

# LDraw Tutorial (VIII)

## Buffer Exchange and Ghosting

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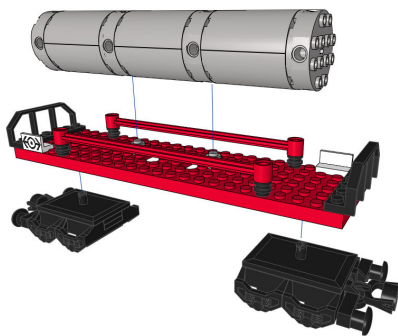
Have you ever wanted to show where a part or sub-assembly goes the same way it's sometimes done the instruction booklets from LEGO®? The trouble is, if you do, there are two problems: one, the arrow stays in your LDraw file; two, you don't want the part or sub-assembly to turn up twice in your file.

Of course I wouldn't have brought this up if there wasn't a way to overcome both these obstacles, and the title is pretty clear about what you need to do so, but you'll probably appreciate a more detailed explanation so here goes.

### Buffer Exchange

MLCad has a special feature called Buffer Exchange. It allows you to, in a manner of speaking, save a snapshot of your LDraw file at a specific moment, so you can retrieve it later on. The way it works is really quite easy, and probably the best way to see exactly how it works is by having a look at a file that uses this function. In this article I'll be using the example created by Michael Lachmann[1], creator of MLCad, a file named Waggon1.mpd[2] (see fig. 1)

When you open the file you will see that it doesn't look very good. This is because in *Edit Mode* you see all the parts in all the locations they are used. But when you switch to *View Mode* or view the file in LDview you'll see it just the way you'd expect it. Let's go to View Mode and advance a few steps. Step 8 and 9 are where you get to see exactly what Buffer Exchange can do for you. In step 8 you see the tank hovering over the wagon and two arrows indicating exactly where it should be placed. In



step 9 you see the tank in its final location and the arrows have disappeared.

To see how this works you need to have a look at the text of the LDraw file[3]. Step 8 starts in line 34. In LDDesignPad you can see line 35 reads `0 BUFEXCHG A STORE`. MLCad shows it as `BUFEXCHG` in the Type column and `STORE A` under Part name/Description. What this does is store the way the file looks now and the parts it contains in exchange buffer A (you can use a total of 26 different buffers, A-Z, although you'll rarely need more than one). You can add a buffer exchange in

MLCad either by going to *Edit > Add > Buffer Exchange...* or clicking on the last icon in the object bar, selecting the buffer you wish to use and clicking OK.

After this you make the changes you need to make (add the tank hovering over the wagon and insert the arrows). You then restore the previous state of the file in almost the same way (the only difference is that you need to check the box next to Retrieve in the configuration window). The line `0 BUFEXCHG A RETRIEVE` is then added to the LDraw file, which MLCad displays as `BUFEXCHG` in the Type column and `RETRIEVE A` under Part name/Description. The previously added parts and any indicators (arrows) you may have used have disappeared and you can place the tank in the correct position.

### Ghosting

So far so good. There are a few things to take into account though. If you use this technique in a sub-file of an MDP file, when you use the resulting composite part you'll notice it contains too many parts: the parts you added during the buffer exchange are now again visible!

In order to avoid this you need to set a special attribute for the parts you add during a buffer exchange. Since the parts are there but should not be shown outside the buffer exchange, they are ghosted. You can do this by selecting the parts you need to ghost and either go to *Edit > Visibility > Ghost*, or by clicking on the ghost icon – the first in the Visibility bar. If you use LPub4 you may get the impression that this software automatically excludes parts added during a buffer exchange even if you don't ghost them, but this is only partially true. The parts are not shown, but they are counted so they will turn up in the parts list (PLI) and the bill of materials (BOM). This means you shouldn't only ghost parts added during a buffer exchange in a sub-file, but also in the main file. Try unghosting the tank added during the buffer exchange in the main file of waggon1.mpd. Save the file and open it in LPub4. You'll now see that LPub4 tells you to make the tank twice, even though you only add it once. In short, you need to ghost all parts you add during a buffer exchange.

By using a combination of Buffer Exchange and Ghosting you make your LDraw instructions look even more professional and a lot easier to understand. Combining it with sub-assemblies in call-outs it also allows you to place more parts in a single step without making the instructions more complicated.

[1] You can read an interview with Michael Lachmann in Hispabrick Magazine 007

[2] <http://www.lm-software.com/mlcad/models/dats/waggon1.mpd>

[3] You can do this either in the part list of MLCad or opening the file in LDDesignPad or the text editor of your choice

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