

## MJ Co passenger coach

### ASSEMBLY INSTRUCTIONS

#### *General notes:*

- The parts are numbered with a letter and a number. E = etched part, C = cast item and P = purchased item (not manufactured from my master). The parts are listed in the Bill of Material and the etched parts are shown on the etch identification sheets.
- Assembly pictures and exploded views are included separately.
- Etched parts can be cut free with a knife or scalpel. Press out the rivets where required, either with a rivet tool (from for example NorthWest Short Line) or with a dull needle. Folding is done in the usual way unless stated otherwise. In some cases the parts will need to be flattened.
- Remove flash from cast items.
- Soldering with low temperature solder (145°C) is recommended for all brass. Use 10% phosphoric acid or similar for flux.
- For attaching wood to brass, epoxy is recommended.

#### *Required tools:*

- Screw tap M2,0 mm
- Drills Ø0,5, 0,8, 0,9, 1,6, 2,0, (2,4) mm, (reamer)
- Soldering iron, (torch)
- Files, metal saw, pliers, screwdriver, ...

#### *Kadee couplers:*

- Please observe that the coupler height is higher than recommended by Kadee since it is placed at the height of the original buffer.
- Although uncoupling in On2 is possible with a large magnet under the track, do note that placing a magnet between the rails will not work due to the too narrow gauge (I use H0 couplers for On2 gauge).
- Non-working prototype buffers cast in brass are available as replacement. They have the same dimensions as the Kadee coupler boxes and can be exchanged at any time.

#### *Web updates:*

Please note that these assembly instructions and the other related documents can be downloaded from my web page (except the assembly pictures). Thus your feedback about tips or problems is important in order to update the documents for other builders and as improvement for future kits.

#### *Just in case:*

Should problems occur you are welcome to call me at +41 76 3673690 or contact me via e-mail at [ljung@bluewin.ch](mailto:ljung@bluewin.ch) . I hope you enjoy the kit!

## **i. Underframe**

See "Exploded view 1,2"

1. Cut a 1,5 x 1,5 mm square brass rod to length and solder to E1 *Underframe, main part*. Drill an Ø0,5 mm hole from the backside according to the pattern in E1, then widen to Ø0,8 mm. Later the platform corner posts will be fitted here.
2. Fold E1 together step by step. Begin with the outer flanges: fold 10-20° at a time using a pair of pliers working along the length of the flange. The main beam can now be fold by hand.
3. Solder a M2 nut and E9 *Intermediate plate* to E8 *Bogie mounting pad* with a screw temporary in place. Solder the assembly to E1 as bogie mounting pad. **Unfortunately the bogie mounting pads were made too low. Please add a solid metal bar or similar to add another 2 mm height.**
4. Repeat the procedure using E10 *Intermediate washer* and E8 to make the second pad.
5. Punch out the rivets on E2 *Riveted solebar overlay* and add some solder along the back side while flat (photo #1). Fold the footsteps together and solder them.
6. Solder E2 to E1. Fold the carbody brackets and solder.
7. Punch out the rivets and fold E7 *Riveted head stock overlay*, solder to E1.
8. Folder E12 *Corner angle* and solder to E2/E1.
9. Bend 8 footstep bracket reinforcements in form of Ø0,5 mm brass rod according to E11 *Bending jig: footstep bracket*. Bend the footstep brackets to shape and solder the footstep bracket reinforcements in place to E1 and E2 (photo #2).
10. Solder E3 *Destination-card holder* to E2.
11. Bend an Ø0,8 mm brass rod as a truss rod. The queen post should protrude 5 mm from the underside of the solebar (photo #3 and #4). Important: Solder the truss rod to the queen post first, thereafter to E1 (thermal expansion...).
12. Fold and solder the E4 *Coupler hook* to E1.

## **ii. Carbody**

See "Exploded view 3"

1. Solder the E23 *Window outer frame* to E20 *Carbody, main part* while flat.
2. Solder E25 *End of train signal light cover* in place while flat.
3. Fold E20, form the side walls with help of E21 *Check gauge: carbody wall* and solder together (photo #5 and #6). (On the inside there are markings where the side wall should be bent. Use a steel ruler to mark the folding line. Bend about 5° using the steel ruler to get a straight bend. Adjust the angle by hand until it fits the E21. Now fold up the walls and solder together in the corners.)
4. Solder E24 *Railing holder* and a piece of Ø0,4 mm brass rod as railing (4x); Bend Ø0,4 mm brass rods as window protection bars for all end windows except the one with the postbox (if used). Solder E29 *Mounting plate for postbox* in place. Now file flat on the inside to clear the interior.
5. Fold E28 *Postbox*, add E30 *Postbox overlay* and solder together. (It will be attached after painting, see final assembly section).
6. Fold the E26 *End wall* together and solder. (It will be attached after painting, see final assembly section).
7. Solder E22 *Window inner frame*. (It will be attached after painting and glazing, see final assembly section).

### iii. Interior

See "Exploded view 4,5"

1. Bend the E40 *Interior, main part* side walls according to the markings on the outside, check the angle with E42 *Intermediate wall* (photo #7).
2. Solder four M2 nuts to the floor of E40 with screws temporary in place. Solder two M2 nuts to the lamp boxes in the upper corners with screws temporary in place (these two screws needs to be shortened by about 2 mm), fold and solder together. **Unfortunately the square hole in the end wall is too high up; please cut the corresponding flap on the lamp box.** For the other two fastening boxes in the upper corners fold and solder them together (photo #8). (Optional: Solder a two M1,4 nuts with screws temporary in place for the interior lighting. Also reinforce the holders of the interior lighting with a piece of 0,5 mm brass rod).
3. Fold up the walls and solder together in the corners.
4. Solder a piece of Ø0,3 mm phosphor-bronze rod as a friction coupling on the fastening box. Use some grease to hold the phosphor-bronze rod in place and to avoid soldering the elastic part – only the root should be soldered (photo #8).
5. Solder or glue E41 *Interior, end wall* to the outside of E40 on each side.
6. Stick E45 *Luggage rack bracket* into the holes of E40 and solder. This is a bit tricky: Use a pair of pliers to hold the E45, put it through the holes in E40 and bend the remaining part on the outside with a screw driver or your finger nails. Now solder and then all luggage racks are in place file flat on the outside to clear the carbody and the window inner frame.
7. Solder E43a *Luggage rack, long*, E43b *Luggage rack, long, one end cut to clear fastening box* and E44 *Luggage rack, short* in place (photo #9).
8. Laminate E42 *Intermediate wall* and solder. (It will be attached after painting, see final assembly section).
9. Fold and solder E46 *Bench, long* and E47 *Bench, short* using E48 *Bending jig: bench* as a gauge (photo #10). (It will be attached after painting, see final assembly section).

### iv. Roof

See "Exploded view 6"

1. Solder E60 *Ceiling* and E61 *Roof, outer* together. To do this, first tin both parts and then solder them together using the kitchen stove as a "soldering iron". **Important:** Let the parts cool down slowly, or they may warp. Some heavy item with a flat bottom (i.e. a pot) can be used to keep the roof flat while cooling down (photo #11).
2. Bend the roof to radius using E62 *Check gauge: roof radius* as a gauge. It should be a snug fit to the carbody, check carefully.
3. Solder the bottom part of C1 *Chimney* to E61.
4. File the head of a M2 screw to roof radius and solder to E60 so that the screw is vertical.
5. Cut the head off a M2 screw and file one end slightly conical to fit C1 (photo #12). The screw should protrude about 5 mm (photo #13).
6. Test fit to the interior and carbody. The M2 screws should snap in to the fastening boxes with its friction coupling and on the other diagonal the chimneys will be used to screw the roof to the interior at the lamp boxes.
7. Drill up the hole in the C3 *Corner post holders* to Ø0,9 mm. File the outside so that the total width is about 2,8 mm. Solder in place with the roof temporary mounted to the carbody.

- Carefully solder E63 *Roof end profile* to E60 and C3 (photo #14 and #15).

## v. Platforms

See "Exploded view 7"

- Temporary screw the carbody and interior to the underframe. Cut Ø0,8 mm brass rods to lengths as platform corner posts and solder to E1.
- Fold and solder E70a *End railing with integrated gates* between the platform corner posts. There are also two alternative versions, E70b *End railing with separate gates* and E70c *End railing without gates* (as the wagon was originally delivered). I found a torch very helpful to do this job.
- Solder E71 *End railing top rail* and E72 *End railing top rail with brake staff support* (brake end).
- Punch out the rivets of E6 *Drop step*. Form the lower part of E6 to a hinge: First form a half circle with a pair of "thin" pliers, then put a piece of Ø0,5 mm brass rod in place and form the hinge around it (photo #16).
- Fit E6 to E7 with two pieces of Ø0,5 mm brass rods, solder carefully.

## vi. Brake

See "Exploded view 8"

- File a M1 nut to a 1,3 x 1,3 mm square while soldered about 1-1,5 mm from the end of a M1 screw. Drill a Ø0,5 mm hole through the nut, forming the brake die. Add a Ø0,5 mm brass rod protruding 0,4 mm on each side.
- Fold E81 *Brake die support*. Solder the M1 screw to the bottom of E81. Solder a Ø0,7 mm brass rod to E81 and the upper part of the M1 screw (photo #17).
- Solder E82 *Brake bottom support* (2 parts, right&left) to the E7 so that the centre is in line with the brake staff support of E72.
- Solder E81 to E1 and E72.
- Fit E83 with a piece of Ø0,5 mm brass rod through E82, but do not solder yet.
- Fit the E84 *Brake link* between the brake die and E83 *Brake L-angle*, solder in place. This is tricky; Cut a small piece of solder and add flux, then make a quick job with the soldering iron. Make sure to remove the soldering iron as soon as the solder melts to prevent the nearby joints from melting. Trim the brass rods when the brake assembly is completely soldered (photo #18).
- Solder E85 *Brake rod to bogie* to E83.
- Solder a piece of Ø0,5 mm brass rod as a handle to E80a *Brake handle*, solder to the Ø0,7 mm brass rod (photo #21) (Optional: if using E80b *Brake wheel* it should protrude 0,7 mm above E72, E80a should be a bit longer – compare to the delivery photo from 1895 of the prototype).
- Solder the four lowest layers of the E74 *Platform floor* together and tap the hole with an M2 tap. Glue the top layer then ready and glue E74 to E1. The thread is for the Kadee coupler fastening screw.

## vii. Bogies

See "Exploded view 9"

1. Drill the axle holes and the bogie fastening hole to  $\text{Ø}1,6$  mm for the *C2 Bogie side*.
2. Tap the bogie fastening hole with an M2 tap.
3. Make sure that the axle taps rolls free in the axle holes.
4. Solder the *E91 Bogie bolster* together.
5. Screw C2 temporary to E91. These M2 screws should be shortened to about 3 mm length.
6. Solder the *E92 Riveted strip for U-beam* to a 2,5 x 1,5 mm U-profile making an end beam.
7. Solder *E93 Detail on U-beam* in place. If you wish to add safety chains, a hole has to be drilled through E93 and the U-profile. The location of this  $\text{Ø}0,5$  mm hole is between the rivets on the E93.
8. Solder the end beam symmetrically to one C2 only, so that the bogie can be disassembled for painting.
9. Fold and glue the *E92 Riveted angle* to C2 on the soldered side. The E92 of the “none soldered” side will be attached after painting and final assembly of the bogie.

#### **viii. Optional: Hints/ideas for making a split frame bogie for current collection**

1. Substitute the *E90 Bogie bolster* with a PCB board (10x6 mm, not included) soldered to *E95 Plate for split frame construction*. Drill a  $\text{Ø}2,0$  mm pivot hole according to the pattern on E95. Solder two cables on each side, just outside the dotted markings on E95. Carefully saw a cut for insulation of the bogie sides according to the dotted markings on E95.
2. Widen a styrene pipe ( $\text{Ø}3,2$  mm outside, not included) to  $\text{Ø}2,4$  mm “press-fit”, cut to 10,9 mm length (= back-to-back for 0n2). Cut the wheels sets axle in half and press/glue the half axle with no insulation. (You will need an extra set of wheel sets, not included.)  
Paint black.
3. Assemble as the normal bogie and connect the wires to the interior illumination.

#### **ix. Optional: Hints/ideas for making an interior illumination**

1. Use a PCB board (not included) along the length of the carbody for holding the lamps (4-5x 1,4 V lamps). Fixation to interior ends by M1,4 screws. The cables can be led through holes in the benches.
2. Use an LM317 constant lightning circuit (see ELFA catalogue for generic circuit, choose the resistances to get 1,4 V). The circuit can probably be fitted under one of the benches. Connect the circuit to the lamps and the current collection.

#### **x. Painting and lettering**

See “Exploded view 10”, Photos #19-21

1. Underframe, platform railing and bogies: black
2. Platform floor, footsteps: grey
3. Carbody: blue, postbox: yellow, railings, protection bars and end of train signal light cover: black.
4. Interior, benches, end walls and inner window frames: light wood brown.
5. Roof: Paint grey and add lens cleaning paper to simulate tarpaper. Chimneys black.  
Ceiling: white
6. Black (rust): Chains, coupling links and Kadee couplers/Buffers, drop step.

7. Add transparent glazing to the inner window frames, the interior end doors and the end walls. Add red glazing on the end walls for the end of train lights.
8. Lettering: white. Glue the signs carefully to the carbody.
9. Weathering.

#### **xi. Final assembly**

*See "Exploded view 10"*

1. Attach the E5 *Coupler chain link (oval + triangular)* to the E4 *Coupler hook*.
2. Glue the postbox to the carbody.
3. Attach P2 *Kadee no 5 couplers* with M2 screws. The M2 screw should protrude maximum 1 mm behind the Kadee coupler to avoid interference with the platform floor, grind off accordingly. Non working prototype buffers cast in brass are available as replacement, fitting in the same space.
4. Glue the benches to the interior.
5. Glue the intermediate wall.
6. Glue the inner window frames to the carbody.
7. Put the end walls in place and screw the interior to the carbody and chassis.
8. Glue E27 "*T*" *door handle* in place.
9. Assemble the bogie. Important: make sure that all 4 wheel sets have their insulation on the same side. Glue the E93 in place on the open side (after this the bogie can not be disassembled without taking these away!).
10. Screw the bogies in place and add the safety chains. Tip: Press with a pair of pliers over the thread of the screws to avoid loosening up too easy.
11. Screw the roof to the interior with the chimneys.
12. Again, please let me know if something was wrong or if you have any improvement tips.
13. Enjoy your wagon and send me a picture!