



03-028E
18 October, 2012

TROUBLESHOOTING THE I²C BUS

I. PURPOSE:

To go through the analyzer systematically and locate which board is bringing down the I²C bus

II. TOOLS:

None

III. PARTS:

Service Note 02-032

III. PROCEDURE:

1. If you have an I²C bus failure you may see the display read invalid characters, it will be locked up, blank, just a cursor in the upper left hand corner and/or the LEDs on the relay board will all be off.
2. Before you get started you will need to check the 5VDC power. To check the 5VDC power, refer to Teledyne API Service Note 02-032A
3. The important part of troubleshooting the I²C bus is to know where it goes in the analyzer you are working on. The illustrations in the following pages outline the I²C path for models 100, 200, 300, 400, 700, and 703 E and T series instruments.
4. Another important part of trouble shooting the I²C bus is to observe the flashing bright blue SDA LED (DS5) and SCL LED (DS7) on the motherboard. Watch these LED's and make sure that they are blinking at a steady pace. If these LED's are blinking, it means that the CPU is operating correctly. If these LED's are not blinking at a steady constant rate, either the CPU board, motherboard, or cables are bad or there is a problem in the software.
5. If the unit has failed in this manner you first need to turn off power to the unit and reseal all of the cables going to the motherboard. Turn the unit back on and see if it remedies the problem. If it does not, turn the power back off and remove the CPU from the motherboard and wait 2 minutes. Then, reinstall the CPU back onto the motherboard and see if it fixes the problem. If it doesn't, you will need to swap out either the DOC/DOM on the CPU, the entire CPU assembly, or Motherboard to find the problem part.
6. If the DOC/DOM, the CPU or Motherboard isn't the problem, start trouble shooting the I²C bus by unplugging the connectors in reverse order. Remember to power down the analyzers before connecting / disconnecting any electronics and/or power cables. After each step observe the display and the relay board. If you unplug the faulty board when the I²C bus is operating, you will see the LEDs on the relay board either go on or flash on and off, or the display will begin to function normally. The bright red Watchdog LED (D1) on the relay board must be toggling every 5-10 seconds or something is wrong with the I²C bus.

The following are the steps to take for each of the analyzers to determine which board is bad.

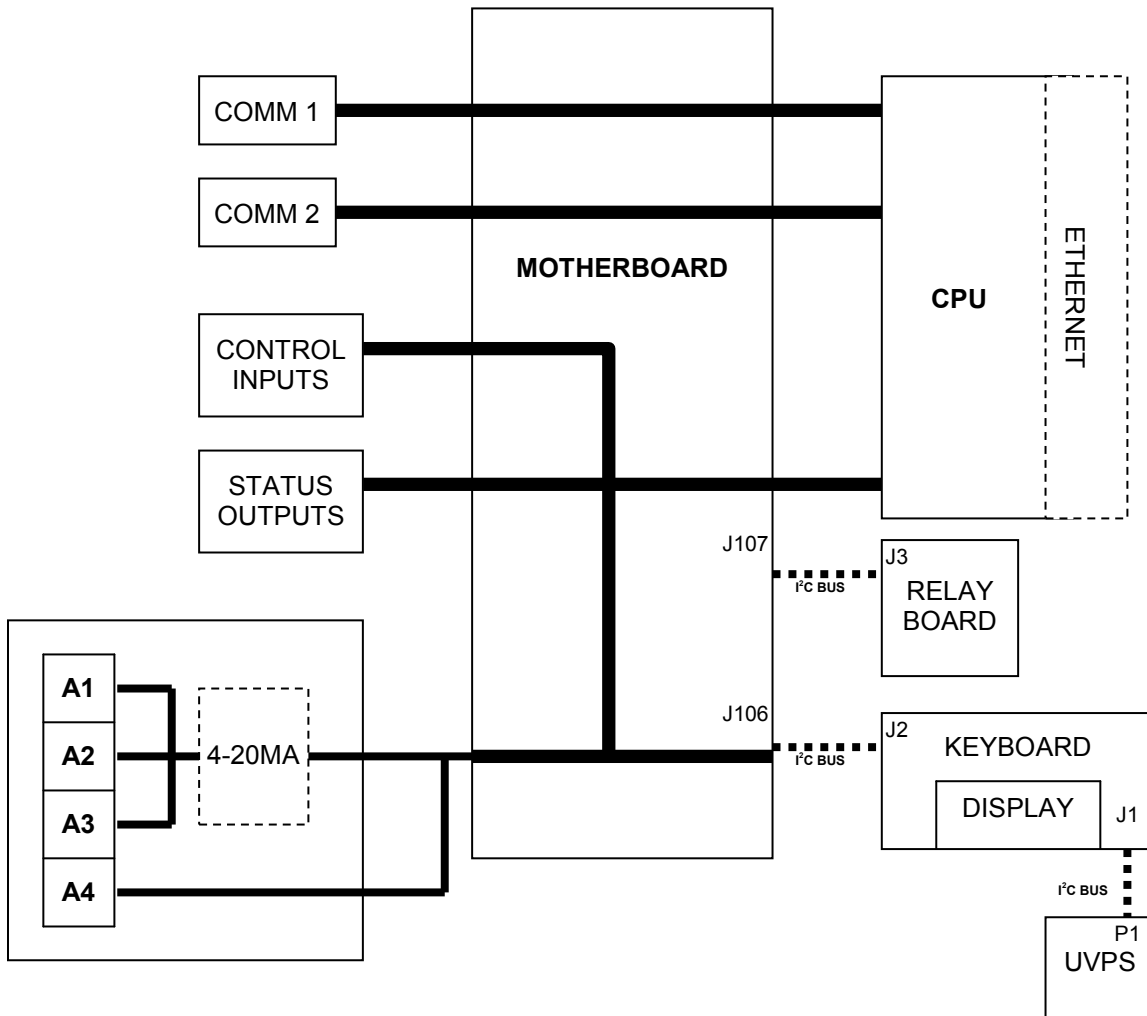
M100E

CPU → Motherboard (J106) → Keyboard (J2) → Keyboard (J1) → UVPS (P1)

CPU → Motherboard (J107) → Relay board (J3)

1. Unplug P1 on the UVPS board, and wait 2 minutes. If the LEDs on the relay board stay off then the UVPS board is not the problem. Plug P1 back in to the UVPS board.
2. Unplug J2 on the Keyboard and wait 2 minutes. If the LEDs on the Relay Board stay off then the keyboard is not the problem. On the Keyboard plug J2 back in.
3. Unplug J3 on the Relay Board and wait 2 minutes. If the front panel does not begin to function normally then the relay board is not bad.
4. The only other components that will pull down the I²C bus are the Motherboard, or the cables. Replace each in turn with a known good spare to determine which part is the problem.

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T100

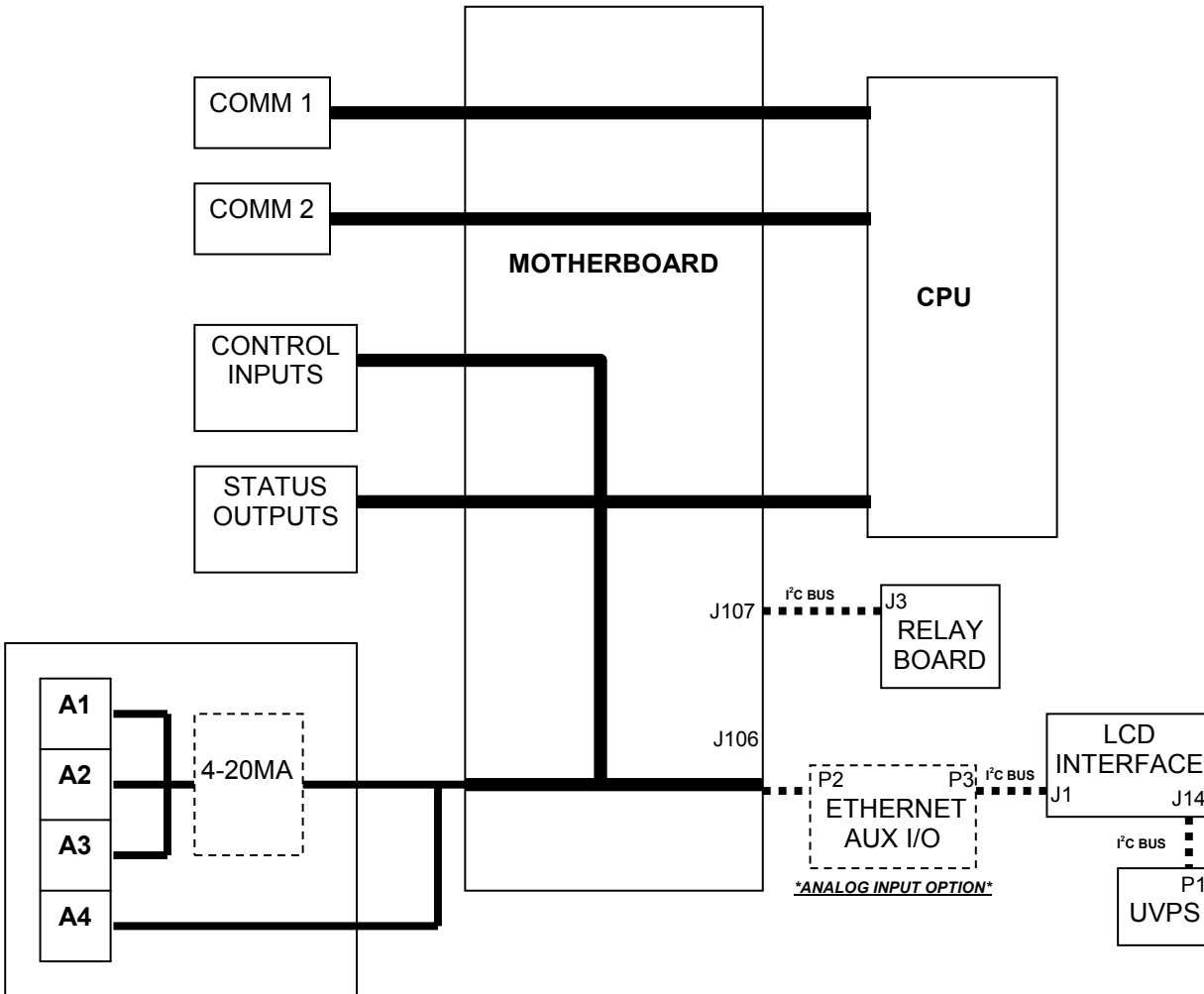
CPU → Motherboard (J106) → [*Ethernet-Aux I/O board (P2) → Ethernet-Aux I/O board (P3) →]

LCD Interface (J1) → LCD Interface (J14) → UVPS (P1)

CPU → Motherboard (J107) → Relay board (J3)

1. Unplug P1 on the UVPS board, and wait 2 minutes. If the LEDs on the relay board stay off then the UVPS board is not the problem. On the UVPS board, plug P1 back in.
2. Unplug J1 on the LCD Interface and wait 2 minutes. If the LEDs on the Relay Board stay off then the LCD Interface is not the problem. Plug J1 on the LCD Interface back in.
3. If the Analog Input option is installed unplug P3 on the Ethernet-Aux I/O board and wait 2 minutes. If the LEDs on the relay board stay off then the UVPS board is not the problem and plug P3 back in.
4. Unplug J3 on the Relay Board and wait 2 minutes. If the front panel does not begin to function normally then the relay board is not bad.
5. The only other components that will pull down the I²C bus are the Motherboard, the cables, or if the Analog Input option is installed the Ethernet-Aux I/O board. Replace each in turn with a known good spare to determine which part is the problem

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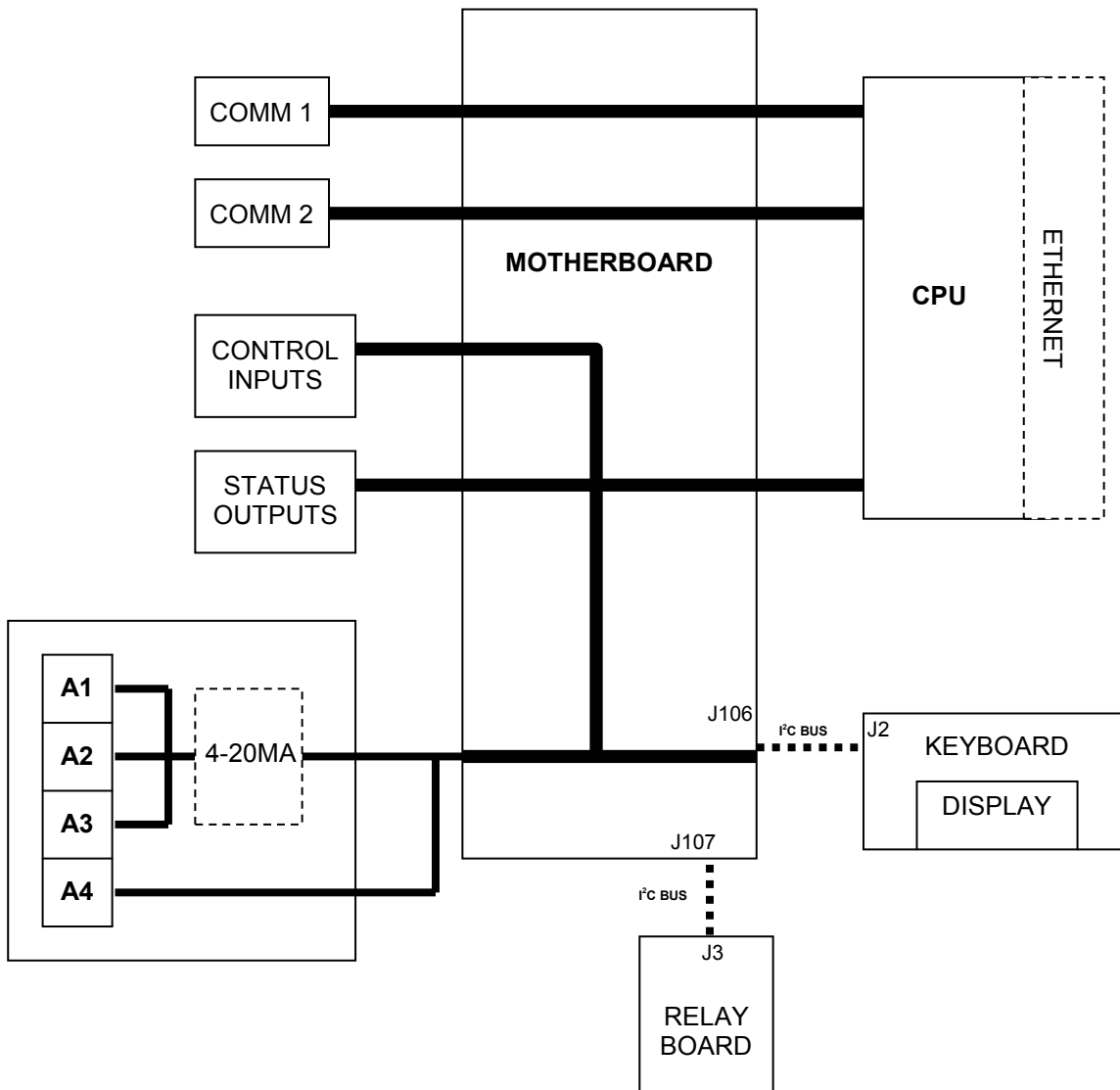
M200E

CPU → Motherboard (J106) → Keyboard (J2)

CPU → Motherboard (J107) → Relay board (J3)

1. Unplug J2 on the Keyboard and wait 2 minutes. If the LEDs on the Relay board stay off then the keyboard is not the problem. On the Keyboard plug J2 back in.
2. Unplug J3 on the relay board and wait 2 minutes. If the front panel does not begin to behave normally then the relay board is not bad.
3. The only other components that will pull down the I²C bus are the Motherboard, or cables. Replace each in turn with a known good spare to determine which part is the problem.

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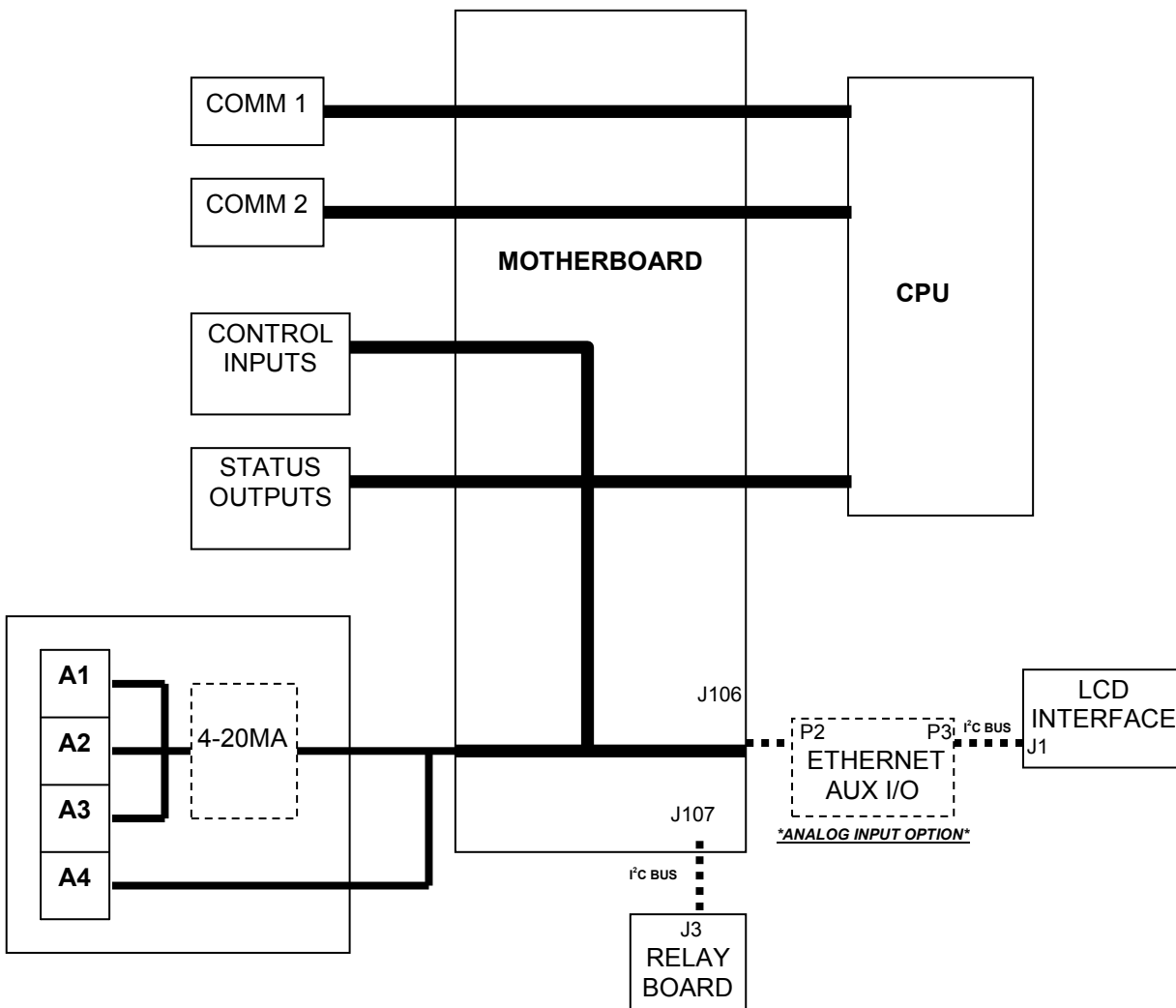
CPU → Motherboard (J106) → [*Ethernet-Aux I/O board (P2) → Ethernet-Aux I/O board (P3) →]

LCD Interface (J1)

CPU → Motherboard (J107) → Relay board (J3)

1. Unplug J1 on the LCD Interface and wait 2 minutes. If the LEDs on the Relay Board stay off then the LCD Interface is not the problem. Plug J1 on the LCD Interface back in.
2. If the Analog Input option is installed unplug P3 on the Ethernet-Aux I/O board and wait 2 minutes. If the LEDs on the relay board stay off then the UVPS board is not the problem and plug P3 back in.
3. Unplug J3 on the relay board and wait 2 minutes. If the front panel does not begin to behave normally then the relay board is not bad.
4. The only other components that will pull down the I²C bus are the Motherboard, the cables, or if the Analog Input option is installed the Ethernet-Aux I/O board. Replace each in turn with a known good spare to determine which part is the problem

T200 I²C BUS



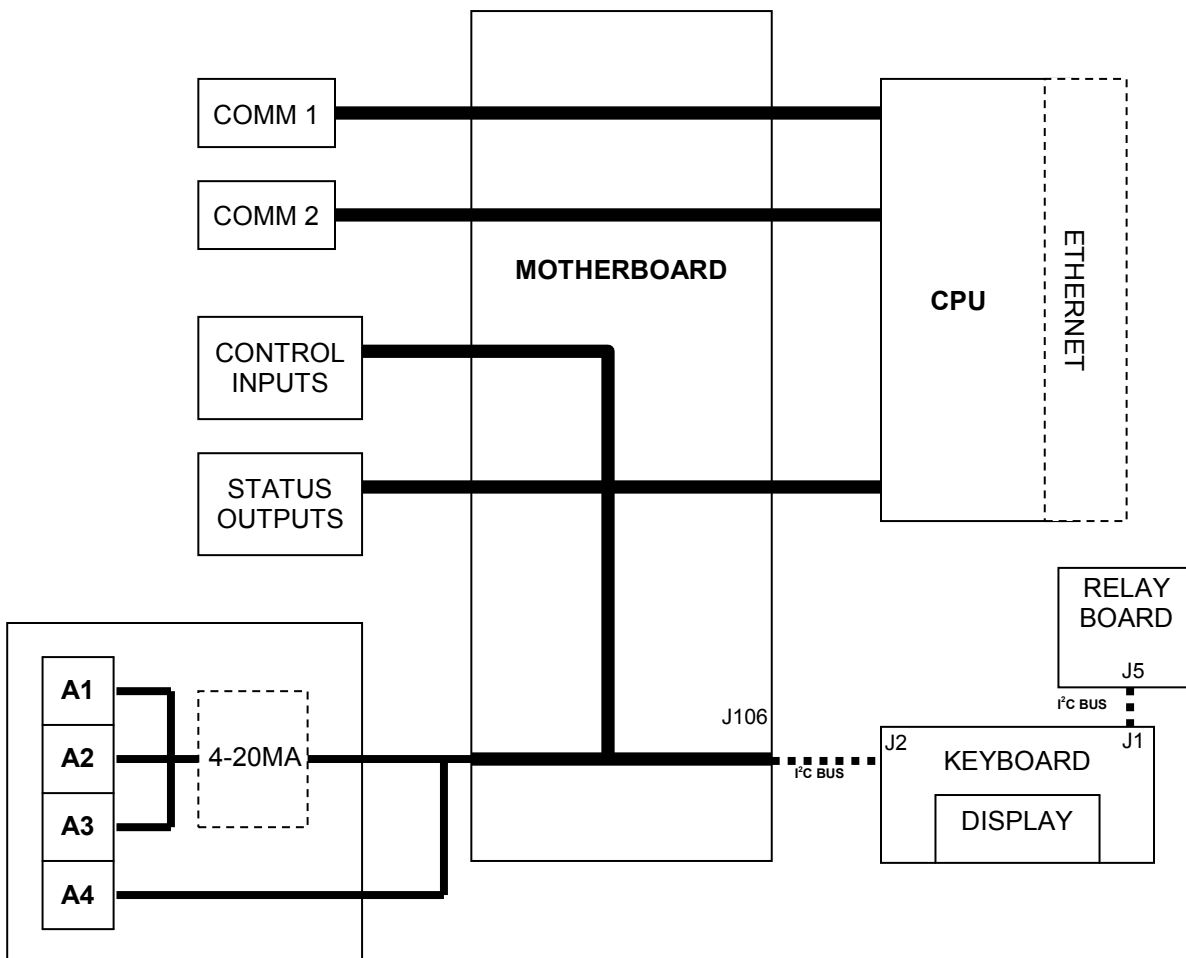
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M300E

CPU → Motherboard (J106) → Keyboard (J2) → Keyboard (J1) → Relay board (J5)

1. The M300E is a little tricky to troubleshoot because of the route that the I²C bus takes. First unplug J5 on the relay board if the display still doesn't work then the relay board is not the problem, and plug J5 back in.
2. You will now have to turn off the power and swap keyboards with a known good keyboard. Turn the power back on and see if the I²C bus is still down.
3. The only other components that will pull down the I²C bus are the Motherboard, or cables. Replace each in turn with a known good spare to determine which part is the problem.

M300E I²C BUS



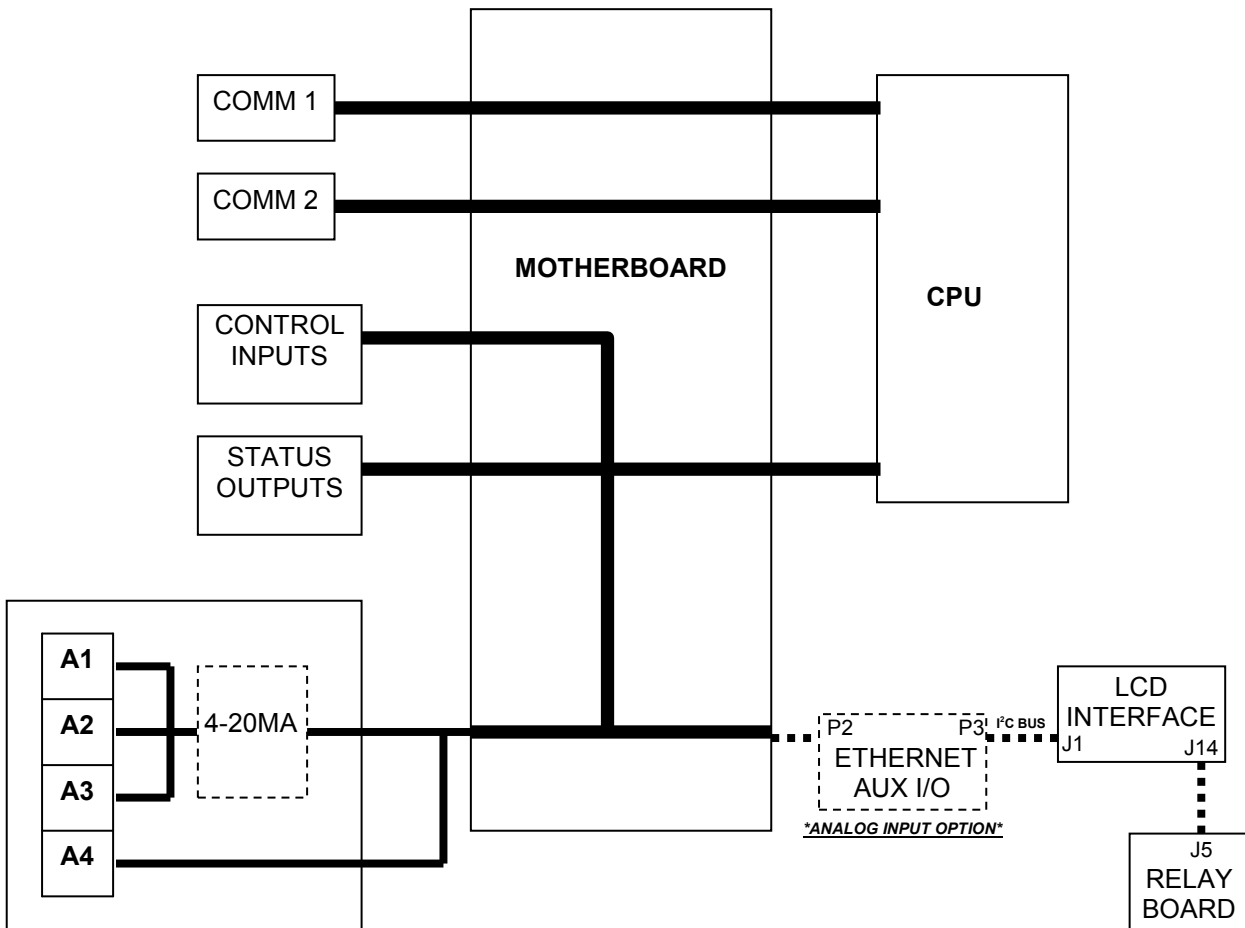
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T300

CPU → Motherboard(J106) → [*Ethernet-Aux I/O board(P2) → Ethernet-Aux I/O board(P3) →] LCD Interface(J1) → LCD Interface(J14) → Relay board(J5)

1. The T300 is a little tricky to troubleshoot because of the route that the I²C bus takes. First unplug J5 on the relay board if the display still doesn't work then the relay board is not the problem, and plug J5 back in.
2. You will now have to turn off the power and swap LCD Interface with a known good spare. Turn the power back on and see if the I²C bus is still down.
3. The only other components that will pull down the I²C bus are the Motherboard, the cables, or if the Analog Input option is installed the Ethernet-Aux I/O board. Replace each in turn with a known good spare to determine which part is the problem.

T300 I²C BUS



M400E (M700E, M703E)

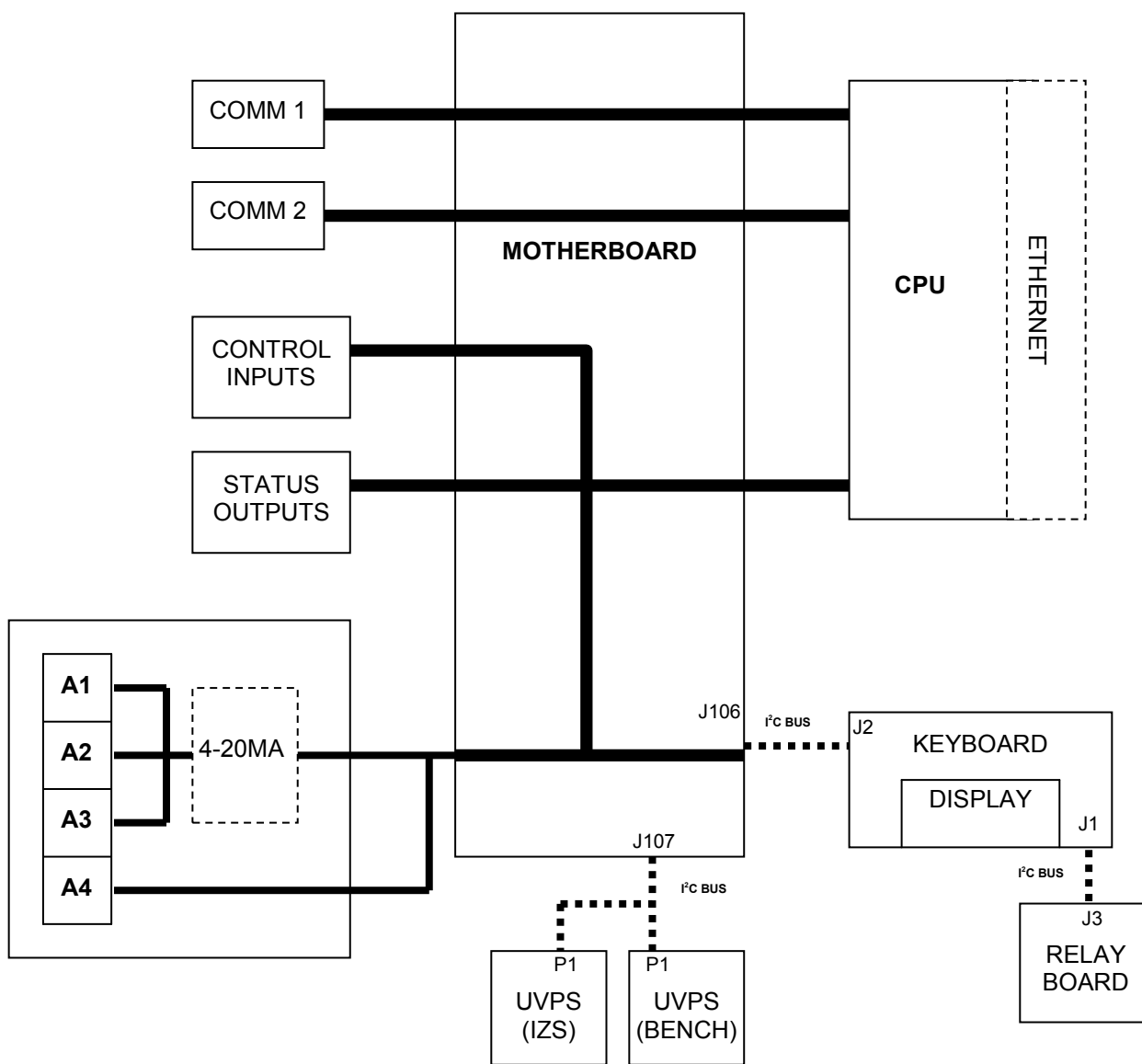
CPU→Motherboard (J107) →Bench UVPS (P1) →O3UVPS (P1)

CPU→Motherboard (J106) →Keyboard (J2) →Keyboard (J1)→ Relay board (J3)

For the M700E and M703E, please follow the instructions below as the I²C components are identical. *If your M700E does not have the ozone/Photometer option, ignore the steps for disconnecting the UVPS connectors.

1. Unplug J3 on the relay board and wait 2 minutes. If the keyboard does not come back on then they relay board is not bad. Plug J3 back in on the relay board.
2. If you have IZS installed in the analyzer unplug P1 on the UVPS for the Ozone Gen Tower and wait 2 minutes. If the LEDs on the relay board stay off then your UVPS for the Ozone Gen Tower is not the problem. Plug P1 on the UVPS back in. Repeat this step for the UVPS for the bench lamp
3. You will now have to turn off the power and swap keyboards with a known good keyboard. Turn the power back on and see if the I²C bus is still down.
4. The only other components that will pull down the I²C bus are the Motherboard, or cables. Replace each in turn with a known good spare.

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T400 (T700, T703)

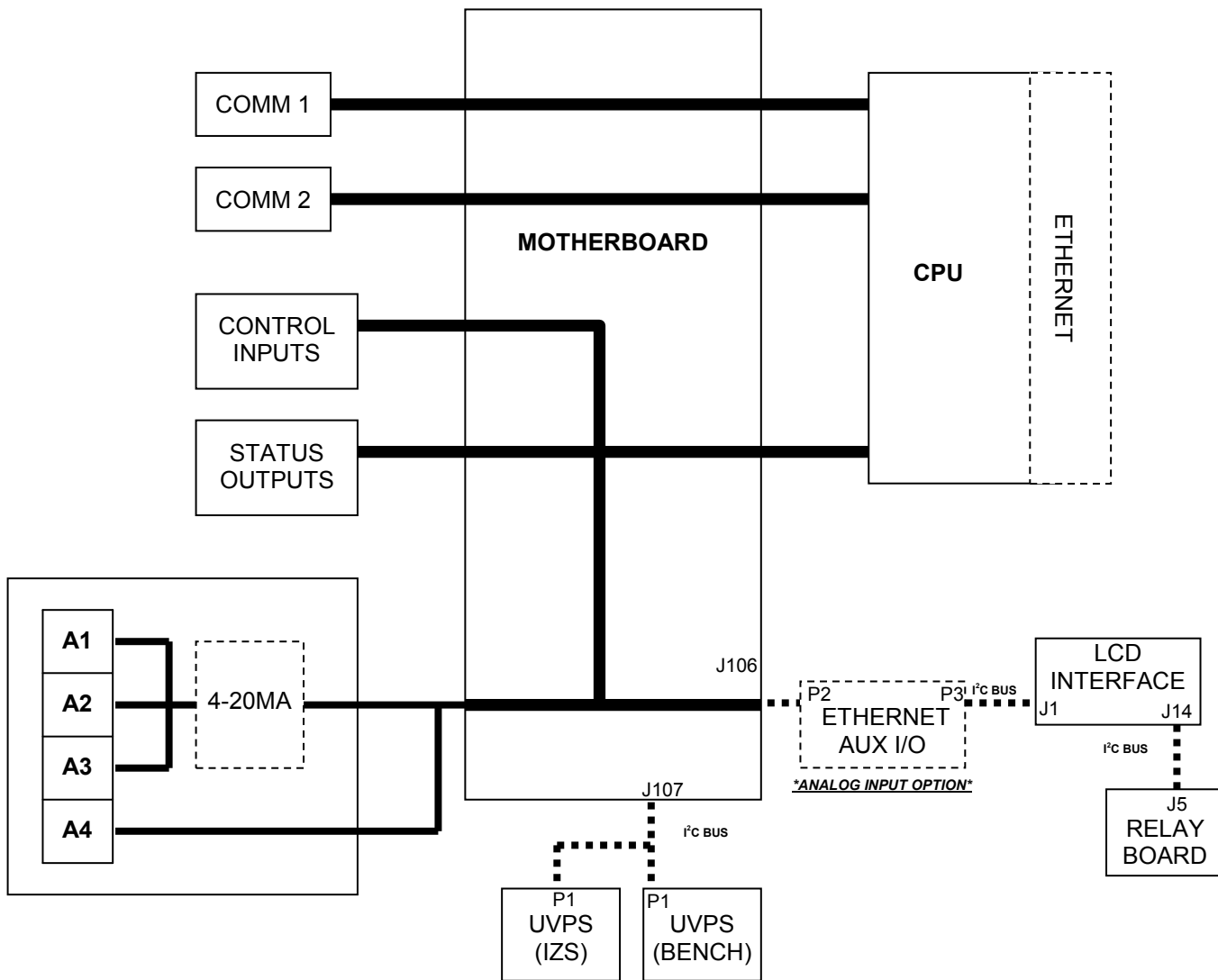
CPU → Motherboard (J107) → Bench UVPS (P1) → O3UVPS (P1)

CPU → Motherboard (J106) → [**Ethernet-Aux I/O board (P2) → Ethernet-Aux I/O board (P3) →*] LCD Interface (J1) → LCD Interface (J14) → Relay board (J3)

For the T700 and T703, please follow the instructions below as the I²C components are identical. *If your T700 does not have the ozone/Photometer option, ignore the steps for disconnecting the UVPS connectors.

1. Unplug J3 on the relay board and wait 2 minutes. If the keyboard does not come back on then they relay board is not bad. Plug J3 back in on the relay board.
2. If you have IZS installed in the analyzer unplug P1 on the UVPS for the Ozone Gen Tower and wait 2 minutes. If the LEDs on the relay board stay off then your UVPS for the Ozone Gen Tower is not the problem. Plug P1 on the UVPS back in. Repeat this step for the UVPS for the bench lamp
3. You will now have to turn off the power and swap LCD Interface with a known good spare. Turn the power back on and see if the I²C bus is still down.
4. The only other components that will pull down the I²C bus are the Motherboard, the cables, or if the Analog Input option is installed the Ethernet-Aux I/O board. Replace each in turn with a known good spare to determine which part is the problem.

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