Problem Report PR-005

HW part: HW0001

HW rev: R002

SW rev: 2021-04-09

Test record: 20210409-Cakewalk session.sal

Test record: 20210410-Piano and Cakewalk Session.sal

Description: Some MIDI data is not recognized by synthesizers.

Steps to reproduce the problem

1. Connect piano input to MIDI IN 2
2. Connect PC output to MIDI IN 3
3. Connect PC input to MIDI THRU 2
4. Connect synth input to MIDI OUT 2
5. Turn on piano
6. Record data on channel 1 (Cakewalk)
7. Record data on channel 2 (Cakewalk)
8. Playback data (Cakewalk)

Expected results:

1. None
2. None
3. None
4. None
5. Synthesizer should change program to Piano 1, but no effect was observed.
6. None
7. None
8. Synthesizer should playback sound, but note commands are consistently missed.

Investigation notes

2021-04-09: testing with the Saleae logic analyzer shows that in a SysEx sequence (0xE0 from Cakewalk), the 0x00 bytes (and only the 0x00 bytes) do not transfer to the output. Since these sequences register correctly in the previous software version, it’s not the Rx interrupt. Need to look into the algorithm for 0x00 bytes.

2021-04-10: I attempted to update the software to include a state machine that should address the issue. I still get the same type of behavior. See 20210410-Piano and Cakewalk Session.sal. In studying this measurement, it looks like the input is incorrectly sent to the output. It’s possible this is a hardware issue or a measurement issue.

2021-04-11: I realized that by loading the output with the synthesizer, it is not a valid measurement to look at the output of the amplifier. I re-ran the last test with the logic analyzer looking at the loaded and un-loaded outputs. Sure enough, the unloaded output matches much more of the inputs. I still don’t understand why the algorithm is dropping data with 0x00 in it. I’ll have to study this closer.

2021-04-17: I tracked the issue down to software defects in the state machine. Now the state machine is working, and the MIDI router is able to successfully route messages from all inputs to all outputs. With the caveat, of course, that the fourth channel is disabled to allow messages to be channeled through the MCU.