HARDCOAT ANODIZING SYSTEM
TYPE III

Chemicals and Equipment To Setup A Hardcoat Type III Anodize Line

Contains:

- **3 x 6 Gallon Tanks (for Degreaser, Desmut & Anodize Baths)**
- **1 x 8.5 Gal Enamel Tank (for sealing)**
- **Aluminum Degreaser Powder**
- **Deoxidizer/Desmut**
- **Anodize Sealer**
- **GP Plates (cathodes)**
- **Titanium Wire For Hanging Parts**
- **Mist Suppresstant**
- **Rinsing Bottle**
- **30 Amp/30 Volt CC/CV Rectifier**

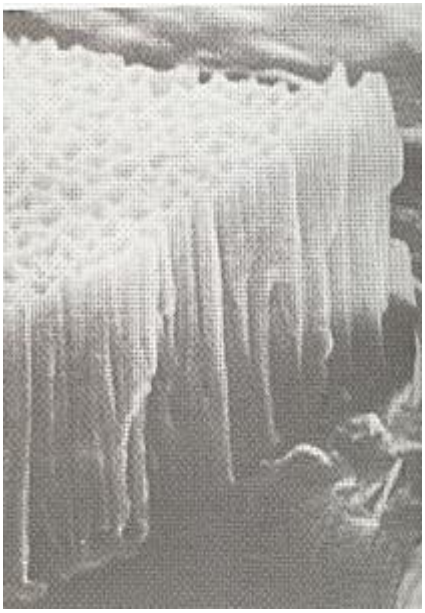
You Will Also Require:

- **1.75 Gallons Battery Acid (most automotive parts stores sell this)**
- **Chiller System (check Aquarium Stores)**
- **Tubing & Pump To Run Chiller**

HARDCOAT ANODIZING

The process of anodizing is, chemically speaking, rather complicated, but in practice is extremely simple.

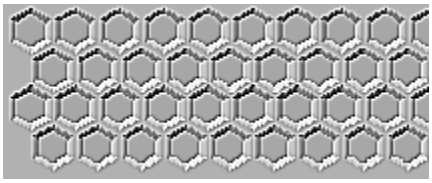
The process involves placing aluminum in an electrolyte, weak sulfuric acid, and passing a low voltage current through it. The aluminum part is connected to the positive (anode) side and the negative side is connected to a cathode made of lead. This causes the aluminum to oxidize, similar to steel rusting, with the net result of a very hard, tough abrasion resistant protective coating being formed. An interesting 'quirk' of this process is that the film formed looks like honeycomb, and has 'tubes' growing up from the aluminum.



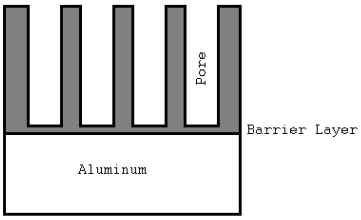
Cross section

For the technically inclined, the surface of the aluminum actually grows a layer of aluminum oxide on itself, which is then transformed into aluminum hydroxide (anodize) and finally hydroxide monohydrate. The whole anodize layer is non conductive. The hydroxide is microscopically porous which allows it to absorb dyes. This layer looks somewhat like a honeycomb, as can be seen from this photo, magnified some 40,000 times.

The 'barrier layer' at the base of the pores is thin enough to pass some current, even though the complete layer is non-conductive, so the honeycomb structure continues to grow, as long as current is flowing through the system. The acidity of the solution will also dissolve the anodize, so the latter is only true if dissolution is not faster than growth.



Looking from above



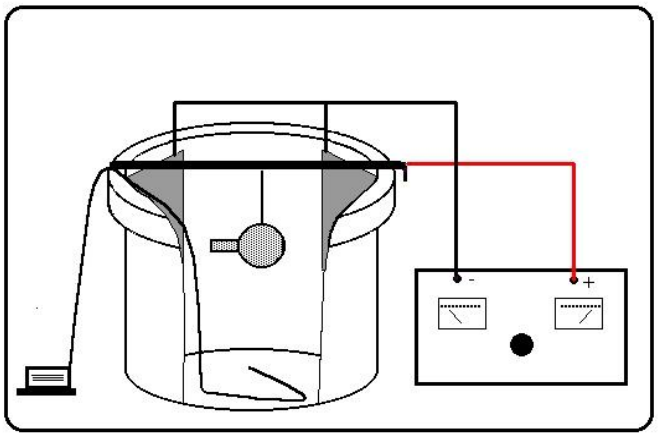
Hardcoat Type III vs Type II

Type III anodizing is a much harder coating than Type II. It is commonly seen when strength and lubricity is of the upmost importance. The Type III layer gets its strength from a more condensed pore structure than Type II. This is achieved by anodizing at very low bath temperatures. This also means that it will not readily accept dye. The pore structure is too tight to absorb color.

Setting up the Anodizing Tank

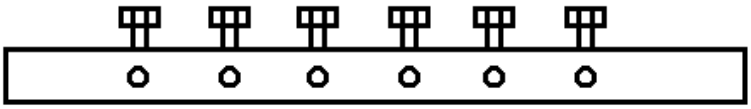
Wiring up the parts.

Anodizing requires special attention to wiring up the pats, because only aluminum parts can be placed into the solution, so the actual wire, must be made of this, or titanium. Consequently, an aluminum wire also is anodized. If a connection is poor, then the anodize film grows on the wire, where it is touching the part, and an insulating barrier is formed, preventing further film growth.



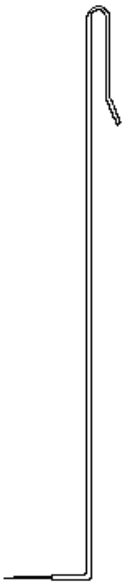
Titanium wire is supplied in all the kits, and can also be obtained separately. Thin aluminum wire may be obtained from almost any garden center/hardware shop. This is ideal for wiring small parts, as long as you make sure you secure the wire mechanically, either by wedging it into a hole or by tightening an aluminum bolt onto it, and into the work piece.

Ideally, the tank bar should also be made plastic. This will avoid corrosion problems and any shorting out due to mists



An aluminum tank bar, using hex head bolts to secure the wire rack

settling on a metal tank bar. A solid bar of plastic could be used, and for the engineering inclined, this could be drilled with holes to accommodate the wire or needle, which could be secured with hex head bolts, tapped into the block.



An alternative technique to wire is to use knitting needles. By removing the top of the needle and bending it into the shape needed, it can be forced into a slightly smaller hole, using the needle's tapered point as a wedge.

Aluminum knitting needles are usually anodized, and as this is an insulator, the anodize must be removed, either by sandblasting, abrading with emery paper, or stripping in the anodize stripper. If stripping, leave the needle in the stripper until all the color has gone, usually about 3 minutes. Some needles are coated with lacquer, so you may have to abrade this off.

If you decide to re-use these, you MUST strip off the anodize film every time prior to usage.

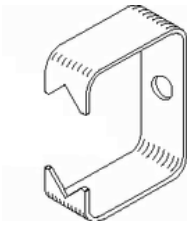
Knitting needles (see left) are usually made of harder material and so, when the taper is forced into the hole, it slightly enlarges the softer aluminum, ensuring a tight fit. Soft wire will actually decrease in size if pushed into a work-piece, which is harder than itself, thereby shrinking it, and causing a loose connection.

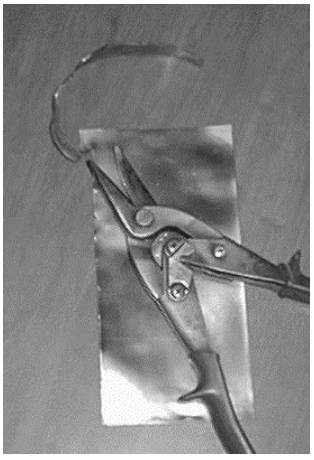
There is a host of different types of Titanium grips and racking clips available. Titanium is actually better than using aluminum, as it is not anodized in the process, saving you the job of stripping your racks after each operation. Titanium is also much harder and stronger than aluminum.

Servi-Sure Inc are suppliers of these racks. www.servisure.com

2020 W. Rascher Ave., Chicago, IL 60625 Phone: (773) 271-5900, Fax: (773) 271-3777

Email: racks@servisure.com





Installing the GP Plates (Cathodes)

The anodizing system uses 2 GP plates 8" x 8" as cathodes. (The actual part being anodized becomes the anode). To install these into the tank, see page 11 & 12 for anode/cathode installation procedures.

The GP Plates should be occasionally cleaned using wire wool or Scotchbrite type material.

Remove the plates from the solution when not in use.

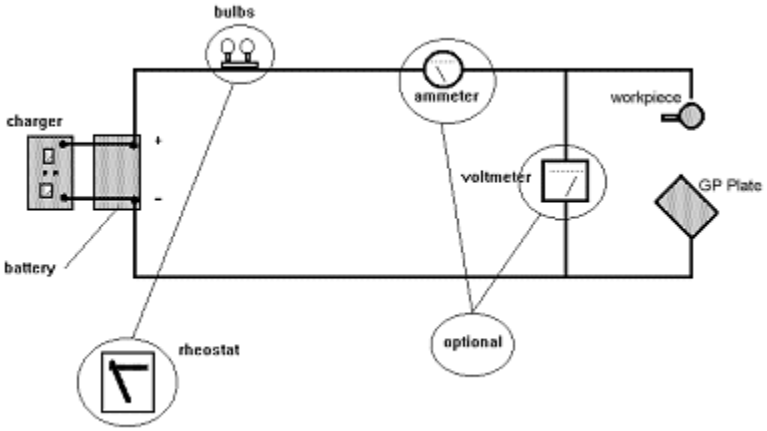
CONTROLLING THE POWER

The Power Supply and Power Requirements.
Unlike plating, anodizing has the peculiarity of becoming an insulator to itself, cutting off power and stopping further growth of the film. The thicker the film, the more insulated the part becomes from the power supply. There comes a point when a Peak Anodic Resistance (PAR) is reached, when the film will grow no more, and if power is kept being applied, it actually erodes away the film. PAR is quite visible on a rectifier, because the amperage needle drops off. It is therefore useful to install some type of ammeter into your system, so you can see when you reach PAR. The optimum current requirement is 4.5 amps per sq foot, or 30 milliamps per sq inch. This can easily be supplied from a 12 volt battery and controlled using light bulbs.

See the FLASH VIDEO on www.caswellplating.com concerning controlling the power with light bulbs.

a. Battery chargers

Battery chargers do a good job on anodizing, but the current still needs to be controlled. Using light bulbs will do this economically. Set the charger to the 12 volt position.



There are some major misconceptions about using battery chargers as power sources. Battery chargers are rated for driving a partially discharged battery, not a grounded load like anodizing or plating. As an example, the voltage was measured and current of a charger under load. This unit was rated for 12V at 10A, when loaded the results were as follows:

- At 0 A (no load) V=13.4 V
- At 3.66 A (3 Ω) V=11 V
- At 5.35 A (2 Ω) V=10.7 V

A 10 amp load wasn't tested as it would overheat the charger and open its thermal circuit breaker if operated for any realistic length of time. If this unit were rated as a transformer isolated unregulated power supply, using a full wave rectifier (which is what it is) the rating would be 10.8 V at 5 A. Larger or smaller chargers will scale accordingly.

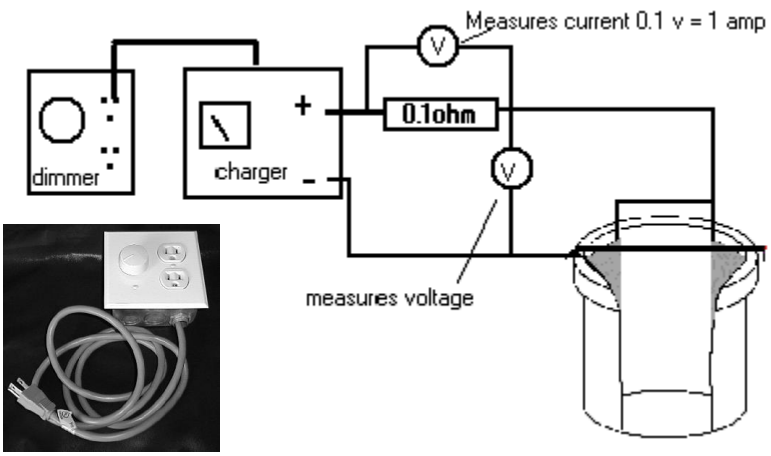


Figure 6. A Variable Voltage Battery Charger Power Supply

Besides not putting out the voltage and current that you think you are getting, battery chargers also have no effective means to reduce the voltage and current provided to the load. You can compensate for the first problem by de-rating the battery charger as discussed above, and there is something you can do about the control problem. A perfectly simple way to solve the control problem is to use an ordinary 600 W lamp dimmer to control the input to the charger. This is shown in Figure 6. A charger is a transformer load, not a motor load. The dimmer can power a transformer as easily as it can power a light bulb. The resolution you can actually get isn't great, but it is better than you can get using any reasonable number of power resistors or light bulbs to control the current.

b. Batteries.

Batteries are not the best power source for anodizing. You are better off using a battery charger controlled with a light dimmer switch. Monitor the current using a multi-meter and a shunt 0.1ohm resistor, as per fig 6.

c. **Rectifiers.**

Rectifiers are the ultimate in anodizing. Variable controls, voltage and amperes dials, allow you to fine tune your anodizing efforts.

Cooling The Anodize Solution

To achieve the pore structure required for a Type III coating, the anodizing tank must be chilled down to 37-40 deg F.

While there are many homebrew ways to do this (such as pumping the solution through a cooler full of ice), the best way is to purchase a chiller.

A 1/4HP Aquarium Chiller should be more than sufficient to chill 5 gallons down to 40 deg F. You will also need an acid resistant pump to pump the acid from the tank, through the chiller.

We recommend piping the solution from the top of the tank, rather than drilling bulkheads through the tanks. This minimizes the chance of leaks developing. Acid leaks are not fun.

Make sure to securely attach the pipes to the tank, to make sure vibration doesn't cause them to slip off.

The WATER BREAK TEST

Also recognised as ASTM-F-22

This test is probably one of the most important procedures in any plating or anodizing operation.

Make sure you carry out this test after doing all the preparation work, including degreasing and etching in pickles.

To pass the test water will sheet off the part rather than bead off.

Take a cleaned and dried part and set it in a vertical position.
Use a spray bottle containing distilled water.
Spray the part two to three times from at least 6" away.
If the part is clean and free of oily residue, the water spray should sheet off.
If some oily residue remains, the water will tend to bead on the part
Repeat the cleaning process until the part passes the test.

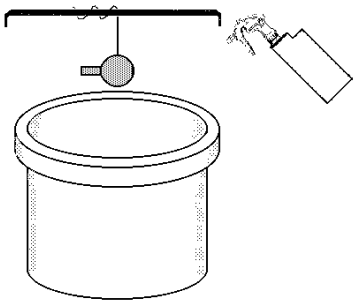
Alternatively, apply several drops of distilled water to the cleaned surfaces.
If the surface is inadequately cleaned, the spherical form of the drop is largely retained, and the surface must be cleaned once more.
If the water runs on the treated surface, then wetting has been satisfactory and the part is ready for plating.

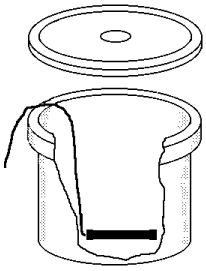
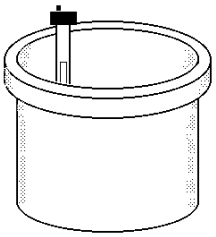
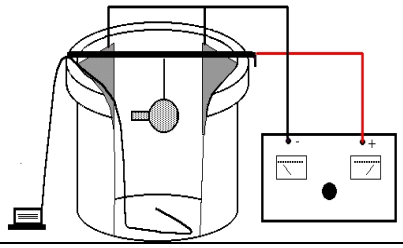
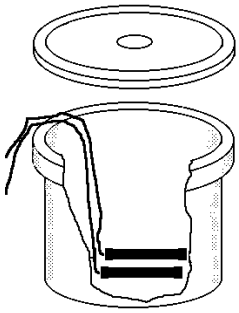
Oil/dirt film makes water bead up

No oil/dirt film allows water to cover part

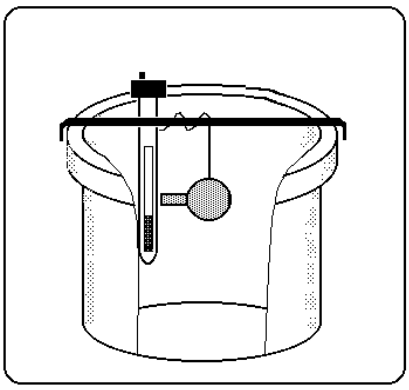
RINSING WITH DISTILLED WATER

The part should be raised out of the solution and sprayed liberally with distilled water.
The runoff should be allowed to drain into the tank.



PROCEDURE	SETUP	OPERATING PARAMETERS	EQUIPMENT	SAFETY
1. SURFACE PREPARATION	Buff & Polish for a mirror finish. Bead Blast for a 'flat' finish. Nylon Abrasive wheel buff for a 'scratched brush' look.			
2. DEGREASING		No agitation 5 mins immersion 3lb SP Degreaser 5 gal Distilled water	1 x 6 gal tank 1 x tank lid 1 x 3lb Degreaser	
1. RINSE IN DISTILLED WATER SPRAY 2. WATER BREAK TEST				
3. ALUMINUM DE-OXIDIZER		No agitation 3 mins immersion 4 gal Distilled water 2 x 1 qt De-Oxidizer	1 x 6 gal tank 1 x tank lid 2 x 1qt De-Ox	 Wear rubber gloves and goggles
RINSE IN DISTILLED WATER SPRAY				
4. ANODIZING TANK		37-40 deg F Current at 6 amps per sq ft for 120 mins. 3.5 gals distilled water 1.75 gal battery acid (add acid to water) 2 tsp Mist Suppressant	1 x 6 gal tank 1 x tank lid 2 x GP Plates Mist Suppressant Chiller	 Wear rubber gloves and goggles
RINSE IN DISTILLED WATER SPRAY				
5. SEALANT		210 deg F on hotplate No agitation 15 mins immersion 5 gals Distilled water 5 oz Anodizing Sealant Use mist balls and the lid to retain heat and speed heating. In extreme cold, wrap sides of tank with bubble-wrap & duct tape.	1 x Enamel tank 1 x 1lb Anodizing Sealant	
RINSE IN DISTILLED WATER SPRAY				

Aluminum De-Oxidizer & De Smut.



Aluminum De-oxidizer is a concentrated, easy to use liquid material designed to deoxidize and de-smut aluminum prior to anodizing and chromating. Aluminum De-oxidizer is non-chromated, yet offers performance comparable to or better than most chromate bearing products. The product is especially useful on certain types of aluminum alloys found on Japanese motorcycles, which have a certain amount of zinc in them. The prescence of zinc makes the casting smut as soon as it enters the anodizing tank. Pre-dipping with Aluminum De-oxidizer reduces this problem.

PRODUCT FEATURES
No chromate disposal problems.

EQUIPMENT
Tank: HDPE Plastic tanks
Agitation: Continuous air agitation is recommended to increase effectiveness.

OPERATING PARAMETERS

Concentration: Mix 1 qt (1 liter) of Aluminum De-oxidizer with 2 gallons water
Temperature: 70-110°F Optimum 100 deg f
Immersion time: 1-3 minutes
Water: De-ionized or distilled

SOLUTION MAKEUP
Before making up or replenishing the working solution, refer to the Material Safety Data Sheet for protective safe handling measures.
1. Fill tank 2/3 full of water.
2. Add required amount of Aluminum De-oxidizer to the water with mild agitation.
3. Add water to operating level and mix again.
4. 110 deg F

To prevent excessive heat generation and spattering, never add water to Aluminum De-oxidizer. Always add Aluminum De-oxidizer to water. Add in small amounts over the entire surface of the solution with mild agitation.
Dip the parts into the solution for 1-3 minutes, rinse in fresh water, then immediately proceed to anodize the part.

Operating the Anodizing System.

1. **Check the part for cleanliness**. After thoroughly preparing the part, by bead blasting, polishing etc. ensure it is completely degreased by using the 'water break test'. Simply run water over the part, if the water sheets evenly, then the part is clean. If it 'balls up' or spots, then it needs further cleaning. At this point, the part should already be wired up to the tank bar. This will prevent you from handling it. DO NOT TOUCH THE PART FROM THIS POINT UNTIL THE PROCESS IS COMPLETE.

2. **Caustic Etch**. Dip, for a few seconds only, into a room temperature solution of Anodize Stripper, as the etching action will dull the finish slightly. To maintain a bright finish, you may omit this step, however, the part MUST pass the 'water break test'. Rinse the part.

3. **Anodizing De-Oxidizer** Dip the part for 1-3 minutes into the pre-mixed solution at 100 deg F. See the section on Aluminum De-oxidizer.

4. **Rinse**, thoroughly in fresh water. Agitate the part, and if necessary, spray with water to rinse chemical from hard to reach areas. A sprayer attached to a faucet is a great idea.

5. **Anodizing the Part**. Place the pat into the tank, and connect the tank bar to the positive side of your power supply. Make sure the negative wire is connected to the GP Plates (cathodes). Switch on the power.

6. **General Duration of Anodizing.**
   This is totally dependant on the part reaching PAR, Peak Anodic Resistance) 1-3 hours
   Remove the part from the tank and rinse off thoroughly in distilled water.

7. **Acid Neutralizer.** Make up a tank of 1 gal distilled water and 1/2 lb baking soda, as your neutralizer tank. Before proceeding to dying, the part must be completely ridden of acid; otherwise, this will cause you problems. Acid dragged from the anodizing tank into the dye tank will cause streaking and blemishes. It will also eventually alter the dye's color. After neutralizing, rinse in fresh or distilled water.

8. **Fixing (or sealing)** Using a plastic tank supplied with the kit, place 1 or 2 gals of water, depending on what will cover the part, and add 1 oz per gallon of ANODIZING SEALANT POWDER, and bring to the boil using the non adjustable ceramic heater. Then place the anodized part into the tank, using the tank bar as the suspension support. Boil for 2-3 minutes per 0.10 mil. oxide coating thickness. 24 microns = 1 mil Wipe the parts dry and immediately apply a mineral oil (WD40 etc) with a soft cloth. Alternatively, you could use ANODIZING SEALANT LT which is a liquid. Add to distilled water at the rate of 2 fl oz per gallon. Warm the liquid to approx 85-95 degrees and immerse the part for 10 minutes. Anodizing Sealant LT may slightly effect the color of some dyes, but this is offset usually by the simpler technique.

9. **Cure. A**llow the part to cure in an ambient, dry area for 24 – 48 hours to obtain its final hardness

10. **Polishing.** You may polish the part using a loose cotton buffing wheel and either a white or blue buffing compound. Be sure to take care, the anodize film is not very thick. You could damage it.

SEALING THE ANODIZE WITH ANODIZING SEALANT
High Temperature Sealant.

An enameled pot is supplied to heat this solution over a hotplate. DO NOT LEAVE UNATTENDED or the solution will boil away and the tank may ignite.

Always use distilled water, as ordinary water may leave mineral deposits on/in the film.

Anodizing Sealant is a nickel acetate compound for sealing anodic coatings on aluminum. It is a fine flowing greenish powder, readily soluble in water and specifically formulated with a pH regulator and an agent to help minimize smut.

OPERATING PARAMETERS

Make up a solution of : 1 oz per Anodizing Sealant to 1 gal of distilled water - or 7.5 grams per liter
Time: 5 to 30 minutes depending on anodize thickness (2-3 minutes per 0.10 mil. oxide coating thickness) 24 microns = 1 mil.

Temperature: 202-210°F
pH: 5.5 to 6.0
Water: De-ionized or Distilled water

CONDITIONS FOR USING ANODIZING SEALANT

Tank: Sealant solution should be contained in a plastic tank.

pH: pH adjustments will not be necessary unless acidic or alkaline compounds are carried over into this sealing bath. Add acetic acid (to lower pH) or ammonia (to increase pH). Acetic acid is difficult to come by, and it is preferable to discard the bath, especially as it has a limited shelf life anyway. White vinegar is a good substitute.

Rinse: Before sealing, a LIGHT rinse is necessary to remove any foreign substances. After sealing, the work should be thoroughly rinsed at once, as is normal in nickel acetate sealing, before it is dried.

Filtration
Filtration clears the bath of precipitates with interfering action. Filter through coffee filters after each use.

Maintenance. Bath life is 14-60 days dependent upon operating conditions and bath upkeep.

BATH TURBIDITY

Freshly prepared nickel acetate sealant baths are clear green solutions. In use they become contaminated by precipitates and grow cloudy. If not removed, these contaminants can form deposits on the sealed surface. The effect can be due to the following: High pH (at pH values above 6.0, nickel acetate may be converted into soluble nickel hydroxide), hard water and trapped impurities.

The following measure can be taken to minimize this affect: Maintain pH value of 5.7 ± 0.3, through rinsing of anodized, dye or un-dyed work prior to sealing to prevent possible introduction of contaminants and filtration to clarify the bath and to prevent surface deposit formation

STRIPPING THE ANODIZE FILM

Mix up a solution of 4-6oz of Anodize & Chrome Stripper with 1 gal of water. Add the powder slowly to the water.

Dip the anodized part into the solution for between 20 seconds and 10 minutes, depending on the thickness of the existing anodize film.

Rinse off the part thoroughly in fresh water.

TESTING FOR ANODIZE FILM CONTINUITY (see overleaf) and if present re-immerse.

Ideally, the solution should be at approx 70 deg F plus. The hotter the solution, the more rapidly the anodize film will be stripped. Solution temperature range is 70-150 deg f.

Use only plastic vessels, not aluminum, as this material is extremely corrosive to this metal.

TESTING FOR ANODIZE FILM CONTINUITY

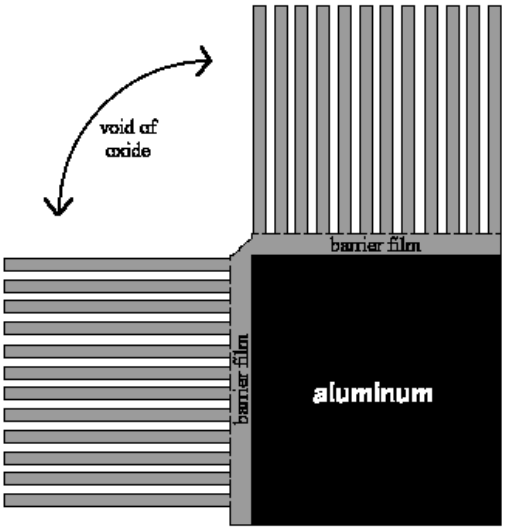
Anodize film in non-conductive, whereas the actual aluminum is conductive.
It is therefore relatively easy, using a multimeter, to determine if we indeed have grown an anodize film. Set any multimeter to the 1000 ohm setting.

Place the black and red probes on the aluminum in different places. The needle on the multimeter dial will swing over if there is NO anodize film. If you have grown an adequate film, then the multimeter will not register at all.
The work must be perfectly dry to do this test.
Test does not show ADEQUATE GROWTH, but only that there is SOME growth of film.

Sharp edges can create problems, because the anodize pores grow out at right angles to the metal. On the example here, the corner area is almost completely void of pores. This will show up when dying.
MIL SPEC A-8625F calls for a 1/32" minimum radius on corners, when applying a 1 mil anodize film.

Consideration needs to be given to this phenomenon, and sharp edges should be rounded over.

Pore diameter and barrier film thickness will vary depending on the voltage and the electrolyte temperature. Different alloys will also have different effects. Pore size is related to current density, higher volts means smaller pores. Generally speaking, the larger the pore, the easier the dye will tak



Anodes and Cathodes

Supplied in each kit is a set of metal plates which can be either a cathode or an anode. The plates are called anodes when they are used in a plating tank, and cathodes when they are used in a de-plating or anodizing tank. Anodes are always connected to the (+) positive side of a power unit, and cathodes to the (-) negative side.

The anodes we supply are of very pure quality. Substituting, particularly copper, is tempting but can result in low quality copper being introduced into the bath, which can cause contamination of the solution and disbonding of subsequent layers of plate.

Nickel Anodes 6" x 8"

Nickel anodes are supplied either singly, or in a set of 2, each with a special bandage. The bandages should be wrapped around the anode, to make an envelope and secured with a rubber band. This prevents the oxide that forms during plating from falling into the solution and contaminating it. The other types of anodes do not usually require this treatment. Note how the bottom of the bandage is folded up and then secured. Always remove the anodes from the tank after plating. Rinse and dry them to store.

Copper Anodes 4" x 8" (High Phosporous)

Supplied singly, or in a set of 2, with anode bandage. As of January 1997, we have changed our policy on anode bandages for copper, and they will be added to each pack of anodes. Install the bandages in the same manner previously described for nickel plating. Anode bandages in copper provide a smoother, higher quality plate. Always remove these anodes from the tank after plating. They will deteriorate rapidly if left in the tank.

Pictured right, the anode and bandage, with a strip cut to make the tank hanger.

Chrome Anodes 12" x 12"

These larger plates are used as anodes for chrome plating. The chrome is derived from the solution and not from the anode, so these plates are a permanent fixture. They are a specially made alloy of lead and antimony.

Chromic acid will attack the anode. forming a yellow layer of lead chromate. This acts as an insulator and prevents the anode from functioning properly. Anodes must be removed from the tank, immediately after plating and cleaned with a Scotchbrite pad in fresh water to remove this film. Dry and store the anode ready for the next usage.

Chrome anodes need to be affixed to a heavier wire than all other types of anode, due to the much larger current requirement of the plating operation. To affix the anode to a thicker wire (such as jumper cables), bare approx. 2" section of the wire and roll a corner of the anode around it. Hammer flat to secure. The anode can be hung into the tank, using the wire as its positioning support. Alternatively, use jumper cable clips to secure the anode to the tank wall and make the connection.

PEROXIDING CHROME ANODES. As an option for chrome anodes, you may wish to treat them to prevent the build-up of 'lead chromate' This yellow coating prevents the correct function of the anode. It usually occurs if the anodes are left in the solution for long periods without regular cleaning.

Make up a solution of 15% sulfuric acid (battery acid) and 85% distilled water.

Clean the anodes with wire wool, and connect anodes to a dc power supply, one to the negative and one to the positive. Adjust the current to obtain approx 5amps per sq foot of anode surface area. Maintain current for 15 minutes.

Reverse the polarity and repeat the process for 15 minutes.

Finally, reverse the polarity once more, and repeat the process for 15 minutes.

A dark brown coating will form on the anodes, indicating the prescence of lead peroxide.This layer will prevent the formation of the lead chromate whilst still allowing the current to flow.

Installing the anode/cathodes

It is imperitive that you do not allow any connecting wires/clips etc. to be immersed into the plating solution. Any such foreign objects will be dissolved by the plating action, and the result will be a contaminated electrolite.

To ensure that ONLY THE ANODE is dissolved, cut a strip down one side of the anode, about 1/4' in. Do not completely sever the strip from the anode, stop cutting about 1/4" from the end. This strip can now be bent 180 degrees to make the hanger and contact for the anode.

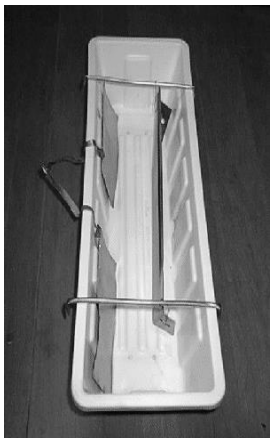
Drop the anode into the solution, and bend the top of the strip over the lip of the tank. You may now use an alligator clip to attach your power line to the anode. Attach a second wire from this anode to any other anodes.

Anode Positioning

Most items can be plated in our round tanks with an anode either side. In larger round tanks several anodes may have to be placed around the circumference. The effectiveness of an anode placement is something you will learn by experience, but as a general rule, try to keep the anode least 3" away from the article being plated and no more than 9" away. When chrome plating, remember that chrome has poor throwing power, so anodes should be evenly placed around the object.

For long objects, several anodes may have to be placed along the length of the tank.

Objects with recesses may not plate effectively in the recessed corners. To overcome this, you may need to place the anode closer to the recess and actually form it to conform to the recess.

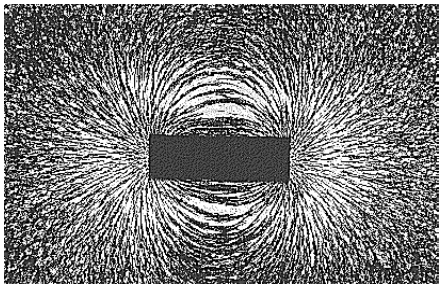


To reach difficult areas, you may need to make a cut in an anode edge and bend a strip upwards, so that it can be pointed into the recessed area. This technique is especially useful for plating inside tubes. See the section on HARD CHROME PLATING, for specific anode design.

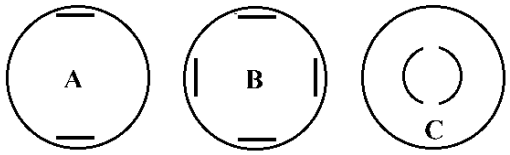
In the picture, left, a long object is required to be plated on one side only. Both anodes have been placed on one side, facing the part. Their strips are joined together ready for the positive terminal from the power supply to be attached.

If both sides were to be plated, anodes would be placed on either side of the part, which would be centralized in the tank.

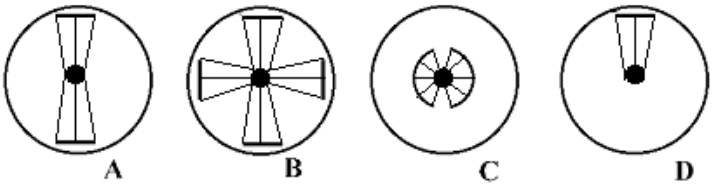
Left. The two tanks bars have the part suspended on copper wire. If the part were to be plated on both sides, additional anodes should be placed opposite the existing ones.



Anodes give out 'Lines of Force' similar to a magnetic field. These lines travel in almost straight lines form the anode to the part, but, like magnetic force fields they will bend slightly. So an object being plated which is facing only ONE anode, will generally only the side facing the anode plated. Because the 'Lines of Force' bend, some of the back edge of the part may also get plated. This phenomonen will vary from part to part, also depending which type of plating you are doing. Generally, zinc plating will almost plate all the back side of a part, whilst chrome will not, as it has poor 'throwing power'.



Here are several configurations of anode placement. Tank C shows the anodes hung centrally in the tank, and bent around to keep their surface a small equidistant from the part. This is especially useful when chrome plating the part. If the anodes were left in the A tank position, the distance from 'throw' part would be so great that the 'chrome anode would be unable to The the power across to the part, resulting in a patchy, on existant plate. anodes in tank C could also be made into a complete tube, with the part hung in the center.



The configuration in tank B could be used when the part has many 'nooks and crannies', ensuring the 'Lines of Force' come from many directions.
Here left, the lines of force are shown. Note in A that the areas directly opposite the anodes get more lines of force, so get plated heavier. Whereas the 'sides' of the part get much less.

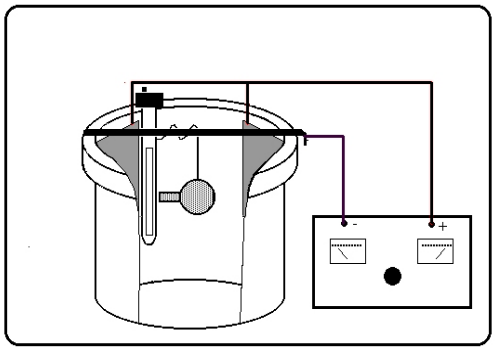
In tank D, note that the lines of force are only attracted to one side of the object, so the side 'in shadow' from the anode doesn't get plated.

GP Plates 8" x 8" (General Purpose Plates) Used for Anodizing, Stripping.
In these instances the plates are called cathodes, and are wired to the negative side of the power unit. They may be attached to wire in exactly the same way as the chrome anodes. If the tank is to be stored for any length of time, it is advisable to remove the anodes/cathodes, wash & dry them and store them separately.

Making up the tanks

There are two basic types of tanks;

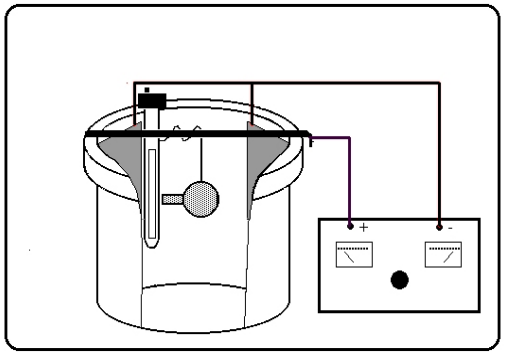
A. PLATING **B. DE-PLATING.**



A. PLATING TANKS are used for applying the various metals to the objects. One type of tank will only plate one type of metal, therefore you will have several tanks for triple chrome plating, where the requirement is to copper, nickel then chrome plate. The metal plates used in these tanks to supply the plating metal are wired to the positive side of the power source and are, in this instance, called the ANODES. The part to be plated is wired to the negative side of the battery and is called the CATHODE.
The negative CATHODE attracts metal from the positive ANODE.

B. DE-PLATING TANKS are used for:-

1. removing old plate
2. anodizing aluminum
3. dissolving rust
4. electric etching



These tanks are set up in exactly the same way as the plating tanks, except that they are wired up IN REVERSE.
So you end up - DE-PLATING.

Our previous policy was to bolt the anodes/cathodes to the side of the tank, but now we prefer to cut a strip along the long side of the anode and use this as the hanger. This enables the anode to be placed deeper into the solution, with no fear of contamination from the hanger.

Plating long objects.

As our tanks are cylindrical in shape, this can cause some problems when plating longer objects. Most objects can be half plated, then turned in the tank and the other half plated. Where there is a join mark, this can be buffed out leaving no signs of its existence.

Pictured right is a plastic window box. Note how the anodes are placed on one side only. In this instance, only one side of the object needs plating. More anodes would be needed to plate both sides, or the object could be turned and the process started over for the other side.