



NEWSLETTER

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Current Central Station 3 Version – 2.2.0 (5)
Current Central Station 2 Version – 4.2.13 (14)
Current Mobile Station 2 Version – 3.121

Greetings digital fans! I hope you are all doing well and keeping safe. Let us jump into it!

For your information, there has been a minor update to the CS2. This brings the Mobile Station software to version 3.121. At the time I was writing this, there had not been a new update to the CS3. The only way to get this update for the Mobile Station is through a CS2. We expect to see the Mobile Station software version in the next CS3 update – but we cannot be sure when that will happen.

Our first article is on the controversial subject of track cleaning. While the second article is about “Using a Digital Multimeter for Testing Your Track.”

Track cleaning...let me start by saying that there is no “perfect” way to clean track. Basically, like scenery, weathering and other options, everyone has their own favorite technique. There are many opinions on what to use, how to use it, and when to clean. So, I encourage everyone to try different methods and decide which one works best for you – even if is not mentioned here.

The first thing that I have noticed is that track is always dirty. I can always see some dirt by wiping my fingers on the track. It is just the way it is. It only takes one passing train to be able to wipe some dirt from your freshly cleaned track. So as many of you, I personally do not clean my track until I start having trouble.

Manual Cleaning

We all do the same thing – we wipe our fingers on the track as a gauge to see how dirty the track is (Fig. 1). Honestly, this is not always a good idea as the dirt is just getting smeared around and the oil from our fingers is adding to the problem, not helping it. So, I do not recommend using fingers. A dry cloth will do better for spot cleaning; however, a dry cloth is not the best option either, but it helps in a pinch.



Fig. 1 The finger test

One technique that seems to work well (believe it or not) is a plain old block of wood (Fig. 2). This has the benefit of scraping the deposits off the rail and softly scrubbing the rails clean. The oil is absorbed into the wood helping to keep the block useful without re-depositing the oil on to the track. There is an ongoing debate whether the end grain is better than the side grain, but nobody wants to pay for actual lab tests.

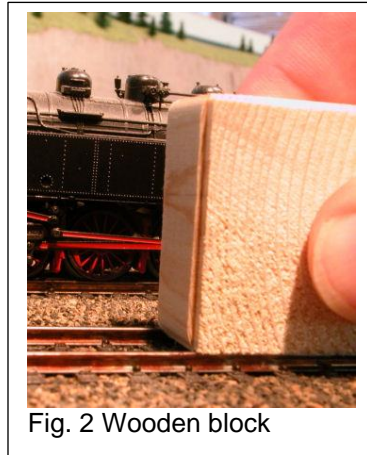


Fig. 2 Wooden block



Fig. 3 Eraser type cleaner

There is always the “eraser” type track cleaner (Fig. 3). This is a rubberized (probably silicone) pad that has a soft abrasive mixed in with the rubber (silicone). These do surprisingly well... for the spots that can be reached.

Another option is using a cleaning solution with a lint free rag - not a paper towel. A paper towel will leave paper in the joints and catch on the center studs of Märklin track, which end up in the locomotive.

Many people mention that they use various cleaning solutions but the most we hear is rubbing alcohol. Again, if it works for you then great, you found your technique. We do not recommend alcohol, mostly because it has water in it. Also, we have found that alcohol will make it harder for trains to run. This is because the alcohol will (for lack of a better phrase) get the track too clean. This means that the impurities (or lack of) that are left behind are not as conductive. Conductivity is the key to smooth operation.

For an easier way to clean track, there are track cleaning cars and locomotives depending on the scale you are modeling (fig. 4 and 5). These can make the job easier, and it can reach all the track. There is a problem with a track cleaning car though, if your track is too dirty, a loco might not run over the dirty track to clean it. Also, a track cleaning car or locomotive will probably need to make a few passes over the track to clean it.



Fig. 4 Märklin Z scale track cleaning locomotive



Fig. 5 LGB track cleaning locomotive

Some track cleaning cars have a dry pad to clean the track with friction. These pads can be replaced when they get too dirty and are probably meant to be used as maintenance rather than a deep clean



Fig. 6 Märklin 46049 Track cleaner



Fig. 7 Track cleaning tank car

(Fig. 6). Other cleaning cars have a place to put cleaning fluid and a pad to pick up dirt. Figure 7 shows a tank car where the tank is filled with a cleaning solution and a pad to apply it and clean the track. A locomotive will usually have some sort of cleaning wheels or disc.

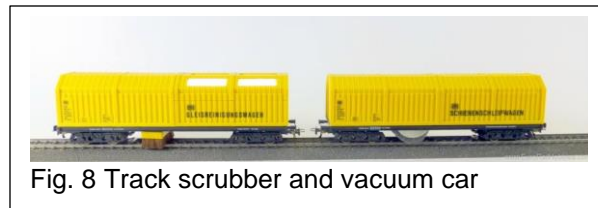


Fig. 8 Track scrubber and vacuum car

There are also track cleaning systems. These consist of a rail scrubbing car and an optional vacuum car to run behind it (Fig. 8).

As with anything, there are defiantly “Do’s and Don’ts”. Here are a couple of “Don’ts”.

We do not recommend using anything with a hard abrasive such as sandpaper or emery cloth. While rubberized (silicone) cleaning pads or discs have a “soft” abrasive, they are easier on the track itself. Track can have a coating on the rails to reduce oxidation. An abrasive will remove the coating and make the track more prone to corrosion which is not conductive. We also do not recommend a wire brush made of steel or brass wires. A plastic wire brush would be ok to use.

Now, I have saved the worst for last. Do not ever use steel wool! It is tempting to clean track that has been stored for years. We take calls about this quite often. I have also had a person send their locomotive in for repair that “wasn’t running right”. It was filled with steel wool (Fig. 9 and 10). Unfortunately, the person did not call intime for me to warn them about steel wool. The locomotive needed a complete tear down and cleaning because it only takes a couple of steel fibers in the wrong spot to do serious damage. The thing to remember is that steel wool is ferrous, and a locomotive is a rolling magnet. No good can come from this.



Fig. 9 Steel wool in a locomotive



Fig. 10 More steel wool from locomotive

Our Recommendation

What we recommend is Marklin Smoke Fluid. This is for two reasons; of course, it is a great smoke fluid (I always have some around for locos that have a smoke generator) and it will clean the dirt and oil from the track while not affecting the conductivity. I wipe the areas that I can reach (after the finger test usually) and put some in the track cleaning tank car for the areas that I cannot reach for a light cleaning. For a deep clean, I use the track cleaning system with the scrubber then a vacuum car.

For those people using Märklin track, it might be tempting to want to clean the center studs. I generally do not clean the center studs and I have rarely needed to. If everything is adjusted

properly, sliders on locomotives and cars should keep the center studs clean because of friction. The studs are blackened on purpose and an abrasive will make them shiny and thus more noticeable. Also, a rag or paper towel will be torn up by the studs and could possibly damage a turnout if you are not careful, not to mention the way a rag can grab a signal or catenary mast (this comes from experience). Keep the cloth balled up in your hand and watch your sleeves around those signals if you plan on using a rag.

Enjoy your hobbies!
Rick Sinclair

Using a Digital Multimeter for Testing Your Track

Our position of being your digital consultant means that we have inherited two aspects that any technical support person needs to handle. One, you are going to call or write us with your problems. Two, to resolve your problem, we often must gauge your level of experience and expertise in solving the problem. In this article, I will discuss the use of one of the main tools used in resolving track power related issues, the Multimeter. I will explore some of the methods on how I use it to locate track issues and dispel some assumptions on how you may apply them.

What is a Multimeter?

A Multimeter is a test measurement device that has combined many different electrical component testing meters, thus Multi-Meter. They are used to measure Voltage (in AC or DC), Resistance, and Current levels (just to name a few). They come in analog or digital forms, and from this point on, I will refer to the “Digital Multi-Meter” mostly as the “DMM”.

I have been asked what DMM to use, while there are good precision quality name brands out there, I will show why they are not required. You can spend \$12 on a decent DMM or you can spend \$400 for a fancy one and virtually get the same results. I will also point out some good features to have on your DMM to make your trouble shooting life easier.

Measuring Voltage (aka Voltmeter function or VM)

Measuring voltage on a train layout is one of the more misconceived notions that needs clarification. Mostly because of the variants on how the layouts can be powered. These variants include AC vs DC, Analog vs Digital. It is also the first things we think to measure when turning on a DMM. You will see that I do not really use my DMM for measuring voltage. Instead, I will use it for checking general voltage as well as polarity. I will include a sense for why this is so, but for that information I have placed it at the end of the article at the section called, “One Explanation of Digital Power”.



Fig. 1: The main settings used on my Digital Multimeter

Setting your DMM to the V(ac) or V(dc) setting will allow you to check for an average voltage supply signal. With Marklin H0 gauge users, its common to refer to their layouts as AC track and will think they should use the V(ac) setting. In digital systems, this is not true, and you can (and sometimes will) use the V(dc) setting. The V(dc) reading will give you a slightly higher voltage reading. On my layout, my V(ac) reading is around 11-12 v, and my V(dc) is around 12+ v. (See Fig. 1 on what those meter switch settings may look like on a DMM).

What you will be checking for is that your voltage readings are consistent around the layout. If you have a voltage drop that is large or near 0v, then you would be checking for any wiring or power supply issues, unless this is intentional.

Set the DMM to the V(dc) setting and you can check track polarity or the positive and negative connections of the layout. This is important when connecting polarity sensitive electronics to your layout. It is similar to putting a battery in backwards prevents your flashlight from working (why be in the dark about this stuff?).



Fig. 2: Using the Voltage DC setting to show polarity.

You will notice on the 3-rail Marklin H0 system that if you put the positive (red probe) on the center rail and the negative (black probe) on one of the outer rails your DC readings will give you a negative (-V) reading on the DMM. That is because, contrary to popular belief of experienced users calling the outer rails the “GROUND” rails, the center rail is the GROUND (-) rail and the outer rails are POSITIVE (+). Flip the probes around so the black probe is against the center rail and the red probe is against the outer rail and you will see a positive voltage reading. Fig. 2.

In essence, when wiring Märklin products, follow the color coding of Märklin’s wiring diagrams. However, when attempting to wire polarity specific components, remember that the center rail is ground (-). LED lighting is typically used as an example, as raw components are polarity specific.

Measure for Continuity

There are two basic methods for testing for track continuity: The Ohm Meter setting or a Diode test setting. On basic DMMs, you will have a resistance measurement, known as an Ohm Meter (it is the horseshoe icon). On DMM’s with a bit more functionality you will have a Diode Test setting (look for the triangle with a line at one point). Even better would be to have the Diode Test with an option for a tone setting, this provides you with an audible beep (indicated by a speaker or parallel curves as an icon). The benefit of this is that you will not have to look at your meter when checking for continuity.

What is Continuity?

Continuity is basically the method for checking that a signal at one point of a circuit reaches another point of a circuit. On your layout, you will be checking for areas that have continuity as well as for sections that DON’T have continuity. For example: you will want continuity from

each end of a wire that connects devices together. You will want continuity from one track piece rail to the next. You do not want continuity between track piece rails if you have installed a rail insulator. A braking or slow down module will have 3 isolated track sections and you will want to be sure all sections are insulated from the other.

There are three ways that you can test continuity on a DMM: Ohms (in resistance), Diode testing, and continuity testing (audible). The readings may differ, but essentially, they are the same when used to evaluate continuity. See Fig. 1 for the most common DMM icon settings.

Setting the DMM to the Ohmmeter setting will give you resistance values. A low measurement will indicate good/fair continuity. What you do not want to see is a high number, if you are looking for continuity. Your DMM may display as "OL" (Over Limit) or show a very high number in either a K ohm (3 digits) or a high number (2 digits) M ohm range. This means your electrical signal has very high resistance and is being 'choked' off. Think of parking your car tire on your garden hose.

The diode test (The triangle with a line at one point) can give resistance readings, but with general use diodes the test is more of a current flow direction test. If you are testing a diode placing the probes properly on a diode will give you a small reading but reversing the probes will result in an "OL" reading (again this is for general diodes). How this setting works for testing continuity, is to just be sure you are **not** getting an "OL" reading. You may not actually be testing a diode but are just testing for continuity of a signal.

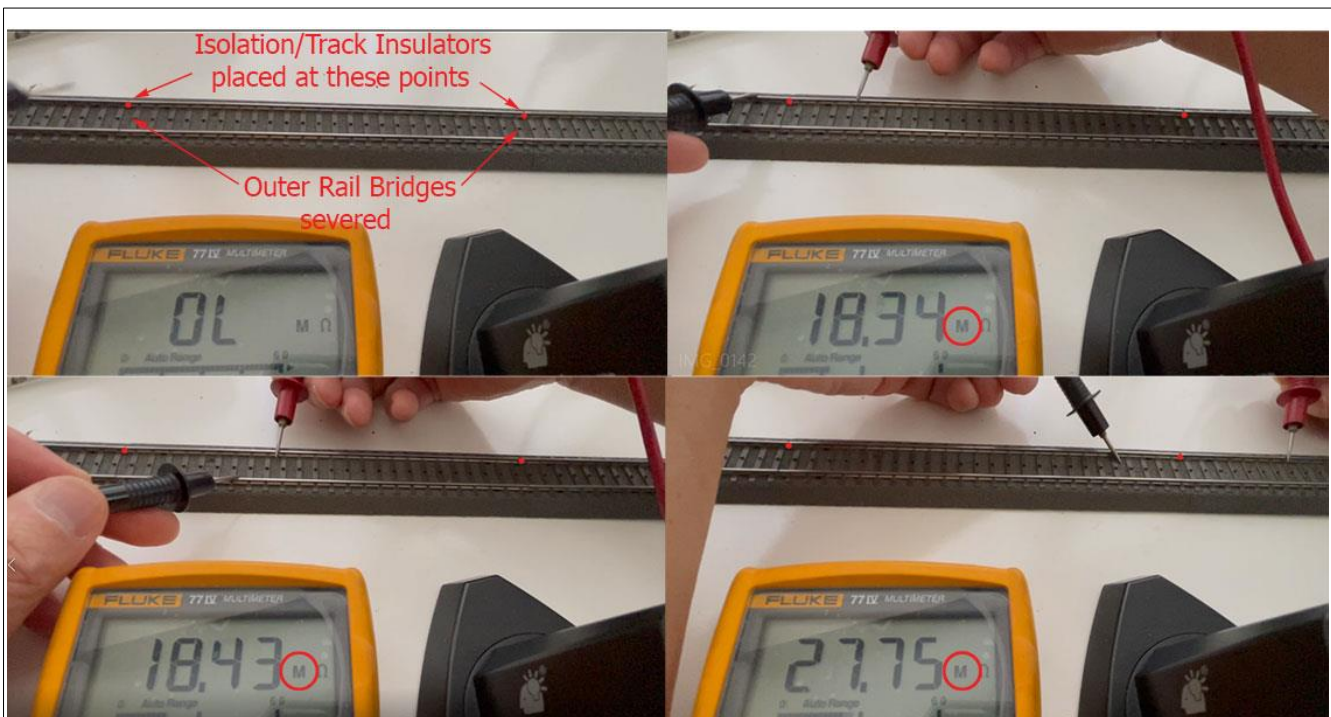


Fig. 3: The three testing methods to verify rail isolation

The continuity setting is often paired with the diode setting, in this case it is like turning on the speaker to the diode test. An audible beep will sound if there is continuity but remain silent if there is a break in the connection. Place the two probes together and you will hear the tone, separate them and the sonic tone will stop. This is the fastest way to test your track connections because you will not have to look at the screen (and the numbers do not matter)

and you can hear if you are getting the proper continuity evaluation. The continuity test may also give you resistance readings.

The images in Fig. 3 show how you would test for proper isolation of a Contact track. Included in the images are the locations of the track insulators or rail separators for reference (red dots). You will see the Mega ohm indicator (red circle) showing the high resistance values sufficient for non-continuity.

Contact tracks will have one isolated rail; you will want to be sure that the other rail(s) are still in contact. In Fig. 4, I show the non-isolated rail will have good continuity with the surrounding track. Notice the low resistance reading (neither the MegaOhm *M* nor KiloOhm *K* indicators are showing).

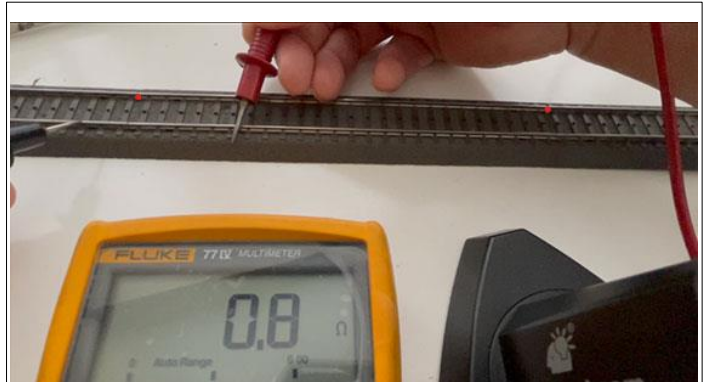


Fig. 4: Continuity between tracks - non-isolated rail

You can also verify the integrity of your wires and wire connections to S88s, M83/M84 and other layout devices by placing one probe on the wire contact point (often the screw terminal) and the other probe on the opposite wire end (if available). This can let you know that the connection to the wire is good as well as testing if there is a break within the wire within the wire's insulation sleeve.

Overall, the two test settings that I use are the Volts (DC) setting and the Continuity/Diode setting (tone). On rare occasions I have had the wiring reversed where the VDC helped to solve a short circuit when a track was connection (you usually only need to learn that lesson once). The continuity test is by far the most frequently used setting because I deal with contact tracks on my layout. Usually once these issues are resolved, it is seldom necessary to have the DMM on hand on a regular basis.

One Explanation of Digital Power

In analog layouts, measuring voltages is straightforward, set your meter for AC or DC (depending on the voltage system your track runs on) and measure the voltage level of the

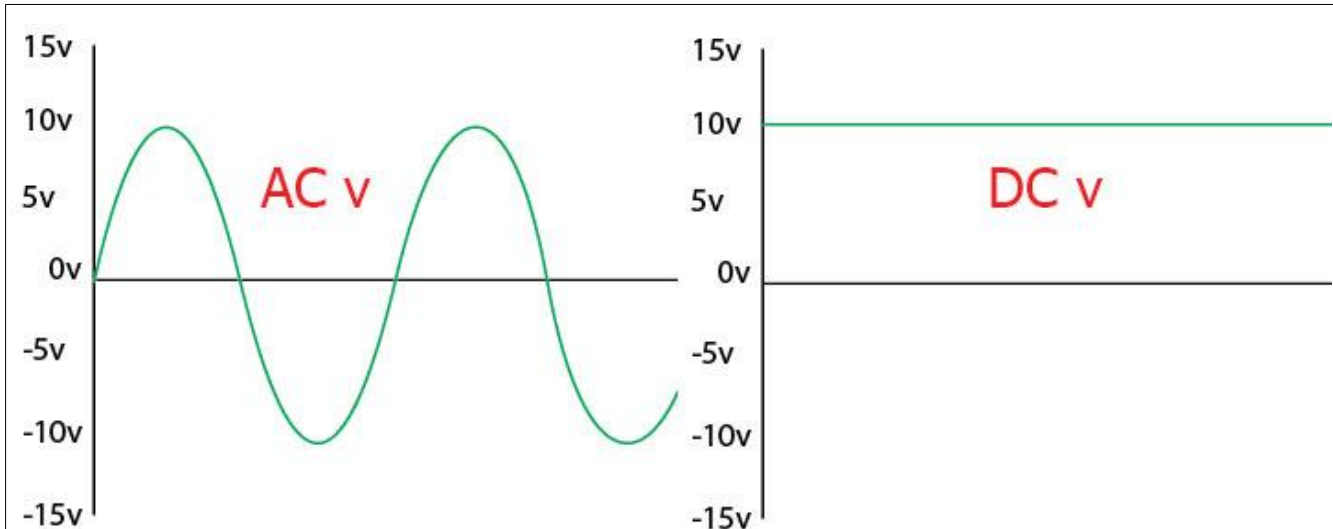


Fig. 5: AC signal vs a DC signal – Note voltage 0 v reference line

track. To measure, you should have two probes (one black, one red). Place a probe on each rail for two rail layouts. For 3-rail tracks place one probe on the wheel rail, and the other on the center rail. Turn the speed up or down and you will see the voltage level change accordingly.

The difference between an analog AC voltage graph and a DC voltage graph is shown in (Fig. 5):

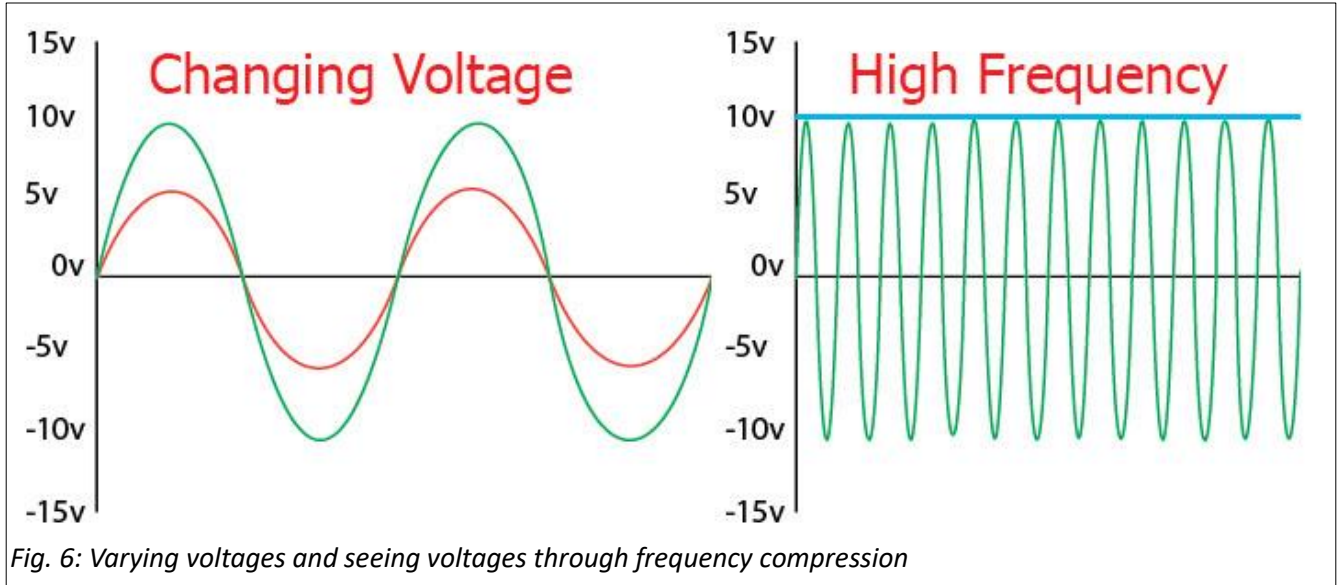


Fig. 6: Varying voltages and seeing voltages through frequency compression

The AC power will shift equally between a positive and negative voltage (green line), whereas the DC voltage is constant at a positive voltage. In this sense, you may still find the AC power graph difficult to understand how it relates to power output. This is because the simple graph does not always show power adjustments and the frequency (sweep between pos and neg).

In Fig. 6, I illustrate a change of voltage between a 5v and a 10v AC reading (red and green graph). This will make more sense when you condense the graph to represent the frequency of sweep more accurately [typically 50 or 60 cycles per second (up and down) in common household power supplies]. I also compared it to a DC power line graph to show how the increased frequency can be more linear (as the DC line).

Going Digital with AC and DC

While I mentioned the frequency in the previous section (50-60 cycles per second), a digital system breaks down each cycle into even more divisions. Each point in the cycle will be represented by a value, because when you go with digital, you are talking numbers and a numbering system can represent a curve. In Fig. 7, I break down an AC cycle into segments which can be represented by the voltage markings on the graph. You can compare the analog vs digital representation.

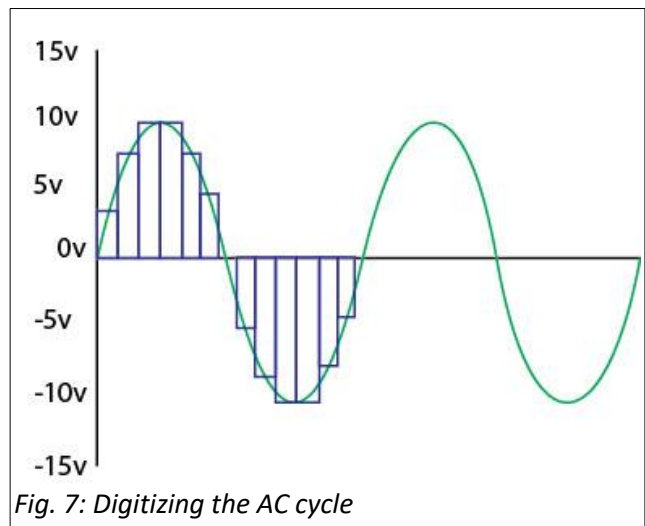
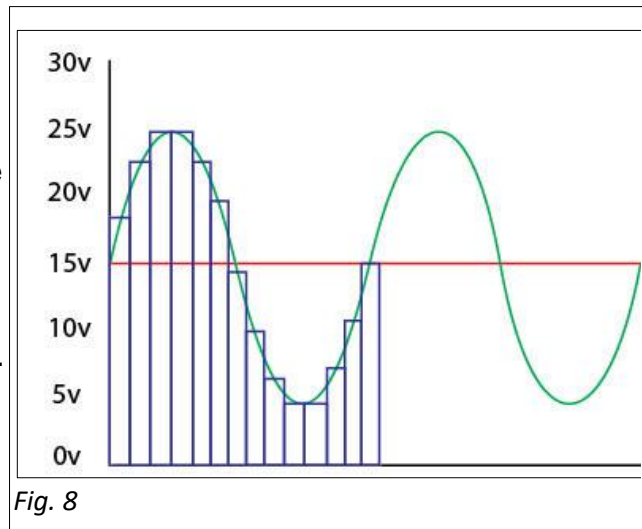


Fig. 7: Digitizing the AC cycle

I want to point out that this is a digital AC line and does not represent any sort of 'digital command code'. Think of the DC line as a digital signal without code, all the values would be the same. When you include command code, the DCC (digital command) blocks would have varying steps. The same would apply to digital AC. It just does not really need an illustration if you can imagine how the DCC signal would not be a straight line.

The problem with the straightforward digital AC signal that is represented in Fig. 7, is that you cannot have negative (-) voltages in a digital system, yet AC is defined by alternating currents between positive and negative voltage. The solution is to change the reference point that the AC is measured upon. In Fig. 7 the reference is 0 v.

If we were to add a 15v DC voltage to all points of our AC graph (I call this a DC base, but then I am just a layman), then you can properly represent a graph of an AC signal using all positive voltages. This is shown in Fig. 8. I have represented the base of 15 v in the red line, and I have shifted the digital AC signal into levels from the 0-v line. So, we now have a digital AC signal that is based on a 15-v reference (as opposed to 0-v analog reference).



Trying to apply your multimeter to measure voltages will never give you solid figures in a digital layout, because an AC voltage setting will give you a fluctuating DC voltage level. And the DC voltage setting is going to fluctuate wildly with code and the AC variance. The best you can hope for in most cases is to get a general idea of if you are getting voltage at all. And, if it is consistent around the layout.

Hopefully, this article has cleared up your level of understanding in your use of a Digital Multi Meter around the layout. It is indeed powerful in troubleshooting for problems around the layout, but do not try for accurate measurements of your system. Even a basic meter will help you out sufficiently. If you do seek advice on purchasing one, I recommend getting one with a continuity test w/ sound.

Cheers!
Curtis Jeung

Upcoming appearances:

Märklin Digital Webinar #11
Basic Event Script for the CS3
April 14th 11:00 – 1:00 PST
Login details will be emailed

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