



## PA Systems for Multi Trailer Trams

It has always been challenging finding a PA system for Trams that allows you to attach and detach trailers without affecting the sound quality!

This will take a few lines to explain why, but learning the issues of past designs will help to understand our solutions.

- Amplifiers are designed to work within a 4 to 8 Ohm impedance range or speaker load. If you have a Tram with only one trailer and a couple speakers, most amplifiers will be happy. When you add a second or more trailers, each with their own sets of speakers, the impedance changes dramatically. Too low, the sound will be distorted, the amp may overheat and possibly fail? Going too high and your system isn't loud enough to overcome the ambient noise.

One possible solution along with some head scratching, is to wire all the speakers in a combination of Series/Parallel so the load falls within the amps operating range. But that means you can never change the number of trailers or their order without sending the system design into a tail spin.

- One common solution today is to install a massive car audio amp that works down to .5 Ohms load. But when operating at that impedance you can fry an egg on it and depending on the outside temperature, it can go into heat protection mode and shut off. And guaranteed, that will happen at the most inopportune time.

Another past solution was borrowed from commercial building PA industry, which uses 70V transformers to stabilize the load so you can add or subtract speakers at will. With today's price of 70V transformers they might as well be made from the rarest metal known to man... Unobtainium and a 70V amplifier for a vehicle is like finding the last unicorn.

- One more piece to the puzzle is, how many pins do you currently use in your multi pin trailer plug to power your speakers ... 2 or 4?

It's not that past ideas are overly bad... they just becomes unsupportable, especially with the changing needs of today's customers.

So, whether you run a pull car with passenger seating and speakers, or a tug with just a driver, below are a number of solutions allowing you to attach or detach trailers (in any order) and still keep the PA system stable.

## Solutions

All our designs use “off the shelf” products and are easily supported, now you have a choice of many mic styles from hand held to headset and wired to wireless. For simple systems with a maximum of one trailer, just use Diagram 1 with either of our 4 x channel PA 63 or PA 64 amplified systems.

For trams with multi trailers, use Diagram 2, 3 or 4 and just add a small amplifier on each trailer. This is a similar concept to the old 70V transformers, but it is designed for 12V vehicles and it gives you the ability to independently adjust the volume on each trailer.

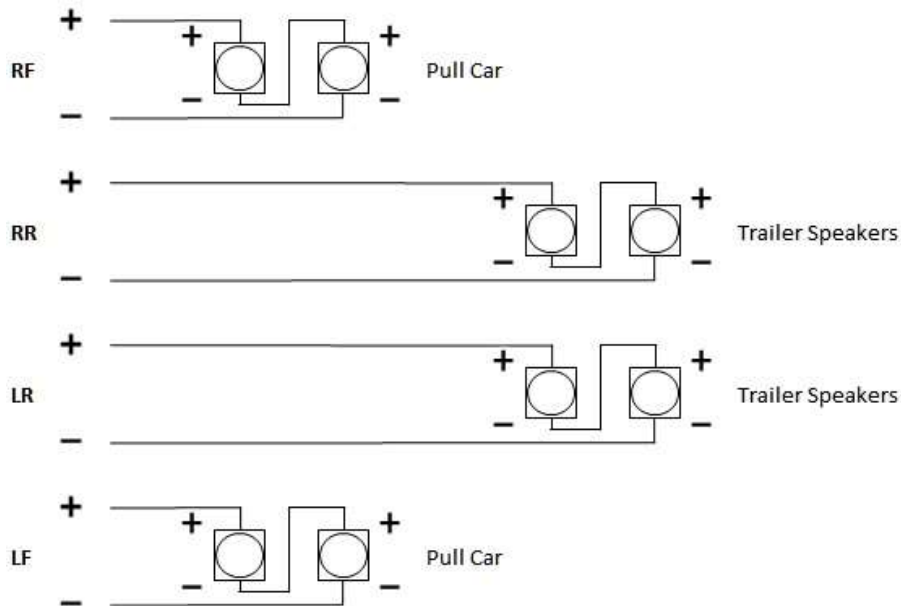
Each Tram operator will have their own particular needs, whether only one trailer or maybe up to 4 depending on the daily customer count? Possibly your tram is so long, you need people at both the front AND back being able to speak to keep your guests safe? In this case use Diagram 4. Some operators just want to talk, while others want to play seasonal music to enhance their tour experience, with the PA64, you can do it all.

Obviously there are some questions that need to be flushed out based on your particular needs and some technical points about your existing trams. So we always suggest you give us a call at 1 888 724-5351 and we'd be happy to explain fully.

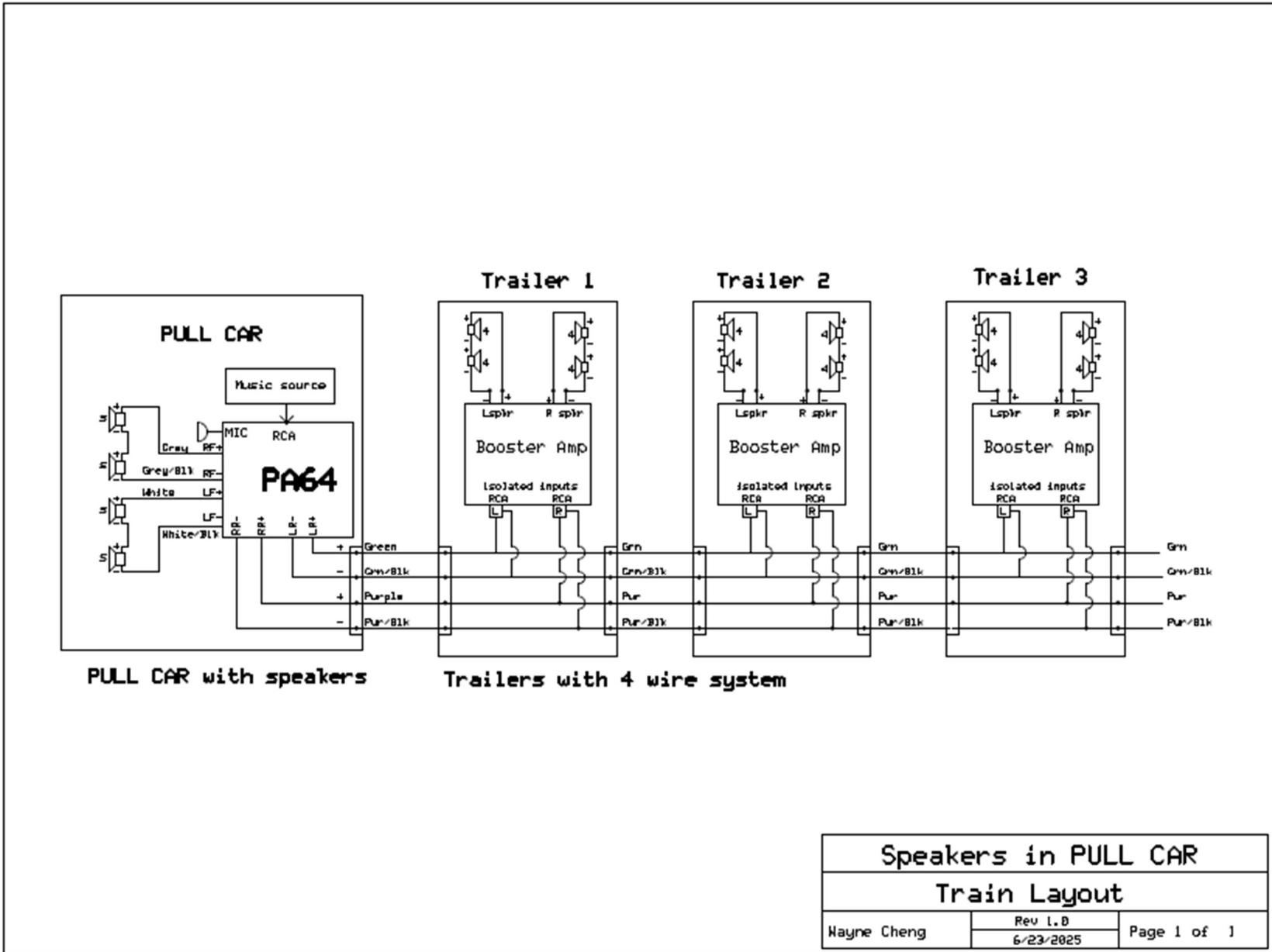
### Diagram 1 / Simple system with speakers on the Pull Car and one trailer

#### 8 Speaker Option 4 Speakers in Pull Car - 4 Speakers in the Trailer

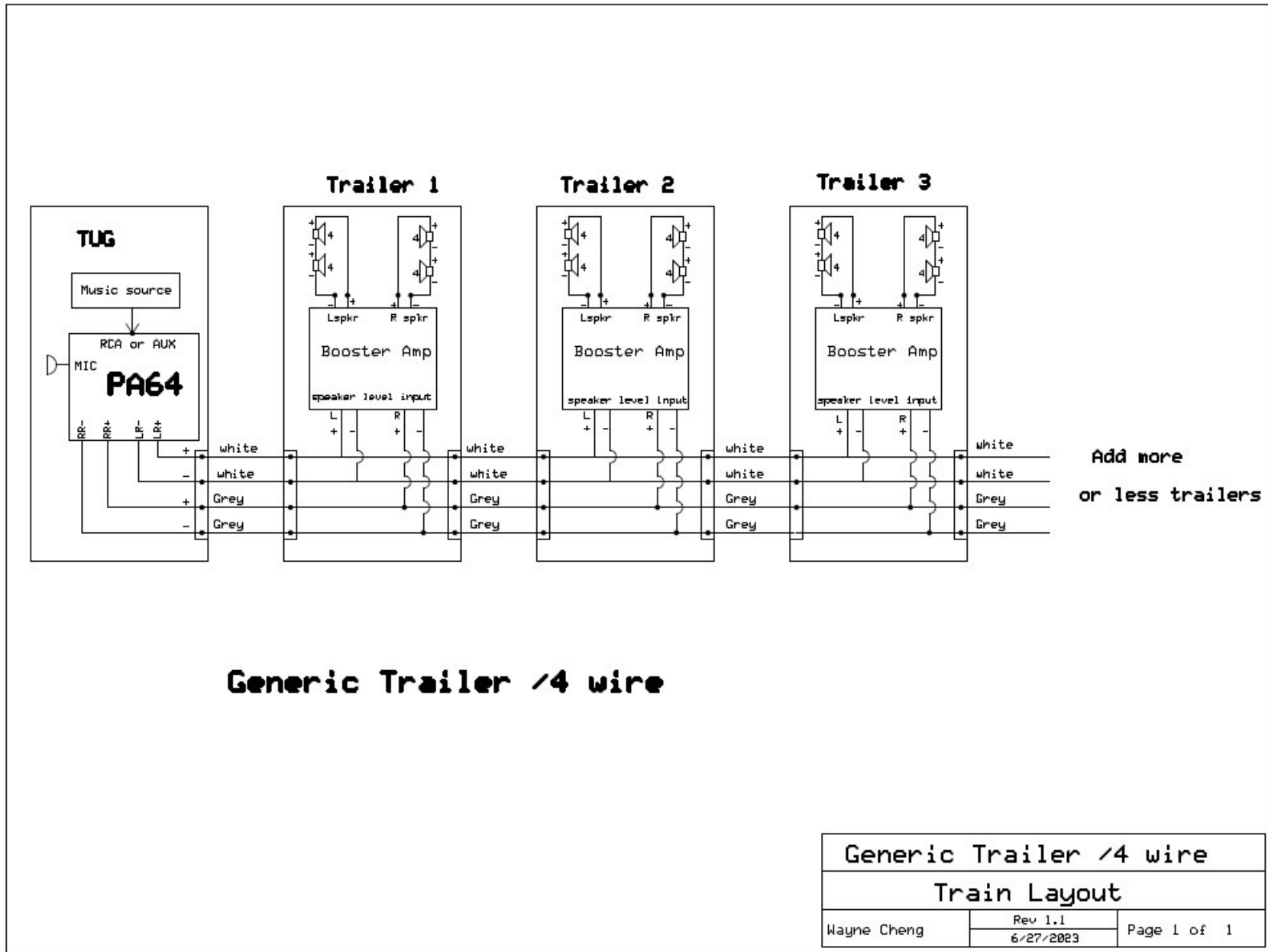
Using 4 Ohm Speakers



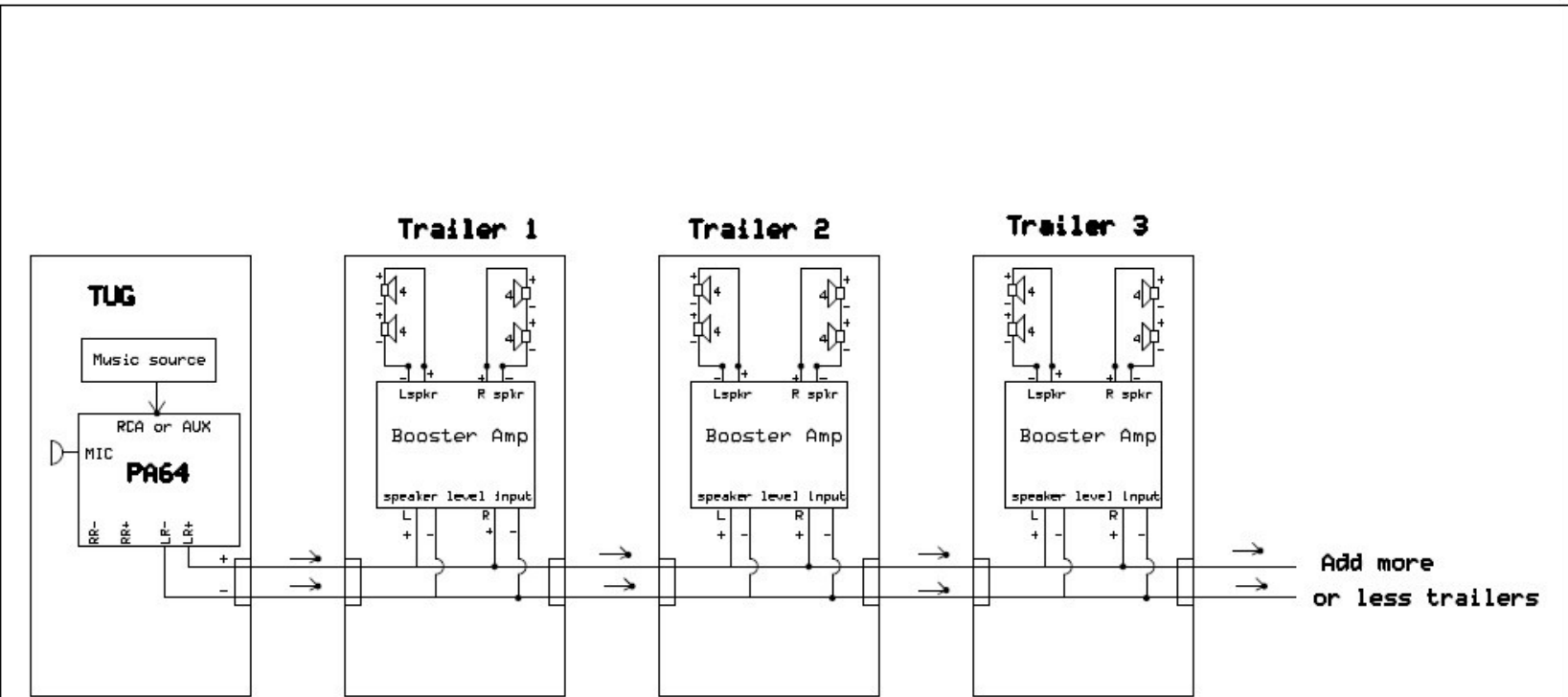
**Diagram 2 / Speakers in the Pull Car and if you have 4 pins available in your trailer plugs. Best option for playing music**



**Diagram 3 / If you have 4 pins available in your trailer plugs. Best option for playing music**



**Diagram 4 / If you're limited to only 2 available pins in your trailer plugs for speakers**



**Generic Trailer /2 wire**

Generic Trailer /2 wire		
Train Layout		
Wayne Cheng	Rev 1.1 6/27/2023	Page 1 of 1

Diagram 5 / Allows 2 x mic inputs – both at the front and rear of the tram

