Guide to Ultimate Playfield Restoration

v1.6

The original guide was written by vid1900 and can be found at
https://pinside.com/pinball/forum/topic/vids-guide-to-ultimate-playfield-restoration

PDF produced by bleargh

August 11, 2014 - 01:04pm PDT

Sections

vid1900

So lately we have all been seeing these terrible "restored" playfields. Decals lifting under the clear coat, dirt sealed into the shooter lane, too thick coats of clear, water based clear coats with clouding starting to appear, inserts bucking under the clear, no restoration under ramps or slingshots, faded decals under the clear; simply awful work done by some so-called experts that seem to be spamming the forums constantly.

When I mentioned that I was going to publish a "real" guide to playfield restoration, a few of the playfield restorers that I respect asked me not to do it. They worried about the income loss if people start doing their own work, and they worried that some of the hacks that spam the forums would step their game up.

My logic is that the little information out there is more dangerous than if people were fully informed. All these game owners who get a bit of info here and a bit there, are ruining a bunch of playfields because they are following too many leads, rather than having a single resource.

Also, I would be happy if the spammy "pro restorers" DID step up their game. They are going to continue to get orders because nobody checks up on their work and they price their work cheap, so they might as well learn to do it right.

vid1900

First, not all playfields "need" to be restored.

If the game is a player's machine, if the game has a single small wear spot, if you are simply not artistically inclined.....just leave it. No shame at all having games that show their age.

You can practice the examples on some plywood and see if you have what it takes, without jeopardizing a genuine playfield.

vid1900

REMOVING MYLAR

You want to start by removing the Mylar.

At least once a month somebody asks if they can clear coat over the Mylar. Usually the clear lifts off after a year, so lets just say no to that idea.

There are about 100 internet guides to removing Mylar, but the system that works best for me is to freeze it with canned air (just turn a can of Dust Buster or Maxell upside down). The propellent will freeze the adhesive causing it to separate from the Mylar film. Carefully peel the film back a section at a time.

If the film lifts off the playfield paint, or even the top layer of wood, the playfield is not a good restoration candidate. Sometimes a game was stored in an unheated garage and went through many freeze/thaw cycles.

There is some risk, and there is often no way to know until you start. Take a deep breath and remind yourself, not every game needs to be restored.

After you get the Mylar off, use Goo Gone (never Goof Off!) and remove the left over adhesive. Keep the Goo Gone on the painted parts of the playfield and try not to let it drain down the holes. It will have to soak for 20 minutes or so, then scrape it up with a plastic razor blade or a credit card.

If the Goo Gone is evaporating too fast, cover it with plastic food wrap.

vid1900

DAMAGE ASSESSMENT

Now with the adhesive gone, you will see your playfield in the harsh light of day.

You will need to assess its needs but usually you will have:

PAINT LIFTED FROM INSERTS
the paint has a harder time sticking to the plastic than to the wood, so often the Mylar lifts off the paint too.

GHOSTED INSERTS
the paint AND clear coat have partially lifted from the insert leaving an air gap between themselves.

RAISED/SUNKEN INSERTS
the plastic has expanded at a different rate than the wood and is now proud or below the playfield surface.

CUPPED INSERT
especially on old Ballys, the thin face of the insert has become cupped from age and heat from the bulbs. Inserts without the reinforcing facets on the backside seem much more susceptible to cupping.

FADED INSERTS
UV from the bulb and other light sources like sunlight, have removed the color from the inserts.

CRACKED INSERTS
Damage to plastic from air balls or trying to level raised inserts with a hammer and wood.

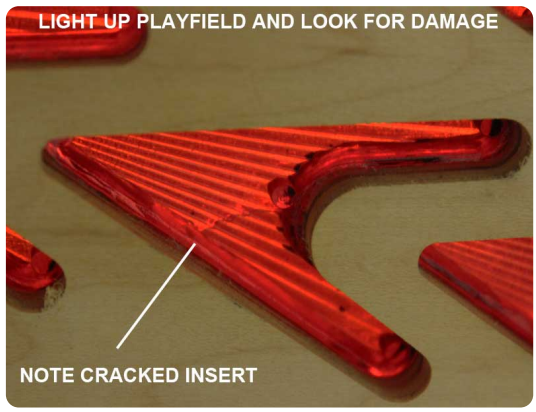
WORN PAINT
The paint on the playfield or inserts have worn off.

PLANKING
The paint has checked along the surface of the wood. This can happen to any game, but you see it especially when a game is stored in an unheated garage.

vid1900

Light up inserts from the front with a flashlight and check each one for damage. You want to look from the back because there will be less to distract your eye.

You can sometimes reinforce a broken insert with epoxy and chopped glass fibers, but if you are putting a lot of work into a machine, you probably want to order new inserts from Gene at Illinois Pinball.



vid1900

REMOVING INSERTS

Before we pull an insert out from the playfield, we want to be sure it does not lift any of the surrounding artwork.

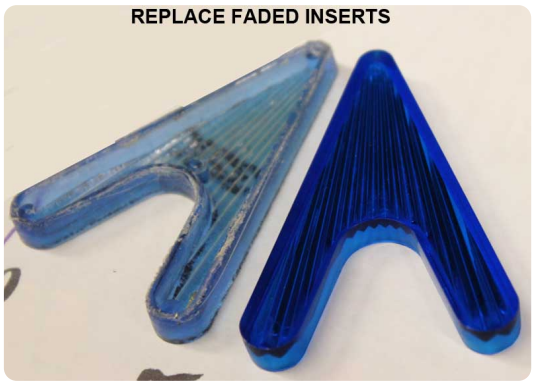
Most Williams games have no, or almost no clear coat (whenever someone talks about wanting Stern to have "Williams quality", all the ops laugh).

Just to be safe, run a brand new Xacto blade around the parameter.

If it's a new Stern game, or if it has been clear coated, REALLY make sure you have cut the insert free of the surrounding clear coat.

vid1900

Next after cutting through any clear coat, it is time to remove the damaged/faded insert.



1. Find a wrench socket that just fits into the insert hole on the bottom of the playfield. On strange inserts like the chevron arrowhead insert pictured, I use a small nut driver.
2. Take a hair dryer, set it on high and warm both sides of the insert. (I use a heat gun, but I don't want any beginners thinking that this is a good way to learn - too risky until you have a feel for this stuff).
3. While keeping your hand on the face of insert to control its release, push the insert out from the bottom of the playfield. It does not take much pressure at all. On Williams games, you might get the feeling that the insert "wants" to come out - its that easy.

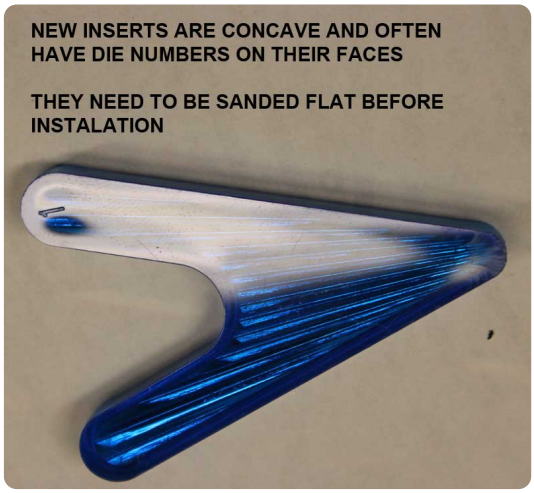
Look how faded this insert is. Note that the playfield itself, nor the cab art had any fading. All this fading can only be attributed to crappy plastic and UV light from the bulb for 20 years.

vid1900

Keep in mind that you can use a LED to help make a faded insert look better, but it will still look terrible when the game is off - and if you are going through this much work to restore a playfield, you might as well do the job right.

vid1900

INSTALLING INSERTS



Many people don't know how playfields are manufactured, so they don't understand that you can't just put a new insert in the holes without working them first.

The sheet of plywood is CNC routed with all the holes.

Then the inserts are glued in by a Pick N Place machine.

Then the entire playfield gets run through a drum sander. The drum sander sands the wood and the inserts all down to one level.

Finally the wood is coated with sealer and it goes to the silk screen to print the graphics.

So, brand new inserts are not flat. They don't have to be, because they get SANDED flat after installation in the playfield.

We don't have the luxury of sanding the entire playfield (unless we are installing a printed overlay over the entire surface), so we have to flatten the inserts first.

vid1900

To get the inserts flat, you start with 100 grit sandpaper.

Place the sandpaper face up on your table saw (or any other really flat surface), and move the insert around in a circular motion. Apply even pressure, checking your work often.

You don't want to take too much off, because thin inserts are more likely to crack.

Next sand with 220 grit.

And finally 300 or 400 grit. Do not polish further. You will see why in the clear coating section of this guide (if the insert is opaque or prismed, you can even leave it at 220 it will give the clear coat some extra tooth).

http://www.youtube.com/watch?feature=player_embedded&v=DP5ss7B46cA

Video of Whitewater inserts being installed.

vid1900

The old playfield glue can be epoxy or a sticky mastic of some sort.

You want to clean it all out so the wood can accept the new glue.

The sticky mastic stuff does not readily take to other glues, so be extra careful if you encounter it.

vid1900

If the soft mastic is hard to remove, use the Burr tool with your Dremel.

Don't enlarge the hole by removing wood, just spin out the mastic.

vid1900

As you have probably noticed, even brand new playfields have problems with inserts lifting up.

Wood contracts and expands at different rates than does the plastic insert.

We sure don't want to spend all this time restoring a playfield and have the inserts rise up again and ruin our clear coat.

We want to glue in the new insert (or reseat an old one) and never have to do it again. That means we have to do a better job than the manufacturer did.

If you have ever put a glob of epoxy on an insert, you have noticed that you can chip it off after it has dried. Obviously, this is not an acceptable bond for something we never want to do again.

We need to give the epoxy some "tooth", so we sand the edge of the insert with 100 grit sandpaper.

vid1900

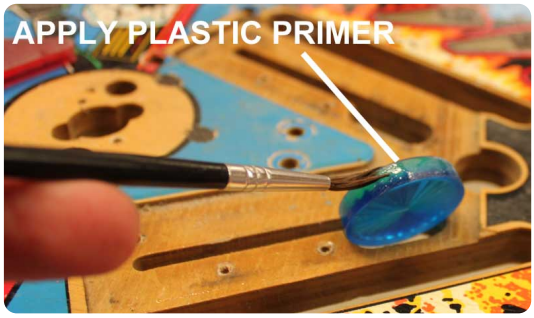
This is where you start to separate the boys from the men in playfield restoration.

Even sanding the edge of the insert is not enough.

The final step is to prime the plastic with 3M Plastic Primer.

It goes on thin like water and dries in a few seconds.

Now when you apply the epoxy, you can't chip it off.



vid1900

Clear two-part epoxy is the glue of choice here.

We know it sticks to our primed plastic, we know it sticks to wood.

Any glue you can easily chip off of an old sacrifice insert like wood glue, Gorilla Glue or silicone is obviously not going to give us the permanent bond we require.

I use Two Heads epoxy, but you can use just about any brand. One of my favorite restorers has been using the Harbor Freight $1.50 stuff (http://www.harborfreight.com/super-strong-quick-drying-epoxy-92665.html) for years with perfect results.

Pick a brand with honey-like consistency, you don't want a big mess dripping out the bottom of the playfield.

Always apply the glue from the bottom of the playfield. This way you won't drip on the painted surface and the "squeeze out" will head towards the underside.

Never apply glue to the insert itself, or the squeeze out will all be on top of the playfield.

If you do somehow get glue on the playfield surface, wipe quickly with a rag lightly dampened with Acetone.

Use an "acid brush" to apply the glue. Epoxy dries quickly, so you will throw a bunch away as you work. Don't bother trying to clean or save them.

If you are a beginner, glue up maybe 2 inserts at a time. Don't get too far ahead of yourself, once the glue hits its "work time" it starts to set up fast!

vid1900

Acid Brushes are disposable brushes used to apply flux on copper plumbing.

You get a big bag of them for $5 at any plumbing or tool store like Harbor Freight.

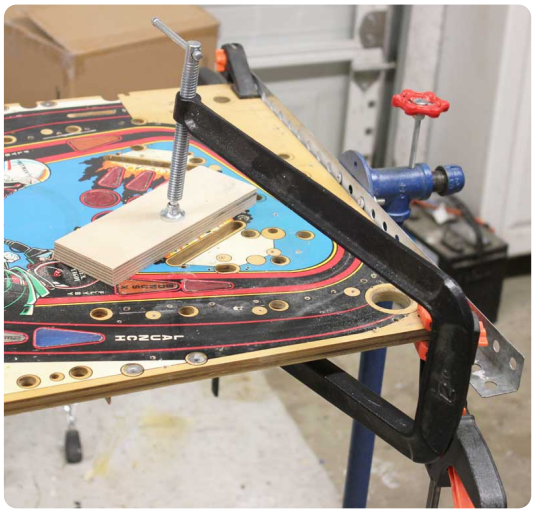
vid1900

Sometimes you find that an insert has "a mind of its own" and won't stay down for the epoxy to set.

There could be some tension in the wood (maybe the reason the insert popped out in the first place).

To fix this, we use a 12" C-clamp ($9 at Harbor Freight) to hold it from rising above the playfield surface.

Knock the edges off of 2 blocks of good quality (flat) plywood, and clamp with 2 pieces of wax paper (in case any glue squeezes out). Don't forget the wax paper, you won't be happy if you glue a piece of wood to the playfield....



vid1900

Sometimes you hear someone tell you to just use a piece of wood with a hammer and bash the inserts back down level with the playfiield. Often they say "go ahead, you won't hurt them".

The problem is that although they will stay down for awhile, whatever forces that were in the wood that ejected them in the first place are still there, and they tend to pop up again.

You can heat inserts with a heat gun and press them down with the 12" C-clamp - this tends to last longer than just hitting them, but still they tend to pop back up.

Once you have a nice clear coat on the playfield, you don't want to ever mess with the inserts again, so just reglue them the correct way.

vid1900

There of course will be inserts that you will not need to replace or reseat.

After 20 or so years, you would think that if they were going to move, they would have already moved. And certainly there is some truth to this.

But a new clear coat is going to put new tension on the playfield that was never there before, so usually you will want to apply some glue to the back lip of those inserts.

I know, it's not as good as roughing them up and using plastic primer, but it is better than a surprise 6 months down the road.

vid1900

FIXING INSERT GHOSTING

Insert Ghosting is where the clear coat has pulled away from the plastic and now you see the air gap between the back of the clear coat and the face of the insert.

(LED Ghosting is where small amounts of current that would never illuminate an incandescent bulb, actually causes a LED to become lit when it should be dark. So the "Special when Lit" always appears lit, or dimly lit.

LED Strobbing is where the GI LEDs rapidly flash and make the bulb look like its moving through a disco.)

vid1900

The theory of fixing Insert Ghosting is that we need to "glue" the flap of clear coat back down to the insert face. There is going to be no place for a lot of solvent evaporation, so we need a "glue" that will cure without direct exposure to air. We also want this glue to have some flexibility to it so something brittle like epoxy is out. Pro restorers have found that Isocynate Clear coat is the perfect solution.

Lately, I've been using Diamond Plate for my top coats (I restored a game for a Dupont engineer who brought me a rather generous 5 gallons of the stuff), but it seems to be too "hot" for this kind of repair.

What does work nicely is PPG Shop Line JC661 clear. You mix it in 2:1 ratio with a fast topcoat hardener and it cures before it eats the old clear coat. Still, you should make a scan of that area of the playfield in case disaster strikes. You can then use the scan to make a decal (directions for this process are coming up later in this guide).

You need to neatly apply the clear under the flap, and for this you will need a syringe. The JC661 is too thick to be drawn up into an Insulin syringe, so you will have to get a big horse syringe.

Using an absolutely brand new Xacto blade, cut a slit around the damage, following the edge of the insert itself.

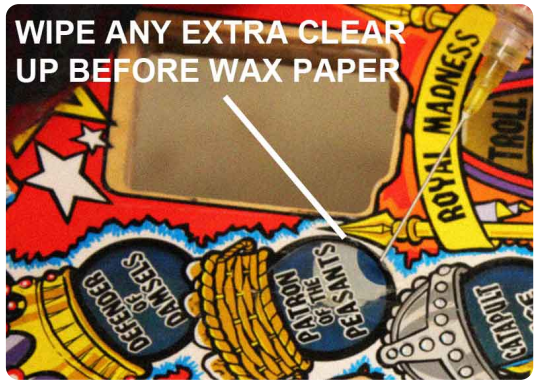
vid1900

Be extra careful because the clear contains Cyanide, so you don't want to go injecting yourself with that.

Fill the gap under the flap with the clear.

Have a rag moistened with Acetone ready to clean up any spills. Use less than you think you need, it takes very little.

Press down the flap to push out any extra clear or air bubbles into the rag. Cover area with waxed paper.



vid1900

On top of the wax paper, place a hard rubber block.

Under the playfield hold a piece of plywood.

Clamp together tightly overnight with a 12" C-clamp.

vid1900

The next day, unclamp the rubber block.

CAREFULLY remove the wax paper in the same direction as the flap you cut.

If any bubbles got trapped under the flap, just open them with your Xacto and fill with a drop of clear when you spray your clear coat over the entire playfield.

vid1900

PAINTING FOR PLAYFIELD RESTORATION

I'm going to break up the logical order of things because I got a few emails about paint and Frisket over the weekend. Rather than email everyone separately, I'll cover them here....

Let's start with paint for playfield restoration.

We NEVER use Sharpie pen, Paint Pen, or those little bottles of Testors enamel that you have left over from your Dungeons & Dragons days - EVER.

All of the above will run into the final Clear Coat, making a smeary mess (for you or the poor sucker that buys the game after you and tries to have it restored).

We don't want to use those cheap $1 acrylics from the craft store, because they fade so quickly, making our repairs more apparent over the years.

We don't want to use cheap paints because they don't contain enough pigment to cover in a single coat (especially expensive pigments like Red). Add a little thinner so you can run it through the airbrush, and you find there is almost nothing there.

We don't want paints that dry darker than they look when wet.

We don't want paints that become darker when they are clear coated.

We don't want a paint that permanently sets until heated. This gives us an "out" if we spill, mix the wrong color, or simply make a mistake.

So what paint can we use? Createx air brush colors.

http://www.createxcolors.com/products.html

1. It's already good to go in your airbrush, no thinning is necessary (unless you are doing shading)
2. It covers in a single coat.
3. No waiting for it to dry. If you like your work, you hit it with a heat gun (use a hair dryer if this is your first time - safer), and go on to the next color. Tape will not lift it. This saves you hours of time.
4. It does not react with auto clear coat.
5. It dries the color you mixed it.
6. It is almost the exact same shade when clearcoated.
7. The colors mix properly. Many cheap paints just turn brown when mixed (blue + yellow = brown).
8. It's fade resistant.
9. It sets so fast with heat that even when using white, old colors do not telegraph through the new paint.

Yes, it's $4 a bottle, not .99 cents, but once you try it, you won't ever go back to cheap paint again.

vid1900

The Air Brush

Now I just said the word that scares the beginners - Air Brush.

Don't worry, you can get a perfectly serviceable brush for $12 at Harbor Freight.

You could try to thin out paint and manually brush it on, then try to sand it flat to remove the brush strokes, then touch it up again - but you are not going to do that. Your time and your playfield is more valuable than that.

You have spent $200 on LED lights for your game, you can certainly buy yourself an airbrush.

Now if you "get good" at this airbrush stuff, you can certainly buy a $200 Iwata brush, but I'm telling you that there is no playfield I could not restore with the HF one. I sometimes have 4 HF brushes filled with different colors at once, so I can keep my pace up. Spray, heat set, and on to the next color - that is how he pros do it.

You can use a regular shop air compressor (like a Pancake or 120 gallon garage monster), a dedicated "air brush" compressor, or even just canned airbrush air.

If you use a regular shop air compressor, put a simple water separator on the front of the air line to catch the moisture.

Don't ever drip oil into the hose you are going to use for painting. If you have already done this for your other air tools, buy a dedicated painting air hose.

http://www.harborfreight.com/deluxe-airbrush-kit-95810.html On sale all the time for $12.

vid1900

Mixing/Matching Colors

You always read somebody asking "What color paint matches the blue on XXXXX game?".

And the real answer is "The one you mix yourself".

Even if you had a can of the actual Williams paint, your playfield has faded in the last 30 years.

Even if you knew what the color mix was at the time, those colors were mixed by eye at the silkscreener, and thus varied from batch to batch.

Even if someone found a match "Blood Moon #666" for their XXXXX game, it would not match yours, because different games have seen different amounts of UV light.

Now many people have tried to mix their own paint and found it did not create the color they thought it would, or it just turned brown. That is because cheap paints don't have the pure pigments and binders that mix well with others.

Good quality paints mix beautifully, creating the results you expect.

Mix paint in a clear container that you can set on the playfield to match it up. Try to use natural light, not a yellow incandescent lamp. Use a flat container, so you are not looking down the neck of a bottle.

Women have much better color vision than men. Don't be afraid to ask your wife to match colors for you. It will involve her in your hobby and make her feel important that she has a skill you don't. Let her do the actual mixing, don't just ask if a sample is a match.

vid1900

Mix up a little more paint than you think you need.

You will lose some in the air brush or you may have an unexpected touch up latter.

Store small amounts in contact lens cases (5 for $1 at the dollar store), or little "artists" jars.

Step by step matching:

1. Take a drop of your mixed paint and put it on the playfield and see where you are at. Adjust lighter, darker, greener, whatever and place another drop.
2. If drop looks good, spread it out a little and let it air dry. Still the right color? Excellent. No good? Wash off with damp cloth (remember, it's not permanent until you heat set it).
3. Once you have a good dry match, take some Naphtha on a rag and wipe it over the playfield and the paint sample. Does the color still match while wet with Naphtha? If yes, you are ready to paint! If not, adjust slightly until you get it right. The Naphtha give us a temporary "clear coat" to check our work.

vid1900

The two hardest colors to match are Bright Orange and Gray.

On many Bally games, use standard orange and add a few drops of florescent orange. It's amazing how a tiny amount of the florescent fixes it.

On Williams game with hard to match Gray, a drop of yellow or purple will usually make a frustrating match suddenly lock on.

Practice while seated. If you get frustrated, wrap it up for the evening. "Fresh eyes" tomorrow will often get it on the first try.

If you were out in bright sunlight, give your eyes 20 minutes to adapt to the color tone indoors.

vid1900

Frisket

What the hell is a Frisket?

If you are not from an art or auto background, it probably sounds like something you should have tried before you got married. But nothing is more important in restoring playfields than your roll of Frisket.

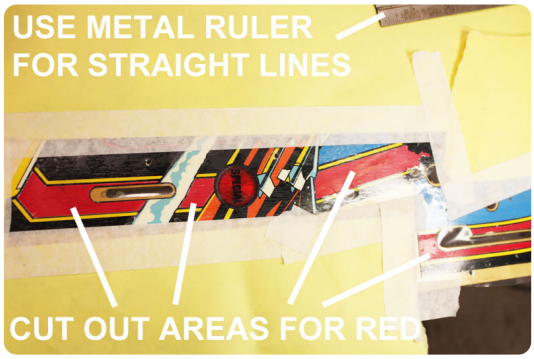
Frisket is a roll of masking plastic:

1. It cuts super cleanly, so you don't get raggity paint lines.
2. It is clear, so you can see what you are cutting (It is available in opaque, for what reason, I don't know).
3. It is self adhesive yet does not leave any glue behind.
4. Although it is "low tack" and normally does not lift paint, it totally keeps paint from seeping under the edge. Much better than blue painter's tape or green "frog" tape in that regard.
5. It withstands heat well enough to not shrink when we are setting a layer of paint.

If you can use tracing paper, you can use Frisket.

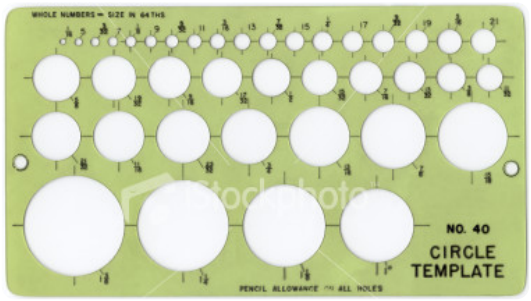
vid1900

Cut a section of Frisket and lay it over the area to be airbrushed.



Run you finger along the outline where you will be cutting. You don't have to really press the rest of the frisket down.

Using a BRAND NEW Xacto blade, trace the outline of your soon to be painted areas. Don't press too hard, you should not be feeling the surface of the playfield as you work.



Use a metal straightedge to guide you along straight lines - giant time saver.

If you are cutting a circle for Keylining, you can use a circle template to again save time.

Cut exactly on your line. You don't have to worry about bleed.

Lift the Frisket film from any place you want to get painted. See how cleanly it lifts? Press any air bubbles out that forms as you remove the pieces.

I used "oil paper" here for masking, but you can use Kraft paper or whatever you have.

Make up a bunch of masking papers with one leading edge with masking tape applied.

You will be reusing them as you move to the next area of the playfield, so make them large enough for the biggest section.

vid1900

Spraying Color

Now lay down your color.

Practice by shooting a little on the masking paper. If you set the gun down without the cap over the nozzle for more than a few minutes, it may throw a glob out, known as a "booger".

Don't wait for the booger to dry and then sand it out, just wipe the area clean with a rag and spray the entire area again. You are going to like using Createx paint, believe me.

Shooting on the paper lets you be sure that if any boogers are going to fly, it won't be into your work.

Catch the light on the wet paint and make sure your coat is even. If it all looks good, hit it with the heat gun and set the paint.

Now you can change colors, or even put another layer of the same color without waiting around.

Note in this picture how the Frisket that was pressed down onto the playfield has stayed perfectly attached without shrinking from the heat gun- while the area not pressed down has wrinkled. It's good stuff!

vid1900

Although there are times when you are blending different colors at once, normally it only makes sense to do all the same color at the same time.

Cut out all your Frisket at the same time.

Then move your masking papers around in an orderly fashion, from zone to zone.

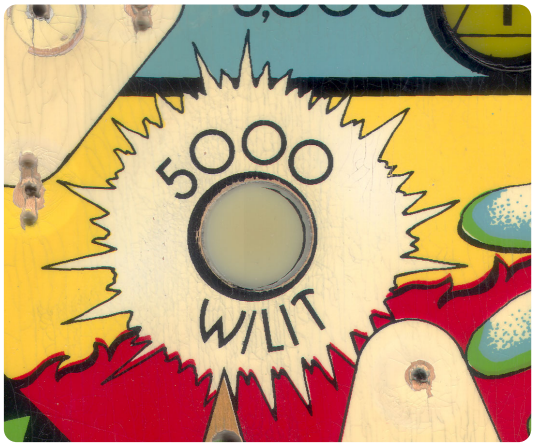
Don't waste time masking off the whole playfield with little windows and miles of tape. Just move your masking scraps around. Once the paint is heat set, you don't have to worry about the tape or Frisket lifting the paint.

Do all your colors from light to dark, but save white until the end so it does not get dirty. The Createx paint is flat finish, so the white can soil easily.

Often, once you think you are done, you will find black areas that still need touch up. Be careful you don't get the black on the new white paint!

vid1900

FIXING LINE ART AND TEXT



Sometimes you have a area of the playfield that can't be cleaned up with the Magic Eraser.

Normally, the ME and 99% alcohol cleans out the cracks, leaving the cracks behind, but because they are clean, they fill nicely with the clear coat.

If you have to clean too much with the ME, the actual paint will wear away. Or sometimes there is too much printing to clean around. Or sometimes the cracked area is close to the flippers and draws the eye to the cracks, where higher on the playfield it would go completely noticed.

First scan the area with a hand scanner or one of those HP 4670 scanners.

Sand any keylining off of the insert, and leave it roughed up to 500 grit. We want that rough area so the clear coat has some "tooth" to hold on to.

Shoot a thin coat of clear over the playfield to lock down any loose pant and seal the surface.

Lightly sand it back to flatten out the cracks that telegraph through the clear.

In this example: Note the planked surface, note that the ME could not get it clean without removing the black printing, note the poor "kiss" of where the red meets the other paints.

vid1900

While your clear coat is hardening, open your favorite photo program and examine your scan.

Using the "Channels" function, kill off any color other than the black and white and make a .jpg of the font.

Go to http://www.myfonts.com/WhatTheFont/ and upload the .jpg of the font.

"What The Font" will tell you what font is it. If your .jpg is crappy, it may ask you to clarify a few characters.

Download the font and open it in your photo program.

vid1900

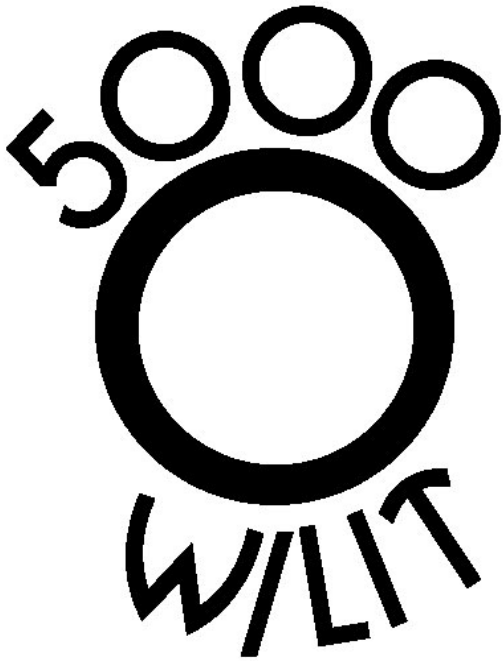
Overlay the new font letters on top of the playfield scan in a new layer.

If the letters are arched like this example, you can Rotate each letter or use the "Warp Text" function.

Remember that font size can be fractional, so your font might be 28.6 size rather than just plain old 28. Take your time a get it exactly right.

This font was identified as: Omnibus.

Next, draw the Keyline that goes around the lighted insert. Hold the SHIFT key down as you use the circle tool and overlap the outside of the original circle (this makes a "perfect" circle). Then hit the Subtract button and draw the inner circle. This "cuts out" the center of the first circle.



Unview the background image and check your work.

If it's your first time, the above will take you 20 minutes. If you've used photo programs in the past, it will be less than 5 minutes of work.

vid1900

Next, you have to print your art.

You need Clear Water Slide film, and a Laser Printer. Get the thinnest film they have, if offered a choice.

Ink Jet printer inks quickly fade, don't even think of using them.

Most high end hobby shops have really good decal printers that can print opaque white, and gold / silver metallic. If you need those kind of decals, don't be afraid to use their services.

Trim off the excess film around the printing, leaving clear tabs to connect the keyline to the letters.

vid1900

Using Frisket film, lay it over the sanded clear coat area to be repainted.

Cut out the Frisket any place that will be painted white (in this example).

Clean up anywhere that the colors don't "kiss" correctly.

vid1900

Pull the Frisket off and clear over the paint (maybe the whole playfield if you are efficient).

Remember, we never want to apply a waterslide decal to the bare paint, or directly to a plastic insert.

The reason is that you don't want the tension of the clear coat to be different on the topside of the decal than it is underneath.

You run the risk of ghosting if you just stick the decal to the insert plastic.

I've never had an insert decal ghost that has been applied on top of clear coat, then coated over.

Don't take a shortcut here - do it right.

vid1900

FILLING GOUGES AND CHIPS

Latter in this series, I'll show some better examples of filling gouges. These pictures were not intended to focus on that part of the repair.

You can use Epoxy, 2part Auto Clear, or Bondo.

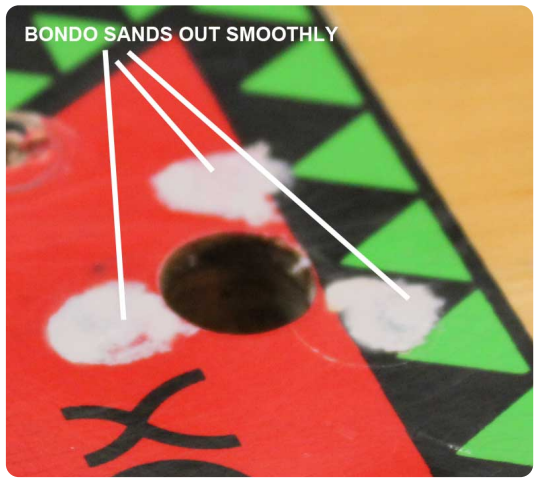
Here, I'm replacing the crappy System 6 flipper mechs and coils with the much superior Williams 1990s style.

The Sys6 flippers connect through 3 fin screws that run through the top of the playfield.

After removing the screws, the holes and chips must be repaired.

vid1900

The screws left not only a hole, but a depression around the holes and lifted some paint too.



I taped over the back of the holes and filled them almost to the top with 5 minute Epoxy.

I dewaxed the surrounding area with Acetone, then I topped the depression off with Bondo.

Why not just use Epoxy all the way? Because Epoxy is harder than the playfield, so you won't get a nice feathering around the fill. You will sand off lots of paint before you ever get the edge even with the playfield.

Bondo sands and feathers easily.

I gave the Bondo a half hour to dry and then feathered it into the surrounding playfield.

You can color blend the area in with an airbrush, or mask off and spray to the edges - depending on the complexity of the surrounding graphics.

vid1900

If you have smaller chips, and you are going to clear coat anyway, drip the clear coat into the chips with an eyedropper and level them off. Sand lightly, repair any paint loss and proceed with clear coating the entire table.

vid1900

RAISING INSERTS

Sometimes you find that inserts have sunk below the playfield surface. Not cupped, but actually fallen in.

Cupped inserts can simply be filled with clear coat, but if you can see the wood beneath the playfield around the edges, you need to raise it up.

Heat the insert from above and below with a hair dryer.

Keep one hand on the face of the playfield to control the insert, as you push the insert from behind with the largest socket from a wrench set that will fit in the hole.

You may have to reheat while you work.

If the insert is really loose, and you can easily remove it, do so (rough up the side edges with coarse sandpaper, prime with plastic primer and re-glue with epoxy).

If the insert is really tight, then just level it with the face of the playfield and re-glue the entire insert perimeter from the back of the playfield with epoxy.

Don't spare the epoxy, better to have a heavy coat that no ones sees from the back, than to have the insert move around in the future.

vid1900

> 
> **john_ny said:**
> Some of the wireforms have wings or blades near the ends that are presssed/formed, to retain them in the playfield, so they are not 100% round. These wings will sometimes pull up bits of the playfield when you remove the guides.

Yeah, that can be nerve wracking.

Usually I pull the first wireform the farthest up the playfield (or hidden from player) to see what I'm in store for.

Warm the area with a heat gun to make sure the paint is soft and not brittle, so it is less likely to chip.

The trick whether you are tapping or pulling out, is to make sure you are moving both ends of the arch equally. Pry a little on one side, then move to the other side.

Once you have the wire out a little, gently rock the wireform side to side. This will slightly enlarge the holes, making for a clean exit. This is especially important for the wires with wings.

Keep on the lookout for wings, or a sharp burr on the very end of the wire - that is what usually gets ya.

I lay down a thin piece of plastic cutting board to protect the playfield and usually use a 5 inch "mini prybar" from Harbor Freight. I've tapered the ends of the prybar on a grinding wheel. I'll never use it for real prying, so I'm not worried about loosing strength on the bar.

I bought a set of nylon prys too, but I always forget to try them out.

vid1900

PAINTING WHITE AREAS

Most playfields have lots of reflective white areas that are lit by the General Illumination circuits.

Even though you often don't directly see these areas, it's important to repaint them bright white.

My light meter says that by repainting these sections, you are gaining 30-40% reflectance - that's a lot.

Not only are you getting a brighter reflection, you are getting a pure reflection, rather than one tinted beige or yellow.

The old paint has yellowed, the old Lacquer on top of it has yellowed, but at some point these areas were indeed a nice white.

These areas are mostly out of sight of the player, so you can do them without a bunch of leveling and patching. Because you can do them so quickly, there is no reason not to do them.

Sometimes these areas are just clear wood on one version of the playfield and screened white on another, latter production run. It's a judgement call if you want the extra light reflection (and color purity) by painting the clear wood white. Some purists frown upon it, many customers insist on it.

Don't get paint in the light sockets, or try to put balls of foam or tape in them. Just put some old bulbs in the sockets and paint around them.

vid1900

THE SHOOTER LANE

The Shooter Lane is a special case in restoration.

Because each layer of plywood changes direction, each layer wears in a different way. Dirt gets pounded in and end grain wear in the wood can leave soft fibers exposed.

Get a dowel or a piece of pipe of suitable circumference. If you do a lot of playfields, you will have a few sizes around the shop.

Cushion the sandpaper with an old rag so that your pipe has some "give" like a sanding block has.

If the lane looks bad, you might start with 120 grit sandpaper and see if you can clean it up.

Don't remove too much material or the groove can become too wide.

Step down to 220 grit and see what it looks like.

vid1900

After the 220 grit, run you finger along and see if you have it smooth. See if you have a bunch of spongy wood fibers.

vid1900

There is a little bit of sanding skill and a little bit of fudge factor involved. Take your time, it either will be nice, or a pile of crap.

If you think you got it nice, take some Naphtha on a rag and wipe down your work.

This gives you a preview of what the clear coat will look like.

Sometimes it looks great dry, but looks terrible when Naphtha-ed.

Other times it looks dicey and grey, but comes out perfect when wet.

If the damage is too bad to sand out, don't despair.

Patch any soft wood fibers with wood filler, sand smooth, mask with tape and simply paint in the "layers" of plywood.

I know this sounds flaky, but I've done it 100s of times and 95% of the time the customer never notices - but if I did not paint it, they'd notice for sure.

vid1900

Usually I remove Mylar, Magic Eraser, and scrape paint off worn inserts .

Then I put down a light coat of clear.

This:

1. Locks down worn wood fibers, letting the paint adhere cleanly, without fuzz or texture.
2. Locks down existing paint - so masking tape and frisket don't lift paint and make more work for me.
3. Fills in planking and swirl. Sometimes the tiny cracks simply fill in and do not need further painting.
4. A new coat of clear highlights low spots that need to be brought up so the playfield is dead flat. A quick run of 220 grit sandpaper over the field will show much work needed. If you see shine, that spot is low!

vid1900

PAINTING VERY FINE LINES

Sometimes you have a fine line to repair. If you have a bunch of fine lines, make a water slide decal; but for just one line here is a big time saver.

Don't make this kind of fix over rough wood. Be sure you have a solid foundation, or your first clear coat down.

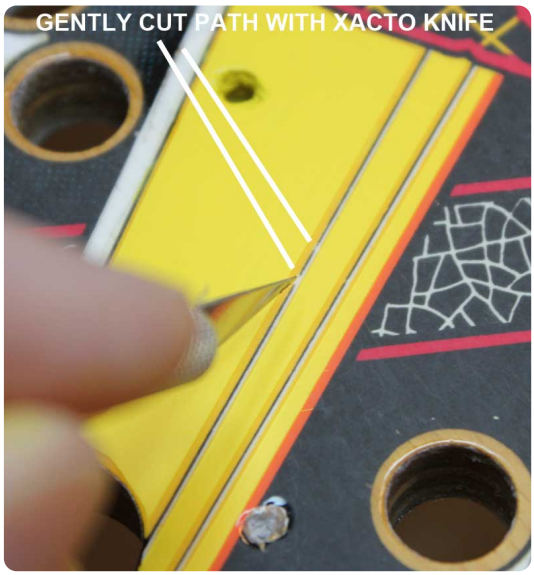
Here is where the ball has worn through the line.

It is in a very noticeable place from the player's point of view. It needs to be repaired.

vid1900

The line is thinner than a 000 brush, so how can you paint it without making a mess?

First we gently cut a path with a Xacto knife. Use a fresh blade, of course.



vid1900

Now load the tip of the Xacto with your paint.

Use a little less than you think you need.

vid1900

Make a pass in the guide you cut. Notice how the pre-cut guide perfectly takes the paint.

Make as many passes as you need to match the thickness of the original line. Most thin lines need 2 passes.

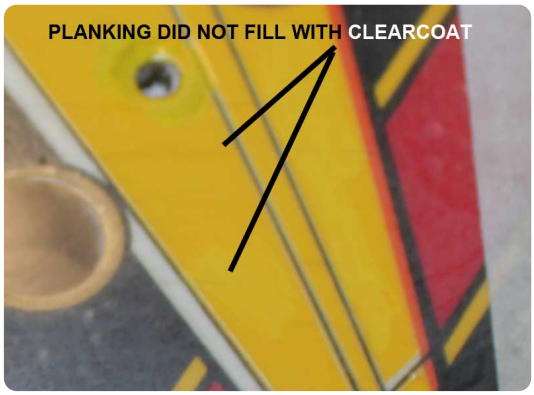
You could not do this freehand with a brush.

Once you have mastered this technique, you will be quickly fixing playfield details you never though were possible.

vid1900

PLANKING REPAIR EXAMPLE

Using Magic Eraser dampened with 99% isopropyl , I cleaned out all the planking (those little cracks in the clear/paint that run parallel to the length of the playfield). Under magnification the cracks looked clean, so I shot my first coat of clear to fill in the cracks and lock down the existing paint.



Many times, the planking fills with clear and no further painting is necessary. This was not one of those times.

The light color of the area (yellow) and the fact that this section is right under the player's nose meant that the planking stood out like a sore thumb.

Sorry about the blurry pic, I took a few shots for safety, but they all were out of focus...

vid1900

I color matched the paint by eye, put a drop down on the original yellow paint, dried it with a heat gun and then wiped over the area with Naphtha. My second try matched the color exactly; so I was ready to mask the area off.

Using Frisket, I masked over all the surrounding yellow. Don't try to "spot" repair, it will stand out if the two paints fade at a different rates in the future. Paint all the way to the edge of the art.

I used a Xacto knife and a metal straightedge to quickly cut out the masked areas.

There was no worry about the Frisket lifting the playfield paint upon removal because the playfield already had a layer of clear on it.

vid1900

Here I shot my first coat of yellow.

Because this is Createx opaque yellow, note how much coverage I got from a single coat. You would not see results like that with the cheap, $1 acrylic paint from the craft store, especially on a light color like yellow.

I set the paint with a heat gun and laid down a second, final coat.

Don't sit around waiting for cheap paint to dry. Always use paint that you can heat set. Your time is certainly worth more than a $1 bottle of paint.

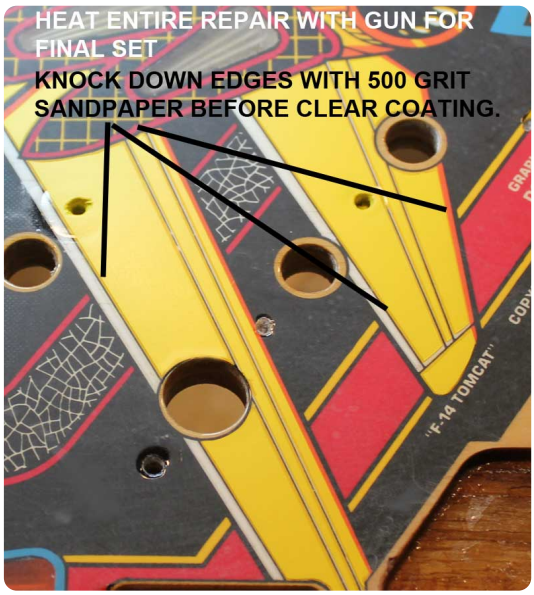
vid1900

After heat setting, I pulled the Frisket off.

I, of course, noted that there is an edge you can feel between the playfield and the new paint.

Using some 500 grit sandpaper, I gently knocked down the painted edges so the threshold was much smoother. This will make the next coat of clear "flow" over the edges rather than causing them to stand proud.

Because I used paint I could heat set, I had no worries about sanding 5 minute old paint. Again, you can't do that with the cheap stuff....



vid1900

AIR COMPRESSORS

Dewey68 said:
If someone didn't want to invest in the equipment needed to spray automotive clear

The investment is quite small, as long as you can borrow someone's compressor. Way under $75.

You spend $150 on a plastic ramp, so by comparison, this stuff is cheap!

You'll need an air compressor with a bigger size tank, 30 gallons or larger (nobody ever complained they bought too large of a compressor). That's the High Volume part of High Volume Low Pressure (HVLP). If you are going to get a really big air compressor to use with air tools and the like (60-80-100 gallon), don't get a crappy aluminum head Husky or Craftsman. Get a real iron headed compressor (like a Saylor-Beall) used on Craigslist. It will outlast you and cost less than the Husky. The iron headed compressors can be completely rebuilt, unlike the aluminum.

You'll need a water separator:

http://www.harborfreight.com/air-tools/air-tool-accessories/12-standard-air-filter-68279.html

You'll need a moisture filter that installs at the gun:

http://www.harborfreight.com/disposable-inline-moisture-filter-68224.html

You'll need a regulator that installs at the gun (you don't want to keep walking back to the compressor):

http://www.harborfreight.com/air-tools/air-tool-accessories/125-psi-air-flow-regulator-with-gauge-68219.html

You'll need the HVLP gun:

http://widgets.harborfreight.com/wswidgets/common/displayCoupon.do?week=0813&campaign=b&page=coupon18.html&single=true&cust=77933728034&keycode=101

Of course once you have a nice sized air compressor, you can wet sand pneumatically and get the playfield really flat.

vid1900

Sorry Joe, that compressor only puts out 3.8 CFM (maybe) and you are going to need more.

The problem is that compressors overrate their output, and sprayguns underrate their air consumption.

If you were refinishing chairs, you would do a lot of start-stop spraying as you rotate the piece, so the compressor might have a little time to charge back up.

But a playfield requires you to do long, even shots as you flood and overlap the surface. You don't want to be caught waiting for the compressor to charge back up as your last pass starts to catalyze.

An experienced shooter can eek out a little more performance from a small compressor and an expensive gun, but that is not you (yet), so hit Craigslist and get a real compressor.

Just for a worst case scenario: figure that a HF cheap gun needs to run @ 6 CFM and 47 PSI to smoothly shoot Shopline JC 661 clear.

vid1900

Also, because this will now become an air compressor thread for the next page or so:

An Oil Less compressor sounds like a good thing ,but its not. They just don't last long and tend to be really noisy.

A regular compressor will need an oil change after so many hours, but will last 10x as long before a rebuild is necessary.

vid1900

When buying a used air compressor, first download the manual and find out how long it takes to recharge the tank from zero. Then look online for valve rebuild kits and don't buy a compressor that does not have them commonly available.

Drain the tank, then time how long the recharge takes. If it is within a minute or two of the manual, you are probably in good shape.

If you take the head off and run it for 5 minutes (I know what you are thinking, it won't hurt anything), you should not see a puddle of oil forming above the pistons. If you do, it needs new rings.

If it takes forever to recharge, and the rings are good, you probably need new valves. You can order a valve kit (for good compressors, probably not the Husky) or take it to any local compressor shop.

The shop won't want the whole thing, just bring them the head. They will put new valves in it and send you home with a new gasket to use when you put the head back on.

For home use, a real air compressor, rebuilt, with yearly oil changes and a belt every so often, will probably last 15 years before another rebuild is necessary.

vid1900

APPLYING INSERT DECALS

This section we will discuss applying Water Slide Decals (WSD).

To recap some earlier info:

1. Laser print or silkscreen WSDs. Regular ink jet printer's inks fade quickly.
2. Use clear WSDs on most inserts. If the insert has white printing on it, use white WSDs or print with an ALPS printer on clear decals (the only printer I know of that prints with white ink is the ALPS. It can even print metallic gold and silver .).
3. Most hobby shops have great printers and will gladly charge you to print your decals.
4. Turn the toner darkness up all the way on your laser printer to get a nice dark image. Turn off any "toner saver" or "economy" modes. There is no room for economy when restoring playfields.
5. Make sure you have your first coat of clear on the playfield before installing WSDs. You don't want a different tension above the decal than below it; or you might get ghosting (decal ghosting is where the decal lifts from the insert).
6. Since you need to clear coat over the decals, sand the whole playfield down to 1000 grit so the next layer of clear has some "tooth" to adhere to. Since you can't sand the decals, you need to do this BEFORE you install them.
7. Refer to this part of this thread to see how we scan and acquire the art and type font:

https://pinside.com/pinball/forum/topic/vids-guide-to-ultimate-playfield-restoration/page/3

vid1900

Supplies you are going to need:

1. Shallow dish of clean water. Use just regular tap water. Neither cold nor warm water is required.
2. Decal Setting solution. I know someone is going to chime in and say they don't use Decal Set, but we are going to restore a playfield worth $$$$, so a $3 bottle of solution is not going to kill the budget. If you are going to start restoring playfields, get in the habit of doing things right. Decal Set smells like Acetic acid, but I don't know anyone who has ever figured out what it is exactly. It softens the decal so wrinkles come right out and helps with adhesion.
3. Decals. Although you would instinctual reach for your Xacto knife, cut decals out with SHARP scissors. Razors tend to leave an edge that sticks up and makes it harder to release the decal from the backing paper.
4. Small Acid Brush. Any small brush can be used to apply the Decal Set on the playfield.
5. Soft, lint free cloth. Use this to apply the decals.

vid1900

Soak the decal for about 45 seconds in the water. The time does not have to be exactly 45 seconds. You will know the decal is ready when it easily slides off the backing paper between your thumb and forefinger.

vid1900

Long or large decals tend to curl as the water saturates the paper backing quicker than the decal itself.

Soak these decals face down to prevent this curling.

vid1900

Assuming you already blew all the dust off of the playfield before you started, brush some Decal Setting Solution over the target area.

Start with the inserts in the center of the playfield and work your way out the edge. This way you won't mess up the decals you already set.

Now start sliding the decal from the backing paper.

Don't touch the back of the decal where the adhesive is! You could leave a fingerprint or introduce dust.

Hold one side of the decal against the playfield with your finger, then slide away the backing paper.

vid1900

A good trick is use a playfield rotisserie and lay a 4 foot long florescent lamp on the floor, directing it's light upwards to illuminate the inserts. (If you need plans for a super easy rotisserie : https://pinside.com/pinball/forum/topic/vids-quick-and-dirty-rotisserie-guide)

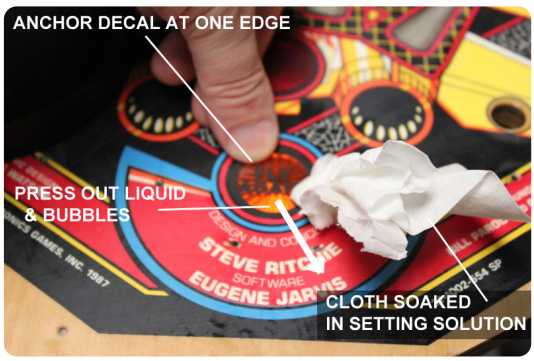
Rotisserie or not, you will probably need a small flashlight to perfectly align the decal.

Often, the black key-lining of the playfield is poorly aligned with the inserts. Do the best you can, but be prepared to fudge a little bit to make it look right.

vid1900

Once you get the alignment correct, it's time to "set" the decal.

Anchor the decal at one edge with your thumb to keep it from moving around.



Using your lint free cloth soaked in Decal Setting Solution, press out the excess water and air from under the decal.

Once you have 95% of the decal pressed out, move your thumb to the pressed side, and wipe down where your thumb was originally.

vid1900

If you have ever tinted the windows in your auto, you will instantly know what to do on the playfield.

Push bubbles and wrinkles out to the edges until the entire decal is set.

If you went to fast and have a "permanent" wrinkle or notice a miss-alignment, flood the decal with Decal Set, and carefully work it out by pressing and wiping.

vid1900

Let your decals dry overnight and you are ready for clear coat.

Two-part auto clear is "hot", meaning that it has very active solvents that will melt your fragile decals if you are not careful.

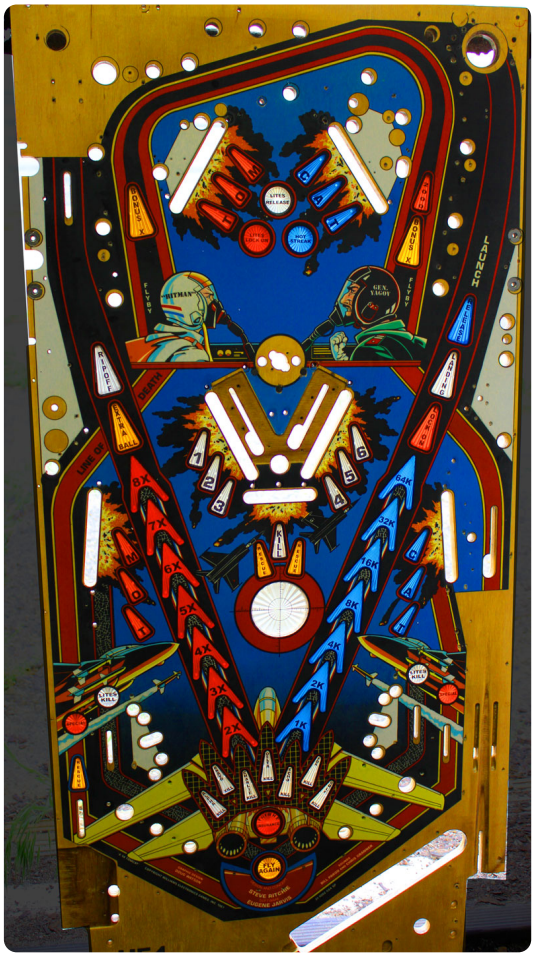
If this is your first time spraying clear, practice on some decal scrap stuck to a beer can or piece of sheet metal. Get the feel for how much clear melts the decals on some scrap rather than your precious playfield. When I say melt, I mean destroyed; the effect is not subtle.

Spray your first coat as dry as you can. Almost dust over the decals.

Ten minutes latter, give another very, very light coat.

Ten minutes after that, you can finally give a normal, light coat of clear.

Now your decals are protected. You can make any other last minute painting touchups you found, or go ahead and finish clear coating the playfield.



vid1900

> 
> **andypuk said:**
> If I want to use new insert decals on some of the inserts on the playfield (some are worn or half gone!), what is the best way of peeling off the current remains of the decal off the playfield?

Take a SHARP 1/4" wood chisel, and holding it VERTICALLY (that means straight up, not at an angle like you would normally use a chisel), scrape off the clear coat and any printing.

Your first stroke will be hair raising, but once you "get" it, it goes really fast.

vid1900

WOOD REPAIR

> 
> **pinwillie said:**
> My question is what is the best material for the wood repair? I have "quikwood" or plastic body filler

That "epoxy wood" stuff that comes in a dough-like stick is good.

Really rough up the area that it needs to adhere to, it will chip off if you try to patch over clear coat or wood filled with wax.

Sand a nice, smooth radius over the edges when it dries, a sharp edge will chip.

Paint it to match the surrounding wood. If you a lighting a saucer hole with an odd color like Red or Violet, check how your paint matches using that color. You don't want to find out after you have assembled your playfield that the repair stands out under Red illumination.

vid1900

> 
> **Aurich said:**
> Hey vid, what's your personal take on how long to wait after buffing out the final clear coat before repopulating the upper playfield and/or actually playing on it? I see people's numbers all over the place.

Really depends on what brand clear you use.

Some softer clears, like the ones CPR uses takes months to completely cure.

The Diamondplate or JC660 that I usually use is hard in less than 30 minutes, but the highest shine takes about 3 weeks of cure before it will totally buff out. So I usually just shelve the playfield for a month and then buff.

In a pinch, I've used an IR lamp to speed curing up, but I'm always worried that the IR might one day raise an insert or something (you know how unpredictable wood is).

vid1900

> 
> **sc204 said:**
> Quick question, after removing all of the items from the top of the payfield, there are raised mounds of wood where the wood screws were. I assume you try to push those back in before sanding?

A domed punch makes quick work of all the mounds.

You could also use the handle end of a nut driver, if it is not all chewed up.

vid1900

> 
> **sc204 said:**
> Couldn't find it under ball head, punch, round head punch etc
> Unfortunately just went to the local well stocked tool and hardware store and they didn't have it. Guess I will have to find it on line.

If you want a really big set of them, Harbor Freight has them for $29 after coupon :

http://www.harborfreight.com/25-piece-doming-block-and-punch-set-93539.html

Sears stores have them.

Mechanic stores might have them as "Pilot Punch", used to drive pins.....

vid1900

BROKEN POSTS

> 
> **mof said:**
> What's the best way to remove a broken post down in a hole?

If it is a regular "wood screw post" you can drill it out from the rear with a "hollow screw extractor".

http://www.highlandwoodworking.com/set3hollowscrewextractors.aspx

Don't drill all the way through to the face of the playfield. Just drill about 1/2 way through and then twist the screw tip out the rest of the way with a pair of needle nose Vise-grips.

You can backfill the hole with epoxy so it is strong enough to take the new post.

vid1900

> 
> **flugs said:**
> Could I fill the inserts with clearcoat until they are levelled again, or should I remove, sand and glue them in again?

If the EDGES of the inserts are below the face of the playfield, I'd remove, sand the sides for "tooth" and reglue them.

If the inserts are loose, I'd remove, sand the sides for "tooth" and reglue them.

Once the inserts are flush and stable, then I would fill the cupped inserts with clear coat.

vid1900

CLEARCOATING PLAYFIELDS

In this next section we are going to discuss Clearcoating Playfields.

Nothing about playfield restoration has more misinformation than the clearcoating process.

I'm going to walk you guys through clearcoating with just normal tools you can find anywhere. Sure I've got a bunch of high end HVLP guns, but I'm going to show you how to do it with a $12 gun and get totally pro results.

I'm also going to stress SAFETY. You will probably get tired of me talking about it, but it's the most important topic of this whole section.

vid1900

The Great Pretenders

People love easy, it's human nature.

They want to just go to Home Depot, walk out with a can of clear, go home to their basement, clear a playfield with a brush and put it back in the machine a day or two latter.

As this is the Ultimate playfield restoration guide, were not going to be doing anything like that.

Lets look at some unacceptable products for clearing playfields:

Pretender #1: Polyurethane

Poly is what people think of when they think "clear protective finish".

This "oil based" clear turns yellow as it ages, even if it claims non-yellowing formula.

Some formulas dry fast, but don't actually get hard for months (even a month latter the "finger nail test" lets you leave a mark).

After a few months of drying, it can be buffed to a high shine.

Vapors are very toxic.

Do not use Oil Based Poly on a playfield!

Pretender #2: Water Based Poly

This "water based" Poly (sometimes sold as Varathane or Polycrylic), cleans up with water.

The number one reason we don't use it for playfields is that it dulls the colors of the underlying playfield in a serious way. It does not make much sense to do all that work fixing up a playfield, only to dull down the color pallet.

Water Based Poly yellows over time, but not as much as oil-based Poly.

The finish drys very fast, but it takes 3 coats of Water Based Poly to build up the same thickness film of a single coat of Oil Poly. So you need many more coats to get the same protection, but each extra coat is further dulling the colors.

The can says that Water Based Poly is "tougher" than Oil Poly, but on a playfield, ball trails start cutting their way through much more quickly than with Oil.

Water Based Poly can be buffed to a medium gloss, but not as high as other clearcoats.

The vapors give you a headache, but they say it is non-toxic.

Water Based Poly makes a good primer over raw wood if you are going to paint over it, as otherwise the paint may soak into the wood fibers. Because it drys fast, it is ideal for this use.

Do not use Water Based Poly as a clearcoat on a playfield!

Pretender #3: Lacquer

Lacquer is a fun clear coat for many things because it drys super fast and you don't have to sand between coats.

You don't have to sand between coats because Lacquer is very "hot". It chemically melts into the lower layers, becoming a single layer.

Lacquer can be buffed to a very high gloss.

The bad things about Lacquer are that it turns slightly yellow, it is so hot that it often reacts tragically with other coatings and paints, and it melts decals like nothing else on the planet.

Some older pins were clearcoated with Lacquer.

Vapors are very toxic.

Do not use Lacquer to clearcoat a playfield!

Pretender #4: Shellac

Shellac is made from the bodies of the Laccifera lacca insect. It is actually safe to eat, and is used as the coating on Reese's Pieces and fruits like apples.

Shellac has a yellow to amber color to it, and can actually be purchased in different shades.

Shellac flakes are simply dissolved in alcohol and then applied.

Some older pins were actually "clear coated" with Shellac (test under the apron if the finish dissolves with alcohol).

In playfield restoration we use Shellac in layers to match freshly sanded wood to the surrounding wood. Newly sanded wood is bright white, and stands out like a sore thumb. Spraying layers of Shellac allows you to match darker older wood easily.

Vapor are mildly toxic (alcohol).

Shellac is not very durable as a clearcoat, but is does have a place in your tool kit.

vid1900

The Proper Choice For Clear Coating

So above, we ran through all the choices of what we don't want to use to clear a playfield, so what CAN we use?

2 Part Auto Clear (2PAC).

2PAC is the stuff the pros use (and soon you will too).

It REALLY protects the playfield from wear.

It does not yellow.

It makes the playfield colors pop.

It has UV blockers to keep your painted or printed repairs from fading at a different rate than the rest of the paints.

It is hard in an hour, and crazy hard in a week.

It is ready for another coat in 5 minutes.

It buffs to the highest shine (although you can latter knock down the shine to match older EMs, if you want)

It is compatible with acrylic paints and Waterslide decals commonly used for repair.

It can be used to fill in cupped or shrunken inserts so they are level with the rest of the playfield.

It can be mixed with different hardeners so the speed that it catalyzes can be controlled.

There is currently no better clearcoat choice available on the market.

vid1900

There are probably 100 different 2PAC brands and formula on the market, so what do I recommend ?

PPG JC660

It is the most forgiving 2PAC I've found for the beginner. Literally, a beginner can lay down a layer of this stuff their first time out, with a $12 HVLP gun and stand back and say DA-HAMMMMMM!

It is available everywhere PPG paints are sold (over 2000 dealers in the USA).

It has 3 different speeds of hardener.

It is less "hot" than the old DuPont Imron DiamondPlate that Williams used to use (I have 5 gallons of DP, and it is HOT stuff).

Vapors are very toxic

http://www.bapspaint.com/docs/psheets/PPG/Automotive/Shopline/JC661.pdf

Now, like I said, there are 100s of other choices and experienced auto painters are all going to religiously preach about their favorite brand. If someone is familiar with another brand and how it lays up, or has a friend who gets it "free" at work, or got laid once because the cleared their Trans-Am with it, more power to them.

vid1900

Stuff You Are Going To Need To Clear A Playfield

You are going to need a pile of stuff to clear a playfield. Even if you are not going to clear anything today, you might as well start getting all your supplies in order.

The first chemical you are going to need is Naphtha. It is usually sold as VM&P Naphtha (Varnish Maker & Painter's Naphtha). It has little odor, but is a carcinogen, so you need to wear your chem mask while using it. Naphtha evaporates very fast and won't dissolve our playfield touch-up work. We clean everything with Naphtha before we clear.

The next chemical you need is Lacquer Thinner. This is nasty stuff that dissolves many finishes. We use it to clean our spray guns, eye droppers, measuring cups, spills. DON'T use Lacquer Thinner to clean your playfield. Lacquer Thinner is a mega carcinogen, so again, chem mask needed during use.

Next you need the Clearcoat itself and the hardener. Unlike Poly, the 2PAC will not just air dry. The hardener acts as a catalyst and chemically turns the clearcoat hard as a rock. You must be very careful to never even get a drop of the hardener into the can of clearcoat - if you do, in about a month the entire can will turn into a solid cube of plastic. So again, do not dip an eyedropper into one can and then use it in the other!

The clear is mixed with the hardener in a 2:1 ratio, so a half cup of clear to a quarter cup of hardener. Or 10 drops of clear to 5 drops of hardener if you are mixing small batches to level inserts.

Don't mix the clear in any old plastic or foam cup, because the clear will become contaminated as it melts the plastic. Use a glass measuring cup and do it right. The store you buy the clear at will have disposable plastic measuring cups that are solvent safe, but I like to reuse the glass and keep the plastic out of the landfill.

Most of the time I use the Medium speed hardener, but the fast can be useful when we don't want to have decals dissolve, or we don't want out-gassing bubbles in old Bally playfield inserts (more on that latter). So you might buy a small can of Fast hardener to have on hand along with the Medium.

The clear contains super toxic Isocyanates (as the names implies, it contains cyanide) so you don't want to breathe it into your lungs. Isocyanates don't have a smell, so the company that makes the clear adds the most horrific smell to the formula. It smells like a mixture of Chlorine and Puke. If your chem-mask is leaking, you will know it!

Yes, I've seen the videos on Youtube with the guy shooting 2PAC with just a "10 cent dust mask", but that is the most insane thing I've ever seen. DON'T EVEN THINK ABOUT IT.

Next you need the all important Chem-mask. You can get one at the store that sells you the clear for $29. Home Depot sells an Isocyanate rated mask, but it is not with the other dust masks, it's in the isle with the Mold abatement products. Don't ask me why.

You need to wear the Chem-mask anytime you spray clear, rattle can paint, work with solvents (Naphtha, Toluene, Lacquer Thinner...) or sand painted cabinets (commercial products continued to use lead paint well into the 2000s - you can safely assume any pinball cabinet is painted with lead paint). Do not sand pinball cabinets in your basement or garage - you will NEVER get the lead dust out.

Your Chem-mask only works if it is sealed to your face. That means you need to shave the day of the spraying. That means you people with fancy facial hair are going to need to shave the mask's pattern through it.

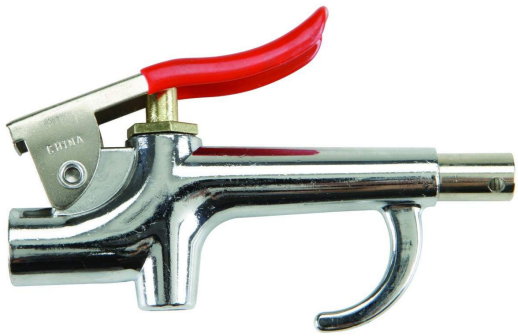
You need to keep the mask in it's thick zip-lock bag when not in use. The chem part of the mask lasts about 40 hours of use, and then you can start to smell the stench of the clear. Don't continue if you can smell the clear - stop and replace the cartridges!

If you start clearing playfields all the time, it makes sense to switch to a full hood that supplies outside air . The $350 cost of the hood will pay for itself in replacement cartridges and it is much more comfortable to wear. You can even wear it with a full beard.

Next you need some packs of Tackcloths. Tackcloths are Cheesecloth covered in resin that grabs even the smallest particles of dust. Even stuff that won't blow off with the Airgun, will be removed by the Tackcloth.

You will need some fine 800 grit sandpaper. They probably won't have it at Home Depot, but they will have it at the place that sells you the clear.

An Airgun or Blowgun attaches to your air compressor hose and lets you blow off fine dust out of the nooks, slots and holes. It is also great for blowing 40 years of dust and mold spores out of old cabinets (do this outside, not in your garage).



vid1900

More Safety Equipment You Need

You will need some Nitrile gloves. These are usually black in color. You don't want paint, clear, or solvents ever in contact with your skin. Regular latex gloves will allow the solvents soak right through them easily. A box of 100 is usually $7.

You of course need a Tyvek "bunny suit" . They are $10. Get the size above whatever the package recommends for your height, because the chart is always too small in actual use.

You need some airtight goggles, as safety glasses wont keep the vapor out of your eyes. You can even just use swim goggles if you have them already.

You need a roll of plastic sheeting. The mist from the clear goes EVERYWHERE. It will Escape and cover your wife's car, your other games, your entire garage would be coated if you don't tape off a "clearing booth".

Taping off a booth will keep dust from settling all over your fresh clear. You can even wet the garage floor with a hose just before spraying to further keep the dust off the playfield.

Just buy the super thin cheap .31 mil plastic that painters cover windows with - not the expensive 9 mil "drop cloth" stuff. You are not going to be walking on it.

vid1900

> 
>
> **Anth said:**
> Vid, what is your opinion on high quality rattle can auto clear? I'm assuming it's slightly inferior to two part, but will gladly trade that for the tremendous convenience and cost savings.

I've never used it, so I can't yet recommend it.

CONS: It costs more than mixing the 2 parts yourself, once you activate the spray can, you have 2 days to use it all up. No long term data of how it holds up hardness wise. Does it melt decals?

PROS: You don't need to borrow an air compressor, no measuring or mixing.

DIFFERENT: You probably have to spray it into a glass jar, then use a glass eyedropper to fill in cupped inserts.

vid1900

More Stuff You Are Going To Need To Clear A Playfield

You are going to need a HVLP (High Volume Low Pressure) spray gun.

Do you need a $300 Devilbiss sprayer to lay down some clearcoat that looks like a sheet of glass? Hell no.

A Devilbiss is a nice gun, but we don't need anything that good. We are shooting a surface that is flat on it's back. We are not going to have any runs to worry about. We are going to do what painters call a "flood and go". It's so easy, you almost feel guilty that it does not require more skill.

The Harbor Freight gun can be had for $9-12 bucks on sale, so sign up for their email coupons. Buy a few if you want, they are cheaper than probably anything else you have ever bought for pinball.

You need an air regulator that installs right at the gun, you don't want to keep walking back to the compressor to adjust your air flow.

The gun says it wants 40psi to run, but don't be surprised if you need 45-50psi to get a silky flow.

You set it and forget it, so once you get it right, you won't have to think about anymore (unless you shoot other brand paints/clears with your gun). The guns and air regulator are so cheap, you might as well use a different gun for shooting clear and shooting paint.

You want a little disposable air/moisture filter that attaches at the gun. These are $1-2.

Yes, I know you have a water filter at the compressor, but for $1, why not do it right?

You need a little roll of Teflon Tape (.20 cents).

When you hear people complain that their spray gun leaked air "right out of the box", that is because they did not put Teflon Tape on all the connecting threads.

Every threaded air connection needs tape.

Make 3 full, smooth wraps, clockwise, at each joint, around the male threads.

Don't ever use "pipe dope" or putty on the threads. That will contaminate your air supply and gun.

You need a $3 set of Air Connections.

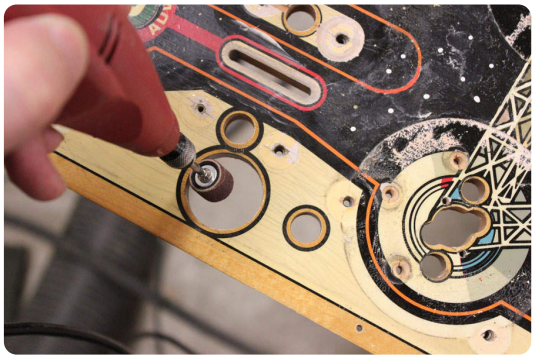
The gun and valve does not come with any connections, so you need a few.

It's good to have some extras around because brass is soft and sometimes the ends get dented and leak.

Finally you need a Dremel to clean out the insides of holes and slots.

vid1900

You need a Dremel (aka "rotary tool") to clean out the slots and holes.



Why?

If anyone ever used Pledge or Milwax on the playfield, that stuff contains a bunch of silicone (NEVER use Pledge or Milwax on any game that might be restored someday!). Silicone is just about impossible to remove from a playfield because Silicone is inert.

If you open the coin door on a game you want to restore and smell lemon Pledge - **DO NOT BUY IT.**

Even the slightest amount of Silicone will produce a dime sized "Fisheye" in the clear finish.

You hopefully can wipe enough of it off the flat surfaces, but around the holes, the Silicone can be impossible to remove so you get a big hole in the clear, right alongside the hole in the playfield.

We use the rotary tool with rough sandpaper to clean the holes and hopefully give enough tooth to the clear so that it can grab without the Silicone creating a Fisheye.

Some Emery Sticks can also be helpful in cleaning out the slots.

vid1900

Hey Vid: Won't Smoothie Fish Eye Eliminator prevent Fisheyes???

No.

Popular lore says that Smoothie will prevent Fisheyes in the clear. It works great on clearing automobiles, but it is powerless against liquid silicones like Pledge.

And it makes the clear coat a little less hard and take longer to cure.

Save your money.

vid1900

AIR COMPRESSOR (discussion)

PinJones asked a few weeks ago: How many times should I empty and fill the air compressor before I start spraying to get the water out?

Zero times, actually.

I always hear somebody saying that you should completely drain the air tank, then charge it up again, then drain it again and finally recharge it one last time to get all the water out of the tank. This is nonsense.

The water that condenses in an air compressor actually comes from the atmosphere itself.

Every time you run the compressor, any moisture that is in the air is condensed and collects on the cooler temperature walls of the tank. This moisture rolls down to the bottom of the tank.

So if one filling of the compressor on a humid day nets you a 1/4 cup of water, filling and draining the tank 100 times will still, of course, net you a 1/4 cup of water.

You will note that at the bottom of your tank there is a drain valve. Open this valve slightly until all the rusty water blows out and only clear air is emitted. This will probably take 5 seconds unless you have not drained your water in a few weeks (ever? lol).

Small "pancake" compressors often have a reverse threaded valve you turn to the Right to open; don't ask me why.

Large air compressors will often have an auto-drain that blows out the water at the very start of each cycle.

Back on page 5 we talked about how big of an air compressor to get:

https://pinside.com/pinball/forum/topic/vids-guide-to-ultimate-playfield-restoration/page/5

vid1900

The final air compressor accessory that is probably already installed on your compressor, is the oil/water separator filter.

This takes the air from the tank and removes any oils or water from it.

It is usually mounted on the tank with the air hose connector connected to the output of the filter (although you could mount it anywhere).

It has an IN and an OUT, so make sure your sprayer hose is connected to the OUT.

The separator is clear glass so you can see how much water has been pulled from the air supply.

Turn the valve on the bottom of the filter to blow out the captured water.

vid1900

> 
>
> **UvulaBob said:**
> For applying the clear coat, people are recommending a 600 dollar air compressor.

You don't have to spend 600.

Craigslist has 1000s of old compressors that are much better than the ones made today.

Look in your neighbor's garage, you will see an upright 60 gallon compressor just sitting there "Yeah, we really only use it to fill the kid's air raft...."

You want an old Iron Headed compressor (test with a magnet), not a new aluminum head one.

Get a brand name like Speedair, Saylor, Ingersoll Rand..... those old compressors will run forever in home use. (Even an old Craftsman (USA made) will run for 20 years).

vid1900

CUPPED INSERT REPAIR

Before we clear a playfield, we often need to repair it first.

One common problem is cupped inserts.

Common pinball folklore says that hot, incandescent bulbs melted the cupped inserts; but even NOS playfields have them, so that can't be the case.

Old inserts that are not reinforced with jeweling, will simply cup from being made too thin and the pressure of the surrounding wood.

You almost never see a cupped jeweled insert.

Q: Shouldn't I take them out and sand them flat?

A: No, they are too thin already.

Q: Shouldn't I take them out, heat them up and flatten them again?

A: It's risky and they will cup again in a few years.

We want to avoid removing inserts whenever possible. Many styles have not be made in years, so you are unlikely to find replacements should you break one during removal.

So what do the pros do? They fill the cupping with 2PAC.

This reinforces the insert, making it stronger, and less likely to cup further.

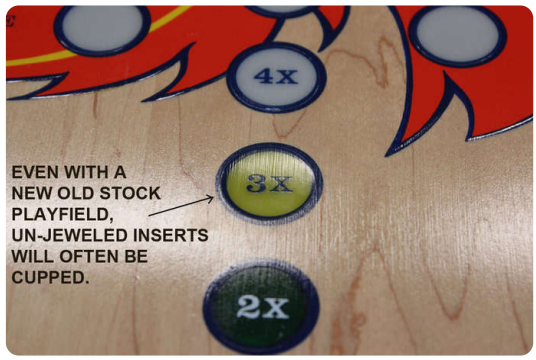
We also know that the cupping fix is compatible with our clearcoat.

vid1900

Here we have a 30 year old New Old Stock playfield.

These old playfields hardly have any clearcoat at all (it was just silkscreened on), so they need to be protected with a real coat of clear. Even in home use, a nicked ball will destroy these fragile playfields in no time at all.

If we don't fix this cupped insert, it will launch air balls, deflect ball travel, and of course cause deep wear around it's edge.



vid1900

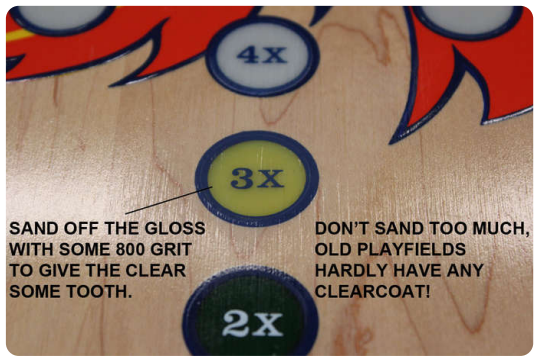
So first we epoxy all the inserts from the back of the playfield to keep them from moving once they are heated by the lights.

Any inserts that are proud of the playfield are heated up and pressed back in flat with a 12" C-clamp, and then glued:

https://pinside.com/pinball/forum/topic/vids-guide-to-ultimate-playfield-restoration

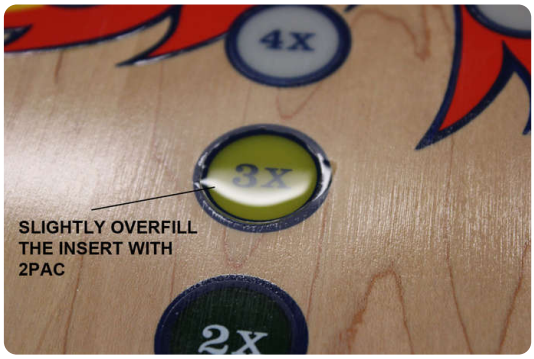
Then we take some 800 grit sandpaper and sand off the gloss. This gives some tooth to the 2PAC so it does not "ghost".

Don't sand too much or you will wear away the paint on the insert. There is VERY little clear coat on these old playfields.



vid1900

Blow off any sanding dust and then clean out the insert and the surrounding area with Naphtha. Once you clean it with Naphtha, don't get any oily fingerprints or dust near the insert.



Put your respirator on and find a glass substrate to mix the 2PAC on. You can use an upside down pickle jar.

Using 2 different glass eyedroppers, drip the correct ratio of Clear & Hardener onto the mixing surface.

Remember not to get even a single drop of hardener into the can of clear, or the whole can of clear will become a cube of plastic in a month. This is why we use 2 different eye droppers.

Depending on how many inserts you have to fill, you need to mix up your clear, by counting drops. Each insert might need 12 drops of clear, so your ratio might be 10 drops clear : 5 drops hardener.

Use the fasting curing hardener you can for this. The faster it cures, the less chance of any outgassing from the insert (more on this latter).

Mix up the clear and then let it sit for 5 minutes to allow any bubbles to dissipate.

Draw the clear up into an eyedropper without creating any bubbles.

"Draw" around the edge of the insert with the clear, so as you fill it, the clear will climb to the very top edge.

Overfill the insert slightly, it will get sanded flush.

Suck out, or drag out any air bubbles with the eyedropper.

vid1900

> 
>
> **UvulaBob said:**
> But I'm more concerned about the conditions under which Varathane would make someone regret not putting in the effort to use ACC (whether self-applied or paying a local business to do it). What kind of degredation have people started to see after two years? Five years? Ever?

You don't even have to wait 2 years, the moment the Varathane dries, you see that all the colors are now dulled down.

Then once you start playing the game, you see how fast ball trails start cutting through the Varathane.

> **UvulaBob said:**
> Varathane is considerably cheaper, money and effort-wise if not time-wise, to apply to a playfield than automotive clear coat.

Time wise, 2PAC is much faster.

Varathane takes probably 10 coats to build up as much film as a single coat of 2PAC.

Varathane is good to let your kids use on an art project, but it looks terrible on floors and is not suitable for pinball playfields.

vid1900

> **UvulaBob said:**
> Much like the agonizing wait for the next book in a certain sweeping medieval fantasy series, I'm on the edge of my seat waiting for Vid to get to the part where he tells us how long to wait after a given coat before we can sand it down and apply the next one.

Every brand of 2PAC is different, and every brand has different speed hardeners that can be used with it. So like George Martin would say, YMMV.

Many restorers sand the next day. If you wait a week, it is much harder to sand.

If your last coat came out perfect you might not even need to sand at all, wait 15 minutes and top coat it.

Sometimes the last coat comes out perfect, and you don't even have anything to buff out.

2PAC tends to "wall up" around holes in the playfield, so you may end up sanding to make the playfield dead flat.

vid1900

For many people, a good single coat of 2PAC is all they need and they would be very happy with the results.

It would be better than any factory clearcoat.

For others, spraying, flattening and buffing to absolute perfection is their goal.

> **UvulaBob said:**
> The alternative is buying a big compressor,

A big compressor is a great workshop dream, but remember, you can do it with a cheap 28 gallon too.

vid1900

You don't want to make the clear too thick.

We've all seen those playfields that look like they came in out of an ice storm - don't do that.

Sometimes you have to coat and sand back and coat again to flatten, but many times 2-3 coats and you are done.

I'm going to be posting some real life examples of a few common scenarios to help guide you through.

vid1900

> 
>
> **mac622 said:**
> This is somewhat OT but type of wax do you recommend and how long should you wait before applying to make sure the 2PAC is fully cured?

The 2PAC cures chemically rather than by evaporation, so it's not like Poly where you have to wait a month.

Different brands require different cure times.

Try putting your nose next to it and see if it still stinks. If it does not smell like solvent, wax with Blitz 1 Grand and then populate.

vid1900

SHOOTER LANE REPAINTING

Sometimes you would have to sand 1/16" of wood out of the Shooter Lane to get all the dirty, dark gray wood fibers out.

Or sometimes there is some strange defect in one of the plys of the wood that distracts the eye.

If you have to sand too much wood, you mess up the way the ball lays and launches. The ball needs to be CENTERED in the shooter lane, and it will be too low if you sand too much.

What do we do? We paint.

1. Fill in any soft spots or wear holes/dents with wood filler and sand smooth.
2. Cover entire shooter lane with Frisket.
3. Follow the layer of the existing plys with an Xacto knife.
4. Mix some translucent Brown, maybe with some lighter Sand color, and maybe few drops of Red. You need this mix to be transparent, but darker than the existing layer.

You want to still see the detail of the underlying wood.

vid1900

Spray light coats and dry with a hair dryer.

Don't make it too dark.

Make it an attractive contrast.

Don't over analyze it.

If you peel off the Frisket and it looks odd, wash it off and try again - nothing is permanent until you clear coat.

Spray a fine mist of Sand color transparent paint on the lighter layer of wood to cover and lighten any dark spots. Wipe if off with a rag if you put it on too heavy and try again.

Some guys try to "draw" on new wood grain, but it is way faster to just use a light, transparent touch and let some of the old, dirty grain show through.

vid1900

> 
> **PeteB said:**
> clearing a cabinet with the spray gun to be a real pain especially with all the masking required when parts are still in the machine. I'm looking for something that can be rolled on, in a thin coat, which can then be buffed.

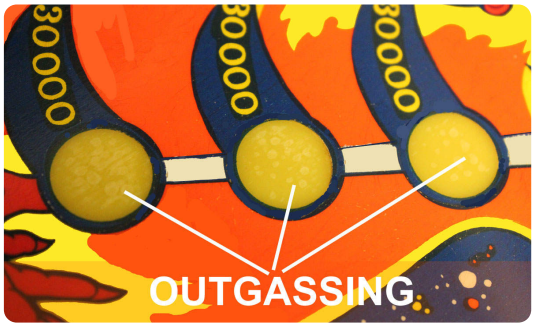
Nothing that rolls on is ever going to give a nice finish as a spray.

Efficient masking with .31 mil plastic that painters cover windows with (not the expensive 9 mil "drop cloth" stuff) is what you need.

You can mask off a cabinet in 15 minutes and be ready to shoot.

vid1900

OUTGASSING and INSERT BLOOMING



Every beginner just thinks if they pick up a 1960-1990 NOS playfield, they can clearcoat it and it will be ready to go.

Of course that is never the case.

These NOS playfields DO have to be clearcoated, or they will quickly wear out, even in home use.

The old playfield's topcoats have become brittle, and the paint beneath it often turns into a chalky consistency.

Beginners are often alarmed how fast wear develops and chips are created, even with fresh balls and thorough waxings on NOS playfields. That is because the old, used playfields had the wood fibers compressed by the ball while the paint was still fresh and soft. The NOS playfields get their wood fibers compressed, but now the paint is brittle and chalky.

So we know we have to protect NOS playfields, what exactly is the problem then?

Outgassing.

The old topcoat on these NOS playfields seems to react somehow with the plastic inserts and the new clearcoat.

The "heat" from the new clearcoat's solvents can create "insert blooming" or "outgassing". Literally, the solvents in the clear have no where to go against the inserts, so they melt the old topcoat and create a pattern of large or little light colored spots.

Worse yet, the Insert Blooming does not happen instantly, it usually appears a few days latter when you assume the clear has cured.

Here is a playfield cleared by one of those guys who are always spamming the forums:

vid1900

Q: Does this happen with all playfields?

A: Once DiamondPlate coatings started to be used in the 1990s, Outgassing was not as much of a problem. The DiamondPlate was already in the 2PAC family, so it is much more compatible.

Q: Why is it more of a problem with NOS playfields, rather than all playfields of that era?

A: Usually the factory topcoat is already worn off, or mostly worn off on well used playfields. If you scrape the old lettering off, and replace it with a decal, there is no topcoat to react with anyway.

Q: Does it matter what clearcoat I use?

A: Yes, the slower the cure time, the more chance of Outgassing. Always use the fastest hardener for your first coat over a NOS playfield. Never use DiamondPlate clear on old NOS playfields, it is WAY TOO HOT and ALWAYS creates Insert Blooming.

Q: Could I protect the insert with a water based clear first to guard it from the 2PAC.

A: No, I've tried that, and it does not work at all.

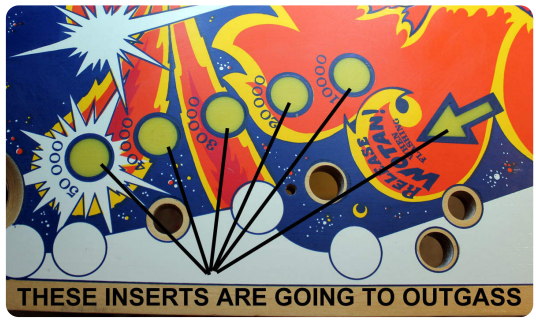
Q: Does it always happen?

A: No, it is hit and miss. You can test an insert near the back of the playfield and check it in a week .

vid1900

Insert Blooming seems to be a bigger problem over yellow or white opaque inserts, although you sometimes see it even on red and clear.

I suspect that it is more common than we think on clear inserts, but the jeweling provides more of a distraction to the eye.



vid1900

So what can we do?

I know some restorers spray and pray - then grind out the outgassing. But I'm going to teach you to preemptively strike, saving massive time and energy.

We are going to quickly and efficiently clean off the old topcoat, so there is nothing for the 2PAC to react with.

How do we do this without chipping up the Keylining surrounding the insert?

With an Acrylic Template with various sized holes.

A 1/4" thick piece of acrylic is ideal. You can see through it for alignment, and it drills cleanly with Forstner bits.

Make one with a bunch of common insert sizes.

vid1900

Center the template over the insert and clamp securely.

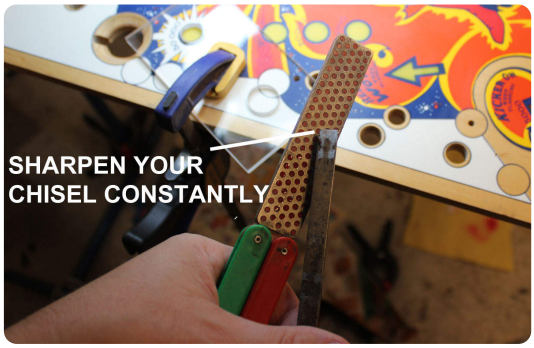
We don't want the template moving around. It needs to be tight to the playfield so it does not end up chipping the Keylining.

vid1900

The tool of choice, way faster than a Dremel, is a SHARP Chisel.

We use the chisel completely vertically, not at an angle like you would normally chisel wood.

Get a Diamond Hone and constantly re-sharpen your chisel. Using it vertically quickly kills the edge.



A sharp chisel works so fast, you won't believe it . A few seconds and you are on to the next insert. It will take you longer to move the template than it will to clean out the old topcoat.

vid1900

Your sharp chisel quickly makes large flakes.

You will get a feel for the crunchiness of the topcoat, the insert itself will feel like slippery plastic.

vid1900

Once you make your way into the center of the playfield, it's time to use your 12" C-Clamp to hold the template.

vid1900

On Arrows or other inserts that you don't have a template for, lightly cut just inside of the Keyline with an Xacto knife, so that you don't accidentally take a chip of keylining out along with the topcoat. You will feel the Xacto cut with the tip of your chisel.

On inserts with lettering, weigh the risk of trimming around the letter, with the risk of Insert Blooming. Test the 2PAC on an insert near the back if in doubt.

Small scratches from the chisel can be left alone, they actually give the clearcoat more tooth and will fill in just fine once cleared.

vid1900

STAR ROLLOVERS

Star Rollovers get their own section because they present a giant time wasting problem to the restorer.

Anyone who has ever bought a CPR playfield, or has ever had a playfield restored by an amateur has had the problem where the white "star" of the rollover is sticky or won't install at all.

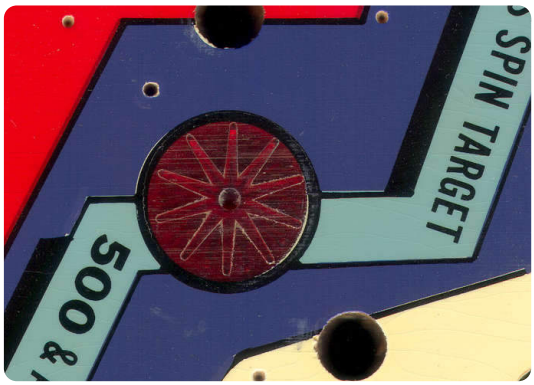
What happens is that the clear coat goes down into the slots making them too narrow allow the star blades to freely move. You sand, and you pick and then sand some more.... we are not going to be doing that on our own playfields.

vid1900

The best way to keep the clear out of the slots is to use some Star Insert Plugs from a NOS playfield. Don't throw these away, after a while you will have a good sized jar of them.

These fit snugly and keep all the clear out of the hole.

You use a #3 screwdriver to "rock" them out while the clear is still hardening.



vid1900

If this is one of your first few rodeos, you can just use the old Star Inserts upsidedown to keep the clear from getting into the slots.

A tiny ball of "Blue-Tak" will keep the inserts from flying out while you spray your clear.

Again, as the clear is starting to harden, roll the insert around to make sure the slots are clean and the insert does not get glued in.

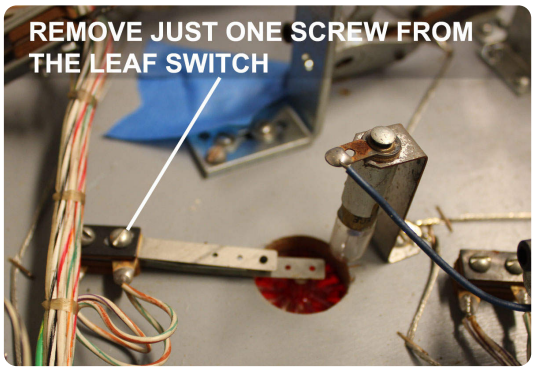
vid1900

Of course you have to get the white star out of the insert, without breaking the insert.

40 year old plastics can be brittle, so you need a gentile technique. It's not hard to do, but you have to do it carefully.

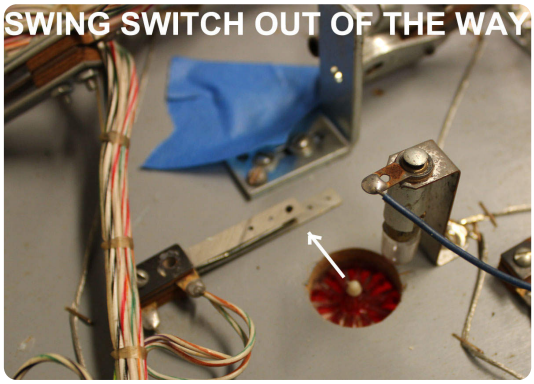
First, we need to get the switch out of the way.

Remove only one screw from the switch.



vid1900

Swing the switch out of the way, exposing the Star Barb.



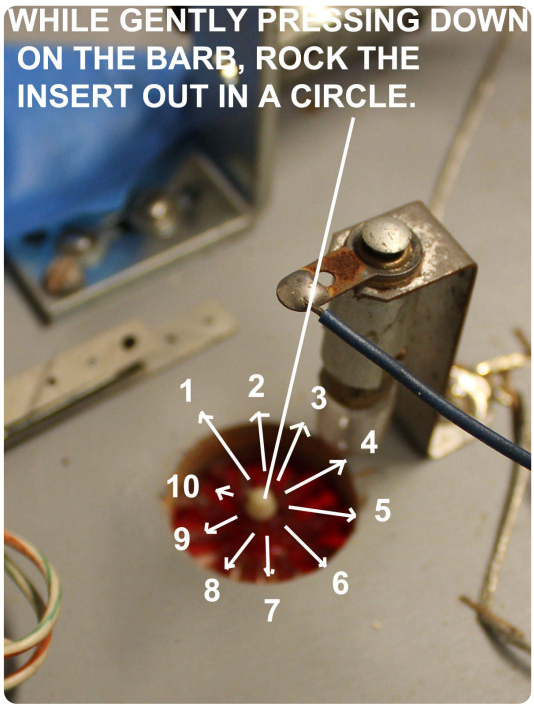
vid1900

Here is where you have to be careful.

The Barb is held in by thin plastic fingers.

You need to GENTLY press on the Barb, while rocking outwards in a 360* circle.

If the old stars are yellow and you are replacing them anyway, you can just cut the barb off with some SHARP end nip wire cutters.



vid1900

The Star will drop out and now you can examine the plastic fingers of the insert.

Light it up with a flashlight from underneath and make sure nothing is cracked.

You want to replace the cracked insert now, not after you clearcoat!

vid1900

Sand the top of the Star Insert with some 220 grit sandpaper before you clearcoat.

This will give some good "tooth" for the clear to hold onto, as the insert flexes slightly due to it's segmented/perforated nature.

vid1900

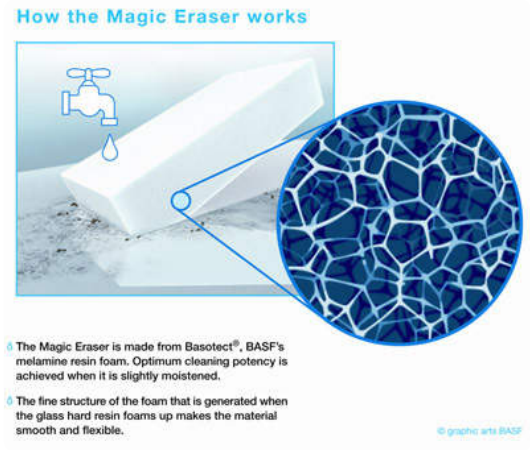
MAGIC ERASER

PinPod emailed me a few weeks ago asking why Magic Eraser + Alcohol works great on some playfields, but seems to in a blink of an eye chew through the paint on others.

The answer is not a complex one, but first let's talk about what ME is.

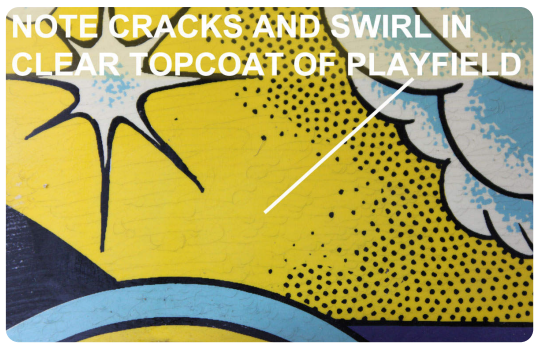
ME is a Melamine Foam that was used in noise control for years. The fibrous foam is made up of the same Melamine that the Chinese were adding to dog food protein (killing 1000s of dogs in the USA).

It has about the same abrasiveness as 1000 grit sandpaper, but its fibrous nature lets it "dig deep" into small cracks and ball swirl.



vid1900

Magic Eraser + Alcohol works best when the cracks and ball swirl is in the top coat of the playfield AND when the top coat is Alcohol Soluble.



Here we have the usual cracks in the top coat of the playfield. The playfield top coat is Alcohol Soluble (tested under the apron).

Using ME + 96% Isopropyl Alcohol (don't use the 50-75% Alcohol, or all that water can raise the grain of the wood), we wet the top coat with a light, quick scrub. Wait 30 seconds for the top coat to soften, and return to give the area a gentle scrubbing.

vid1900

A few seconds of scrubbing, and wow, all the topcoat has been cleaned off, relieving the beautiful virgin paint beneath.

vid1900

This is the old top coat, dissolved and cleaned off the playfield.

Use a paper towel and wipe off any dissolved topcoat/melamine slop before the alcohol evaporates. Otherwise the topcoat hardens again and is a mess to clean up.

vid1900

Here the top coat has been worn off through years of ball travel.

The Magic Eraser seemed to be cleaning out the swirls in the yellow paint at first, but 2 strokes latter, the Eraser had chewed all the way through. It happens in seconds, no matter how careful or experienced you are, lol.

If the Magic Eraser shows ANY paint color at all - STOP, there is almost nothing left for you to sand.

vid1900

Once we remove the top coat, we HAVE to clear coat the playfield.

Without the protective top coat, any wear, or ball swirl will be occurring into the paint itself.

Trying to remove ball swirl from paint, often results in exposing the white primer below.

So if you have an old game you want to "clean up" but not clear coat - don't automatically reach for the Magic Eraser.

Let the old top coat do it's job, and leave it alone.

vid1900

> **Robotoes said:**
> Wondering if this thread will cover what to do with the areas under posts that have "sunken" and bit into the surface and how best to deal with these.

Two schools of though here, and I think you will understand the logic behind both of them:

1. Since the ball never rolls into the post depression, why mess with making it totally flat? It will not affect ball travel at all.
2. It only takes a half hour to fill every depression on the playfield, and since I'm hanging this on the wall, I want it dead flat - even in normally unseen areas.

Note that if you DO leave the depression unfilled, you still have to rough up the depression between each coat of clear by hand with some sandpaper, otherwise when you tighten the post down, the clear could separate between layers.

vid1900

> **Robotoes said:**
> So I should let each layer dry, sand the post depressions free of that coat of clear, then continue with additional coats?

Nope, let the coat dry, then with some 400 grit, de-gloss the depression.

> **Robotoes said:**
> Maybe stuff the screw holes with a little dowel to keep the clear out, and then remove prior to drying?

The post holes won't fill with clear by spraying.

The clear usually walls up around holes rather than filling them.

Even if a the hole somehow filled with clear, you would just drill out a pilot hole before putting the screw back in.

> **Robotoes said:**
> what do you do with screw holes that no longer have bite? Enlarge with a tap?

Put a drop of wood glue in the hole, tap in a wooden shish kabob skewer, break off flush with the playfield.

vid1900

FLATTENING THE PLAYFIELD BETWEEN COATS

Everyone has the idea in their head that each coat of clear "fills in" or "levels off" dips and depressions in the playfield, but that is not true at all.

There is a cohesion tension that breaks up the surface tension of the clearcoat and causes it to wall up around holes and slots.

You need to sand down this build up between EVERY coat of clear.

Also, little dips in the playfield around pop bumper nails, sunken inserts and fisheyes will not just fill in by spraying over them. You need to de-gloss these areas, and fill them using an eyedropper with 2PAC.

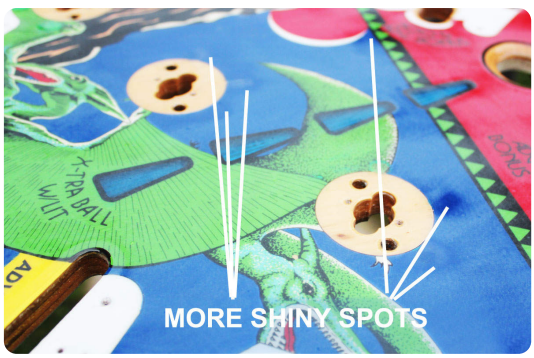
Here we have the first coat of clear on a playfield.

I've gently sanded it with some 800 grit paper on a sanding pad to show any low spots. The sanding pad is flat so it really makes the low spots evident. If you sanded by hand, the sandpaper would just follow the contour of the playfield, never showing how uneven it is.

Note the insert that "felt" flat to my hand before clearcoating, now shows it is sunken and needs to be filled. I'll rough it up with sandpaper by hand, and fill it with an eyedropper.

Note the build up of clear around the drop target slot. This I'll sand back to flat before the next coat of clear.

Here again we see some shiny low spots around the pop bumper nails and just a random dent in the field. You can see that the tip of the 3rd arrow insert has a low spot in front of it too.



vid1900

> 
>
> **Lonzo said:**
> When you fill with an eye dropper do you mean fill and let dry and sand before the next coat or do you mean fill to add clear and then spray the rest of the playfield immediately?

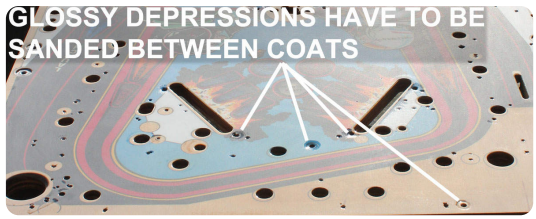
You can fill it and then shoot a layer of clear immediately, but you need to shoot the clear STRAIGHT DOWN over the fill.

If you shoot at any type of an angle, the air pressure will often push the fill out of the hole and leave a "wave" on the playfield. If this happens, sand the wave out with 220 grit (800 would take forever), and fix the depression again latter.

Or just wait for the fill to dry a hour or so, and shoot normally.

If you let the fill dry a few days before you clear, de-gloss it with some sandpaper as the fill is now fully cured, and in need of some tooth to bond with the new layer.

vid1900



Here this playfield is being sanded dead flat.

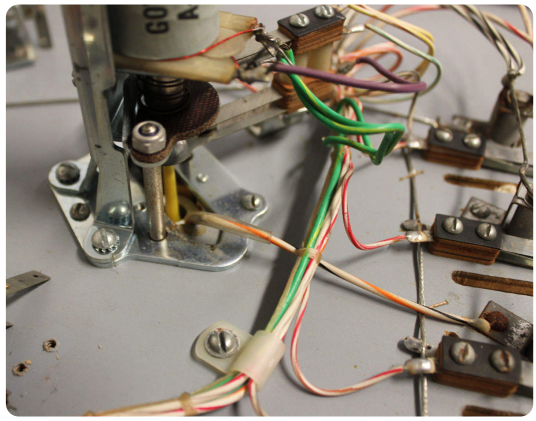
Note that some of the post depressions are still glossy.

Whether you were going to fill them in, or ignore them because you won't see the depression under the posts, you still have to de-gloss the depressions so that the next coat of clear will have some tooth.

If you don't, the next layer of clear may not adhere well enough and could crack when you tighten the posts.

vid1900

WORKING EFFICIENTLY WHILE CLEARCOATING



We don't want to take everything off the back of the playfield if we don't have to.

Some old playfields have no clearcoat or grey paint on the back to seal them, so sometimes you have no choice - but normally, don't put yourself through more work than you need to. A playfield that is coated on both sides has much less chance of ever warping. It puts a more equal tension on both sided of the wood, and it slows the entrance and exit of moisture.

If you are shipping a playfield, then you probably want to strip both sides either way.

If all the light sockets are corroded and in need of replacement, it is usually faster to strip the back of the playfield than to perform surgical replacement.

Note that there is, of course, some risk of not reassembling everything correctly, or even damaging something; in stripping the back of the playfield.

Before you start, take 50 pictures from all different angles and directions of the back of the playfield, so you can put everything back in it's proper place and orientation. If you think you took enough, take 20 more.

vid1900

We need to protect all the electrical connectors from dirt, dust and overspray.

There will be plenty of dust while sanding.

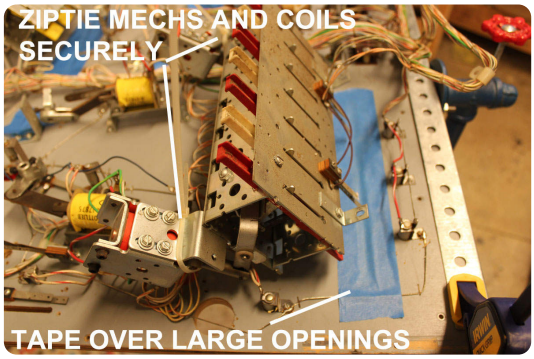
Use heavy duty bags and a zipties to secure them.

Use "freezer" bags, because they are a thicker mil of plastic.

Coil up the wiring harnesses and secure them to the bottom of the playfield.

vid1900

Getting everything off the top of the playfield is easy, but some mechs below we REALLY don't want to get gummed up with overspray.



Pull drop target mechs away from their playfield slots and secure with zipties.

Ziptie mechs to thick parts of the wiring harness, or other very secure parts of the playfield.

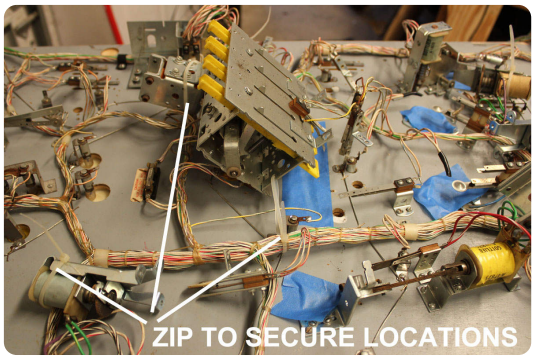
Cover the slots with blue painter's tape.

Clearcoat generally wont go down small slots and holes, but large holes are just asking for trouble if you don't seal them up.

Gottliebs are notorious for having all Standard screw heads that are terrible for re-assembly and disassemblely (both on the top and bottom of the playfield). I usually throw them all in a bag for the owner if he wants "all original" hardware, and re-assemble with Phillips head screws. Phillips install about 20x faster, and way less chance of the screwgun slipping out of the head and damaging the playfield.

vid1900

Look for secure locations for the zipties.



Don't leave anything dangling, or you will get cracked solder joints (if the wire does not break entirely).

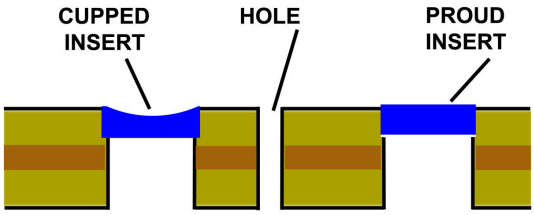
Don't secure any mechs near the top or bottom edge of the playfield because you need that area clear for the rotisserie.

Sometimes the wiring harness or brackets are secured from the factory too close to the top or bottom edge. Remove these and save yourself a lot of headaches latter.

vid1900

SANDING THE CLEARCOAT

PLAYFIELD CROSSECTION



We need to sand the playfield to give some tooth for the clearcoat to stick to.

You want some fine sandpaper for this job, maybe 800-1000 grit.

Think of this job as de-glossing, rather than any actual sanding.

Don't press to hard, you don't want to sand off any paint.

Don't sand flaky paint that has turned to chalk. If it is chalky and dull, it will hopefully adhere to the clear due to it's lack of gloss. Many sys11 Williams games are just too fragile to sand.

You will probably have to hand sand with just sandpaper folded to get into cupped inserts and into holes and slots. Look at a reflected light source at an angle to see any glossy spots you missed.

Make sure you clean out the Shooter Lane and check how it will look with a rag soaked in Naphtha. You don't want to seal a bunch of dirt or grey wood under the clearcoat.

CUPPED INSERTS - I would sand these and fill them with clear from an eyedropper. You will see later why it is good to do this step before you clearcoat.

HOLES - Try and sand inside of slots and holes with emery sticks or coarse sandpaper (120-220 grit). You need the clear to REALLY hang on to these difficult edges. If anyone ever used Pledge or some other silicone based crap on the playfield, you will soon find out.

Blow out any holes on both the front and back of the playfield with your air compressor (do this outside, the playfield dust is toxic).

Wipe the whole playfield down with Naphtha, then follow with a Tack Cloth. Do not touch the playfield with your oily fingers or stir up any dust - you are ready to spray the clear.

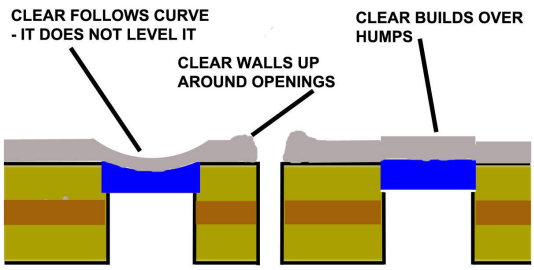
vid1900

So you have shot your first coat of clear.

It will appear glossier than anything you have ever seen (this gloss will fade a little in a few days as the clear shrinks into the cracks and crevices of the playfield).

You will notice that the clear did not "fill in" cupped inserts, dents or worn valleys, it simply followed the curve.

FIRST COAT OF CLEAR



You will notice that instead of burying humps or decals in the clear, the clear simply built the humps even higher.

Finally, you will notice that the clear walled up around holes and slots. It did not "run" down the holes, dripping from the backside. It actually makes a wall around holes, taller than the surrounding clearcoat.

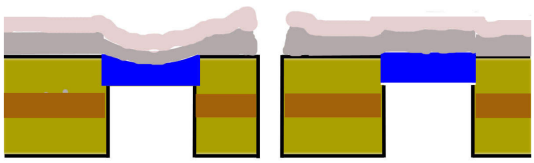
vid1900

Every beginner thinks that the more layers of clear they lay down, the flatter the playfield will become.

But they quickly discover that each new layer of clear follows all the dips and humps, making the new layer just as lumpy as the last (and around holes, sometimes even more humpy).

This means that you have to sand between each coat if you want a totally flat playfield.

SECOND COAT OF CLEAR WITHOUT SANDING



Read the above sentence again.

For about 24 hours, the new layer clear will stick to the last layer because the last layer, although hard, is not fully cured. After 24 hours, plan on always sanding to give tooth to the new layer.

If you don't sand, and simply put a new layer of clear on a fully cured layer, the 2 layers may separate latter down the line. If this happens, you have to sand back to the old layer. You don't want to ever have to do that.

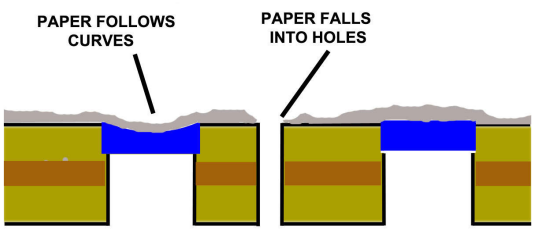
vid1900

The next thing beginners do is fold up some sandpaper and hand sand the last layer of clear.

Hand sanding will follow all the curves in the playfield and not make the playfield flat.

The sandpaper will "fall" into holes and slots, making them crater and angle inward.

HAND SANDING FIRST COAT OF CLEAR



vid1900

To make the playfield flat, we need to sand using a flat surface.

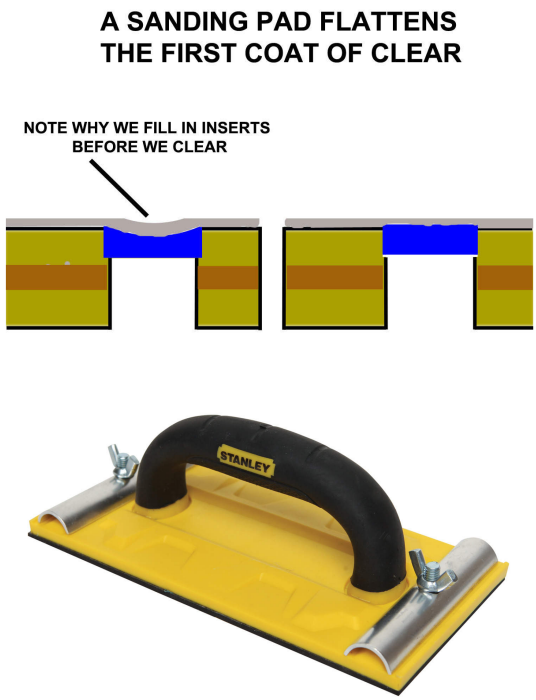
The larger the surface of the pad, the flatter the sanding result.

Once you get a bunch of playfields under your belt, you can use a pneumatic or electric sander, but for a beginner, you want a sanding pad made for drywall.

The fresh clearcoat dust will want to quickly clog your sandpaper, so have your air nozzle ready to blow out the dust from the pad.

You don't want to use any fine grit sandpaper for this knock down of the playfield surface. 400-500 grit will give you quick knockdown of hills, and less clogging on the pad.

The clearcoat dust is toxic, use a respirator mask, and don't track the dust through your house. Take your Tyvek suit off outside and shake it outside.



Note in this diagram how the playfield is flat, but the cupped insert still has a low center. Hand sand the dip, and fill with a few drops of clearcoat before you spray the next layer.

vid1900

FEAR OF MYLAR

A lot of Pinsiders seem to have a fear of Mylar.

There is nothing inherently wrong with Mylar. It has saved millions of games from the dumpster.

Of course if the Mylar is peeling or bubbling and thus affecting the ball travel, it probably should be dealt with, but otherwise 90% of pin owners should just leave it alone. Let it continue to protect the playfield as it has for the last 30 years.

A few years ago I restored a Fireball Classic for a client and I put a piece a piece of Mylar on the upper playfield.

I put the Mylar over the spot that is worn to bare wood on 99% of every Fireball in existence. Every missed skill shot takes a bounce down the chute and crashes into the exact same spot.

After a few months, the guy was waxing his playfield and discovered the Mylar:

> Client: Hey Vid, you put Mylar on my brand new clearcoated playfield???
> Vid: Yes, of course.
> C: I mean, with that super clearcoat, you ruined it with Mylar?
> V: Ruined it? I'm keeping it from getting ruined.
> C: The new clearcoat can be ruined?
> V: The clear is super tough, but it is still not as hard as a steel ball.
> C: I always heard you want to remove Mylar.
> V: Only if it is interfering with the game somehow. How long did it take you to discover the Mylar?
> C: Three months!
> V: Then I think it's not interfering with game play (laughs).
> C: What if it starts to peel?
> V: I'll pull it off and put a new piece down.

It's been years and the Mylar is still solid.

So don't be afraid of Mylar.

Even with a good clearcoat, you want it where balls drop from ramps (like MM in front of the FIRE inserts), some pop bumpers, and any other super high wear spot.

You can ever put it on the bottoms of ramp flaps to keep the spring steel from cutting into the playfield.

Just remember to wax before you Mylar. That way it will peel up easily.

vid1900

There is one Mylar to always fear: *Non-Adhesive Mylar.*

You see this all the time on Gottlieb games.

Abrasive grit and junk gets under the Mylar and is continually ground into the playfield. It literally chews holes all the way down to the wood.

If you have a game with Non-adhesive Mylar installed, replace it immediately with an adhesive ring (wax the playfield before you install it).