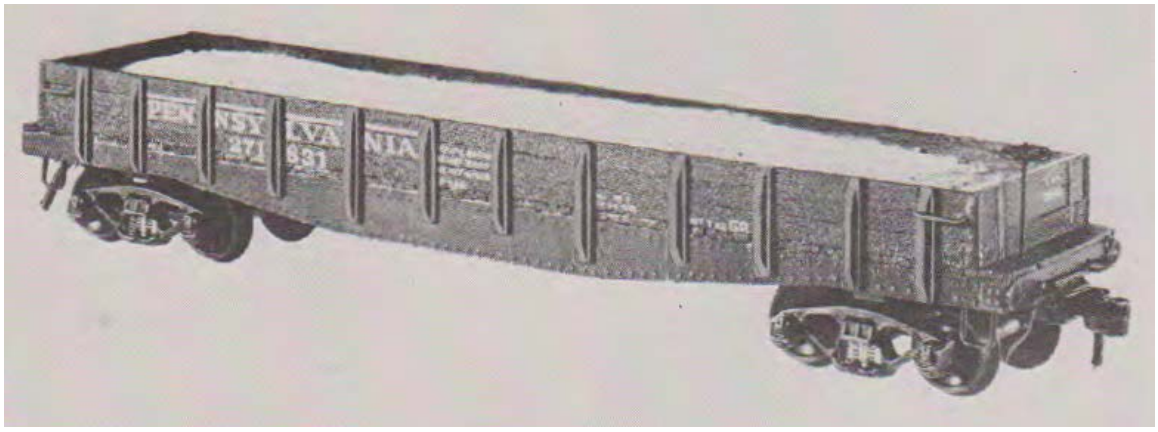
Car 4- HO scale Gondola Car



A picture of the Gondola Car being modeled. Photo by Model Railroader

During research on various types of railroad cars "Easy to Build Model Railroad Freight Cars" which was published by Kalmbach Publishing in 1973 was purchased. There were several projects in the book and an article by Eric Stevens on how to build a gondola car from scratch inspired the construction of the car constructed. I picked the gondola car as my fourth project and following the article's instructions the car was built in HO scale. Research on the Internet revealed that this car was a GR class gondola was one of 16,151 gondola cars built in the period of 1902-1907 for the Pennsylvania Railroad. It was retired from the PRR fleet in the 1930's. The car was 37 feet 6 inches long and was rated for 50 tons.

CAR COMPONENTS

Parts purchased

Coupling assembly- (parts purchased)

2- KD #5 couplers
2- KD #234 gear boxes
2- KD #634 centering springs
2- KD 256 Nylon insulated screws

Trucks-

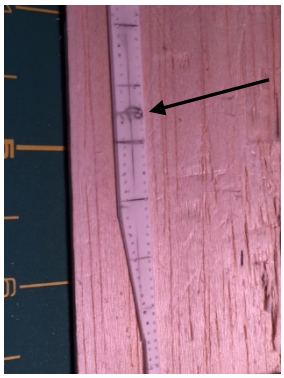
2-Walthers #920-2124 Pullman 8' wheel base 4 wheel trucks- Black

Supplies and scratch building materials

Badger Model X # 16-03 Grimy Black for weathering of wheel bearings.
Badger Model X # 16-172 Rust for weathering of the trucks, wheels, and other steel parts of the body.
Badger Model X #1650 Insignia Yellow for highlighting sets, stirrups, grab rails, and hand rails.
Badger Model X # 16-173 Mud for weathering of the car.
Evergreen #9015 .015 styrene plastic sheeting (used as framing material for the sides, ends, and other parts.
Kadee #438 Air hose and angle cocks (Only the angle cock was used from this package)
Kadee #442 Brake Pads

Evergreen #225 5/32” styrene plastic tube (used for poling pockets on ends of flat car)
Evergreen #275- 5/32” styrene plastic I beam (used for undercarriage support beams)
Evergreen #9040 - .040 plastic styrene sheet (used as subfloor for flooring)
Evergreen #297 – ¼” styrene plastic angle (used for corner protection of flat car)
Evergreen #8206 HO 2”x 6” styrene plastic (used for end reinforcements and straps on load)
Evergreen 3020- .020” styrene plastic sheet (used as spacing material for the coupling pockets)
Kadee #440 Ajax Brake wheel
A Line Products #29220, tie down chain-black- 27 links per inch
Tichy #3034 Split K brake set.
Precision Metals #497 (.039” diameter) metal music wire (air hoses and brake staff)
26 gauge metal music wire used for grab rails and steps.
Plasticstruct #90856 (.045” diameter) round rod styrene (used for luggage racks)
Evergreen # 253 square tube (used for construction of the boxes in the baggage compartment.
Evergreen #263 (.100”) channel (used for the cut lever brackets)
Plasticstruct #90563 3/32” T section material (used for stakes)
Microscale #87-1510 Early Pennsylvania RR Freight Car decals
Northwest Lumber HO 6”x10” wood

HOW THE CAR WAS CONSTRUCTED-



The project started with the fabrication of the car side rail frames. Evergreen #3020 styrene plastic was cut into two rectangular shapes of HO scale 40 feet’ by 2 feet. From this shape the two car side rails were marked up on them and cut using an exacto knife with a #11 blade to the size and shape needed. A centerline, shown with an arrow, was establish and marked on the side rail which provided a method of assuring the car components will be centered as car construction proceeds through the various steps.

On the prototype there were rivets which were used to connect the parts of the car together. For the model a pin vice with a #72 drill bit was used to create the appearance of rivets HO scale 3 inches from the side every HO scale 6 inches along the top and bottom edges of the side rails. The picture to the right shows the drilling of the rivets into one of the side rails. The holes for the rivets were not drilled through the entire thickness of the side rail, only deep enough to create the effect of the rivet existing. Approximately three turns of the pin vice for each hole was sufficient to produce the effect.

In this picture you can see the rivets along the top side of the side rail. For orientation, the side rail is upside down in this picture. After all of the rivet details were completed the pieces were set aside and fabrication of the car floor took place.

The floor assembly was made by using .020 and .040 Evergreen styrene plastic cut to the size of HO scale 39 feet long and 9 feet wide. The .020 plastic had grooves which were approximately HO scale 10 inches apart. The .020 and .040 styrene plastic pieces were glued together using a plastic solvent with the grooved side of the .020 material facing away from the .040 plastic. After allowing the plastic solvent to set, the four sides of the floor assembly were sanded to create a clean flat surface. Next, the fabricated side rails were attached to side of underside of the floor assembly using Gorilla Glue Gel adhesive. After the adhesive set up the end rails were made from .020 styrene plastic by cutting two pieces of the plastic HO scale 1 foot wide by approximately 9 feet long. The length was adjusted to allow a tight fit inside the two side rails. The end rails were then glued to the floor assembly and side rails using Gorilla Glue Gel. The assembly was then set aside to allow the adhesive to set up.

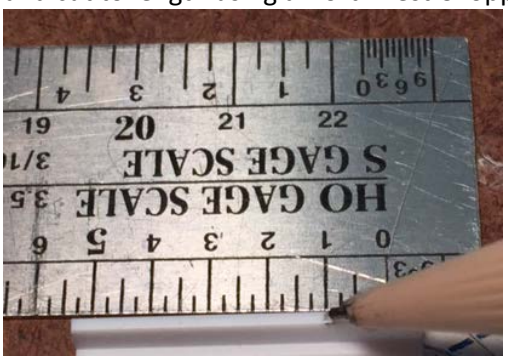
The picture below shows the floor assembly after the side and end rails and floor were attached to each other and sanding of any extra material.

Wooden flooring was attached to the top side of the floor assembly by cutting pieces of HO scale 2” x 8” basswood to a length of approximately 10 feet. The basswood was then attached to the floor assembly using Pliobond adhesive. The picture below shows the floor assembly after the basswood was applied.

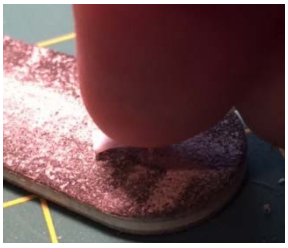
After the adhesive dried, the ends and sides of the floor assembly were sanded using a 100 grit sanding wand. The assembly was then set aside and fabrication of the side and end walls of the car was started.

It was determined that the side and end walls needed to be 57 inches tall using 19” wide pieces. Six pieces of .015” styrene plastic was cut to a dimension of HO scale 37 feet 8 inches long and 19 inches tall. Six additional pieces were cut to 10 feet long and 19 inches wide. The side and end wall pieces were then set aside and fabrication of the side stakes was started.

The side stakes for the car were of two lengths those being HO scale 6 feet 4 inches and 5 feet 8 inches and were fabricated from T section styrene plastic. The T section material was measured, and cut to length using a Northwest Chopper II. The book instructions indicated that the ends of the stakes had angled cuts. The upper end of the stake had a cut that started 22 inches from the end tapering to approximately 2 inches at the end. The lower end of the stake had a cut that started 11 inches from the end and tapered to approximately 2 inches at the end. The picture to the left shows one of the T sections being marked for the location of the lower tapered cut.



The angled cut was made with a pair of sprue cutters on the lines that were marked. The appropriate cuts were made to the top and bottom of each of the stakes after which the cut area and ends were sanded using a 100 grit sanding stick.



The picture to the left shows the sanding of one of the angled cuts.

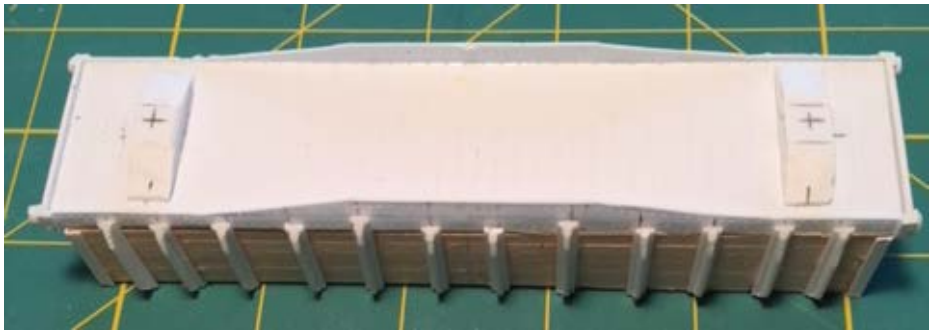
After completing the fabrication of the two types of stakes the stakes were then attached to the side walls. To accomplish this the side walls were placed into a homemade fabrication jig that had been made for a prior car project with the top of the side wall in contact with the jig. This was done to allow the stakes to be attached with the top end flush with the top side of the side wall. Also the locations of where the stakes were to be attached were drawn on the side wall to allow the stake to be place in the proper position. The center line of the side determined and marked on the jig. There are two long and ten short stakes on each side wall. The book instruction provided the proper location of where and the type of the side stakes to be mounted on the side walls. Based on distance from the center line, the first stake was located at a distance of HO scale 19 inches and was a short stake. Proceeding toward the end of the car, the next stake was a long stake located at a distance of HO scale 3 feet 2 inches from the first. The remaining stakes were short stakes at HO scaled distances of 3 feet 4 inches, 3 feet 2 inches, 3 feet 2 inches, and 30 inches from each other in that order. The appropriate stakes were attached to each side wall using Gorilla Glue Gel adhesive applied with a tooth pick. Care was taken to make sure that the top of each stake was flush with the top of the side wall.

The side walls were set aside to allow the adhesive to cure for approximately 24 hours. They were then dry fitted to the floor assembly to determine what, if any, adjustments would need to be made to them to allow a tight fit between the two assemblies. After the dry fitting the side walls, the end walls were cut to length to allow the end walls to fit inside the side walls. The picture below shows the floor assembly and the side during the fitting process. The side and end walls were glued to the floor assembly and to each other using Gorilla Glue Gel and set aside to allow the adhesive to cure and dry. (Approximately 24 hours)

Poling pockets were then added to each end of the car body using tubular styrene plastic material. The tube was cut with a Northwestern Chopper II at an HO scaled length of approximately 3 inches to create the pocket. The material was then attached to each side of each end of the car in the appropriate position. Angular reinforcement of the corners of the side/end walls and the floor assembly was also added using an angle shaped styrene plastic material. Lengths were made for each location, cutting them to appropriate length, minor sanding, and then glued in place using Gorilla Glue Gel. The picture to the left shows one end of the car after the poling pockets and corner reinforcements were added.

Car fabrication now moved to the undercarriage of the car where truck bolsters for the trucks and coupling boxes would need to be mounted. The truck bolsters were made from .020 and .040 styrene plastic. Two pieces of .040 and one piece of .020 were cut to HO scaled 7 feet 4 inches in length and 22 inches in width. These pieces were then laminated together to make a block 14 inches thick that the truck bolster would be created from. An HO scaled 22 inch area

centered on the length of the block was marked and lines were drawn from this edge of the block to the ends creating a taper from HO scaled 14 inches to approximately 4 inches. The extra material was cut away and sanded to create the tapered truck bolsters. After making two of these they were mounted on the undercarriage an HO scaled 30 feet from each other centered to the length and width of the car body. This means that each truck bolster was 15 feet from the centerline of the length of the car. The picture below shows the truck bolsters mounted and the marked center of each screw hole that would be drilled and tapped for a 2-56 nylon screw to mount the trucks.

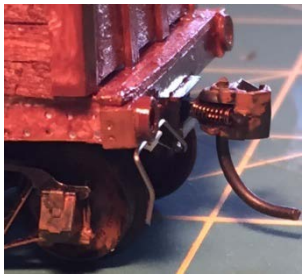


The next step was to mount the coupling draft boxes, one on each end of the car. The coupling box had to be centered to the car and set to the proper height. This created a need to remove a small amount of plastic material on each end of the car to assure the couplings would not have interference to operation from the car body and allow a small shim of .020 styrene plastic to be mounted between the car body and the coupling box. This shim was necessary to set the coupling at the proper NMRA standard height above the track level. For the coupling box to be assembled with the coupler and centering spring in it, a hole had to be drilled and tapped to allow a 2-56 nylon screw to be attached through the coupling box into the car body. All parts were glued in place using Gorilla Glue Gel. The picture below shows the underside of the car body with the coupling boxes attached.

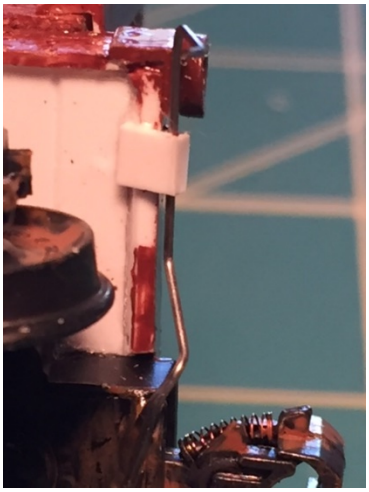
HO scale 2” x 6” styrene plastic was added to the end walls as reinforcement by cutting it to HO scale 58” in length. The reinforcement members were spaced so that they were at 1/3 the car width from each side and glued to the end wall using Gorilla Glue Gel. After a light sanding and cleaning of the car body the car was painted using Boxcar red paint. This is the color that the Pennsylvania Railroad used at the time this car was on the rail. A decision to use a small paint brush instead of an airbrush was made due to a concern about good paint coverage. The above picture shows the car body after the first coat of paint was

applied. The first coat went on well however an additional coat of paint would be needed to provide adequate coverage. After the paint dried, attention to adding details to the car began starting with the addition of cut levers to each end of the car. The picture in the article did not provide a clear view of what the cut levers looked like. Much research was done on the internet and several styles of cut levers were found. On one picture of a prototype of the car being modeled an indication of what the cut lever arrangement should be was provided. The photos below show the picture from the Internet as well as what was fabricated and put on the modeled car. You can also note that by this time the trucks had been mounted on the car.

Picture from the Internet of a cut lever.



Fabricated cut lever handle



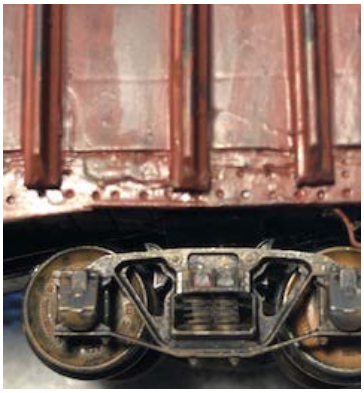
Fabricated lever from below

The cut lever assembly shown in the photo above started with a piece of channel shaped styrene plastic, approximately HO scale 8 inches long, was glued to the car body to make the bracket to support the cut lever. To fabricate the cut lever a pair of needle nose pliers was used to bend a length of piano wire to 90 degrees and the two additional bends to make the cut lever handle. An additional 30 degree bend was made at a distance of HO scale 2 feet from the handle and after dry fitting the lever in place the wire was cut to the appropriate length to make the wire end under the coupling box. An additional 30 degree bend as made at the appropriate location to make the cut lever stay level to the car body. After the cut lever was fabricated it was glued in place using Gorilla Glue Gel at the support bracket and end at the coupling box. The wire was painted flat black and the cut lever handle was painted yellow.

Air cocks were then added to the each end of the floor assembly just to the right of the coupling box. A hole was drilled into the air cock where the air hose mounts to it to accommodate the air hoses fabricated. It was found that the air hoses that come with this package were subject to bending and breaking. Air hoses were then fabricated from .093” music wire bend to the necessary shape using needle nose pliers. The air hoses were painted flat black.

The grab rails and steps were then fabricated using music wire cut to a length of 32 and 48 inches respectively. They were bent to create a 16 inch long flat surface a 90 degree bend which was made using needle nose pliers. #72 holes were drilled into the car body at appropriate locations to permit mounting of the grab rails and steps. The photo to the left shows the fabrication of one of the grab rails.

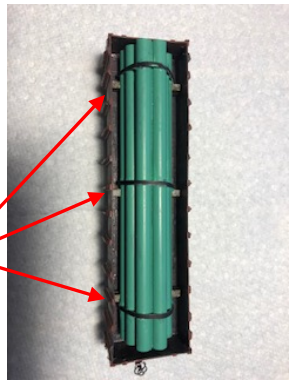
The braking system was added using a Split K brake arrangement with a manual brake wheel and chain. Kadee #442 brake pads were also added to both trucks.



Decals were also added by placing individual letters in place for the road name “Pennsylvania”, car number “271831”, and weight capacities.

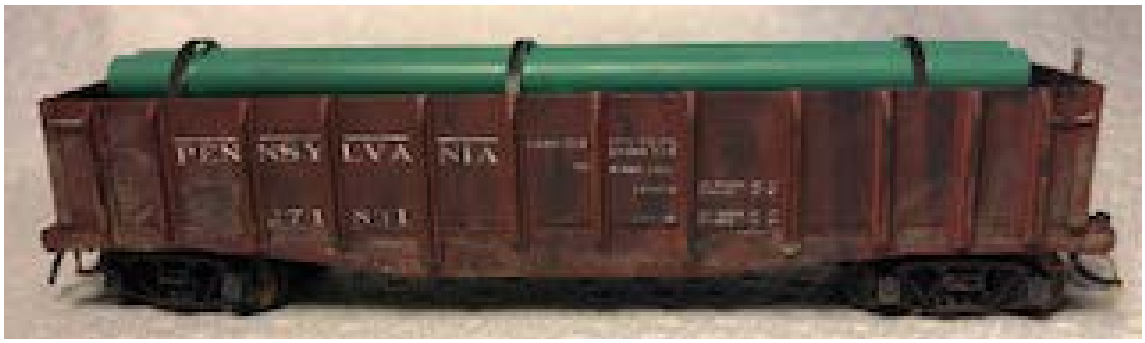
A load for the gondola consisting of pipe was made from ¼” tubular styrene plastic cut to length to allow it to fit into the car. The individuals tubes were glued together to make the final load. It was painted a light green color and then had HO scale 2” x 6” styrene plastic added as bands to hold the load together. Load supports were also installed secure the load in place.

The load can be removed from the car to allow the car to be empty or loaded.



The last step of building the car was weather the car and trucks, and apply a coat of dull coat to all surfaces. The picture below shows the finished car with the pipe load.

The finished model.



Below is a copy of the picture found in the Kalmbach book for the modeled gondola car.