THRALL 5-UNIT ARTICULATED WELL CAR

DIY MODELS

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Trailer-On-Flat-Car (TOFC) and Container-On-Flat-Car (COFC) have become a large business for the transportation industry. Shipping lines and truckers as well as the railroads have worked to make this an effective way to handle and transport goods. Containers especially lend themselves to intermodal transport since they are rectangular, have no wheels or other external components; therefore they can be stacked in multiple layers aboard ship. Railroads adapted 89-foot flatcars to carry this cargo inland from ports. This is often done with the "unit train" concept direct from point A to point B with a minimum of yard switching.

In search of greater efficiency, shippers and railroads worked together to find a better method. Southern Pacific designed and American Car and Foundry (ACF) built a group of 5-unit cars articulated to become one car as the railroads look at it. These cars are capable of carrying 35 or 40foot containers in a stack of two per unit, hence the trade name "Double Stack". These cars have an empty weight of about 40,000 lbs. per platform.

Since APL was seeking to maximize the efficiency of container carrying railcars, they pursued methods of weight reduction. It was apparent that if they eliminated the bulkheads of the ACF car, a significant weight reduction would be obtained. The only purpose of the bulkheads on the ACF cars was to keep the upper container on the car. Through the use of a prototype car designed and built by the Budd Co. (Lo-Pac 2000) to be used as TOFC and COFC both, APL was able to test the practicality of stacking containers two high by using inter-box connectors which are similar to the ones in use for stacking containers above deck aboard ship. Once this method was determined to be successful, APL in conjunction with Budd and the Thrall Car Co. designed a lightweight well-type railcar, which has become the APL Liner Train of today. The end platforms are capable of carrying two 20 foot containers in the well with a 40 or 45 foot container on top. The intermediate platforms are built to accommodate only a 40 foot container in the well with either a 40 or 45 foot container on top. These cars have an empty weight of about 31,000 lbs. per platform.

Initially, 3 trains were obtained with 2 of them operating from Los Angeles to Chicago via UP and CNW and the other from Seattle to the East Coast via Conrail east of Chicago. . Other trains have since been obtained and are running from Los Angeles through Houston and New Orleans via SP and on to Atlanta via the Southern Railway. Trailer Train Corporation has recently acquired Thrall units and will run from the Northwest toward the East.

Another modification to the Thrall unit is to add a diesel engine, generator and fuel tank to one of the end units with electrical connections to the other units to provide power for refrigerated containers. These units are painted red as compared to blue for the standard units. All have white lettering.

Each unit of a car carries the same road number with a letter suffix (A through E). The relationship of the units is B-C-D-E-A so the railroad practice of an A and B end is maintained. Units A and B have conventional couplers and units A,B and D have air brake equipment. On the reefer units, the power equipment is on the A unit.

GENERAL CONSTRUCTION NOTES

Construct the two end units, A and B, which is the minimum possible configuration. You may also construct any inner unit(C,D or E). In the instructions, which follow, references will be made to "end" units and "inner" units as there are some slight differences in detailing. The Bill of Material list the sizing of most pieces are easily cut with a chopper or with a hobby knife. Slight trimming may be necessary to insure a close neat fit with a file or sandpaper. Since there are many small parts, fit the parts before cementing. Study all drawings and written instructions carefully before you start construction so you have a good overall idea of the car and its construction.

Liquid plastic cement is strongly recommended; do not use the tube type plastic cement as it does not dry rapidly and could also spoil some areas of fine detail. Some type of "super glue" is also suggested to bond metal parts to the styrene. Observe all caution notices on any type of cement or solvent.

A good work surface for working with styrene is Formica, wood, or glass since the solvent does not affect those surfaces directly. A straight edge fastened to the work surface is handy in "squaring" joints such as fastening the side panels to the bottom frame assembly.

CONSTRUCTION

- 1. Assemble the bottom frame from two pieces of (A) and two cross pieces (B) using the plan view on Dwg. 1 fig A. Next, insert the other crosspieces as per the plan. When this assembly is thoroughly dry, sand all surfaces lightly.
- 2. Attach side panels(D) to the side sills (C) for end units or (L) for inner units). The narrower edge of the side sill should attach to the edge of the side panel as in Dwg. 1 fig D. The lengthwise positioning of the sill to the panel is shown in Dwg.. 1 fig C. When dry sand surfaces lightly.
- 3. Fasten the side panel assemblies to the outer edges of the bottom frame. Make sure the ends of the side panels are flush with the ends of the bottom frame. Insert the box ends (G) between the side panels so they sit on .top. of the bottom frame and form a flush fit with the ends of the side panels. Trim to fit as necessary. Attach the two bottom plates (J) as per Dwg.. 1 fig 13. A semi-exploded view of the basic car body is shown in Dwg. 2 fig A.
- 4. Insert the end platforms (E) for a short end or (F) for long end) between the protruding side sills so the top of the platform is flush with the tops of the side sills and butting up against the previously installed box ends. When thoroughly dry, trim or sand the tops of the box ends flush with the platform tops. Then sand or trim the ends of the side sills and platforms to the same length.
- 5. Create the male and female link components from .080" x .250" strips per the layout drawing. Cut the pieces to length and drill a hole in the male end for tapping for a 2-56 screw. Drill a clearance hole for a 2-56 screw in the female link. Each male link will have a truck attached with a long 2-56 screw provided with the screw protruding through the link so the opening in the female link will fit over it to act as the articulation joint.
- 6. Build up a bolster and draft gear support from .080" x .250" styrene. Attach coupler pockets to each long casting so the hole in the pocket lines up with the hole near the end of the casting. Kadee #5 couplers so the "ears" of the pocket must first be trimmed off. Sand the back of the pocket smooth and glue. Next sand the bottom of the black plastic bolster and fasten it to the cylinder on the long casting with super glue.

7. Laminate end strips (I) across each long end so the end of the deck and the ends of the side sills are covered. You will have to notch these strips accordingly so the top of , the strip is flush with

the top of the platform. Do the same on all short ends using (I) strips. The ends are now neatly finished.

8. The vertical braces on each side panel are strips (K) and should be attached with care. The positioning of these 'is critical so that custom decals will fit between them properly. This positioning is shown in Dwg. 1 fig C. Now, taper these braces down from the edge of the side sill to the bottom of the side panel where they should be down to 1/32 thick. See Dwg. 1 fig D. This can be done with a flush cutter, file or sanding block but be careful not to mar any other surfaces. Lastly trim and sand the bottom of these braces so they are flush with the bottom frame of the car. This finishes the basic car body. Further detailing instructions are next and this will give the car much of its unique appearance.

DETAILING

- Detailing consists of adding steps, grabirons, and walkways and brake gear. Tools needed are drill bits (#53,76 and 78) to be used in pin vise or variable speed motor tool, pliers, screwdriver and wire cutters. All drilling should be done at this time before adding small bits of styrene details. Dwg. 2 fig A, Dwg. 3 fig B and Dwg. 4 contain information about the holes to be drilled.
 - 2. When drilling is complete, attach grabirons and stirrup steps and fasten with super glue if desired.
 - 3. Attach the walkway risers to the tops of the platforms as shown in Dwg. 4. The drawing is to scale attach risers carefully, as the walkway will be cut to fit the locations of the risers. If this an A, B or D unit, attach air tank stands. When dry attach air tank, air valve but NOT brake wheel and stand. Use .015 wire to simulate air brake piping. See reference A in the photo for details.
- 4. For the "B" end unit only: Fabricate the brake chain hangers from .015 brass wire as shown in Dwg. 3 fig B. Construct the two brake chain pulley brackets from .125 x .015 and .040 x .030 stock provided. Shape the three pulleys from the 3/32 x .040 stock or. See Dwg. 3 fig A for details. Insert the wire hangers at this time.
- 5. Before fastening the above constructed brackets to the underside of the sill, drill two holes with #78 bit through the side sill from top to bottom as shown in Dwg. 3 fig C. Now attach the two brackets as shown and attach the third pulley to the side of the car body, and finish with the cover plate. Cut the piece of .008 brass wire in half and form the smallest possible hook in one end of each. Thread one of these hooks through the end link of the chain provided and then insert the straight end of the wire through the #78 hole nearest the car end. Pull through all the way and bend over sharply on top of the side sill. Fix in

place with a spot of super glue, being careful not to let any drip onto the chain as it will become rigid immediately. When

dry snip off the excess wire from the top of the sill.

6. Thread the chain through the pulley system in the manner shown in Dwg. 3 fig C. Finally using the second .008 wire hook, run it through an appropriate link in the chain and insert in the other #78 hole and finish it as described above.

7. The walkway material should now be prepared. Now refer to Dwg. 4 and the photo. Note that all walkways do not span the complete width of the car body. Dwg. 5 also shows more detail about the walkways. The lateral walkways nearest the ends of all units should be in line with the grabirons. On long ends of units A and B, walkways should stop 1/16" from each side. This leaves room to attach the upright grabs. On all other walkway locations, there will be an equipment box on the left side of one end and the right side of the other end. It is suggested that these equipment boxes be constructed before attaching the walkways. Use the small pieces (.250 x .125 x .015) for inner and outer edges and (.125 x .125 x .015) for the narrow ends of these boxes. The inner edge should attach directly to the walkway riser. The opposite end of these

walkways should also stop 1/16" from the edge as above.

- 8. Small triangular pieces of styrene are used and cut into 1/16" long pcs. and used as load guides. All units have load guides on each side sill at the ends of the box opening. Units A and B also have these at the center of each side but before these are attached, the sill stiffeners should be applied. See Dwg. 1 fig B and C.
- 9. Cut the ladder stock as shown in Dwg. 4 fig B and D, sand the bottom edge flat and cement in place. A strip of .100 x .020 is cut into ¼" pcs and a #53 hole drilled nearest one end of each. You might perform this more accurately by drilling a #78 or #76 pilot hole first. These are the lift rings and should be attached as in Dwg. 1 fig C. Now attach a brake stand and wheel to the long end of the B unit directly above the chain pulley nearest the end.
- 10. This should complete the unit(s) and painting and decaling remains. Floquil Light Blue is a very close match for the entire APL car with Floquil Platinum Mist for the tops of the walkways. Prototype decals are available from Protopower Products. One sheet will do all five units of the car.



Material for 2 End Units

Des ·	Qty.	Size Styrene sizes are for HO scale	40'Contnr. Length in scale feet	48'Contnr. Length in scale feet	Description
А	4	.060 x .125	41'6"	49'6"	Bottom frame side strips
В	10	.060 x .125	7'0"	7'0"	Bottom frame cross pieces
С	4	.100 x .125	57'0"	64'0"	Side sills
D	4	.040 x 2'3"	42'6"	50'7"	Side panels
Е	2	.040 x l-1/8	8'9"	8'9"	Short platforms
F	2	.040 x l-1/8	10'3"	10'3"	Long platforms
G	4	.040 x 3/8	9'0"	9'0"	Well box ends
Н	2	.040 x .125	10'3"	10'3"	Long platform end caps
Ι	2	.020 x .125	10'3"	10'3"	Short platform end caps
J	4	.015 x .188	9'6"	9'6"	Bottom end plates – inside of well
Κ	36 - 44	.060 x .060	2'9"	2'9"	Side panel braces

Detail Items – Refer to Drawings for Location					
			40' Well	48' Well	
m	×	Size	in	in	
Ite	Qt	(decimal)	scale feet	scale feet	Description
	4	.080	1'	1'	Styrene triangular cross sect Load guides
	1	.030 x .040	8' 3"	8'3"	Brake chain bracket base
	A/R	.015 x .125	8'3"	8'3"	Bracket sides
		.040 x .080	4'7"	4'7"	Chain pulley material
	5	.040 x .250	2'2"	2'2"	Long walkway riser(tall)
	23	.040x .100	2'10"	2'10"	Short walkway riser(low)
	4	.030 x .100	2'3"	2'3"	Air tank pedestals
	2				Air tanks
	2				Air valves
	8	.015 x .125	2'10"	2'10"	Equipment box sides
	8	.015 x .125	2'0"	2'0"	Equipment box ends
	1				Brake wheel and stand
	1	.020 x .100	3'0"	3'0"	Lift ring plate material– cut, the round end, drill hole
	6				Ladder stock
	4	.040 x .188	9'9"	9'9"	See-through walkway if you're rich
	4	.015 x .060	33'6"	33'6"	Top side sill braces
	4	.015 x .080	34'6"	34'6"	Edge side sill braces
	1	3/8 x 2-56	screws		Used with center truck
	2	¹ / ₄ x 2-56	screws		Used with end trucks
	3				Trucks – Roller bearing type
	2				Coupler box & Couplers
	2	.125 x .250			Truck bolsters .125 x .250 x 8'9"
	24				Grab irons - make from .015 music wire
	12				Stirrup steps make from .015 music wire
	1				8"pc .015 brass wire
	1				2" pcs .008 brass wire
	1	4" pcs. chain			For brakes on "B" unit
	1	*			Brake Stand & Brake Wheel

De	Qty.	Size	40' Well in	48' Well in	Description
S.		decimal	scale feet	scale feet	
А	6	.060 x .125	41'6"	49'6"	Bottom frame side strips
В	15	.060 x .125	7'0"	7'0"	Bottom frame cross pieces
С	6	.100 x .125	49'6"	57'9"	Side sills
D	6	.040 x 2'3"	42'6"	49'6"	Side panels
Е	6	.040 x l-1/8	8'9"	8'9"	Short platforms
G	6	.040 x 3/8	9'0"	9'0"	Well box ends
Ι	2	.020 x .125	10'3"	10'3"	Platform end caps
J	4	.015 x .188	9'0"	9'0"	Bottom end plates – inside of well
Κ	54 - 66	.060 x .060	2'9"	2'9"	Side panel braces
	66				

Material for 3 Center Unit Frames

Detail Items – Refer to Drawings for Location					
Item No.	Qty.	Size (decimal)	40' Well in scale feet	48' Well in scale feet	Description
	6	.080 triangle?	1'	1'	Styrene triangular cross sect Load guides
	6	.040 x .250	2'2"	2'2"	Long walkway riser(tall)
	8	.040 x .100	2'10"	2'10"	Short walkway riser(low)
	2	.030 x .100	3/16"	3/16"	Air tank pedestals
	1				Air tanks – 1 on unit D
	1				Air valves – 1 on unit D
	6	.015 x .125	2'3"	2'3"	Equipment box sides
	6	.015 x .125	2'0"	2'0"	Equipment box ends
	1	.020 x .100	3'0"	3'0"	Lift ring plate material – cut, the round end, drill
	6				noie Ladder steels
	6	040 199	0'0"	0,0,0,	Laddel Stock
	0	.040 X .188	99	99	otherwise!
	4	.015 x .060	33'6"	33'6"	Top side sill braces
	4	.015 x .080	34'6"		Edge side sill braces
	4	3/8 x 2-56			Used with trucks
		screws			
	3				Trucks – Roller bearing type
	12				Grab irons
	12				Stirrup steps
	1				8"pc .015 brass wire
	1				Brake Stand
	1				Brake Wheel

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