Bill Thrasher on Patch-Bay Wiring

We have a unique wiring detail for our projects in which the client wants to have all the microphone receptacles patchable into the mixing console inputs, and I think (or hope?) that I will be happy(?) to share it with you all. I must however take the time to explain a couple of the problems and beliefs that lead me to develop this detail:

1. We NEVER, NEVER, NEVER, NEVER allow microphone phantom (simplex) power across an audio patch bay jack. Over time, we found that the arcing & sparking created during patching caused the patch bay jacks & patch cord plugs to become intermittent and very noisy (pops, crackles, & explosions from any physical movement of patch cords, vibration, etc.) and subsequently the clients have wanted and a couple of times have actually had the patch bays removed from the system due to the severity of these problems.

We resolved this problem by always designing a passive microphone level transformer "splitter" ahead of the microphone receptacles patch bays, and we apply microphone phantom power to the receptacles on the primary side of the transformer. We never use the direct output(s) of such splitters to feed patch bays, only transformer isolated outputs feed patch bays. We normally leave the direct outputs unused and not connected to anything. We then turn the master phantom power OFF at the consoles, since it is not longer required. Yeah, I know that this problem can also be solved by teaching, training, and requiring the operator/engineer to turn the phantom power off before patching, but will they really always remember to do that, and then will they always remember to teach their replacements (and then they their replacements, and so on) to do the same?

2. I am a hard-core fanatic about having a patch bay (as well as an overall) grounding scheme that provides rock solid consistency. Again, my experience was with working with some patch bay wiring schemes during my employment at Walt Disney World that provided for a change in the system grounding scheme with each and every patch cord insertion. New ground pathways were created by the shield connections thru the patch bay, and sometimes the system would go absolutely crazy (hum, buzz, oscillations, & etc.), due to the patching configuration of a particular show. NOT A VERY GOOD PLAN! First, we design the system to have no (that is, zero) unbalanced audio feeds to or from a patch bay (everything patchable must be balanced or floating in or out). Second, we require a heavy wire or "buss" between the sleeves of all of the jacks in the patch bay, and these buss' are tied together and tied in multiple places to the overall system technical ground in the equipment rack. Third, we treat the patch bays like any other piece of audio equipment, that is by tying the shields at the "inputs" (from a signal source) and lifting the shields at the "outputs" (to a input or load).

3. If the transformer splitter has more than one output (secondary) winding, then we require each of these secondary windings to be terminated, as if they were patched to a console input. This is primarily done to prevent any potential signal level changes based on the number of consoles that are actually patched from any mic receptacle (due to division of power between loads). Our experience was that the house sound engineer would patch up a show, do a rehearsal or sound-check, and then the broadcast sound engineer would afterwards patch in his console, and the levels (and sometimes the frequency response) would shift, causing the two engineers to strongly dislike each other. Yeah, I know that I am reducing the maximum amount of signal (really voltage) that I can get to any single console input (that is, if no other consoles are patched in), but I gain overall consistency in the microphone level signal path. We accomplish this termination by installing two (2) each, 604 ohm, 1% tolerance, 1/4 watt resistors between the two normal lugs (tip normal or TN and ring normal or RN) to the ground (sleeve) buss. This appears to the splitter output to be a 1208 ohm, balanced (center-tap grounded) connection, which we believe best emulates a console microphone input. This is

secondarily done to continually terminate the splitter transformer with it's rated load impedance(s), which we believe makes for the best (flattest) frequency and phase response of this portion of the signal path. We furthermore believe that this termination ties any unpatched (therefore floating) microphone signal wiring to ground (thru the center-tap of the transformer), thereby reducing any possibility of that wiring acting as an antenna, and back-feeding the transformer.

4. Lastly, since we have already used the "normal" connections of the patch jack for the termination resistors, we typically do not allow for "normal" connections of any microphone receptacles to console inputs, but rather we require that the operator/engineer always (consistency again) install a patch cable in order to get a microphone signal from a receptacle to a console input. Our experience was that over time, no one associated with the system could remember exactly which receptacles were normalled to exactly which inputs anyway, and therefore such normals eventually became meaningless. In some systems however, we have needed to hard-wire (that is, not be "patchable") the signal from certain microphone receptacles to a secondary mixer input (again, not patchable) for unattended operation or some other use, and we would then feed this hard-wired mixer from the unused direct output of the splitter. Again, once we have the wiring all installed and any potential grounding problems resolved, the system grounding will not change due to patch changes.

5. Yes, for my critical friends, this plan prevents the operator/engineer from using microphone receptacles for anything except microphone level signals (which would include those from "direct" boxes). With this plan, you really cannot patch a line level signal, production intercom feed, SMPTE time code feed, or anything except a microphone level signal into a microphone receptacle, WHICH YOU SHOULD NOT BE DOING ANYWAY! This plan forces you to keep the low level (microphone) signals segregated from the higher level signals (what a concept!). We normally provide independent line level receptacles ("tie-lines"), intercom system receptacles, and etc. for all these other things.

I know that there will be some persons in our community that would and will violently disagree with this concept and our techniques, but we have found this concept to give us the consistency and quality that we believe our clientele expects.

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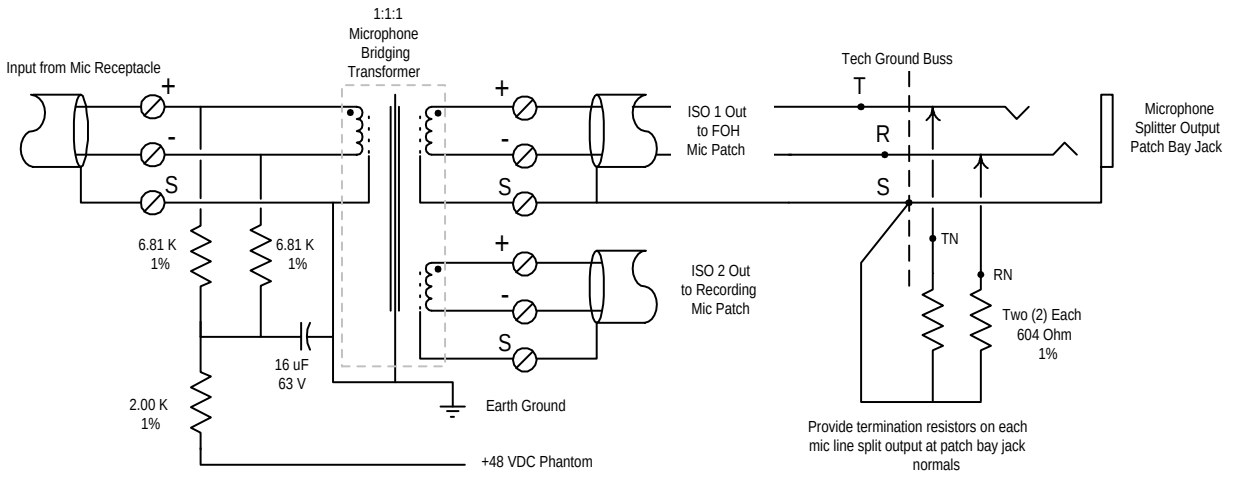
A method that will:

1. Phantom Power a Mic Jack
2. Provide an Isolated Split with Termination at a Patch Bay



courtesy Bill Thrasher