help desk

DMX Debugging | By Wayne Howell

In this fourth Help Desk article I'd like to look at DMX512 fault finding or debugging. You have plugged it all together, switched it on and either nothing works or everything is flickering! Where to start? There are two phases to fault finding: The Sanity Check followed by Divide and Conquer.

So let's invent a simple example to debug: You have a console with a DMX cable connected to the first output. The cable runs to stage where it plugs into a splitter. One of the splitter outputs runs up to the truss where it is connected to six moving lights of a known brand. A second splitter output runs to the front of stage and loops through 10 LED colour changers of an unrecognised brand. You power up: nothing can be controlled by the console . . .

THE SANITY CHECK

This simply means to go through a check list of all the obvious possibilities:

1. Have you actually switched everything on? An un-powered splitter up on the truss will certainly stop things working.
2. Is everything plugged in? Walk from the console along the signal path, check each cable is plugged in and that any data activity indicators are showing the expected state.
3. Is the console loaded with a good show file and patch?
4. Has DMX cable been used? If it is an installation with hidden cable paths, then go and check. Once I discovered the contractor had installed mains cable for the DMX.
5. Have the terminators been forgotten. Check the very end of each DMX run to ensure there is a termination.
6. Any double terminations? Some products have a terminate switch and a loop connector. If you switch on termination and also plug in a terminator, it will overload the DMX signal.
7. Have you exceeded the max limit of 32 fixtures per cable? This can happen if you inadvertently plug a fully-loaded DMX cable into the loop out of a splitter, rather than a true output.
8. Is it just those unknown colour changers that are flickering? They may be borderline DMX512 compatible, try setting the console to output DMX at a slower refresh rate.
9. Are you seeing flicker with a regular repeat rate of two to five seconds? These fixtures are probably RDM incompatible. The console may have the ability to turn off RDM. If not, try moving your fixture start addresses up to high values. This trick often works as RDM packets are usually shorter than standard DMX packets.

DIVIDE AND CONQUER

If the Sanity Check didn't resolve the problem, it is time to Divide and Conquer. This simply means to break this system down into ever smaller sections and check the functionality of each section. There is one thing to remember before you start: only ever change one thing at a time. If you break that rule, then you will never be sure which change fixed the problem!

1. The first division is to unplug the DMX cable from the console. Plug a DMX tester (there is no excuse not to own one - an entry level tester costs around £60) into the output of the console - is there good data?
   a. Yes: Move on to the next division.
   b. No: The problem is at the console. Check the console programming, patch and setup.
2. Plug the DMX cable back into the console, walk to the stage and unplug the DMX from the splitter. Connect your DMX tester to the cable. Is it showing exactly the same as in step 1?

a. Yes: The main DMX cable to stage is good. Go to step 3.
   b. No: fault is in the main DMX cable - repair it or swap it out.
3. Now unplug the terminator from the splitter's loop connector. Plug the DMX tester into the loop connector. Is it showing exactly the same as in step 1?
   a. Yes: We know the splitter input and loop connection is not the problem, so continue to the next division.
   b. No: The fault is in the splitter input stage. Check for broken or damaged connectors - if it is not that, then you have a damaged splitter which needs repair or swap out.
4. Now connect the DMX tester to one of the spare outputs of the splitter. Is it showing exactly the same as in step 1?
   a. Yes: We know the splitter is functioning, so go to step 5.
   b. No: The splitter has been damaged. It will need to be repaired and/or swapped out. But first check the DMX cables with a meter for AC or DC voltages above 5V. It may be that the splitter was electrocuted by a fault on one of the fixtures. If that is the case, then simply swapping out the splitter would result in killing a second one. The metering tests should be carried out very carefully: conceivably the fault could be caused by a hazardous voltage.
5. At this point, we know the console, the main DMX cable and the splitter are functioning. It is possible for a splitter to function on some outputs while having sustained damage on other outputs - one purpose of a splitter is to compartmentalise damage in this way. Disconnect the first output cable and connect the DMX tester to the first output. Is it showing exactly the same as in step 1?
   a. Yes: We know that splitter output 1 is functioning. Duplicate the test on output 2 and if the result is the same, move on to step 6.
   b. No: The splitter's first output has been damaged. It will need to be repaired and/or swapped out. But first meter the cable as described above. Also, do not be tempted to plug the DMX cable into the next free output of the splitter - if you do have a fault downstream you may just cause more damage.
6. Now we know the console, the main DMX cable and the splitter are functioning and that all the DMX outputs of the splitter are functioning. So, we conclude that the problem is in one of the DMX cables or fixtures downstream of the splitter. Leave the second splitter output disconnected and focus attention on the first output. Go to the first fixture and disconnect the cable that is connected to the loop output. Connect the DMX tester to the loop output of the fixture. Is it showing exactly the same as in step 1?
   a. Yes: We know that the DMX cable and fixture pair are good. Duplicate this test for each cable fixture pair - working away from the splitter. Do the same for the second output of the splitter.
   b. No: The fault is either in the preceding DMX cable or fixture. Isolate which and repair or swap out.

By now, you will have either solved the problem or have lost the will to live. If the latter, keep in mind that you have proven the DMX connectivity is good. So try an alternative source of DMX in place of the console - it's possible that it is not outputting what you thought!

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FURTHER READING

For more information, check out the following books: *Recommended Practice* by Adam Bennette, and *Control Freak* by Wayne Howell. ⊗

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