GRIDLESS

STANDARD OPERATING PROCEDURES (SOPs)

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MINING INSTALLATION GUIDE

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1.0			

1. Introduction

Only persons listed below, who have been trained on the mining installation and Quality Assurance (QA) procedures, are permitted to conduct installations. Approval by the operational team is mandatory.

2. Training Record

This is a standard operating procedure for installing miners in a mining container. This process is in line with the QA process: to ensure safety, quality and efficiency of the miners.

Date	Procedure	Trainer	Person Completed Training

This procedure aligns with the Whatsminer Guide for the series listed below:

Miner	Corresponding series
Whatsminer	M30s,M30s+, M30s++, M31s, M31s+, M50, M50s, M60, M60s

3. Materials and Equipment

I. Personal Protective Equipment (PPE)

To avoid injury, wear the following during miner handling:

- Gloves (latex/ rubber grip)
- Dust coat
- Earmuffs
- Reflector
- Safety helmet

II. Parts and Consumables List

Ensure you have all the parts and consumables below for installation:

- Miner & C19-C20 power cord
- Mini computer
- Patch cord (3M)
- C19 to UK Power cord
- Rj45
- CAT 6 cable
- Zip ties
- Metallic Rack
- Portable Mifi
- Padlocks

III. Tools Required

Ensure you have all the tools below:

- Crimping tool
- Cutter Pen knife
- Ethernet Cable tester
- Multimeter
- Computer
- Ethernet to USB converter hub

4. Installation Procedure

Process Map:
Preliminary Steps:

- Confirm that the mining container has power and all Power Distribution Units (PDUs) are installed and functioning.

- Ensure all networking equipment (routers, switches, ethernet cables) is properly installed and tested.

- Verify the internet connection for all networking cables.

Step 1: Unboxing the miner.
Time: 30 seconds

- Unbox the miner from its packaged box (Contains 1 miner and a C19- C20 power cord)

- As you unpack from the styrofoam do **NOT** carry the miner while holding on to the fans to prevent damage.

Step 2: Miner Placement
Time: 1 Minute

- Identify the miner model (M30s, M30s+, M30s++, M31s, M50s etc.) indicated on the side.

- Place miners from most to least efficient (M50, M30++, M30S+, M30S, M31S+, M31S) on the rack, from bottom to top.

Some of the things to do when handling a miner are as follows:

- Place the miner on top of the shelf.

- Align miners properly in partition slots to avoid backflow of hot air
- Maintain proper spacing between each miner.

Step 3: Power Connection.
Time: 1 Minute

- Connect the C19 to C20 power cable to the miner.
- Plug the other end into the PDU, ensuring both connections are firm
- Use 3ft or 6ft power cables as needed depending on distance from the PDU.

Step 4: Network Connection
Time: 30 seconds

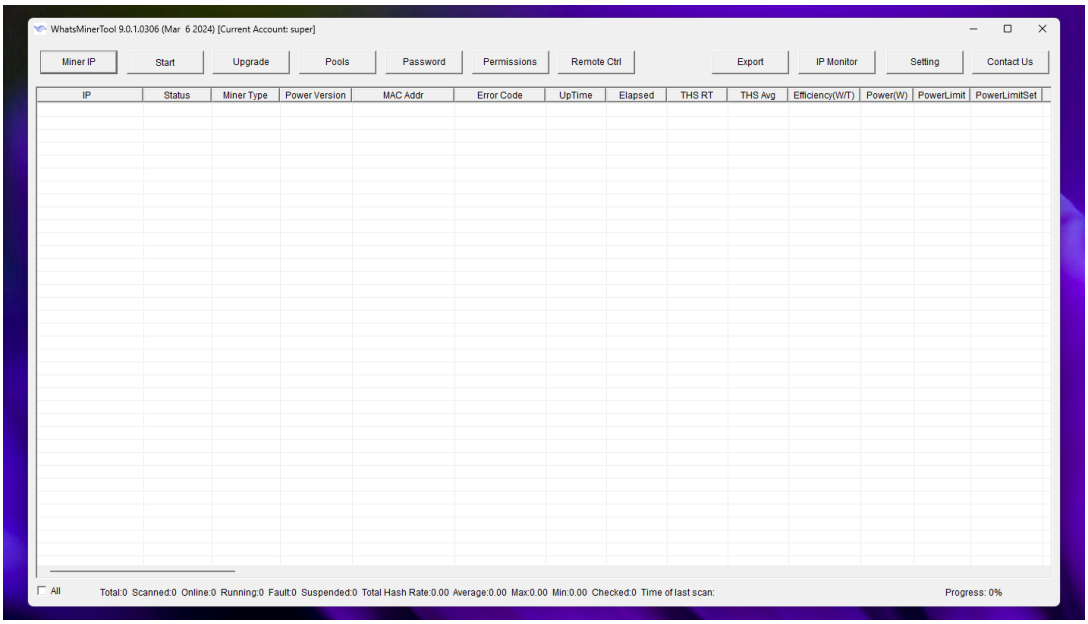
- Insert the ethernet cable into the internet port of the miner, listening for a "click"sound to indicate that it is properly connected.
- Position the ethernet cable on the left side of the power port.

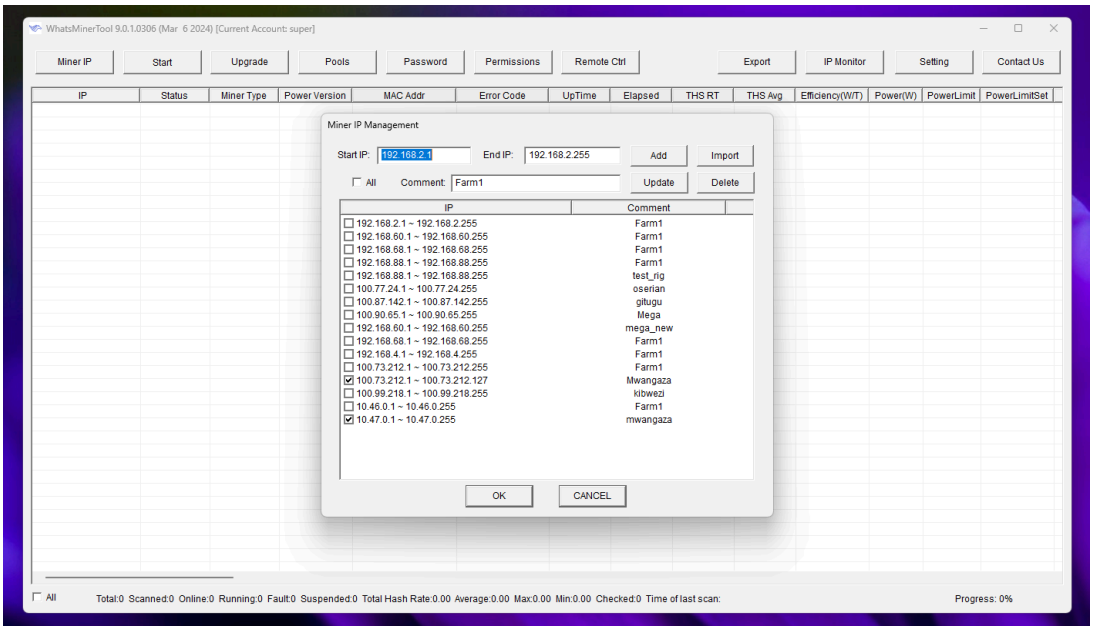
Step 5: Mining
Time: 5 minutes

- Power ON all PDUs by switching the MCB/MCCB to the ON position.
  *They might be on the PDU and also in the control cabinet.
- Gradually turn on PDUs depending on the available power to avoid generator overload.
- The miners will power on automatically (indicated by running fans and blinking LED lights on the ethernet port).
- Coordinate with the power plant operator to manage power surges.

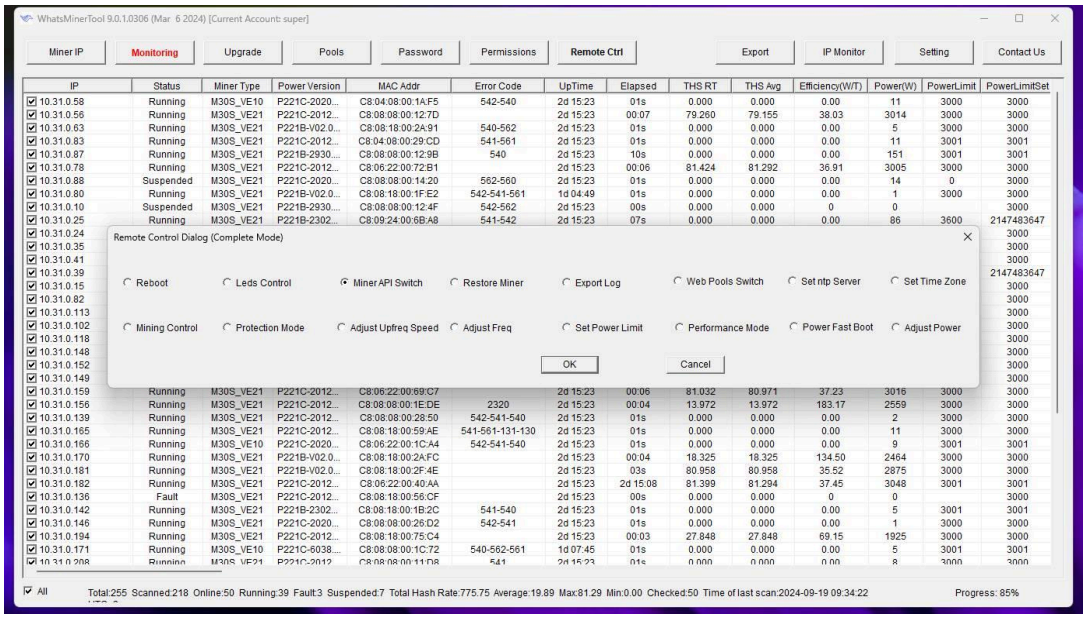
Configure Miners:

- Connect your computer to the same network as the miners.
- Download the **Whatsminer Tool** from the official site.
- Run the tool as administrator, click on the setting button and change the compact mode to "close," and input the miners' IP range then click OK

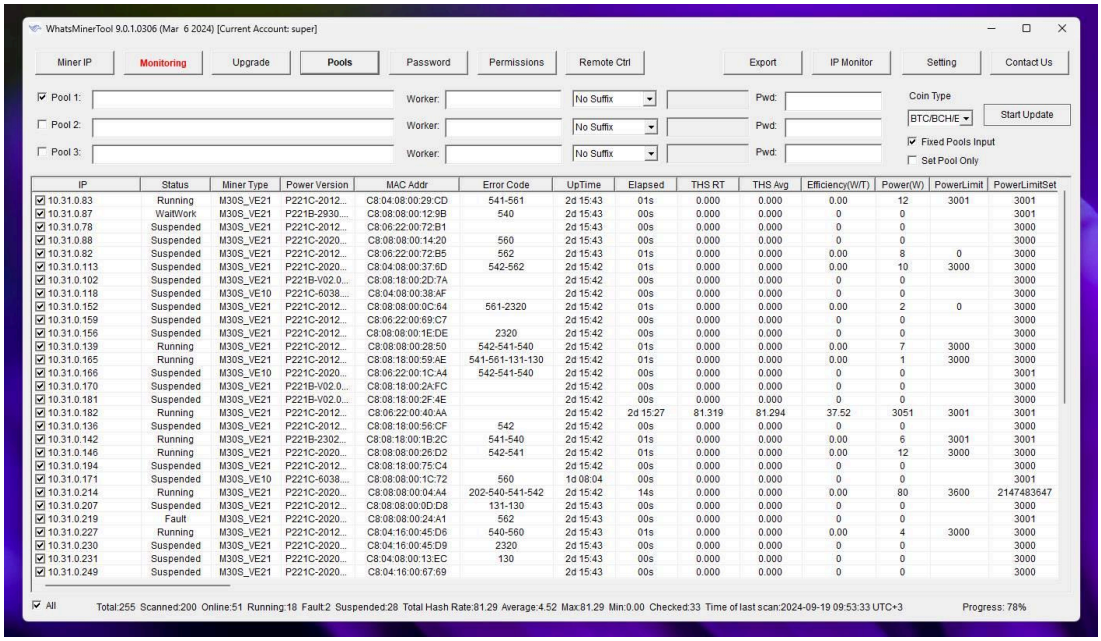




- Start the tool to detect miners connected on the network.
- Check all the miners, then under remote control enable the API and set the power limit.



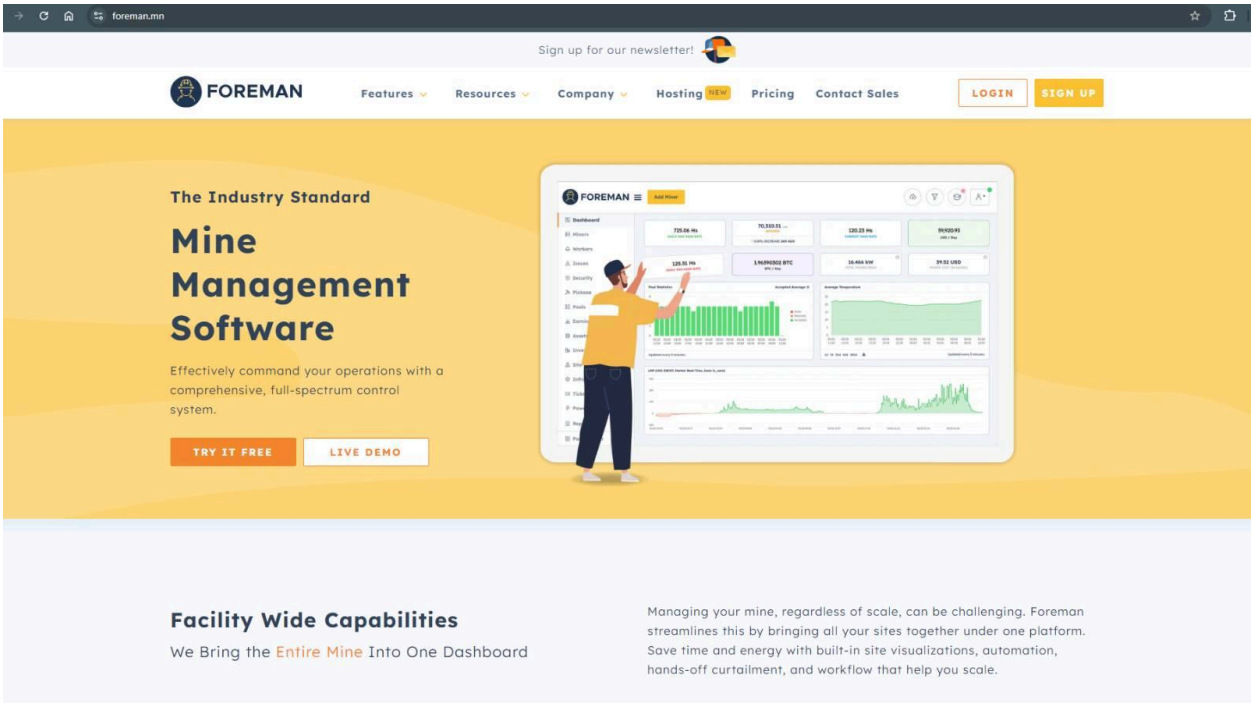
- Click on the pool button and set your pool URL, worker and password. Check the ‘Fixed pool input’ then click the start update button.



Step 6: Adding Miners to Foreman
Time: 30 Minutes

Foreman is an essential tool that will help you monitor, track and get alerts from your miners remotely. This tool is well built and easy to use. Follow these simple steps to get started;

- Using your computer, open your browser and copy paste this link https://foreman.mn/ and follow the setup instructions provided.
- On the dashboard, under resources, you will find (videos and tutorials) to learn how to monitor and manage the mining site remotely.
- Log into your Foreman account, proceed as guided by the video tutorial and start managing your miners



Conclusion:

Follow this guide strictly to ensure safe, efficient, and quality installation of mining equipment. Ensure all personnel are trained and follow proper safety protocols.

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HASHBOARD REPLACEMENT GUIDE

Objective:

This guide outlines the process of grouping, testing, documenting errors, and replacing faulty hashboards in mining machines. The goal is to ensure maximum efficiency by swapping out bad hashboards and using donor machines to maintain operational miners.

Initial Grouping:

1. Remove the Rear Fan and Record Information:

- Turn off the machine and carefully remove the rear fan.
- Locate and read the **BIN number** from one of the hashboards.
- Write down the **BIN number** and **MAC address** of the machine on a piece of paper.
- Tape the paper securely to the machine for easy identification.

2. Group the Machines:

- Based on the BIN number, sort machines into one of five groups.
- This grouping will help in organizing the machines for subsequent error testing and troubleshooting.

Error Documentation Process

Test 3 Machines at a Time (Same SuperBin):

- Connect **3 machines** from the same SuperBin group.
- Allow the machines to run for **30 minutes** at **3000W** (adjust power as needed based on availability).
- Monitor the machines for any hashboard errors that occur during this time.

Document the Errors:

- Record all errors that appear on the **hashboards** in a Google spreadsheet.
- Clearly document the specific errors for each hashboard of each machine.
- After testing, place the machines aside with other tested machines from the same SuperBin group.

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Hashboard Swapping Process

1. **Select a Recipient and Donor Machine:**
- Choose a machine from the tested group as the recipient machine.
- Select additional machines from the same SuperBin group to serve as donor machines to provide functioning hashboards.

2. **Remove Faulty and Good Hashboards:**
- Power off both the recipient and donor machines.
- Carefully remove the **bad hashboards** from the recipient machine and the **good hashboards** from the donor machine.
- Ensure proper handling to avoid damage to components.

3. **Track Hashboard Changes:**
- Record the BIN number of the donated hashboards and the MAC address of the machine they came from.
- Document any previous errors associated with the boards from both the recipient and donor machines.

4. **Install the Donated Hashboards:**
- Swap the good hashboards into the recipient machine, ensuring secure installation.
- Power the machine back on and allow it to run for 30 minutes.
5. **Recheck for Errors:**
- Monitor the machine for any new hashboard errors that may appear.
- If new errors arise, repeat the swapping procedure with another donor hashboard.
- If no new errors occur, add the machine to the operational group of functioning machines

Success Guidelines:

- **Organization:** Keep the machines clearly labeled with BIN and MAC addresses to avoid confusion during the swapping process.
- **Error Tracking:** Ensure all errors are documented in detail in the Google spreadsheet for easy reference and analysis.
- **Repeat Testing:** Continue to test and swap boards until the recipient machine is error-free and fully operational.
- **Team Communication:** Share the spreadsheet with your team for collaboration and keep it updated in real-time.

Conclusion:

Following this step-by-step guide will streamline the hashboard replacement process, ensuring that faulty machines are efficiently repaired and returned to operation. Maintain clear records of all swaps and errors to improve long-term performance and minimize downtime.

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1950 chip and hash board batch comparison table

1950芯片与算力板批次对照表

算力板芯片批次后七位数	1950-03C适用以下批次号的板				
	195001A	195002A	195003A	195004A	195005A
	195001B	195002B	195003B	195004B	195005B
	195001C	195002C	195003C	195004C	195005C
	195001D	195002D	195003D	195004D	195005D
	195001E	195002E	195003E	195004E	195005E

算力板芯片批次后七位数	1950-10C适用以下批次号的板				
	195006A	195009A	195010A	195011A	195012A
	195006B	195009B	195010B	195011B	195012B
	195006C	195009C	195010C	195011C	195012C
	195006D	195009D	195010D	195011D	195012D
	195006E	195009E	195010E	195011E	195012E

算力板芯片批次后七位数	1950-03G适用以下批次号的板				
	195001F	195002F	195003F	195004F	195005F
	195001G	195002G	195003G	195004G	195005G
	195001H	195002H	195003H	195004H	195005H
	195001J	195002J	195003J	195004J	195005J
	195001K	195002K	195003K	195004K	195005K
	195001L	195002L	195003L	195004L	195005L
	195001M	195002M	195003M	195004M	195005M

算力板芯片批次后七位数	1950-10G适用以下批次号的板				
	195006F	195009F	195010F	195011F	195012F
	195006G	195009G	195010G	195011G	195012G
	195006H	195009H	195010H	195011H	195012H
	195006J	195009J	195010J	195011J	195012J
	195006K	195009K	195010K	195011K	195012K
	195006L	195009L	195010L	195011L	195012L
	195006M	195009M	195010M	195011M	195012M

Hash board chip batch last seven digits

算力板芯片批次后七位数	1950-15C适用以下批次号算力板						
	195013A	195014A	195015A	195016A	195017A	195018A	195019A
	195013B	195014B	195015B	195016B	195017B	195018B	195019B
	195013C	195014C	195015C	195016C	195017C	195018C	195019C
	195013D	195014D	195015D	195016D	195017D	195018D	195019D
	195013E	195014E	195015E	195016E	195017E	195018E	195019E
	195013F	195014F	195015F	195016F	195017F	195018F	195019F
	195013G	195014G	195015G	195016G	195017G	195018G	195019G
	195013H	195014H	195015H	195016H	195017H	195018H	195019H
	195013J	195014J	195015J	195016J	195017J	195018J	195019J
	195013K	195014K	195015K	195016K	195017K	195018K	195019K
	195013L	195014L	195015L	195016L	195017L	195018L	195019L
	195013M	195014M	195015M	195016M	195017M	195018M	195019M

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REPAIR AND MAINTENANCE GUIDE:

This guide provides step-by-step instructions for maintaining, diagnosing, and repairing Whatsminer M30/M31 series miners. It includes general maintenance checks, error diagnostics using the Whatsminer Tool, and detailed procedures for resolving common issues such as Chip ID errors, EEPROM errors, PSU issues, and loss balance errors.

1. General information:

Network Activity Check:

- **Check Network Lights:** Ensure the **green and orange** lights are flashing on the machine's network port.
- If no lights flash:
    - Swap the **Ethernet cable** with a neighboring machine to verify the cable's condition.
    - If the lights return, the issue is with the original cable.
    - If the lights do not return, the issue may lie with the **control board**.

Machine Status Lights:

- **Check Status Lights:** If lights are blinking, the machine is operating normally.
- If no lights:
    - Check the **power input**.
    - If the power is fine, swap the **power supply**. If lights return, the issue was the PSU.
    - If the issue persists, swap the **control board** and update the **MAC-ID** sticker on the machine.

Fan Operation:

- Inspect each fan to ensure they are spinning consistently.
- Replace any fan that makes strange noises or fails to spin properly.

2. Error Checking by using Whatsminer Tool:

IP Setup:

- Configure the tool with the proper IP range and scan the network for miners.

Sort by Hash Rate:

- Organize the miners by **current/active hash rate**.
- Export the miner list as a **CSV file** for record-keeping.

Identify Machine Errors:

- Look for the following errors:
  - **54X Errors**: Chip ID errors.
  - **56X Errors**: Loss balance errors.
- Record all machines with these errors along with their current hash rate (if above zero).

Power Cycle Method:

- Unplug the power from the faulty machine for **5 minutes**.
- Plug it back in and monitor to see if the machine starts hashing.
- If the machine still fails, proceed to repair or replace the hashboards.

Uptime Monitoring:

1. Observe the miner list for **15 minutes**, paying attention to uptime and hash rate.
2. If a machine has been running for **45 minutes** but has a hash rate below **80TH/s**, unplug it for 5 minutes and then monitor again.
3. If no improvement, proceed to replace the faulty components.

3.Troubleshooting and Restoration of Faulty Miners

In the case of faulty miners which aren't hashing the way they are required to or are not hashing at all, the best thing to do is to sort them out appropriately based on the issues they are facing.

A miner might have a Chip ID error issue, an Eeprom error issue, network issues, power supply issues and even fans issues at best.

So, if an error code between 410 to 412 appears on your Whatsminer tool, that simply means the miner you are testing has an Eeprom issue. The best way to sort this type of issue is to change the bridge of the particular miner with a new one then re-test the miner again to confirm if it's working right and hashing. Also, you can wash the hash boards of the troubled miner with 99% Isopropyl alcohol which helps to cleanse the hash boards nicely then return the hash boards in the miner and retest it to confirm if it's working well by hashing.

If an error code between 560 to 562 appears on your Whatsminer tool, that simply means a hash board loss balance issue or Power Supply Unit issue . The best way to sort out this issue is to change the power supply if necessary or tighten the screws of the busbars connecting the power supply with the hashboards if they are loose.

Another way to know if a miner has a PSU issue is if it has a lower hash rate than expected (You can see this on your Whatsminer tool). The best way to sort this type of issue is to change the power supply unit with a new one then re-test the troubled miner to confirm if it's working well by hashing or hashing at higher voltages.

If an error code between 540 to 542 appears on your Whatsminer tool, that simply means the miner you are testing has Chip ID error issues. The best way to sort this type of issue is to wash the hash boards of the troubled miner with 99% Isopropyl alcohol, afterwards apply a blue heat sink tape on each hash board then return the hash boards to the troubled miner and re-test it to confirm if it's working well by hashing.

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4.Whatsminer M30 Series Field Rework:

Purpose:

Provide instructions for testing, diagnosing, and repairing hashboards.

Scope:

Testing, diagnosing and repairing hash boards on Whatsminer M30 and M31 series miners.

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Software

1. Whatsminer tool

Tools

1. Thermal paste
2. Thermal tape.
3. Debug tool (PicoBOT)
4. DMM
5. Replacement boost chip (LN3608)
6. Replacement LDO (SPX5205)
7. Replacement 0603 capacitor (4.7uF)
8. Solder gun. (upto 450C)
9. Hot Plate
10. Solder
11. Tweezers
12. No clean flux
13. Home dry cleaner / Benzene

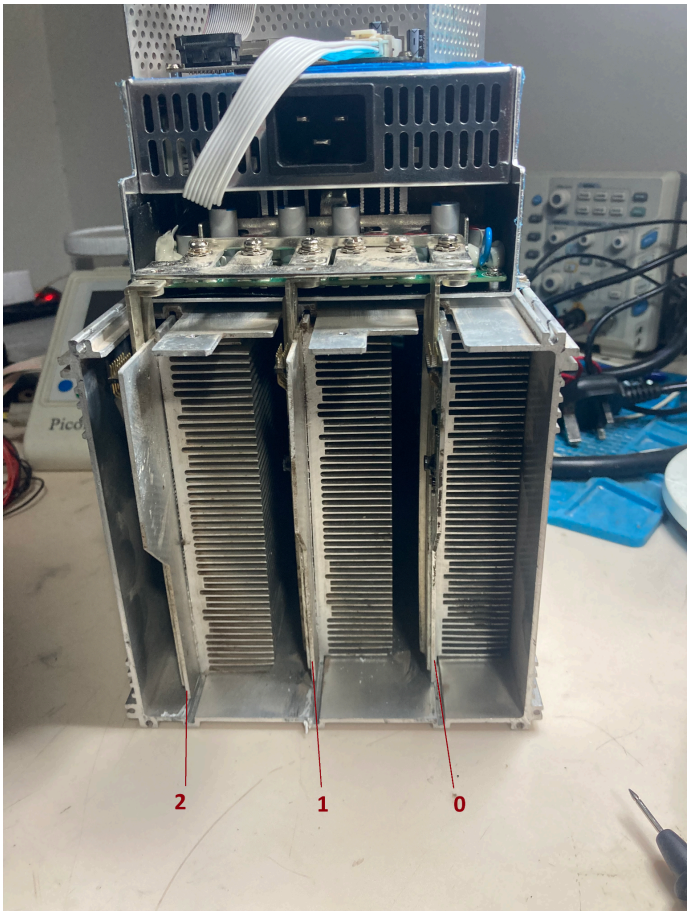
14. Anti Static brush
15. Anti Static mat
16. Solder wick

Initial Set up Procedure.

Error Identification:

- Use the Whatsminer tool to identify units with 54x and 56x errors.
- For 54x errors, remove the faulty hashboards, indicate the error and test each board individually.

The boards range from 0-2 such that the error will be indicated from 540, 541 and 542 starting from the right, with the ethernet port facing you.



Leave the unit ON to make sure it mines.

3. Repeat the procedure above for units indicating the 56x error. The error will range from 560, 561 and 562.

Diagnosing 56x Errors:

1. Place the hash board alone inside a known working miner. The miner in this case refers to a shell with a working power supply, fans, ribbon, bridge, and control board.
2. The miner should get to a hash rate of between 20-30TH/s
3. If the 56x error persists, switch the power supply.

Diagnosis and Repair: 54x Errors

1. Test the hashboard in the middle rail of a working miner. The miner in this case refers to a shell with a working power supply, fans, ribbon, bridge, and control board.

2. The miner should immediately display the 541 error if the hash board has an issue.

3. If the hash board starts mining with no error observed, return to original miner and replace the bridge first then the ribbon if the error persists.

4. For the boards with 541 error, hook it to a power supply with 12V output and connect the PicoBT diagnosis tool.

5. Run the diagnosis tool, it should read the number of chips and the board batch number.
   The number of chips ranges between 66, 105, 111 and 117 depending on the batch.

6. If the board reads the right number of chips and the batch number, make sure the connector pins are clean and okay then place it in a miner for testing.

7. If the board fails to read the correct number of chips, (verify by counting number of chips on board) check the following using a DMM.

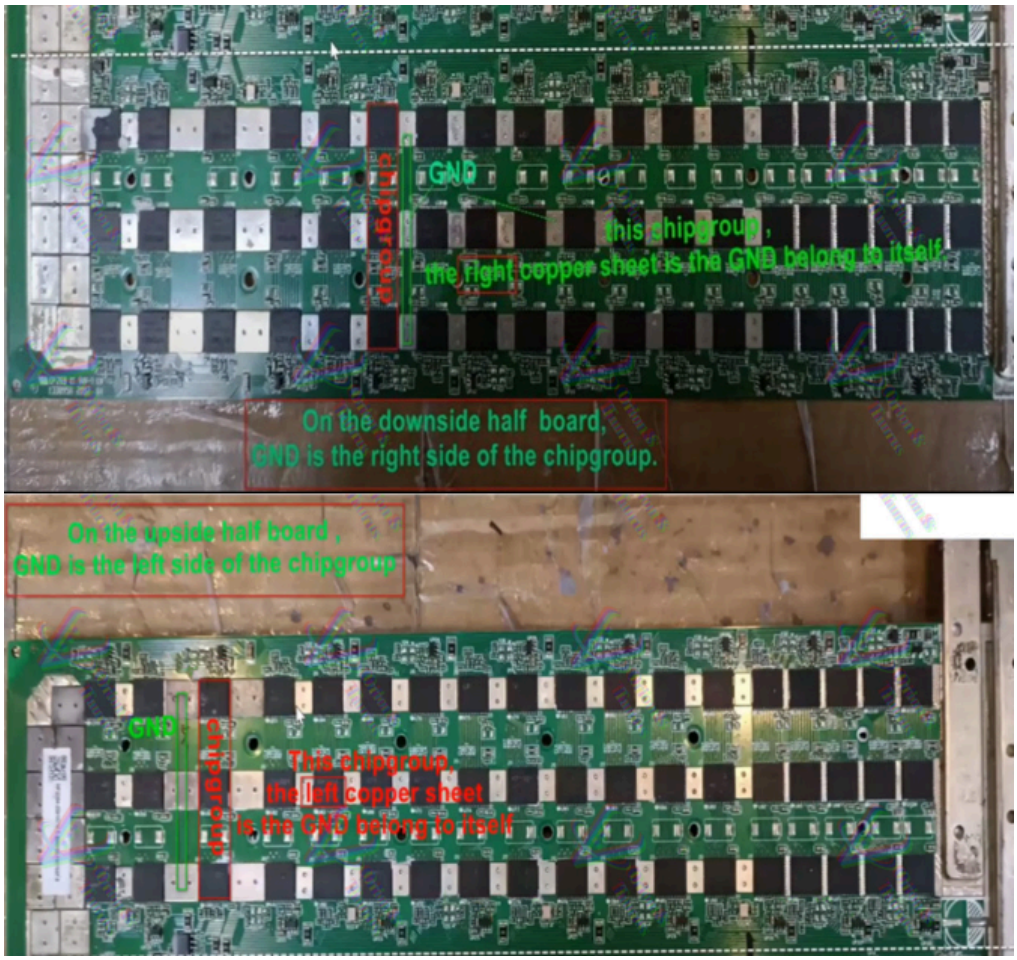
    - Measure the voltage output from the boost circuit. It should a read a value between 16.8V -17.2V

8. If the boost output voltage is below the value indicated above, replace the boost as per the Boost replacement instructions below.

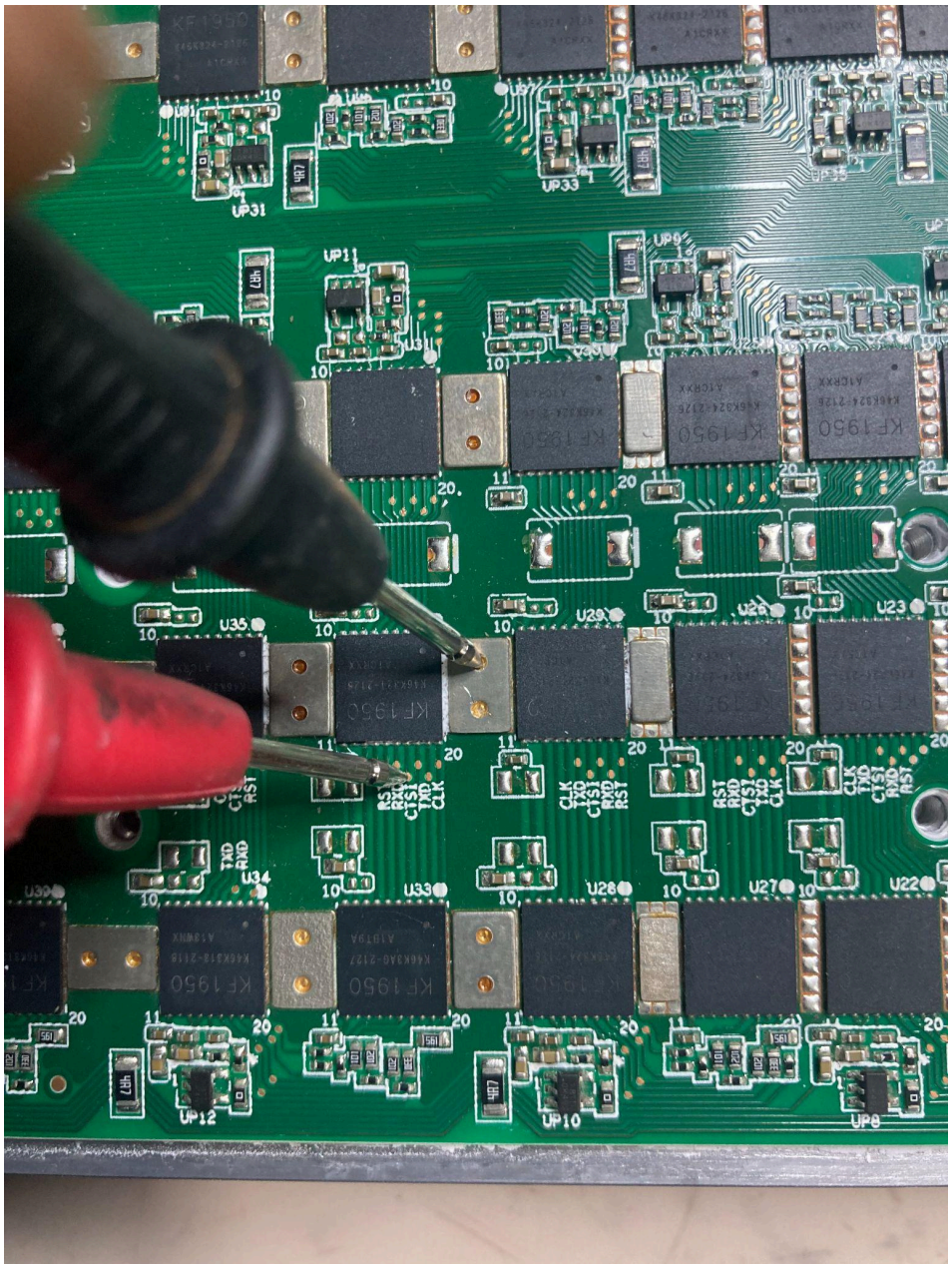
9. For boards with a good boost output voltage and still not reading the correct number of chips, use a screwdriver to remove the top heatsinks of the hash board and use the Isopropyl 99% to clean them.

10. Test them again as per step 5 – 7.
    Assemble back functioning boards using the thermal tape and test them in a miner.

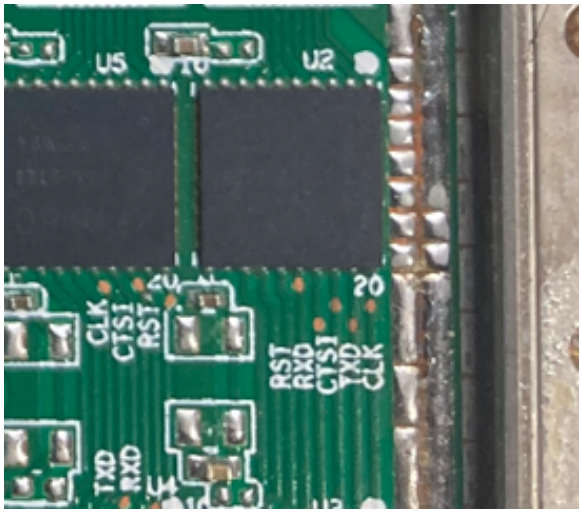
11. If the boards still fail at step 5, then use a DMM to measure the voltage output from each of the LDO. It should read a value between 1.78V – 1.82V.
    Take note of the ground when measuring the LDO; the ground is on the left for the chips in the domains on the top half of the boards and on the right for the chips in the domains on the bottom half of the boards.



12. If any of the LDO output voltage is below the value indicated above, replace the LDO as per the LDO replacement instructions below.



13. If the boost and the LDOs are okay, measure the individual signals on the chipset. They should match up as below.

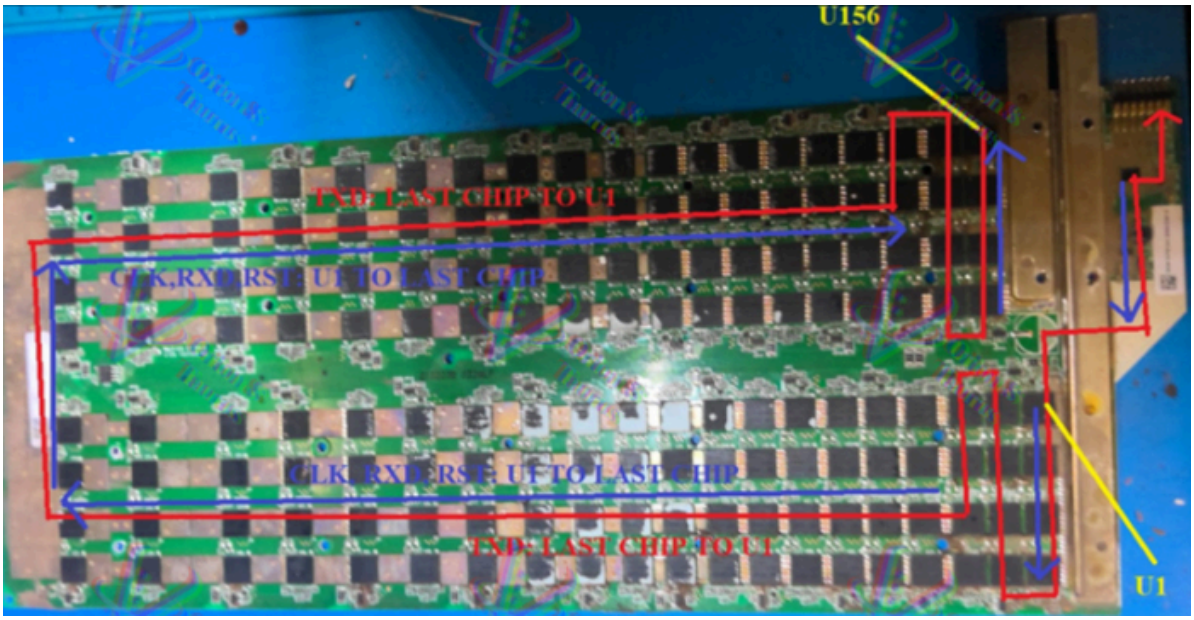


NB: The ground for each domain should match up the same way as measuring the LDOs

14. For TX, start from the domain in the top left half.

For CLK, RX, CTSI starts from the domain in the bottom left half.

- TXD (transmit) is transmitted from U156 (last chip) to U1 (first chip) to level conversion (voltage switch) then to the control board.
- CLK (clock) signal is generated by 1 crystal oscillator, each domain is connected in series to the next domain through a resistor.
- RXD (receive) signal comes in from the control board, and transmitted from U1 (first chip) to U156 (last chip)
- RST (reset) signal comes in from the control board, and transmitted from U1 (first chip) to U156 (last chip)



15. Use the above to identify where the values break down and mark the unit for an ASIC replacement.

16. If the CLK breaks at the very first domain, then mark it for CLK replacement.

How to replace a boost.

1. To replace the boost, you do not have to remove the heat sink.
2. Using benzine / home dry cleaner, and antistatic brush clean the area around the boost. Make sure the coating is removed.
3. Break off the boost chip using cutters making sure not to pull so as not to damage the pads.
4. Using the brush, clean the area exposing the pads.
5. Place the miniature hot plate just directly below the boost chip.

6. Set the hot plate to a maximum temperature of 200C.
7. Heat the solder iron to 400C.
8. Using the clean flux and solder iron clean the 6 pads, and make sure the remaining chip legs are removed.
9. Use the tweezers to place a new chip and take note of the orientation.
10. Use the solder iron and go round on each of the pin and you can add a bit more solder to make sure the chip is connected properly.
11. Clean the area again with benzine / home dry cleaner.
12. Connect the hash board to the diagnosis tool and the 12V output and test it again as per step 4-7 above on ‘Diagnosis and Repair: 54x Errors’.
13. Test the hashboard in a miner after reassembly to confirm functionality.

How to replace an LDO.

1. Break off the bad LDO chip using cutters making sure not to pull so as not to damage the pads
2. Using the brush, clean the area exposing the pads.
3. Place the miniature hot plate just directly below the boost chip.
4. Set the hot plate to a maximum temperature of 200C.
5. Heat the solder iron to 400C.
6. Using the no clean flux and solder iron clean the 5 pads, and make sure the remaining chip legs are removed.
7. Use the tweezers to place a new chip and take note of the orientation.
8. Use the solder iron and go round on each of the 5 pins and you can add a bit more solder to make sure the chip is connected properly.
9. Clean the area again with benzine / home dry cleaner.

10. Connect the hash board to the diagnosis tool and the 12V output and test it again as per step 4-7 above on ‘Diagnosis and Repair: 54x Errors’.

11. Test the hashboard in a miner after reassembly to confirm functionality.