Union Pacific E8 #942

Restoration project at Orange Empire Railway Museum Perris, CA
2011/2012

Union Pacific E8 942 in service. She and her sisters were used on famous passenger trains such as the City of Los Angeles. U.P. 942 was built in 1953 by the Electro Motive Division of GM (EMD) and used by the Union Pacific until 1972. These locomotives had two diesel engines (known as prime movers) rated at 1125 h.p. each.

After being purchased by a locomotive dealer ex-U.P. 942 was placed into service for a commuter railroad in the Chicago area. Here is a picture of 942 (now renumbered 510) shortly after delivery to Chicago.

U.P. 942 after arriving at Orange Empire Railway Museum in Perris, CA. In 1995 she was purchased by the museum from Pacific Rail in Colton, CA.

Another picture of U.P. 942 at OERM. The square boxes on the water/fuel tank are where the locomotives batteries are kept. This was a modification done when in commuter service, originally the batteries were inside the rear of the locomotive.

In 2011 it was decided to restore U.P. 942 in time to celebrate the 150th. Anniversary of the Union Pacific Railroad, so the project had to be completed by April 2012. The first step was to rebuild the rear main generator, which failed in 2007. With only the front main generator operational the front truck alone was receiving electricity to its traction motors and that was not acceptable for the locomotive to be run. In order to remove the failed generator it required a heavy duty crane and people who had experience with this complicated and critical operation. South West Locomotive Repair from Forest Falls, CA. was brought in to remove the generator and then to put it back into place once it had been rebuilt. And of course there was the tremendous amount of work needed to repair the carbody and get it ready to be painted.

Because there was going to be quite a bit of work involved and time was of the essence an indoor location was needed and car barn 7 fit this need perfectly.

Time to address the failed main generator. A crane was brought in, has been positioned and being connected to a panel on the roof of U.P. 942 that needs to be removed before the main generator can come out.

The crane carefully removes the top panel from U.P. 942. Once this piece was off of the locomotive the task of preparing to take out the main generator could begin.

Taking out the main generator required a lot of work, there were large parts that needed to be removed and connections that needed to be un done in such a way that when the generator was put back in everything would line up properly. Here is the generator after being pulled out of U.P. 942. The main generator is a D15 and is connected to a D16 companion alternator that makes 3 phase variable frequency, variable voltage for the cooling fans. They are tied together and weigh 11,000 lbs.

Here the generator is loaded onto a flatbed trailer and ready for the trip to Lyons, Kansas where it will be rebuilt. At this point the museum was not entirely sure of the extent of the damage and were hopeful that there wasn't enough wrong to prevent a successful rebuild.

Fortunately the generator did not provide any surprises and the rebuilder had the job done quickly. Here is the rebuilt generator waiting to be reinstalled.

As shown here the [illegible] while waiting for the generator.

The main generator is now being lifted back into U.P. 942.

Here you can see the limited workspace.

While the main generator was out a mechanical check revealed that the blowers that supply air to the prime movers were in poor shape. The museum had a spare set but they were not usable. Fortunately the museum has a volunteer who was able to arrange to exchange the blowers on hand for a rebuilt set in excellent condition.

locomotive.

Here Frank Kunsaitis and Dwayne Dame inspect the blowers that were on hand at OERM.

After the main generator and blowers were put back in and U.P. 942 was test run she was put back into car barn 7. The clock was still ticking with plenty of work left to be done.
Here were some of the challenges faced by the OERM diesel service crew……


942


942

Time had not been kind to our graceful lady but thanks to the dedicated volunteers at Orange Empire Railway Museum U.P. 942 was now headed to a much brighter future. The group pictured here (left to right Frank Kunsaitis, John Bateson, Wayne Barnhart and George Hays) put in countless hours on the project along with many others without whom this restoration would never have been possible.

In the many years that have passed since U.P. 942 left the EMD plant in LaGrange, IL the elements have left their mark in the form of rust in every conceivable area, visible and not. In many places the rust expanded and caused metal parts to bow and become distorted. Here is a step that clearly illustrates this problem.

One of the more interesting discoveries came about when the rusted metal on the right side of the locomotive under the cab was removed. When the old metal was cut away we found a large amount of rocks and dirt just inside in an area that would not have normally been accessed. At first we could see no explanation for this, but as it was discussed the only thing we could come up with was that at some point in time U.P. 942 suffered some sort of accident. Should this have occurred the side of the locomotive could have been opened up allowing the rocks and dirt inside then for what ever reason repaired without removing the debris. Later we also found that the number board on that side had been damaged then hastily repaired, which added to our suspicions. If is this the case we were not able to find out any information that would verify our theory. So, without any proof as to what really happened the bent number board plus rocks and dirt found inside the locomotive will remain a mystery.

Here is what we found…….

Along the bottom of both sides of the locomotive there is a “rub rail” that acts as a trim and more importantly helps hold the bottom row of body panels in place.

When U.P. 942 came to OERM the rub rail on both sides showed obvious signs of fatigue and we knew that when we removed these pieces it wasn't going to be pretty. So, we were not surprised when we found this…..

Underneath the rub rail sections there is a channel attached to the frame, which has threaded inserts used to bolt the rub rails to the locomotive. What was left of this channel was so badly rusted that there was no way to reuse it. Air chisels and elbow grease were used to remove the old channel so that new ones could be installed.

Here Tim Johnson and John Bateson show how to remove rusted old channel.

In this picture the rub rail has been completely removed from the engineers side. Before the end of the day the rusted channel will be cleaned off.

Since the old channel was in such bad shape it wasn't too difficult to remove. The best way to get the rusted metal off was by using an air chisel so car barn 7 was a noisy place to be when this was going on.

Once the old channel was removed the frame could be cleaned up with a grinder and readied for the new channel to be welded on.

The new channel material did not have the threaded inserts so holes needed to be drilled and inserts welded in place.

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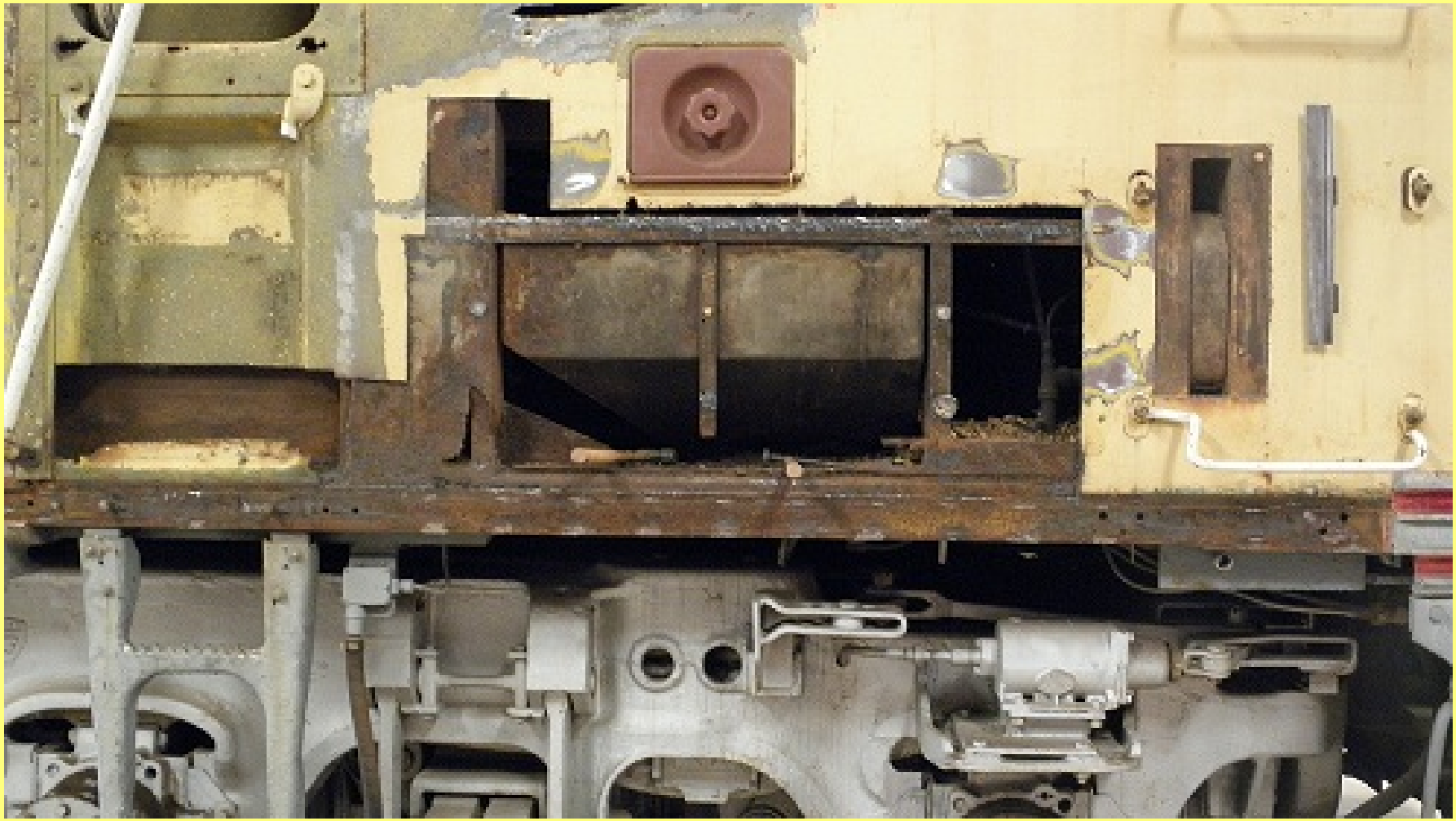
There were many other areas beside the rub rails where the carbody needed some pretty serious attention. The engineers side, under the cab, required quite a bit of reworking. Here is what U.P. 942 looked like after the bad spots had been cut out.



The nose of U.P. 942 was another place that needed to be addressed. At EMD the rounded areas were shaped with lead so the crack and rusted out area couldn’t be welded closed. Fortunately body fillers used today are very strong and the repair work done here will not suffer from age.

After all the bad metal had been cut out it was time to make U.P. 942 look like new again. The following pictures show the high quality of work being done on her……

Before repair


UP
UP

The repair on the nose and cab was quite an accomplishment .

Fireman's side classification light before.....

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Even with all of the work that had been done up to this point U.P. 942 still looked pretty rough, however the volunteers showed up every Saturday, rain or shine and work progressed. Locomotives like U.P. 942 are commonly known as “cab” units and have a very interesting type of construction. The main structure consists of steel frame work that is attached to the locomotive frame, then rectangular panels form the outer “skin”, which are held in place by horizontal and vertical straps as well as the rub rail. When we began the project we weren’t exactly sure about the condition of the body panels and were prepared to replace as many as necessary. When the sanding of the body panels was begun we were very happy to discover that all but a couple of panels were in very good condition. When the locomotive was in commuter service the original steam generator, which was used for heating the older style passenger cars was removed and replaced by a head end power (HEP) unit. HEP needed to be used since the commuter cars required a source of electricity for lighting, heat and air conditioning. Part of the conversion included adding louvers to the lower rear panels on both sides and since we wanted to bring the locomotive back to what she looked like while on the Union Pacific it was decided to replace those panels. Fortunately the bad body panels were also in the rear so the removal of straps and body panels was restricted to that part of U.P. 942.

With the body panels removed you can see the steel structure typical to this type of locomotive.

Shown here are the louvered panels installed while in commuter train service.

Here is the metal for the new body panels. Each piece weighed about 100 pounds and needed to be cut to the proper size.

Once the panels were the correct size strips of metal were welded along each edge. This was necessary to make them fit snugly against the framework.

The refurbished rub rail sections were now installed except where the new body panels were going. Those had to be left off until the panels were placed.

In a few cases there was old debris behind the new channel where the threaded inserts were located.

Here Joh

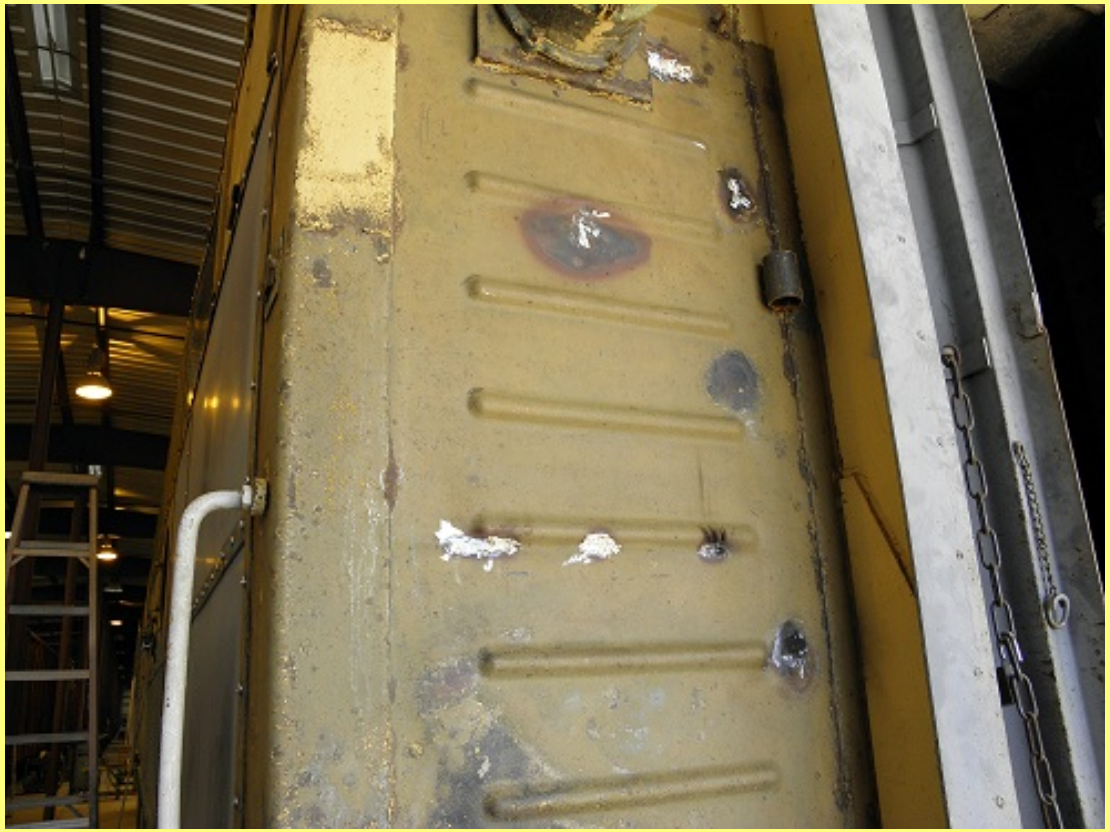
bolts

Next it was time for the new body panels. This was a pretty tricky procedure. The upper panels needed to go in first and in order place them they needed to be slipped underneath the upper strap. A few bolts were placed in the threaded inserts where the lower strap was going to go, which acted as a temporary support for the panels. Then the lower panels were put into place and the remaining rub rails installed. The panels weighed over 50 pounds each and were very awkward to position.

Once the new panels were in place they could be secured. The lower strap was now bolted on and the rub rail bolts tightened.

Originally the straps were held in place by bolts that went into threaded inserts, so at EMD it only required workers on the outside to install them. In many places these inserts on U.P. 942 were so rusted that they broke when we removed the bolts, so reinstalling the straps now required someone on the outside and the inside.

Another area that needed attention was the rear of the locomotive. The two main issues were the extremely poor condition of the rear door and removing the layers of old paint that had become chipped and cracked.



The ridges on the rear of U.P. 942 as well as the door frame made cleaning the metal a bit more difficult than on the sides and front of the locomotive.

Even though cleaning the old paint from the rear end of U.P. 942 was tedious it was a pretty straight forward task. The rear door was a different story, however. After inspecting its condition there was no way around the fact that it needed to be completely rebuilt. Fortunately one of the diesel service crew, Carl Pickus, is very a very skilled metal craftsman and was recruited for the complex job.

Here is Carl delivering the rebuilt door.

Carl Pickus and Frank Kunsaitis get ready to install the rebuilt door.

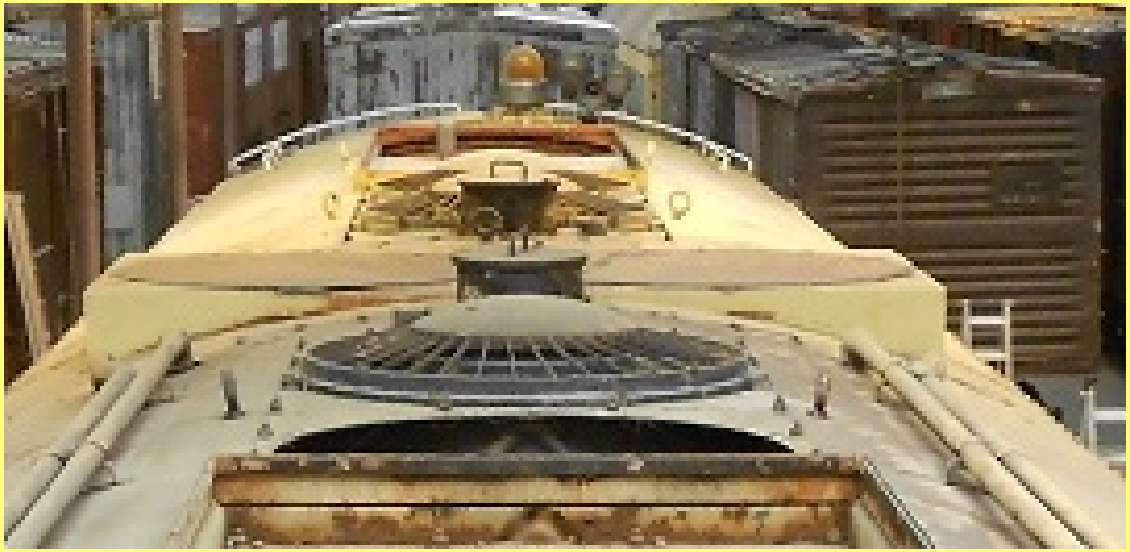
With the rear door taken care of and all of the metal clean it was time to start applying the primer.

After the locomotive was primered the diesel service crew affectionately nicknamed U.P. 942 “The Grey Ghost”.

The project was moving along nicely and was pretty much on schedule but before the paint could be applied there was one more obstacle to hurdle, the cooling fans and winterization hatches up on the roof. When the HEP was installed it was necessary to use additional cooling fans for that system, which resulted in some “add ons” for mounting these fans. Since the HEP had been removed before U.P. 942 came to OERM those fans were no longer needed and the decision to remove them permanently was an easy one to make. Unfortunately there was not enough time to cut away the mounting boxes, all we could do is weld plates to cover the holes and since this wouldn’t really affect the overall look of the locomotive it was something that we could live with. To check the four cooling fans U.P. 942 was started up and the relays that activate them were closed manually. All four turned out to be non operational, but since we weren’t sure whether the problem was with the fans themselves or the locomotives electrical system we decided that the best course of action would be to remove the fans and test them outside of U.P. 942. It turned out that the fans were indeed the problem and the search was on to find replacements. Fortunately they were not difficult to locate and were shipped promptly to the museum.

Here are the new fans waiting for installation.

Here is a look at the covers where the HEP fans were.



The winterization hatches on U.P. 942 were standard to all E8 locomotives and a very clever solution to all weather operation. The hatches covered the radiator cooling fans at the front and rear of the locomotive and at one end of each hatch there is an opening to outside air. Below this opening is a fan that moves the direction needed to push air out of the locomotive. The fan underneath the closed end of the hatch rotates in such a way that it pulls air downward. If the outside temperature is warm enough the fan underneath the opening is active and air is taken across the radiators and out of the locomotive in order to keep the engine cooling water temperature stable. If the outside air is too cold there is a door that blocks the opening and in this case the fan under the closed end of the hatch is active, takes the warm air from the engine compartment and recirculates it, which prevents the water in the radiators from freezing.

Here is one of the winterization hatches before being cleaned and readied for paint. This one has two openings, one of which will need to be covered before going up on U.P. 942.

Before the extra opening could be sealed up the winterization hatches needed a thorough cleaning..

Here the hatches have the one opening, as originally designed. Next step; primer, paint and installation.

Over the years things were added to the roof then removed and when taken off the remaining metal gave this part of the locomotive a “well worn” appearance. Part of preparing the top of U.P. 942 for paint included removing this left over evidence of what was once there. Here Tim Johnson smoothes out the roof the only way possible, with a heavy duty grinder.

The last thing needed before paint could be applied was to wash the trucks in order to remove any oil or grease. Unless we did this paint would not stick to the dirty areas and come off easily.

Finally the project reached a real turning point. The rear and top of the locomotive were ready for primer and when that was done the actual painting process could begin. In this picture the end and roof have been painted U.P. Harbor Mist Grey as well as the red stripes at the top and bottom of the carbody.

Now it was time for the U.P. yellow to be applied.

Now that we were this far along it was time to get U.P. 942 into operational condition. There were only a couple of things that needed to be done in order to accomplish this. One thing was to put in the new radiator cooling fans. After the fans were put into place U.P. 942 was started so that the fans could be tested. They all worked just fine.

In order to start the diesel engines large batteries are required. Originally these batteries were stored in the rear of the locomotive, in the same area as the steam generator. In this location they were difficult to service and replace but there was no other option when U.P. 942 was built. The large tank underneath the locomotive was actually three separate tanks. On either side were water tanks, used to supply the steam generator and the center tank is for fuel. When the steam generator was removed the water tanks were no longer needed and therefore converted into battery storage compartments. Even though this modification noticeably altered the appearance of the locomotive we did not have the time to run the battery cables back to the rear of U.P. 942 and do the metal work necessary to bring her back to the original look. Any one who is involved with diesel locomotive maintenance knows how hard the life of a locomotive battery is. We were not sure how long ago the batteries in U.P. 942 had been replaced, we just knew that they were now in very questionable condition. Through some inquiry it was found that the Union Pacific Railroad had a complete set of brand new batteries and were willing to donate them to OERM for placement into U.P. 942.

Here are the new batteries waiting for installation.

Taking the old batteries out and putting the new ones in required a forklift and lots of muscle.

The effort was well w diesel engines were started with the e to life quickly and easily.

After the new batteries were in place and we knew they worked well it was time for a test run.

Our ALCO S-4 was taken along in
couldn't move under it's own po

A unique feature to the paint scheme worn by the Union Pacific E units was the dark green applied to the top of the nose. Referred to as an anti-glare panel, the purpose of this was to eliminate any possible reflection of the sun caused by the bright yellow paint, which might interfere with the vision of the engineer and fireman. These pictures show how the masking process is done. The light green line is ¼" masking tape used to mark where the green paint will end.

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refe

Marking the outline of the anti glare panel was tricky. Due to the curve of the nose the tape line would look correct from one angle, then completely wrong from another. Once the outline was properly masked wider tape and masking paper were used to protect the rest of the nose from getting green paint splatter.

The green paint was applied with a regular paint brush so that sand could be added to provide an anti skid area, which will prevent a person who needs to be on the nose while cleaning windows, etc. from slipping on a glossy paint surface.

Here is U.P. 942’s green nose.

Now that U.P. 942 was painted the final step was lettering. This needed to be special ordered since the style was unique to the Union Pacific Railroad and the size had changed over the years. Even more challenging was going to be the emblem on the nose, which consisted of a pair of wings on either side and a Union Pacific herald in the center. What complicated this was the crew access door in the center of the nose. This meant that the emblem would need to be made up in three sections and they would all need to line up properly.

The first step in creating the emblem was to make a very accurate paper pattern and test fit it on U.P. 942. Since the company who was making the lettering and emblem needed plenty of time this was done before the locomotive had received primer.

Time was running out quickly, so as soon as U.P. 942 was completely painted the lettering crew went to work.

Pictured here (left to right) are John Smatlak, Scott Steidinger, Dick Harley, and Ryan Steidinger

No attention to detail was spared on this project, even the cloudy old plexiglass in the porthole windows found on the sides of the locomotive were replaced with actual safety glass.

April 28, 2012

The day we had worked for was here at last!!
Here are some comparison pictures to show what had been accomplished.


942


942


942
942

The day was beautiful, U.P. 942 and her train looked great!!!


942
UNION
COTTONWOOD


SP
3100
942

The main reason for the U.P. 942 project was so that we would have a vintage Union Pacific passenger train in time to host the Union Pacific Railroad Family Day, which also corresponds with the 150th. Anniversary of the railroad. The Union Pacific employees came out by the drove and seemed to be having a great time. The event was the perfect opportunity to showcase our beautiful E8, 942 and demonstrate what the Orange Empire Railway Museum and it's volunteers are capable of.

A very sincere thank you goes out to all of those who participated in the U.P. 942 project:

Jeff Jones, Dave Althaus , John Bateson, Tom Platten, George Hays, Frank Kunsaitis, Carl Pickus, Bob Bray, Tim Johnson, Greg Houle, Nick Houle, Mike Houle, Dave Garcia, Paul Krot, Phil Palmieri, Ray Ballash, Brian Voorhies, Wayne Barnhart, Dick Harley, John Smatlak, Ryan Steidinger, Scott Steidinger , Don Strack , Eric Levin, Brian McLaughlin, Matt Monson, Tom Moore, Fred Nicas, Ron Ruffulo, Randy Ruiz, Marty Bernard, Bart Verstegen, Phillip Verstegen, Ken Creasey, Mel Johnson

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