Santa Fe's first air-conditioned car was diner 1418 built by Pullman in 1930. Due to its success, Santa Fe began a program of air conditioning its cars beginning with diners and lounges until much of its fleet was so equipped.

A variety of air conditioning systems were used by American railroads, and Santa Fe settled on steam ejector air conditioning for the majority of its cars. As a result, the roofs have some unique hatches (often erroneously called "ice hatches"). The system has also been erroneously called "steam injector." There are six very visible items which air-conditioned heavyweights should have:

1. **A/C ducts**: these were added to one or both sides of the clerestory to allow air movement from the cooling unit to ducts throughout the car. The placement and length depend on the specific car configuration.

2. **Refrigeration Unit roof hatch** (larger): usually placed at one end of the car with the shutters on the air duct side (see air duct below).

3. **A/C Unit roof hatch** (smaller): Either in the center of the roof or on the same end as the refrigeration unit.
4. **Air vent**: protrudes from the side of the clerestory beside the a/c unit roof hatch and opposite the a/c duct.
Steam Ejector Air Conditioning
Compiled by Steve Sandifer

5. Condenser Water Pump and Valve Box.

Condenser water pump and valve box on 1363, Age of Steam, Dallas, Sandifer photo

Condenser water pump 3010, Orange Empire, Perris, CA, Sandifer photo

6. Valve Closet

Valve closet, 1509, San Diego RR Museum, and 1363, Age of Steam, Dallas, Sandifer photo.
7. Generators: These could have been body mounted or truck mounted, depending on the car. Air-conditioned cars also had two generators, one on each truck, to power the units. Non-air-conditioned cars had one generator.

Jay H. Miller had a good article in the 1st Quarter 1987 Santa Fe Modeler on SE Air Conditioning. His article includes photos of two cars at the Age of Steam in Dallas.

The problem for the modeler (and the manufacturer) is that there was no single standard for the visible equipment. For instance, Mr. Pullman, Tom Madden, writes (1-16-2008):

1. For heavyweights, there are roof-mounted SE systems that were applied to Pullmans, and roof mounted SE systems that were applied to Santa Fe-owned cars. Even though almost all such installations were done at the Santa Fe's Topeka shops, and the Santa Fe ordered all the supplies and equipment, the visual things we model (roof hatches and underneath equipment boxes) were considerably different between the two types.

2. The Santa Fe sent a full set of drawings of Pullman-style SE equipment to Pullman. Most of these are at the Newberry Library, and have formed the basis for my research. No equivalent set of drawings for Santa Fe-style equipment has surfaced so far. So, we can model Pullman-style SE equipment accurately, but for Santa Fe equipment we are dependent on those dare devils like John Fiscella who have spent time up on the roofs taking photos and measurements. And believe me, when your feet are 14' off the ground, and you're standing on a curved surface only 6' wide, with no handholds above your ankles, things can be precarious!

3. Several years ago, New England Rail Service obtained permission from The Coach Yard to duplicate the CY SE roof hatches in resin and offer them for sale. This was based on castings I made of those hatches in a very tough, very hard, yet slightly flexible urethane resin. This was the perfect material for the hatches – the clamp handles would flex but never break and never lose their shape – but I withdrew for several reasons. First, I could never find a set of two CY or PRB hatch castings that were perfect. I tried six or eight sets, and every casting had one or more
missing or seriously misshapen clamp handles. Fine for the individual modeler equipping a few cars; not fine for a manufacturer to market them by the dozens, all with the same flaws. Second, doing the casting was extremely labor intensive. The resin is very viscous, the molds had to be filled in vacuum, and the demold time was 12 hours, with the last six hours requiring oven baking at 150 degrees F. All very doable for small quantities, but… Third, once I found the Newberry drawings and the Santa Fe car at Calistoga and realized the CY hatches were completely wrong for Pullmans - and my interests were specifically Pullman - it seemed pointless to put any more effort into those hatches. So, I killed that project, with apologies to Don Valentine.

4. Branchline Trains always intended to offer SE equipment for their Santa Fe cars, and it's a source of great frustration to both Bill Schneider and to me that it hasn't happened. Whether it will or not is still up in the air. The parts have long since been designed, but the toolmaker who is most qualified to do the job (the one who has done all Branchline's passenger cars) is now far too expensive. Branchline's ownership also changed with the death of owner Howard Chaet. Now his daughter and son-in-law are in charge. Many of you will remember the 19-month delay in the introduction of Branchline's passenger cars. The dispute that caused that delay was resolved literally at the last possible minute, but the 19-month interruption in potential sales wasn't good for anyone. Certainly not for Branchline, and I can understand their decision (for now) to put their money into their very successful RTR passenger and freight car program (which requires no new tooling) rather than into some more very expensive tooling. As I said, I understand that decision for now…. (Side note: Branchline does indeed list SE equipment as being available. This is the underbody unit as used by the Milwaukee Road, and is supplied with every Branchline MILW Pullman.)

5. There is a tremendous amount of variety in both hatch covers and underneath equipment boxes. Most of the installations took place in 1934, 1935 and 1936. Equipment design changed every year. Fortunately, all the Branchline Pullmans that received roof mounted SE systems (8-1-2, 12-1, 10-1-2, 14 Sec) were equipped in 1935 and received identical systems. The Walthers 6-3 was A/C'ed in 1934, so its SE system was different. Also, the Branchline prototypes had ducts on both sides, so their air conditioner units were mounted to blow air along the length of the cars, with "Y"-shaped plenums diverting the air flow to the two sides. The Walthers 6-3 is an all-room car with the duct on only one side. Its AC unit was mounted crosswise in the middle of the car, to blow air toward the car side. Its air conditioner hatch cover is completely different from the Branchline ones.

6. Now for some better news. I have been working, off and on, on patterns for all the variations of Pullman SE hatch covers. What got me off dead center was Walthers' release of their HW Santa Fe coaches with the clamp handles to be added by the modeler. That means the hatch covers can be cast in conventional resin, and I forthwith designed all of them in 3D CAD. A pattern plate containing parts for three of the four needed air conditioner hatch covers was made using stereolithography, a mold was made from that, and this shows a couple of the resulting castings.
All three hatches are the same width, but they are different lengths. With six of these films I can create masters for casting all three hatches. And a view of my cluttered cast part staging area containing all sorts of HW parts.

Another pattern plate containing the fourth A/C hatch cover and all three cooling tower hatch covers is designed and ready for stereolithography.

7. Now for the reality. Those who know me, know that my record for completing projects isn't particularly good. I'm too easily diverted by other interesting challenges. Also, as castings I can visualize doing a few hundred hatch cover sets, maybe even into the (very) low thousands. But not by the multi-thousands... I'll certainly go ahead with all the hatch cover castings, but what's really needed is for a manufacturer to step up and sponsor hard tooling. If not Branchline, I can provide the designs in 3D CAD - for the underneath equipment as well as the hatch covers.

As Madden points out, Santa Fe had their own currently undocumented designs in addition to Pullman's three different hatch covers for the steam ejector unit ("cooling tower") and five different ones for the A/C unit, one of which was used on only three cars.
For the HO modeler, there are two commercial options if you can find them. The Coach Yard originally produced a complete set in brass which includes 5 of the 6 items above (minus the A/C ducts), and two truck mounted generators. It sold for $28, but eventually sold old. Bob Darwin made the patterns for those, from prototype hatches on a Santa Fe Smoker Chair 3109 (renumbered 3136) now used as part of a commercial display of 6 cars at the depot in Calistoga, CA. This car was built in 1929 and air conditioned in 1937. Today it has been altered to appear as a Southern Pacific observation, but that conversion was done for display purposes at Calistoga.

If you have a set, the underbody parts can be easily reproduced in resin.

Pecos River Brass got the hatch drawings from Fred Hill, co-owner of The Coach Yard, and these roof hatches were virtually identical and available until 2007. There may be some around.

The CY/PRB hatches do not represent anything produced by Pullman. They must be a Santa Fe design. They are 6'10" long X 5'3" wide and 4'5" long X 4'7" wide. We assume that they were only used on three cars, Santa Fe Smoker Chair 3134, 3135, and 3136. CY/PRB used these on all Hwt models assuming that they were correct for all, a false assumption.
In 2007 Walthers released a 3060 class ATSF coach with SEAC. The roof hatches for that are presumably based on the prototype car photographed and measured at a mid-west museum. I have been unable to verify the exact prototype. Those hatches are held in place by two small pins and are easily removed. They came without the hatch dogs applied, so the modeler must drill 72 (!) holes to attach the dogs. These hatches are 6'11" long X 5'11" wide and 5'11" X 5'11." It would be a simple task to resin cast additional hatches from these. Casting the handles as on the CY/PRB parts is beyond the capacity of most people.

The Refrigeration Hatch has shutters which normally are on the duct side of the car. The Walther's car has this reversed. It is an easy job to pop the hatch off and turn it around.
Madden's research into the Pullman cooling tower hatches includes two designs that are 5'4-5/8" wide and 6'5-7/8" long. The five air conditioning hatches included three that are 4'8-1/8" wide and two smaller versions. The length was 5'5-1/8", 5' 1/2", and 4'5-7/8" plus the two smaller versions.

The underbody equipment also varied in design and placement.

What this research shows is that you need photos and specific prototype information to create an accurate model.

Tom Casey describes now to scratch build SEAC parts for a heavyweight diner (separate item on this website).

Detail photos from several preserved cars and some publications appear on the following pages.
Steam Ejector Air Conditioning
Compiled by Steve Sandifer

Plans for adding a truck-mounted generator to Walther's Trucks, by John M. Fiscella.

ATSF Moskowitz-Type Truck-Mounted Generator, HO-scale

For use on Walther's 6-wheel trucks
by John M. Fiscella

Assembly Diagram
(not to scale)
Steam Ejector Air Conditioning
Compiled by Steve Sandifer
Underbody details
Coach 3010
Orange Empire Railroad Museum, Perris, CA
Photos by Matt Zebrowski

↑ Left to right: Valve Closet, Condenser Water pump & valve

↑ Truck generator, just to the left of the Valve closet
Steam Ejector Air Conditioning
Compiled by Steve Sandifer

↑ Valve closet from left truck.

↑ Valve closet
Condenser and water pump from in front of battery boxes.
Steam Ejector Air Conditioning
Compiled by Steve Sandifer

Underbody details

Lwt. Chair Observation 3197

Age of Steam Museum, Dallas, TX

Photos by Steve Sandifer

Numbers are measurement in inches
Underbody details

Dormitory Lounge Barber Shop 1363

Age of Steam Museum, Dallas, TX

Photos by Steve Sandifer

Items below are arranged from left to right as they appear. Numbers are measurements in inches.

End view, condenser and pumps
Steam Ejector Air Conditioning
Compiled by Steve Sandifer

Condenser and pumps

Condenser and pumps  Valve closet
Steam Ejector Air Conditioning
Compiled by Steve Sandifer

Valve Closet

Side view, valve closet

The Santa Fe Railway Historical and Modeling Society
Santa Fe 3109 was built in 1929 as 70' Chair Smoker. It was air conditioned in 1937 and renumbered as 3136. In 1967 it was converted to company service as 198665, then to Recreation car 196807. Calistoga Depot Associates purchased the car in 1985 to be part of a railroad theme commercial shopping area. The vestibule was remodeled to the appearance of an observation car and it is in Southern Pacific Paint. This car was the prototype used by Coach Yard and Pecos River Brass for their roof hatches. We thank Robert Johnson of Calistoga for photographing the car for us.
Steam Ejector Air Conditioning
Compiled by Steve Sandifer

A/C Hatch
Steam Ejector Air Conditioning
Compiled by Steve Sandifer

A/C Hatch
Mr. Johnson also provided drawings with measurements:

**Front Hatches**
Dimensions in inches
Steam Ejector Air Conditioning
Compiled by Steve Sandifer

Rear Hatches
Dimensions in inches
Steam Ejector Air Conditioning
Compiled by Steve Sandifer
Steam Ejector Air Conditioning
Business Car 22 – Galveston, TX

A/C Unit hatch and detail. Sandifer Photos.
Baggage-lounge-dormitory 1303, Alan Miller, Matt Herson Collection, from Stagner, ATSF Color Guide, p. 27.

Café Observation 1513, by Neal Miller, in Stagner, SF In Color, vol. 2, p. 101
Steam Ejector Air Conditioning
Compiled by Steve Sandifer

Gordon Bassett collection, from Santa Fe's Raton Pass, Jared Harper, p. 56

Steam Ejector Air Conditioning
Compiled by Steve Sandifer

Lounge-dormitory 1527, Alan Miller Photo, Matt Herson collection, from Stagner, ATSF Color Guide,

Lounge 1536 photo by W. C. Whittaker, from SF Painting and Lettering Guide, p. 14
Steam Ejector Air Conditioning
Compiled by Steve Sandifer

Bar Lounge Dorm 1360 by Robert Loeweng, Dennis Kogan Collection, from SF Painting and Lettering Guide, p. 14
Steam Ejector Air Conditioning
Compiled by Steve Sandifer

Photo of Café observation 1509 by Eugene Anderson,
from Frailey’s Quarter Century of SF Consists, p. 31