, very high reliability, and insignificant maintenance. Small, cost-effective nuclear power supplies such as the URIPS generator are expected to fulfill a growing need for marking the world's sea lanes for years to come.

BATTERY POWER

Back in the dear, dead days beyond recall, farmers knew about batteries. In fact, as early as the late 'teens a device known as the Delco Light Plant was being offered to farmers as a power source for pumping water and lighting buildings. Designed and marketed by The Domestic Engineering Company, a predecessor of present-day Frigidaire Division of the General Motors Corporation, the outfit consisted of a simple one cylinder generator and some glass jar, lead-acid cells. You could choose a 32 v. (16 cell) or 110 v. (56 cell) system, depending on your needs. As a routine part of the Farmer's daily chores, the Delco Plant received careful attention. Such things as electrolyte levels, line connections, and fuel supply for the generator were almost as important as cropping and animal husbandry.

Then came the power line marching down the road, and today every farm in America has access to central station power a-plenty.

But batteries again promise to play a prominent part in rural economics . . . and with far less care and attention than in the old days. These new uses of lead-acid batteries, though, will be mobile, not stationary. Several important new work vehicles are now becoming available for heavy-duty assignments on farms, and these are deserving of a closer look.

One of the most back-breaking tasks ever encountered around a dairy farm is the handling and feeding of silage. Two or three manufacturers are now building battery powered feeding carts to provide quick, quiet delivery of silage to stanchioned cattle, with less effort and fuss than ever before thought possible. One of these carts will carry enough feed in one load to satisfy about 35 head, and the job can be done in about that number of minutes. Powered by four 6 v. lead-acid batteries, the machine is operated by a mounted driver, is easily maneuvered in and out of narrow passageways, makes no noise to frighten the animals, and can be simply recharged between feeding schedules. One manufacturer is testing an auxiliary device that will permit the vehicle to be used for distributing chopped bedding, and this will make the apparatus even more versatile.

Another interesting vehicle is finding its way into the important poultry and egg farmers industry. This three-wheeled cart is designed to do a number of jobs, depending upon the type of accessories used. The egg producer, using the captive hen system wherein each layer is actually an egg "factory" enclosed in a small cubicle with atmosphere and diet closely controlled, uses this battery powered machine to excellent advantage. The operator can ride the cart down the aisle between the rows of "factories," both hands free (steering is done by guide rail pressure against axle linkage arms on the cart), feeding as he goes. Then, on the return trip and with crates replacing the feed bin, eggs can be gathered. Again, this vehicle permits quiet operation, important with poultry, and is mechanically simple to operate and maintain.

In some parts of the country you will see a version of this cart used in other ways: as a flat-bed tote truck for plantings and seedlings in nurseries and garden supply centers, for one. Surprisingly, it will handle heavy loads of balled plants right out into the planting areas, despite soft earth and rough terrain.

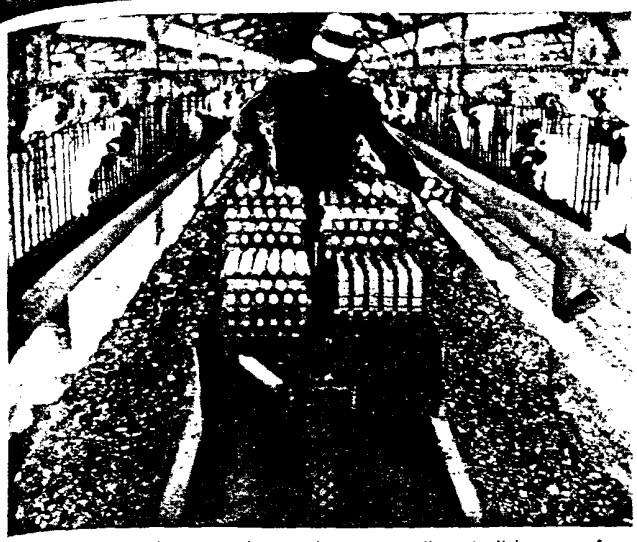
Even more highly specialized is the use of this flat-bed around mink ranches. Here quiet operation in feeding and choring is very essential, because these skittish critters will destroy each other if frightened by sudden noises.

Mechanization in rural America has long been accepted as reality, and batteries are showing their real potential more and more as power sources. New technology in controls, charging techniques, and battery improvements are opening new doors for farm equipment equally as well as in the industrial material handling field. For instance, consider the idea of a battery powered lawn and garden tractor, now being built with combustion engines. This device has wide appeal for the suburban "farmette" as well as fitting into the work support zone of the full-size farm.

More than 200,000 lawn and garden tractors were marketed in the U. S. last year, and the majority of these were in the 4-7 hp. range. One or two prominent equipment manufacturers have studied this market in depth and the technical feasibility of building a machine to operate with conventional batteries. The answers were favorable and these companies are now considering the development of a prototype—late 1968 or early 1969 are the target dates for introduction.

But what about the machine that *all* farm mechanization is built around—the full-size tractor? Could this titan conceivably be built with batteries as a power source? There are some people that think so.

One approach describes a high profile vehicle reminiscent of the straddle machine used in lumbering today, but much more sophisticated, and with industrial type batteries for power. Four 15 hp. motors are positioned within the wheels, which in turn are electrically steered. Each leg is self-adjusting for over-the-ground vertical flexibility, and can be swiveled instantly to move the tractor

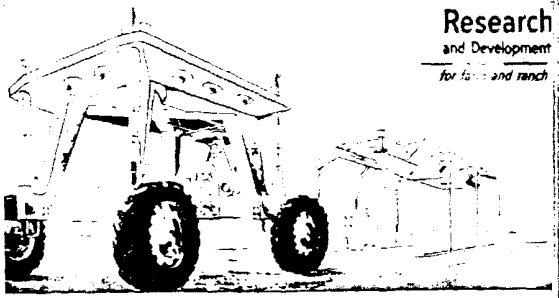


Battery tote cart being used to gather eggs in "captive" hen egg factory. Can also be used for feeding with proper accessories.

Another use for tote cart in nursery operation. It is particularly useful in a one-man operation.

Research and Development for farm and ranch

DOWN ON THE FARM!



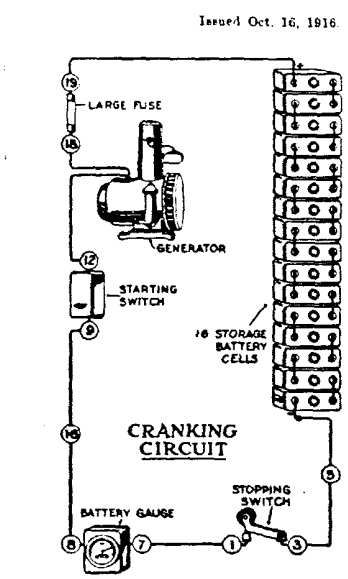
Artist's conception of the future battery powered farm tractor. Charging station is in the right rear, with battery in recharge position at top of drive-in rack. (Courtesy—NATION'S AGRICULTURE magazine)

sideways down the field. The computerized control center can be spotted anywhere along the over frame, and tillage tools, combine, and other attachments would mount directly beneath the frame. The operator would control all functions with a small computer. Battery charging would be done at night, with spare batteries for use during peak seasons.

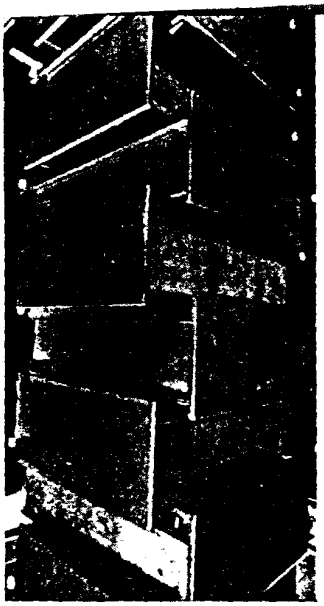
Historically, battery powered vehicles have been restricted to confined uses, on hard surfaces, and with specific task assignments. But, based on some of the signs pointed out here, the future will undoubtedly hold some broader concepts of battery capabilities, and farmers will be among those to welcome the developments.

Truly, Gaston Plante's lead-acid battery, an innovation more than a century ago, promises to invade many fields!

Schematic of Delco Light Plant system from salesman's notebook of 1916.



Silage feeding cart (front view) showing battery boxes at top and bottom center, also at both front corners, bottom. Delivery chute is to rear and just behind wheel.



in corrosion protection . . .

Terne Gives The "Extra" Dimension

Without a doubt, corrosive vapors and humidity are two items likely to be found in most any chemical laboratory. These can play havoc with the furniture. Fumes from acids, alkalis and solvents which are constantly in use around the lab could destroy most metals in a hurry. It is only natural then, that lead should have a part in protecting such furniture.

Lead is well known for its chemical corrosion resistance. It is commonly used in lining laboratory sinks and the waste pipe in the plumbing, as well as for chemical tank linings and piping out in the plant. Duralab Equipment Corp., Brooklyn, N.Y., a manufacturer of quality laboratory furniture takes full advantage of lead in their use of terne metal, a lead-alloy coated steel, in the construction of all their furniture.

John Stein, Sales Manager at Duralab, is enthusiastic about terne's contribution to the quality of the end product. He says, "The terne metal used in our laboratory equipment provides the 'extra' dimension in corrosion protection. In particular", he points out, "one must consider what happens in concealed areas such as joints, where the metal overlaps. The chemical spray ordinarily utilized in the manufacture of such metal furniture fails to penetrate to this area, and in turn, corrosive action in many cases may begin even during fabrication. By contrast, terne metal has a protective coating that combats corrosion right from the steel mill."

Another consideration which Mr. Stein points up is what happens upon injury to the paint finish. Furniture made of terne literally has the unique ability to "repair itself". Without this additional protection, the base metal becomes immediately exposed to corrosion.

During fabrication, terne metal is formed into many shapes without having the coating stripped off, too. A distinct advantage held by the lead alloy over other inexpensive coatings is the fact that it acts as a die lubricant in stamping and drawing operations—thus die life in considerably extended.

Duralab's Vice President, Joseph P. Ingarra notes that terne also has other advantages. "We find this material accepts paint like a dream—simply degrease and it's ready—no costly pretreatment." To emphasize terne's inherent corrosion resistance, he relates, "Many is the time when we receive delivery of terne and the cold rolled steel strapping is fully rusted, yet the terne is in like new condition—and this carries through to the finished product, also."

Duralab provides a wide variety of fume and air conditioning hoods, wall and floor cabinets, sink assemblies, counter tops and assorted scientific laboratory and educational equipment fabricated from terne metal.

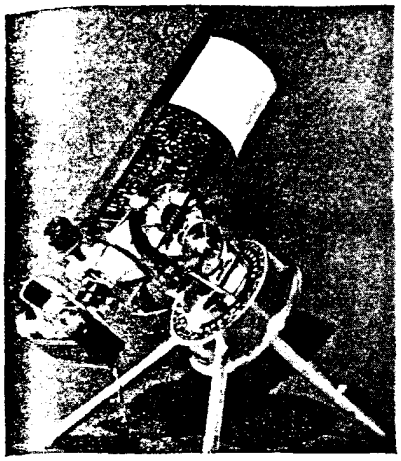
Where quality goes into laboratory furniture, terne, a lead-alloy coated steel helps keep corrosion at bay.

During fabrication and in subsequent joining operations, the lead-tin alloy coating provides "extra" corrosion protection.

Interesting Odds 'N' Ends about Lead

Lead "collars" the universe . . .

Using an ingenious lead-filled vinyl collar this Questar telescope, shown in its polar equatorial position, is in perfect balance with the camera at



the opposite end. The collar, weighing 1 pound, is wrapped around the star chart as an aid for smooth electric driving during celestial photography.

Elastic Ceramic Has Potential

A mixture of lead titanate, lead zirconate, and borosilicate glass called Composition P is a good insulator, a fine dielectric material, and a good adhesive, especially in electronic applications, states International Business Machines Corp.'s Components Div., East Fishkill, N. Y. Due to its elasticity, it is an especially interesting adhesive for joining materials with widely differing coefficients of expansion, says IBM. Example: silver foil joined to an alumina substrate.

Piezoelectric Ignition. Foul or wet, spark plugs will fire with this type of ignition system being evaluated by the U.S. Army.

This plug, based on a solid-state effect in which substances with piezoelectric properties produce electricity when mechanically stressed, consists of a cam and a high-voltage switch. Crystals of lead-zirconate-titanate—which produce a spark when stressed mechanically by the cam—are stacked and encased in polypropylene. The function of the switch is to time the spark to the engine.

And, too, spark plug electrode erosion is decreased due to the extremely rapid voltage rise of the spark, which requires less energy for ignition than most conventional systems.

"Sweating" A Cable. Workman is lifting core of old telephone cable from pot after lead covering has been melted off. Over 20,000 tons of lead and lead alloys were reclaimed in this manner last year by a Western Electric Co. subsidiary—primarily from lead covered telephone cable.

Pb

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lead

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