

## **MU Consisting**

MU stands for Multiple Unit. A consist is a group of locomotives. Some people prefer the term MUing, others prefer Consisting to describe the act of putting an MU consist together. Call it what you want. I have no preference. But, here are the things you should know when it comes to MU consisting with DCC. There are three ways to control multiple locos as one with DCC: address programming, command station-consisting, and Decoder-Assisted Consisting. The following will describe each, and will provide the pros and cons of each method.

### **Address Programming**

This really isn't consisting per se. To do it, you give two or more locos the same address. While this works somewhat, it has so many downsides that you won't want to use it unless your system doesn't offer anything else, or unless the locos you are consisting will always run together.

When you give two or more locos the same primary address, they will respond simultaneously when the command station issues a command packet for that address. Unless you intend to run these locos together all the time, you will have to provide a programming track at all places where you will want to put these locos together, or take them apart.

To put them together, pull all of the locos onto the programming track and couple them together in the order you want them to run in. Unless you have purposely wired some of them backwards, they must be lined up head to tail because they will all run forward or backwards simultaneously. With this done, you can reprogram the address for the entire consist unless the consist is longer than your programming track. In that case, pull these locos forward until they just leave the programming track to make room to pull the next batch onto the programming track and couple to the back of the ones you just pulled off. Reprogram that batch, and so on . . . until all locos have been reprogrammed.

While you can reprogram a batch of locos at one time when assembling the consist, disassembling the consists requires you to reprogram the address of each loco individually. So, pull the first loco onto the programming track and reprogram it. Uncouple it and take it off of the programming track. Now, pull the remaining consist forward and reprogram the next loco, and so on . . . until they are all reprogrammed.

When running a consist with locos all programmed to the same address, they will all respond together including direction, lights, or any other functions. If you turn the headlight on, the headlight of all locos in the consist will come on. There is no way to turn the lights off on the rear units. Of course, if you plan to run a consist together all the time, you could wire a motor backwards so you can have it in the consist tail-to-tail with the lead loco, and you could connect leave rear lamp wire of both locos disconnected, and connect the rear lamp wire of the reverse running loco to the loco's front lamp.

The two systems that come to mind that need this type of consisting are Lenz Digital plus (because of their two-loco MU limit), and Digitrax's Challenger (because of its total lack of MUing capability).

These two systems require the layout to be shut down when programming. So, if you want to do this during an operating session, another method of programming is required. Some people elect to purchase another command station a very expensive solution. A less expensive solution (if you already have a PC) is Digitrax's PR1 a stand-alone decoder programmer that comes with Windows compatible software.

### **Command Station Consisting**

With Command Station Consisting, each loco has a different address, and the command station keeps track which locos you want to run together, and in what direction. That is, you pull the lead loco out on the assembly track (anywhere on any track that is DCC powered), then pull the next loco up to the back of that one (forward or backward) and perform the consisting sequence, then the next loco, and so on until you have all locos assembled. At that time, you pull the consist out and go.

When you change the speed or direction of the consist, the command station sends appropriate commands to each loco.

However, functions are different. Only the lead loco (the one whose address is also the consist address) will respond with function commands by the consist address. That is, if you turn the headlight on, only the headlight of the lead loco will respond. If you want to control the functions of any of the other locos, you will need to address them separately from the consist.

**Note:** Various manufacturers may do this slightly different. For more definitive information, check with the manufacturer of the system you're considering.

### **The Consist Address**

How this works specifically depends upon the system. However, most will use the address of the lead loco as the consist address. That is, when building your consist, if you specify loco #23 first, it will be considered the "top" loco, and "23" is the address you will use to control that consist.

Most systems allow you to use a pseudo consist address - that is, you can specify any address you want as the top (lead) loco providing you don't have a loco with that number that won't be in that consist. Remember, though, if doing this it will take one of the loco spots in the consist. If your system has an MU consisting limit, doing this will reduce the total number of locos in that consist by one i.e., Wangrow's Command Station Consisting will be limited to three, and Lenz would only have one (so why do it?).

When using a pseudo address for the consist number, none of the locos will respond to Function Control directly (unless specifically provided for by the system). While this doesn't have much use, it can be useful for on-board sound cars.

Last is the issue of maintaining the consist between operating sessions:

The Chief will maintain the consist between operating sessions.

Wangrow's SystemOne will not maintain command station consists between sessions.

### **Decoder-Assisted Consisting**

Decoder-Assisted Consisting is what Wangrow calls "Advanced" consisting. Regardless, this process requires both a system and decoders that have this capability.

Here's how it works. Decoders with this capability have a second address byte (configuration variable) specifically for a consist address. When you add a loco to the consist, the command station sends the consist address to that decoder. When the decoder has a consist address, it then ignores the primary address, and responds the consist address. Since all decoders in the consist will have the same consist address, the command station only needs to send one command to the consist when you change speed or direction.

Since the consisting information is kept in the non-volatile memory of the decoder, consists are naturally maintained between operating sessions. While consisting as designed into each system is easier than reprogramming the addresses, there are differences in how each system does it, with some being quite simple, and others being quite complex.

Assembling MU Consists with Different Systems: Lenz Digital Plus

After pulling the second loco up to the lead loco, you push the "F" key, then the "2" key, then the "+" key, key in the address of the second loco, press the "enter" button, then drive them off. To take them apart, with the lead locos' address in the display, you press the "F" key, then the "2" key, then push the "enter" button twice.

Assembling MU Consists with Different Systems: Digitrax Chief

After pulling the second loco up to the lead loco, you push the "mode" button twice, then push "+" button. At this point you can drive them off, or pull another loco up to the back of those and perform the same sequence. To take them apart, one at a time, push the "mode" button twice, then push the "-" button. You are allowed to add a consist to another consist, and so on - this is called "nesting", and is limited only by the amount of power a booster can provide to operate the consist.

### **Assembling MU Consists with Different Systems: Wangrow System One**

Press Setup. Next, you need to know whether the decoder has Decoder-Assisted Consisting (Wangrow calls this advanced consisting), and select the correct mode. Next, the procedure depends on which mode you chose.

Advanced mode: Enter the consist number (1 through 111). Enter the first loco's address and press the "enter" key. The system defaults with the loco being in the consist going forward. If this is the case, press "Enter". If the loco is to be added in going backwards, press the direction button. This leaves you in the "enter loco" mode ready to enter another loco. Add all locos until finished. Pressing "Enter" without a loco number ends the Add Loco session.

Non-decoder assisted mode (Wangrow calls this the "Old" style): Press "Add Loco". Enter the loco's number and press Enter. Press Enter to accept forward, or press the direction button. Press "Add Loco" to add another loco. You can add up to four locos, at which time the system will tell you that the Consist is full.

Taking the locos apart has a similar sequence, except that you start by pressing the "Clear" and "Delete Loco" buttons instead of the "Setup" and "Add" Loco buttons.

### **Consisting Sound Cars**

If you install an on-board sound system in a freight car, you can have direct control of the sound function if you use that car's decoder address as the lead loco in the consist. Even though the car will be being pulled by the consist, the system doesn't know that. What's important is that all decoders in the consist will respond to the speed and direction commands, but only the "top" decoder address will respond to function commands given to the consist. You can select the real lead loco's address to control the headlight of it.