Core16 Test and Serialize

Document V0.1 (2023-10-04) goes with firmware “Core16_TnS _V0.8.4.uf2”

Program the Raspberry Pi Pico with latest Test and Serialize (TnS) firmware. See Appendix A.

(1) Write Serial Number with thin sharpie or sticker on the back of the Core16 Logic Board.

OK to use last 3 digits only. Write between U7 and U10. This batch of 100 starts at S/N 300006 and goes to 300105.

(2) Program the Core16 Board ID EEPROM with the Serial Number

Start with power off, clamp Core16 Logic Board in the test fixture, power on.
Connect with Serial Terminal at 115200 8N1. LEDs may flash brightly.
Start-up sequence determines if Board ID EEPROM is present and blank.

```
CORE16: Use 's' command to set last three digits of 300xxx
serial number.
```

Examples: **S 6<ENTER>** or **S 105<ENTER>**
Core16 restarts immediately after a valid entry.

(3) Verify I2C Bus Devices are present and

I2C Bus Scan results
Verify I2C SCAN 5 items are present:

```
Device found at address 0x30  (SI7210-B-01, Hall Sensor 1)
Device found at address 0x31  (SI7210-B-02, Hall Sensor 2)
Device found at address 0x32  (SI7210-B-03, Hall Sensor 3)
Device found at address 0x33  (SI7210-B-04, Hall Sensor 4)
Device found at address 0x57  (EEPROM BOARD ID)
```

Depending on the test fixture configuration, there may also be another device if the OLED is connected:

```
Device found at address 0x3C  (SSD1306,DigisparkOLED)
```

(4) Verify power supply is good

INFO DISPLAY: Verify INFO section voltages 5V0 Rail = 5.0 ± 0.3 and 3V3 Rail = 3.3 ± 0.1

(5) Test Core Memory Matrix Driver Circuitry

NOT AVAILABLE IN SIMPLE TEST FIXTURE WHEN CORES ARE NOT INSTALLED.
If S/N is >= 300006, it will automatically jump to MODE_CORE_TEST_MANY (#31)
Use the magnetic stylus on the core memory to make sure all pixels respond by lighting up.

(6) Test Hall Sensors

Touch + with stylus to move to next mode, MODE_HALL_TEST (#32)
Verify one LED lights for each magnetic button. With each stylus touch of magnetic button, one of the four corresponding lower row LEDs will illuminate.

(7) Test LEDs

Dwell 2 seconds on “+” magnetic button to go to next MODE_LED_TEST_ALL_RGB (#33).
Verify all LEDs are illuminated in RED, GREEN, BLUE sequence.
Power off and remove Core16 from test fixture.

END OF TEST

APPENDIX A: PROGRAMMING A PICO

Program the Raspberry Pi Pico with latest Test and Serialize (TnS) firmware

Start with power off.
Hold button on Pico, connect Pico USB to computer, release button.
Pico enumerates as Mass Storage device. RPI-RP2 or similar.
Open Mass Storage device and drag-n-drop “Core16_TnS _V0.8.4.uf2” into first level.
File copies over, Mass Storage device disappears, Pico restarts and runs the new firmware.
In normal operation, the Pico LED blinks in heartbeat pattern when powered on and streams information through serial port.
End with power off.

APPENDIX B: IMPLEMENTATION NOTES

case MODE_START_EEPROM

If LogicBoardTypeGet returns UNKNOWN, set MODE_MANUFACTURING_EEPROM_FACTORY_WRITE and break right before LED and Buttons are set-up.

case MODE_START_SEQUENCE_COMPLETE

If LogicBoardTypeGet is Core16 and S/N is between 300004 and 300105,

One more INFO so it’s close to the bottom of the screen.
Change Mode to MODE_CORE_TEST_MANY

case MODE_MANUFACTURING_EEPROM_FACTORY_WRITE

Serial interaction:
Mfg mode splash
Core16 expecting S/N 300006 to 300105.
Request last three digits of S/N.
Add Command Line Handler for undocumented command “S” followed by a number.

The largest value that can be handled with atoi is 65535.

Verify between 6 and 105.
Convert that number back to STRING of three characters to write to EEPROM.
Write everything to EEPROM.
INFO
Prompt user “is it correct Y/N?”
If yes, Set mode to MODE_START_POWER_ON
If no, ask for last 3 digits

If S/N 300001 to 300005 then HWV = 0.1.0 and manufacturer is JLCPCB.
If S/N 300006 to 300105 then HWV = 0.2.0 and manufacturer is TexElec.